# The Use of Intellectual Property in High Technology Japanese and Western Companies

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Submitted for the Degree of
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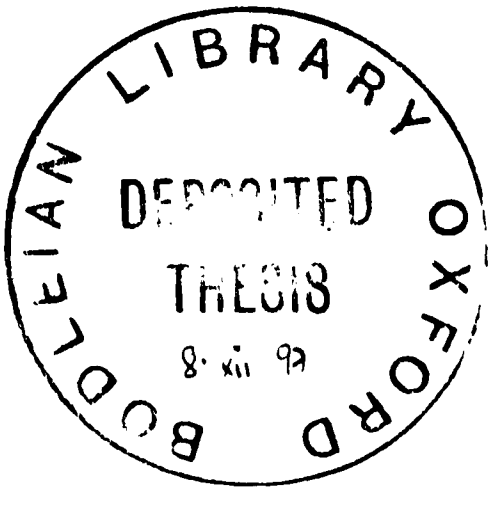
Michaelmas Term 1996 [illegible]



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## Abstract

This research comprises a comparative study of Japanese and UK Intellectual Property (IP) management and an extension, informed by the study, of existing IP strategy frameworks.

The research was prompted by observing that little has been written about IP management and that Japanese IP management might differ from that in the West due to differing economic, legal and technological circumstances. A literature review found IP related economics literature but little in English regarding IP management. The most relevant work was that by Teece concerning the combined role of complementary assets and intellectual property rights (IPRs).

The present research's contribution is thus threefold. A detailed description of the development and nature of Japanese IP management. A comparison with UK IP management, putting Japanese IP management into an international context. Finally, a development of existing general IP Strategy frameworks informed by the results of the international comparison.

In studying IP management in Japan a wide range of specialist literature in Japanese was studied. Interviews were held, those with Japanese IP managers, lawyers, government and NGO officials being in Japanese. The first comparative survey of UK and Japanese IP management formed a key source of the data collected. A response rate of 44% in Japan (211 replies) and 33% in the UK (259 replies) enabled comparisons by both size and sector.

Many similarities were found between Japanese and UK attitudes to and practice of IP management, reflecting the similarity of the underlying issues in both countries. There were also significant differences between Japanese and UK companies especially in the extent and organisation of resources devoted to IP management, in attitudes to IP strategy, licensing, litigation, the filing of patent applications and in the use and management of patent information.

The study provided the basis for developing a view of IP strategy as a dynamic management strategy process. This process occurs in a framework involving time and the control of technological scope and progress using IPRs and complementary assets. Other considerations involved comprise the ability to use resources to exploit markets fully and learning opportunities.

The study of Japan's IP management and its development from a position of technological followership to that of still learning leadership thus provides a basis for a view of IP strategy as taking place in an integrated dynamic management framework.

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# Chapter 1. INTRODUCTION

## Summary

This chapter introduces the research field being studied and defines some of the key terms used. The research aims are set out and an outline given of the course of the research project.

## 1. Outline of the Research Field

### 1.1. IPR systems and technological development

It is a fact increasingly, if sometimes grudgingly, acknowledged in today's world, that a country in competitive pursuit of technological progress, must adopt an intellectual property system. Leaders of world industry, especially the UK and USA, have actively promoted the use of intellectual property (IP) systems for some considerable time. The UK patent system for example had a role to play in the Industrial Revolution (MacLeod 1988) and the American Revolution provided an explicit basis for US IP law in the constitution (Art.1 viii).

Such IP systems can be a source of pressure on other countries to adopt similar systems. However, countries such as Japan, which have seen IP systems not just as a threat but as an aid to technological progress, appear to have developed technology based industries faster than countries which have viewed them more as unjust hindrances (Watanabe 1985)[1].

In the wider context of technological development the role and merits of IP systems have been vigorously debated in political and economic circles for many years (David 1993). This work will not continue that debate but just in considering it momentarily, there is a noticeable lack of study of the use and management of the IP systems being discussed.

Despite the increasing interest in fields involving both business and technology strategy, discussions of the use of IP systems by companies have been limited. Such studies as exist have been largely confined to either those by lawyers and patent agents involved in administration of such issues or those by Economists. Amongst this all there has been some good use made of the availability of Patent Statistics in studying technology management. However, in the case of technology strategy the IP specialists with their practical experience have largely ignored the insights of those non-IP specialists studying business strategy and vice versa. For example, Michael Porter even when writing about Technology and Competitive Advantage (Porter 1985) does not include intellectual property rights (IPRs) as a specific entry barrier.

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[1]Both Japan and India for example introduced patent laws at the end of the nineteenth century. In Japan the system received active promotion from the government whereas in India it has not received the same long term support. Whilst India is highly technically advanced there has been less development of R&D capability in private industry than in Japan. In 1992 India granted 285 patents to Indian nationals whilst Japan granted 78994 to Japanese Nationals. With India's accession to GATT/TRIPS this may well change.

Only David Teece in his work on the use of complementary assets with IPRs has treated IP considerations as a truly integral part of business strategy (Teece 1986a).

There is thus a gap between law, economics and business studies into which IP management is particularly prone to falling. This can only be bridged by looking at IP management from a viewpoint informed from both legal, economic and managerial viewpoints.

IP systems are, not surprisingly, promoted most strongly by those countries with the most technological assets to protect. However, Japan is interesting in that it has made use of the patent system since the beginning of its industrialisation despite being a technological follower for most of its history. It is arguable that the Japanese patent system has played a significant role in Japan's ability to catch up with more technologically advanced countries and will in future help to preserve its gains (Watanabe 1985). Yet, in spite of this interesting view of the IP's role, little has been published in the West regarding management of IP by Japanese companies. There is thus not only the opportunity to bridge the gap between IP law and business studies but to bridge it using insights from Japan.

The aim behind this study is thus to study Japanese IP management, to put the findings in perspective by comparing them with UK IP management and to derive from the overall study some general conclusions about the IP strategy.

## 1.2. Definitions

This research spans the usually separate fields of IP law, management studies and Japanese studies and before discussing the research objectives defining some of the terms used and in particular those involved in the title of this thesis, may be helpful.

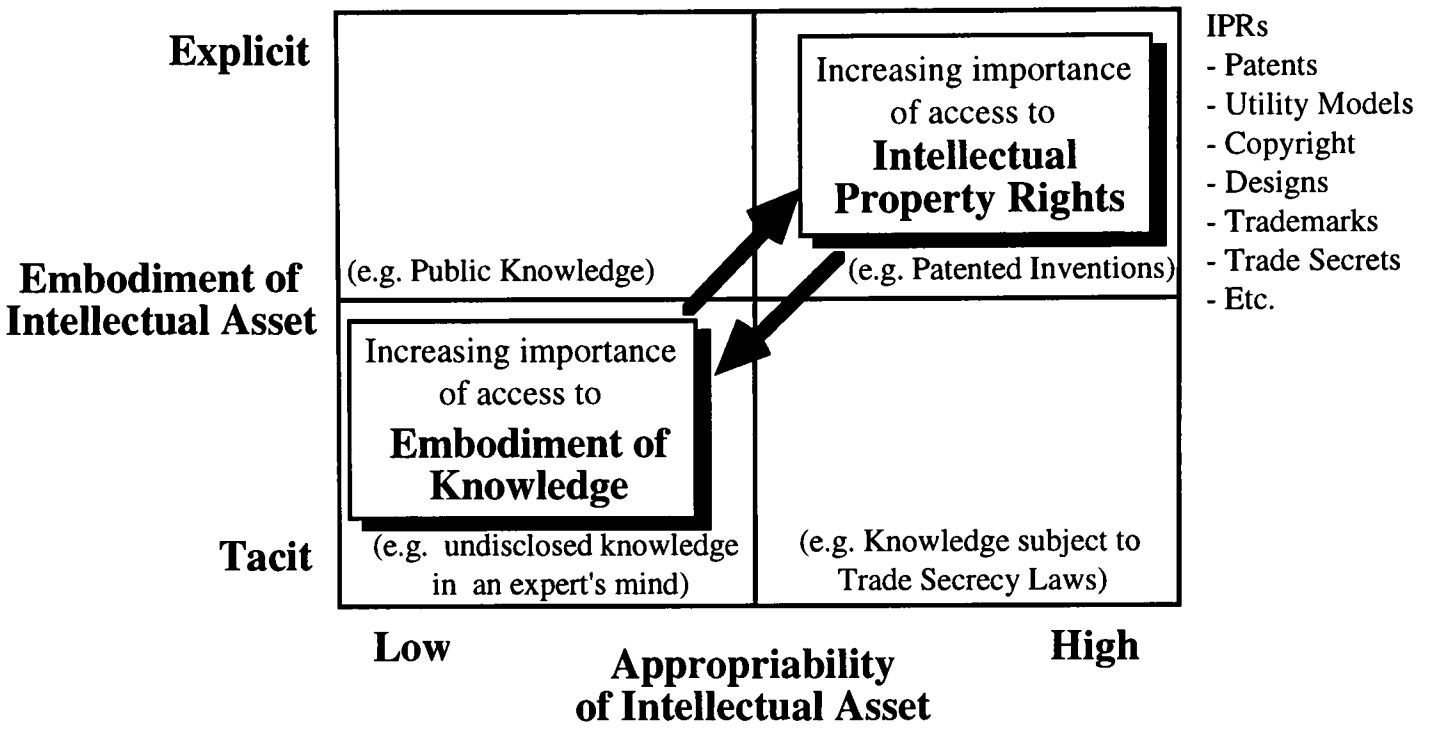
### 1.2.1. Intellectual Property

The overall management of knowledge and information is an increasingly important concept in today's business and technology world. Various names have been used to describe what is being managed including:- Intellectual Capital, Intellectual Property, Invisible Assets, and the like. However, all treat Intellectual Property or "IP" as a company resource.

From a legal point of view though, the word "property" is a concept necessarily implying the existence of rights of ownership. On this view "Intellectual Property Rights" or IPRs are synonymous with "Intellectual Property". In practice the instances where IP (in a non-legal sense) is not subject to IPRs are limited to those cases where the intellectual asset turns out to be, or to have become, a public good. For example a case where a patent is refused and other IP laws are inapplicable. Such fine distinctions need not concern us further here. However it

is important to note that whilst there is much talk about what I shall call the *Intellectual Assets* underlying and protected by IPRs, it is in most cases the actual IPRs that are subject to management not the more theoretical Intellectual Assets. Consequently, the expression "Intellectual Property Management" in most companies really means management not of IP per se but of the legal rights that define it - the IPRs that a company controls.

Figure 1 Embodiment and Appropriability of Intellectual Assets




Intellectual assets can be categorised by the embodiment of the information concerned and its degree of appropriability using IP law. As knowledge becomes more explicit and more protectable using IPRs, controlling access to the physical embodiment of the information - (which might be a particular expert or group of experts[2]) becomes less important and controlling access to and managing the IPRs concerned more important. The management of tacit knowledge is interesting (Polanyi 1966) (Nonaka and Ray 1993)(野中　郁次郎 and 紺野 登 1995)(Nonaka and Takeuchi 1995). However, this study will concentrate on the management of mainly explicit knowledge protectable by IPRs. Consequently, in studying the use and management of IP, the management of the IPRs forms the focus of study.

A wide range of IPRs exists including, registered and unregistered design rights, copyright, utility models, petty patents, trade marks, rights under unfair competition law (or the law of "passing off "in the UK), semiconductor chip design rights, trade secrets, even plant varieties as well as patents. In high technology industry probably the most important IPRs are patents[3] and these will necessarily form the primary focus of this research.

[2]Interestingly the Japanese Government has designated certain artists in Japan as literally "Important intangible cultural assets" (重要無形文化財) or more colloquially "Human national treasures" (人間国宝).

### 1.2.2. IP Strategy

The gap which exists between the fields of IP law and Business Strategy means that there is no accepted definition of "Intellectual Property Strategy". However, I have taken it to mean : *The use of IP, either alone or in combination with other resources of the firm, to achieve the general strategic objectives of the firm.* This includes the organisation of a firms resources to achieve objectives regarding its IP as part of that process. The term thus encompasses both a firm's external dealings involving IP, in which the IP is treated as an extra resource of the company to be used in its overall strategy, as well as internal resource management within a firm aimed at managing the creation and preservation of the company's IP resources.

In the same way that IP management falls between fields of study, responsibility for it within companies can often fall between departments. A key issue in managing IPRs is the balance between legal expertise and general and strategic management skills. Despite this balancing act specialist IP departments will be the focus of IP management. Together with non-specialist managers assigned the task of managing IP (in companies without IP departments) they will be the people managing both internal administration of IP and external and strategic management such as litigation and licensing of IP. They will thus be the key access point through which companies' attitudes and practices regarding IP can be studied. The focus of this study is thus on the work of the IP department, where such a department exists, or put more generally, on those who make decisions about IP issues wherever they are located in a company.

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[3]A discussion of each of such rights can be found in an introductory IP textbook (Bainbridge, 1994). However since the primary focus of this research will be on patents the following is a brief explanation of the key points regarding them : Patent systems can be rationalised in a number of ways. Bainbridge lists four main ones :

Contract Theory : Inventors receive temporary protection in return for disclosure
Reward Theory : Past Inventors should be rewarded for socially useful inventions
Incentive Theory: Future Inventors should be encouraged by financial rewards
Moral Rights Theory : Inventors have a right of property in their ideas. (Bainbridge, 1994)

In the case of contract theory a patent is a bargain between the state and the inventor by which the state grants a monopoly of limited duration to the inventor in exchange for disclosure of the invention to the public. This is so that on expiry of the monopoly all may use it and so that even before that date (and even before the patent is granted if early publication is carried out as in most of Europe and Japan), others may learn from the invention and if possible develop it further. Patents therefore have two essential parts. i) A description of the invention and ii) a set of claims defining the scope of the invention for which protection is granted by the state. In general the requirements for patentability are that the invention be new, inventive in the sense of not being obvious to other experts and capable of industrial application. The actual scope of protection obtained will be determined partly by the patent office granting the patent and deciding on the width of claim that is allowable in the view of what has been invented before and partly by how the courts construe the patent's claims and decide whether alleged infringing goods fall within their scope. It is of course the state that grants the monopoly and therefore companies must obtain separate patents in respect of each state in which protection is desired. However, various treaties and a few unitary application systems exist to make this process easier for companies seeking protection in several countries at once (the two main ones being one covering a range of countries in Europe run by the European Patent Office and another run under the Patent Cooperation Treaty with more international coverage). The consequent need for harmonisation means that increasingly patent application systems are becoming more and more alike even though considerable differences in enforcement and general legislation still exist. The framework set by these sometimes differing patent systems is one feature of the environment which will be discussed later.

### 1.2.3. "Japanese" &"Western"

The word “Japanese” in the title of this thesis needs no further explanation, "Western" on the other hand does.

The primary interest of this research is IP strategy and the use and management of IP by Japanese companies. To put this into perspective and to broaden the theoretical findings of the study the use and management of IP by Japanese companies is being compared with that by companies in the UK where the field research outside Japan has been carried out. However, as will be seen later on, the subject of IP in Japan cannot be discussed without reference to the USA which is in most cases the main foreign point of reference for Japanese Industry. It is obvious that this study would be enhanced by the extension of the research to cover the USA but for purely financial and practical reasons this has not been possible. The term "Western" has therefore been chosen deliberately to include both the UK where the comparative data collection is based and the US. This will allow reference to be made to material concerning the US as well as UK survey data.

### 1.2.4. "High Technology"

The term "High Technology" has been used to define the sectors to which the study is confined. It is mainly intended to exclude non-technical and media related IP. The data collection exercise thus covers the chemical, pharmaceutical, electronic, transport, mechanical and miscellaneous technically based industry sectors. Media related industries are thus excluded. The main IPRs involved are thus patents though obviously other IPRs are also relevant, for example copyright protection in the software industry[4]. In certain circumstances, especially on the expiry of patent protection, trade marks will also be relevant but since their main role is in the non-technical marketing of goods they do not form the focus of this study.

## 1.3. Research Objectives

A key feature of the field is that it is divided by a language barrier. This is not impassable but equally there is a form of asymmetric valve or dynamics controlling the flow of information between the West and Japan. This allows information in English to flow more freely than in Japanese. There is a wealth of information in Japanese about patent management but few people capable of and willing to translate it into English. The few pieces of research on patent management in Japan that have appeared in English make no reference to the voluminous quantity of books and articles available. Thus whilst this material is in no sense “new” to

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[4]Gradual changes in patent law particularly in the USA regarding the patentability of computer software mean that patents are becoming increasingly important in the field of software as well even if attitudes to the patentability of software outside the USA are different.

Japanese readers it will be completely new to English readers. Making this material available in English it is hoped is a major contribution to the field in itself[5]. However, it should be emphasised that the aim is to make a contribution not just by translation but by analysis of the material from an external, objective and comparative viewpoint and principally by supplementing it with an original data collection exercise which will contribute to knowledge in whatever language.

A first aim of the research therefore is to study and analyse the state of patent management in Japanese companies and to present this with an analysis which it is hoped will also be of interest to both Japanese and English audiences.

Quite apart from the state of Japanese patent management there is relatively little published on the nature of patent management by UK companies. There has been a study on Multinationals patenting activity by Wyatt et al. (Wyatt, Bertin et al. 1985). This included the UK and Japan but primarily looked at whether patenting provides an incentive for innovation and their value as an information source and technology output indicator. The last survey of UK IP management was published by Taylor and Silberston in the early 1970s (Taylor and Silberston 1973) and since then there has been much change, not least a complete revision of UK and European patent systems and the advent of the information technology age. A study of the use and management of IP in the UK alone is thus also of interest.

However a simultaneous study of UK and Japanese patent management provides an opportunity

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[5] Some notes on the handling of Japanese text may be helpful here :

**Quotations** I have referred extensively to many Japanese sources. Since such sources can only be read in Japanese I have endeavoured wherever possible to quote their title in Japanese which should make locating them easier. Where an English version of any source exists I have endeavoured to note it, though it should be said that in general the few English versions of Japanese texts which exist (e.g. the English version of the JPO Annual report) are often noticeably thinner.

**Translations** - Where I have quoted from Japanese sources and interviews held in Japanese, unless otherwise stated, if the source is Japanese and the quotation in English the translation is my own (as are the translations of works in German). This also applies to a number of diagrams where I have translated the Japanese text appearing in them into English and used it to replace the original Japanese. In such cases where an equivalent UK version by the author exists I have used it to help my translation but where significant differences occur between the Japanese and English versions I have stuck to direct translation of the Japanese text as being more true to the original intention of the author.

**Names** - Where a full name is given I have followed the English convention of Forename Surname (e.g. Bennet Woodcroft, Robert Pitkethly) and in Japanese the Japanese convention of Surname Forename (e.g. 高橋 是清). In the bibliography, names whether in English or Japanese are quoted as Surname, Forename (e.g. Woodcroft, Bennet; 高橋, 是清). Unfortunately I have not been able to find a suitable English font with Macrons to indicate vowel lengths. I have therefore used ô and â where appropriate though occasionally an ou, au or oo or aa may be used due to word-processor or other technical limitations.

**Computing** - Those interested in bilingual computing may be interested to know that this thesis was written using an Apple Macintosh with the Apple Japanese Language Kit. All tabulation and statistical analysis of the survey data was carried out using Macintosh versions of Minitab v8.21 and Lotus 123. The latter accepted Japanese text and was also used for all charts and graphs. The Bibliography was written using Endnote Plus v2.0 the English version of which works in Japanese. Word processing was carried out using Nisus Writer 4.0.

to expand knowledge of practices in each country and also to compare them. One can anticipate both differences due to the influences of differing environments and similarities due to the basic similarity of the problems faced. However, by comparing them a broader picture should be obtained of the subject of IP management in general. A second aim of the research therefore is to compare how Japanese companies use and manage IP with how UK companies manage such issues. This should also enable conclusions to be drawn about how IP use and management might be influenced by the environment facing companies and lead to more broadly based conclusions about IP management in general.

The third and final aim of the research is to use the findings of the above research to extend existing theory concerning IP Strategy and in particular that concerned with the management of resources and appropriation of intellectual assets.

There are thus three levels to the research of increasing ambitiousness comprising description, comparison and theory extension :

i) the description of IP use and management in Japan and the UK
ii) the comparison of IP use and management in Japan with that in the UK.
iii) the use of the research results to extend existing theory about IP management.

## 1.4. Research Project Outline

The project comprised several main stages :

a) Reviewing the background to the field (Ch.2)
b) Conducting a comprehensive Literature Review (Ch.3)
c) Formation of Hypotheses and subsidiary Hypotheses (Ch.4)
d) Data Collection in Japan (Ch.6)
e) Data Collection in the UK (Ch.7)
f) Data Analysis and Comparison (Ch.8)
g) Assembly of topic studies from collected data (Ch.9)
h) Assembly of extensions to theory (Ch.10)
i) Drawing Conclusions (Ch.11)

The background chapter (Ch.2) discusses the role of IP in technological development, trade in technology involving Japan and the nature of existing institutions and organisations concerning IP in Japan and the UK. [6] The study of IP use and management in Japan is best viewed in the knowledge of how the current environment has evolved and how it fits in with developments

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[6]This has been kept as brief as possible but where supplementary data and comment would be useful to readers unfamiliar with all the legal historical and economic background to the subject and the data is hard to find it has been included in the Appendices.

in other parts of the world such as the UK. This preliminary chapter thus aims to set the scene regarding the role of IP from an overall technological development perspective and in doing so to set out some of the key environmental factors. A further chapter (Ch.5) is devoted to a discussion of the research methods used and the reasoning behind their choice as the most appropriate methods for this study.

The literature review and initial pre-data collection work was carried out mainly in the UK along with preliminary UK based data collection in the period from January 1992 to May 1993. The data collection in Japan was carried out in Japan during the period May 1993 to May 1994. This time in Japan was made possible by a grant from the Japan German Centre Berlin and with the cooperation of the National Institute of Science and Technology Policy in Tokyo where I was based as a visiting researcher. I also received the invaluable cooperation of the Institute of Intellectual Property in Tokyo in conducting the questionnaire survey in Japan. The main data collection in the UK and in particular the questionnaire survey was conducted in the period from June 1994 to June 1995. The final work on this thesis was also informed by discussions with a number of Senior IP managers of Japanese companies during visits to Japan made in late 1995 and early 1996.

# Chapter 2. BACKGROUND

**Summary**

This chapter provides a background to the study by discussing the environment in which Japanese and UK IP management occurs. The key features discussed are the development of patent systems, international trade in technology between the West and Japan in the course of Japan's industrialisation and external influences on the Japanese IP environment, particularly from the USA. The discussion shows how IP policy (whether at a national or company level) develops and interacts with environmental factors in both the UK and Japan. The discussion also shows that Japan's present position as both a technological leader and follower make it particularly appropriate subject for a study of IP management.

## 1. The role of intellectual property in technological development

### 1.1. Intellectual Property Systems

At first this discussion may seem discursive but both the present state of IP management, whether in the UK or Japan and more general concepts of IP strategy must be put in context. Current attitudes and actions in both countries have not suddenly appeared but have developed over several years and in response to several environmental influences and pressures. A brief consideration[7] of these will I believe provide a useful background for the study by showing that hypotheses that IP laws and management are influenced by their environment are reasonable and also highlighting some of the key factors affecting IP management today.

One could say that, rather like the science of uncontrolled nuclear fission, the development of the use of IPRs is something that once realised in one country tends, rightly or wrongly, to develop inexorably towards conclusions dictated more by the logic of game theory, the nature of the players and the conditions involved, than on any individual's opinions as to what would be ideal. For example, no country not subject to a more general breakdown of all law and order or loss of independence has yet managed to unilaterally and permanently abolish an IP system once it has been established. The only countries to have tried have been Holland which abolished its patent law in 1869, but reinstated it less than fifty years later in 1912 (Davenport 1979) and Switzerland where the patent law was largely out of action from 1850 until around 1907 (Schiff 1971). All that countries can and do try to do, is to adjust and amend their laws and just as importantly their judicial implementation of them, to try to suit themselves not their competitors insofar as external pressures to suit others will allow. The

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[7]The following discussion assumes a knowledge of the history of the UK and Japanese patent systems, a reasonably detailed knowledge of the present state of US, UK and Japanese Patent Law and familiarity with the basic institutions connected with the IP environment in the UK and Japan. Since no convenient summary of such material exists one is provided in the appendices.

recent adjustments to Intellectual Property law in China are another case in point with laws being implemented and enforced to appease foreign interests in a similar way to the development of IP laws in Meiji era Japan (See Appendix D). Thus, whatever a country's views about the necessity, morality or usefulness of IPRs no country can avoid the need to interact with and manage them if it is to act in the country's current best interests.

When technological progress occurs there is no guarantee that it will be concentrated in any particular state. Most states therefore aim to promote their own technological progress, both internally and by encouraging the importation of resources and developments from other states. One of the main roles of a patent system therefore is to encourage the introduction of new technology from inventors whether at home or abroad.

### 1.2. The Development of the UK Patent System[8]

Study of the history of the UK patent system shows that changes to the UK's patent law system have followed a course of first encouraging invention by granting monopolies. Incentives to use the system were then expanded by increasing publicity and reducing costs. Enforceability and the strength of the patent system were increased and finally action has been taken both at home and abroad to increase the strength of patent protection internationally.

There is a clear progression in this from promoting and diffusing indigenous invention to protecting indigenous invention to promoting protection of invention internationally. This has been responsive and even reversible if need be to suit the needs of industry. A key point is that generally the UK has been among the front runners of scientific development throughout this process, and that the development of its patent system has by and large not had to respond to external pressures for change so much as internal pressures from the needs of UK industry. The case of Japan is different.

### 1.3. The Development of the Japanese Patent System[9]

In contrast to the UK Patent System which having developed earlier did so more independently the development of the Japanese System was much more related to foreign patent systems.

In the development of the UK system there was a balance between the self-interest of competing groups - for example those in favour of weakening or abolishing patent protection to favour certain industries and those in favour of strengthening patent protection especially abroad to favour their interests. In Japan there were also competing interests, but between

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[8]See also Appendices B & C.

[9]See also Appendices D & E

those intent on using patent protection as a purely internal incentive for invention and those prepared to concede points to foreigners on the basis that on balance Japan would benefit.

Studying the development of Japanese patent law one is struck by the advantages of followership (Pyle 1974) that Japan enjoyed and the extent to which the development of the law depended on intense study of foreign laws and cherry picking of articles from them for inclusion in Japanese law. Also noticeable is the extent to which indirect foreign influence and contacts played a part in the general direction of such study. The first Japanese patent laws relied heavily on US and French law and later following 1900 the influence of German law increased, noticeably in the adoption of Utility model law. The intense study of developments abroad thus seems to be a particular characteristic of the development of any Japanese institution.

### 1.4. Comparison of the development of UK and Japanese Patent Law

The overall conclusions one can draw from comparing the patent laws of the UK and Japan are that countries invariably consider self interest first when considering the impact of changes to IP systems, even though changes may be prompted as much by developments and pressure from abroad as by local reasons. As David puts it :

> "the protections accorded intellectual property by nation-states have not manifested any great consistency in adhering to pure principle. Rather they have been pragmatically altered over time in response to changing perceptions of the way the creation and dissemination of information and information products affect "national interests" (David 1993)

The case of Japan is one of adapting and exploiting circumstances regarding IP law to Japan's long term advantage, not resisting external pressure to change in the hope of short term gains. In the UK though, internal influences were more influential. However, again illustrating the responsiveness of IP policy to circumstances, changes in UK IP law were also arranged to suit UK industry when the external circumstances demanded.

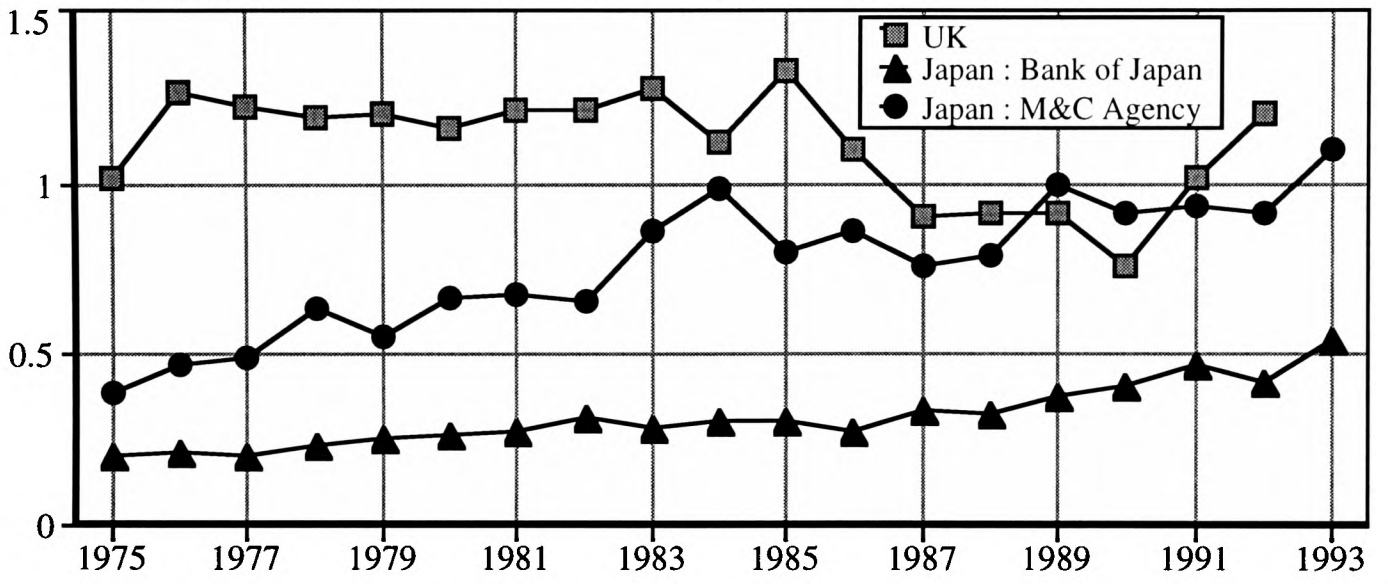
The development of both UK and Japanese Patent systems show two things very clearly. Firstly IP policy at a national level, which in a sense is that at company level writ large, has always been closely linked to and influenced by the environment in which it is made. The factors making up that environment may comprise several things such as, politics, diplomacy, technology, relative states of progress both technical and legal. However it indicates that in studying IP policy one must have regard to the influential even if not determining role of the environment in which that policy is formulated. Furthermore for those who would draw prescriptive conclusions one must be aware of the difference between developments in policy linked to universal factors and those linked to local environmental factors. Those linked to universal factors which are duplicated elsewhere due very often to the underlying similarity of the problems faced may be transferable. Those linked to local factors may well not be.

## 2. Trade in Technology and Intellectual Property

### 2.1. Technology trade statistics

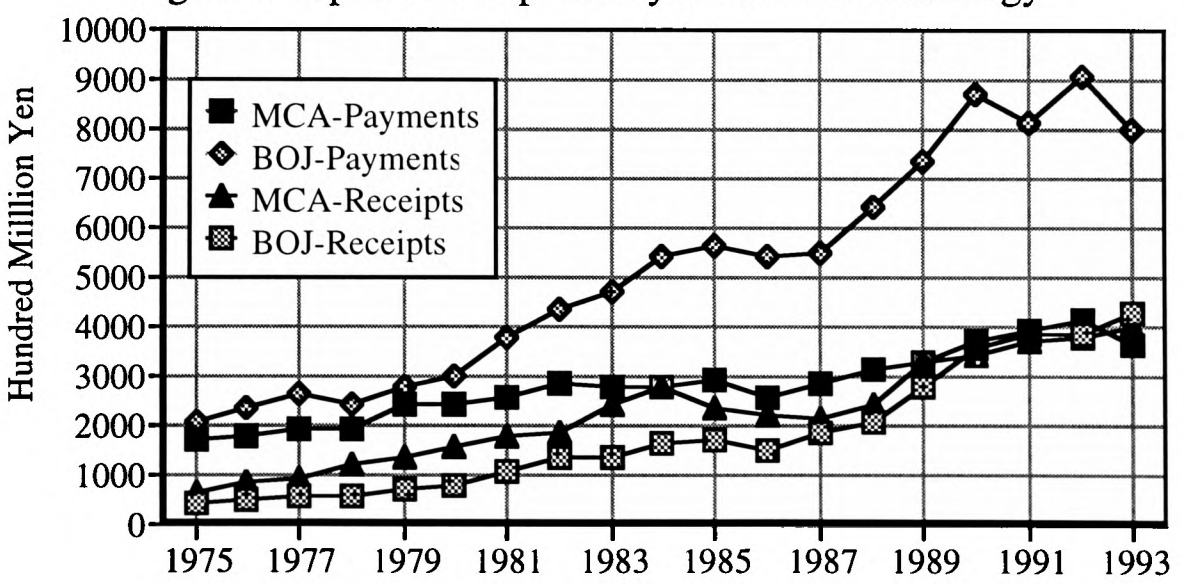
Trade in technology statistics are best used for making statements about general trends not detailed comparisons. The main Japanese figures are published by the Management & Coordination Agency (MCA / 総務庁統計局) and by the Bank of Japan (BoJ / 日本銀行)[10].

Figure 2 Japan & UK : Ratio of technology Receipts & Payments




Whichever set of Japanese figures is used though, the trend is towards an increasing balance between imports and exports in Japan. The balance of technology trade in the UK too in recent years has moved more into balance, however in the UK it is from a position of surplus not deficit as in the case of Japan. It should be emphasised that the increasing balance in Japan's trade in technology is not being brought about by a reduction in technology imports but if anything by a gradual relative increase in technology exports and thus receipts relative to payments.

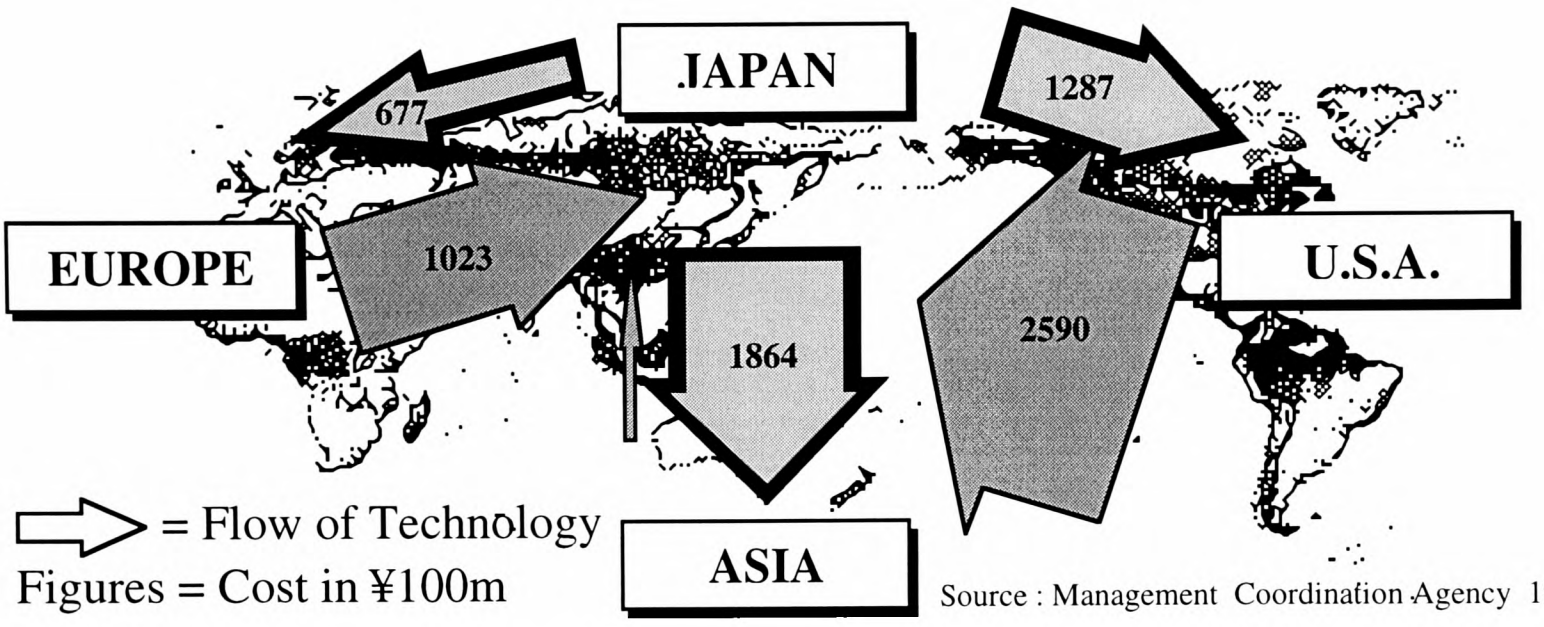
Figure 3 Japan : Receipt & Payments for Technology




[10]A useful data book containing both (inter alia) is produced each year by the STA (Science and Technology Agency 1993). Unfortunately the figures differ. The best discussion of this difference is in a report published by NISTEP. This shows that the truth probably lies somewhere between the two, sets giving in 1991 a ratio of receipts to payments of about 0.6 as opposed to 0.94 according to the MCA or 0.47 according to the BoJ (Takuzo 1993).

When we come to study licensing at a detailed level we will study some of the ways in which this trend is manifest in Japanese company licensing policy. For the moment though the question is where these increasing technology exports are going to.

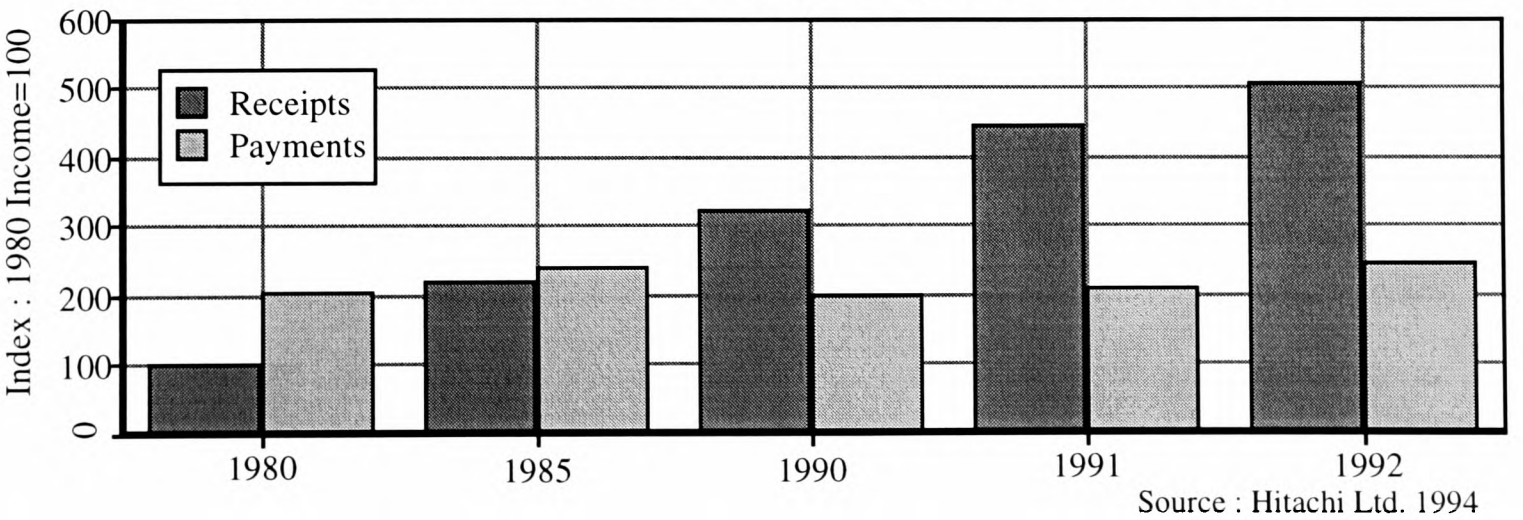
Figure 4 Flow of technology trade 1993




Source : Management Coordination Agency 1993

Study of the MCA figures for technology trade for 1993 shows that whilst a considerable amount of technology flows back to Europe and the USA a higher amount is exported to Asia and the newly industrialising countries there. Thus whilst Japan is amongst the most technologically advanced nations, it in effect, occupies an intermediary position in the flow of technology from the most technologically advanced nations to the least, not in the sense that the same technology is packaged up and passed on but in the sense that technology is still being licensed in from countries more advanced in particular fields whilst also being increasingly licensed out to countries less advanced in others.

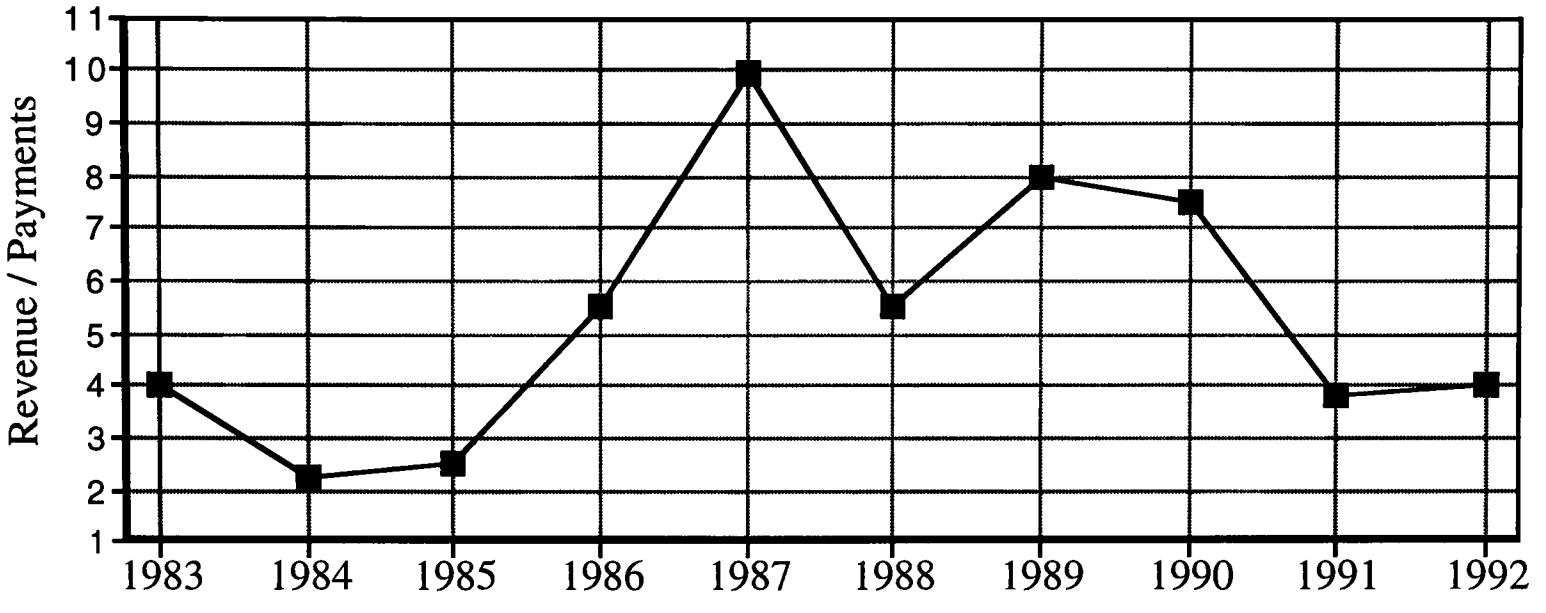
Figure 5 Hitachi Overseas Receipts & Payments for Technology




Source : Hitachi Ltd. 1994

That the improvement in the technology trade balance has not been brought about by a reduction in technology imports will be discussed later. For the moment Hitachi's recent technology trade figures show this well as does Canon's technology trade balance.

Figure 6 Canon - Licensing Balance 1983-1992 (Canon 1994)




> "Royalty payments for Canon's technology has been positive since 1975. By 1992 Canon's income received for technology supplied to other firms, mainly in Japan, rose to four times the expenditure for technology bought in." (Canon 1994).

This trend from pure technology import to a combination of import and export is thus something that has not just happened recently but has occurred gradually over several years.

## 2.2. Technology trade objectives and historical perspectives

It has always been an objective of Japan's technology policy to learn from technology licensed from abroad but without becoming dependent on it and so that it can be used to overtake the competition. The first step in such a process though, is to learn from abroad. This is something that has been a particular strength of Japan. As Abegglen talking about Japanese companies puts it :

> "The Kaisha have shown an unusual capacity to take in, absorb and adapt technology. This is the critical variable in technological progress, and the success of the Japanese company in assimilating technology is a main source of competitive strength" (Abegglen and Stalk Jr 1985).

He goes on to quote Prof. H. Brooks of Harvard in a report on Japanese technological advances who said :

> "it would be wrong to conclude from this that the Japanese are mere imitators who, once they have attained a world state-of-the-art in a field, will not continue to move forward the frontiers of technology. On the contrary, history suggests that imitation, followed by more and more innovative adaption, leading eventually to pioneering, creative innovation forms the natural sequence of economic and industrial development" (House subcommittee on Investigations and Oversight and the subcommittee on Science Research and Technology of the Committee on Science and Technology 1983).

More recently the topic has received some attention in the press. Martin Jacques writing in The Independent about Asian Tigers said recently :

> "Yet there is one general lesson, however, that Britain could learn lock stock and barrel from the Asian tigers. Without much doubt they have been the most successful economies in the world over the last few decades. And the key to their success has been a willingness to learn from the rest of the world, a thirst for innovation, and a strong sense of national priorities." (Jacques 1996)

However such learning ability is something that has long antecedents. In the early Meiji era and even in the late pre-restoration Tokugawa era, knowledge was also assiduously collected from abroad and developed to suit Japanese purposes. In 1853 following the opening of the country to the West restrictions on western learning were largely abolished and foreign engineers and other advisors invited to Japan whilst many students and missions were sent to study abroad. The descendants of these students and travellers are not only present day Japanese students studying abroad[11] but the numerous 見学 "Kengaku" or "study by observation" tours organised by many Japanese associations and organisations today. These form a major route by which developments abroad are absorbed into Japanese Institutions. One such tour, organised in 1975 by the Japan Patent Association, had an influential role in the development of Japanese patent information management (Japan Patent Association 1975). Another such tour organised in 1958 and entitled 「海外特許管理専門視察団」(Overseas Patent Management Inspection Group) organised by the Japan Productivity Centre Central Office has been quoted by several people as having a significant development on the subsequent development of Patent Management in Japan (小川　勝男 1993), (松下　義治 1993).

## 2.3. Adding Technology Exports to Technology Imports

The first Japanese measures concerning trade in technology were primarily aimed at encouraging technology imports. At first this was the overriding concern coupled with the sale of goods to raise foreign revenues to enable the purchase of yet more advanced technology. Gradually technology exports began to increase in importance. To begin with Japanese technological development moved through light industries, basic heavy industries, low tech. electronics and latterly high tech. electronic goods. As each stage was passed through there was some sale of technology, even though this may have been dominated by the purchases of technology that were occurring.

An early example of links between technology imports and exports is connected with the start of Toyota. In 1866 the Satsuma clan had arranged to import some cotton mill machinery[12] made by Platt Brothers & Co. Ltd. of Oldham. Sakiichi Toyoda the founder of Toyoda Loom

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[11]For example Hiraoka quotes the facts that in the 16 years from 1957 to 1973, 7207 Japanese studied physical and natural sciences in the US for a month or more whilst in the same period 317 US citizens visited Japan for the same purpose. By 1982 around 14000 Japanese students were studying in the USA each year (Hiraoka, 1985)

[12]One of these machines can be seen in a museum at the old Satsuma clan factory in Kagoshima.

the forerunner of Toyota probably saw machinery developed from such looms at the 1890 national exhibition in Tokyo. In 1905 when tested against Platt looms, Toyoda automatic looms were inferior but further developments led to the perfection of the automatic Toyoda G-type loom in 1924. This was so successful that in 1929 Toyoda was able to sell the patent rights for everywhere except Japan, China and USA to Platt Brothers for £100,000. The technology had thus moved from import, through development to export and the experience and money was helpful when Toyota began car production (Toyota Motor Corporation 1988) (Morris-Suzuki 1994).

There are also more recent examples of other countries absorbing Japanese technology - to Japan's disadvantage. As a result of an economic cooperation agreement between Japan and Korea in 1965, Japan provided $100m and up to date steel-industry technology to Korea. The first blast furnace was built in 1973. By 1982 there were 4 and the Pohang works had become one of the largest and newest steelworks in the world. Combined with the end of high growth and the closure of Japanese blast furnaces, Korea began supplying Japan with standard steel coil and plate. The cheaper steel had a severe effect on Japanese export markets (Kubota 1986). Japanese industry is thus understandably wary of licensing out advanced technology to potential competitors.

There are also examples of technology being taken without any licence. Mori Seiki service engineers have been asked to service machine tools which are Taiwanese copies of their machines. The Hitachi Seiki President was stopped by a Taiwanese salesman at a trade fair in Beijing in 1991 and shown an exact copy of a Hitachi Seiki machine (Ota 1992). Such events promote the protection of Japanese IP overseas. Recently Toshiba was the foreign firm being granted the most IPRs in the Korean Patent Office with not many less than Hyundai, the Korean company being granted the third most (The Korea Economic Weekly 1995).

Stories of Asian companies seeking Japanese technology can also be found in the electronics field. Talking about active matrix LCD technology Jang-Jeng Liang director of a subsidiary of Tatung, Taiwan's largest electronics company said that "In the whole world only the Japanese have it" and that despite many trips to Japan and having the money "even the basic technology is not easy to get" (Johnstone 1992). Where Korean companies have managed to access Japanese LCD technology it is often in situations where the Japanese manufacturer is in trouble of some kind. In March 1993 Alps electric a small Japanese manufacturer of LCDs announced its first net loss ever, in September 1993 it announced a joint R&D venture with Gold Star a Korean electronics manufacturer to develop LCD manufacturing plant (Mochizuki 1994).

A corollary of increased technology exports though is an increased need for protection. Another instance of increased Japanese willingness to both seek license fees and also pursue

litigation occurred in the USA. Ricoh recently sued Samsung Electronics of South Korea in the US over alleged infringement of patents relating to the recording of fax data, and filed a complaint with the US International Trade Commission (ITC). In return Samsung Electronics sued Ricoh for alleged infringement of a Samsung patent relating to a micro-controller chip used in fax machines. Negotiations ended with the payment of a substantial license fee by Samsung. (PRNewswire 1995).

However, whilst these examples may give the impression that Japanese industry has only reluctantly transferred any technology to developing countries, it is not always the case as the earlier licensing figures for Hitachi and Canon show. The need to raise revenue and in some cases gain access to some technology has meant that there is a stream of technology being licensed out by Japanese industry. Fujitsu for example recently signed a cross licensing deal with Samsung of Korea for microchip technology which involved a $4bn payment by Samsung to compensate for Fujitsu's lead (Miyake, Yoshikawa et al. 1992). This deal represented 25% of Samsung's 1991 pre-tax profits an indication of the relative value of the deal to Samsung and reminiscent of earlier Japanese deals to acquire US technology. This can be compared with a case Abegglen quotes where Toray made a down payment on DuPont's nylon patent which was equal to Toray's entire capitalisation (Abegglen and Stalk Jr 1985).

## 2.4. The dynamic perspective

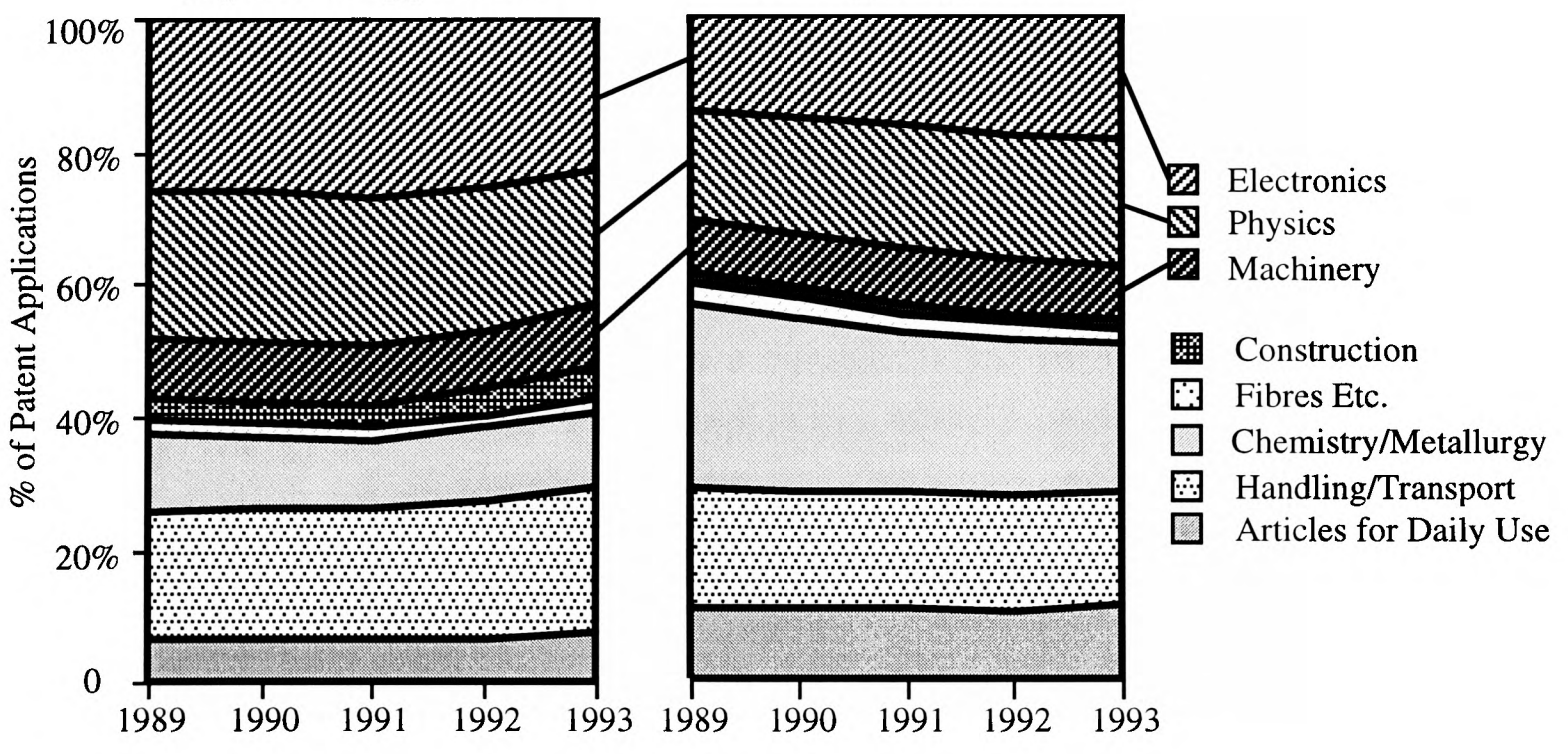
In an interesting comment on the flow of technology, Ryuichi Ohyama the president of another machine tool company has said that "Technology transfer is like water flowing from higher to lower places", maintaining that whatever happens the technology contained in machine tools is flowing into the rest of Asia anyway (Ota 1992). This is not to say that patents are ineffective. As we shall see they can be extremely effective in raising revenue and controlling markets if well managed. Nonaka has also emphasised that knowledge creation is a dynamic process (Nonaka and Takeuchi 1995). What these observations emphasise is that technology does not exist in a static but a dynamic environment and that therefore IP and IPRs too must be considered in a dynamic framework.

However considering patents as either merely a defensive means of monopolising inventions, or as just an information source and promoter of technological trade seems inadequate. Whilst the seemingly different roles of on the one hand encouraging and protecting R&D investment and on the other of promoting technology information exchange and co-operation have been emphasised by different countries at different times the two roles are not incompatible and are actually complementary. That the two aims need not be mutually exclusive is a view put forward by Ordover using the Japanese patent system as an example of a system with features favouring technology diffusion (Ordover 1991).

Another way of looking at the use of IPRs and emphasising the flow of technology though is to include the dimension of time since we are usually concerned with technology flows and their promotion or prevention. This is particularly appropriate for Japan which now has substantial amounts of technology flowing both into and out of it. Extending this view one can say that any man-made barriers to technological progress and diffusion, such as patents, are like dams in the path of that technological flow. However like dams, whilst some last longer and are stronger than others, and some can be used to channel the technological flow this way and that, over time none can ultimately stop the flow of technology. Patents and other such IPRs must therefore be considered as *control mechanisms* in a dynamic framework even though individually they form static barriers.

One further reason for this dynamic view applying particularly to Japanese Industry is a result of the high dependence of Japanese industry on high technology sectors which have what I shall call a *high patent density*[13] sectors such as Machinery, Physics and Electronics which in 1991 comprised almost 60% of Japanese Patent Applications the opposite of the subject matter mix of foreign patent applications in Japan.

Figure 7 Subject Matter of Japanese Patent Applications




Source : (日本国特許庁 1995)

One senior patents manager in a Japanese electronics company suggested that the initial surge in interest in patent applications in the late 50s and 60s was due in large part to the white goods industry which was then going through a boom. Fruin also mentions the industry's aim of supplying everyone possible with the "three household treasures" of a Cooker, Refrigerator

[13]A term coined by the author to denote a technical field where there are a high number of patentable or patented inventions involved in each product. Thus televisions and cars have a high patent density , pharmaceuticals a low patent density.

and Television (Fruin 1994). Such products use a wide range of technology and it was difficult for one manufacturer to own all the technology essential for a successful product. The result was an incentive to acquire large numbers of patent applications to use in cross-licensing with other manufacturers. What the story illustrates though is that *high patent density* fields and social and technical incentives for cooperation promote a patent culture where numbers are important. In the chemical and pharmaceutical fields patents may be more important for their quality since patent densities are low with only a few patents per product being relevant in a field such as Pharmaceuticals.

## 2.5. Conclusion

Japanese and Western companies' past overall strategies related to IP and IPRs have by and large been strongly influenced by the respective societies and technological positions of followership and leadership they were formed in. The historical origins of the two approaches are linked and yet the overall strategies have resulted from very different circumstances. However these circumstances have also been changing and converging. Even if cultural differences remain, these two technological positions are changing and becoming more balanced. It will thus be necessary for companies to become skilled at exploiting both situations both to absorb and diffuse technology. A study of current Japanese approaches should be particularly helpful in this respect since as we have seen Japan now holds an intermediate position where it is at the same time acknowledged to be a leading technological nation and also still a major acquirer and absorber of technology developed elsewhere. In adapting to a future where ultimately all countries experience balanced trade in technology it will be necessary to avoid viewing IPRs purely as defensive mechanisms to restrain competition or purely as counters for trading. Instead a dynamic view, formed using current Japanese experience comprising use of both these approaches within a competitive environment, should show that patents are an essential component in the promotion of trade in technology and technological progress.

## 3. Intellectual Property - Structures and Institutions

This section aims, without pre-empting the results of the field research, to comment on the main organisations and structures connected with IP which exist in the UK and Japan respectively. The aim is to identify structural differences which will be discussed with the results of the field research later.

### 3.1. Comparison of UK and Japanese IP Institutions

The problems facing both Japan and the UK regarding IP have certain features in common. There is a need for a State organisation to administer IP law and registration, there is a need for a body to administer and organise professional representatives acting before that office and there is a need for branch organisations of the major international IP related organisations such as AIPPI[14]. In these respects the organisations and infrastructure of IP organisations in Japan are similar to those in the UK. However, at that point the similarity breaks down and some important differences begin to become apparent[15].

Firstly there are differences of scale, the TMPDF[16] in the UK could not have more than 95 members even if it wanted to since there are only about 95 industrial IP departments in UK industry. In contrast in Japan the JIPA[17] has 650 or so members and this gives it considerable scope for economies of scale and thus a wider range of activities and influence. Secondly a result of the increased scale of IP activities in Japan and perhaps some overstaffing, is that there is more opportunity for circulation or rotation of management among organisations (See Ch.9). This greatly improves liaison between for example Government and Industry and Lawyers and Industry. One product of this easy exchange of personnel and information in particular is a considerably higher quantity of literature on the subject of patent management and related subjects such as patent information management. This is perhaps reflected in the vocabulary one encounters in such publications which have no such frequently or uniformly used UK English equivalents. Patent Management, Patent Maps, IPR Education and the like all occur in the UK but never so uniformly and universally as in Japan. Different companies will use similar terminology often derived from the same patent office course or JIII[18] or JIPA training material or derived from publication of a research report of a study tour from

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[14]Association Internationale pour la Protection de la Propriété Industrielle (International Association for the Protection of Industrial Property) An international non-governmental, non-profit organisation for the protection of intellectual property (http://www.aippi.org/).

[15]Further details of UK & Japanese Institutions are given in Appendix F

[16]The main UK industrial IP department association The Trade Marks Patents and Designs Federation.

[17] Japan Intellectual Property Association : TMPDF's Japanese counterpart

[18]Japan Institute for Invention and Innovation : See Appendix F for further details.

one of the organisations. Just one example of the like minded approach of Japanese IP departments is the fact that many have recently been renamed "IP" departments. IBM changed the name of its patent department to "Intellectual Property Rights Department" in 1986 and Japan IBM changed the name of its Patents and Copyright division to "Intellectual Property Rights Department" in 1988. Thus the list of name changes below provides another example of change in Japan being catalysed by events abroad, in this case as with most other IP issues by changes in the USA.

Table 1 Patent / IP Department Name Changes

| Company | Former Name | New Name | Date | Source |
|---|---|---|---|---|
| Hitachi | Patent Division | IP Division | 1988 | Interview 93/12/3 (日立, 1995) |
| Toshiba | Patent Division | IP Division | 1989 | (東芝株式会社, 1990) |
| Mitsubishi | | IPR Division | 1989 | (JijiPressNewswire,1991) |
| Matsushita | Patent Division | IPR Centre | 1989 | (松下電気産業株式会社, 1990) |
| Japan Steel | | IP Division | 1989 | (児玉, 1990 ) |
| Ricoh | Patent Division | IP Division | 1989 | (リコ=i株式会社, 1990) |
| Canon | Patent Legal Affairs | IP Legal Affairs Div'n | 1989 | (キャノン株式会社, 1990) |
| Fuji Xerox | Patent Division | IP Division | 1989 | (富士ゼロックス株式会社, 1990) |
| Mitsubishi Elec. | | IPR Division | 1989 | (三菱電気株式会, 1990) |
| Omron | Patent Division | IPR Centre | 1989 | (オムロン株式会社, 1990) |
| Sony | Patent Division | IPR Division | 1990 | (ソニー=i株式会社, 1990) |
| Teijin | Patent Division | IP Division | 1990 | (日経産業新聞, 1990) |
| Toyota Machine | | IP Division | 1990 | (日経産業新聞, 1990 ) |
| Minolta Camera | Patent Division | IP Division | 1991 | (日経産業新聞, 1991) |
| NEC | Patent Division | IP Division | 1992 | (日経産業新聞, 1992) |
| Seiko Electric | | IP Division | 1994 | (日経産業新聞, 1994) |

A further difference between UK and Japanese IP Institutions lies in the place of work of qualified agents. In 1993 in Japan there were 3632 qualified patent agents of whom 341 worked in industry. In the UK there were 1250 with 360 working in industry.

To conclude Japanese Institutions and organisational structures concerned with IP are characterised by greater size and a greater degree of interrelatedness than UK institutions and perhaps greater openness to external influence which reflects the cultural and economic environment they are operating in.

## 4. Recent external influences on the Japanese IP environment

### 4.1. Developments in the USA

One element of the background to Japanese IP management that deserves special attention is the role of the USA. We have already seen the effect of US pressure on Japanese legislation. However the way in which developments in US law and practice have affected Japanese company thinking about IP must also be discussed briefly[19].

In the period between 1945 and the late 1970s US patent law was largely "anti-patent". Patents were not enforced strongly and uncertainty in the law compounded the difficulties for patentees. In the mid seventies though the situation began to change, beginning with changes to the ITC (International Trade Commission)[20] whose powers were strengthened.

The main influence on US patent litigation though came in 1982 with the institution of the CAFC or Court of Appeals for the Federal Circuit. This is a specialised court for patent appeals from district court trials. Previously appeals went to several non-specialist appeal courts resulting in a mass of inconsistent law and uncertainty for patentees. Creation of the CAFC thus led to an increase in certainty and litigation.

The Young Report of January 1985, an advisory committee to the US president, headed by John Young, then head of Hewlett-Packard Co., aimed to show how US industry could regain its competitiveness. It recommended that IP law be strengthened. This did not go unnoticed in Japan and was mentioned during interviews carried out during this research by at least one IP department head and in lists of factors affecting IP policy in Japan published by the Japanese Patent Office (日本国特許庁 1995 (平成 7 年) ).

It is interesting to note that the strengthening of the US IPR system which in turn led to moves to strengthen other countries IPR systems notably via the GATT/TRIPS agreement, started as a result of the gradual entrenchment of the *overall* balance of trade deficit of the US with Japan in the 1980s and the perceived loss of competitiveness of US industry. Something which was happening at the same time as the US trade surplus in *technology* was nonetheless

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[19]A more detailed comparison of US and Japanese law is provided in Appendix G.

[20]The "ITC" or United States International Trade Commission administers Section 337 which prevents "unfair practices" regarding imports, including the import of articles which infringe patents. It is much faster than a normal patent infringement case. The law is contained in the Tariff Act 1930 which contains most U.S. trade and customs laws. It has been used more extensively since authority under it was transferred from the President to the ITC in the mid 1970s. It was amended again in 1988 to make it easier to file and pursue patent litigation cases. More recently it has been revised to make it conform to the GATT /TRIPS agreement which has made it slightly more favourable to importers than it was. In particular if simultaneous patent litigation is being pursued it can be stayed and the ITC evidence used in the subsequent patent case (Golden, 1995).

continuing. There has thus been a shift in perception of the long-standing trade deficit in Technology from representing backwardness on Japan's part to representing Japan catching up and overtaking at the USA's expense.

Following the Young report though, there were several changes to IP law. For example in 1988 infringement suits could be brought for infringement of US process patents by importation of products made abroad. The 1988 trade act also introduced the now well known (even in Japan) Special 301 provisions. This requires the IPR protection of foreign countries to be reviewed each year and for retaliations to be made if any failings are not addressed as the US wishes[21]. The incidence of Jury trials (which favour plaintiffs) in US District Court actions also increased before and during the 1980s from 0.8% in 1961 to 11.9% in 1975, 23.5% in 1985 and 35.4% in 1990.

The result of all these changes was a mushrooming of patent litigation. Between 1986 and 1991 the number of Patent and Trademark suits filed in Federal District Courts rose by 26% and between 1975 and 1991 the number of Patent cases filed in Federal District courts rose from 606 to 857. Cases being solved by arbitration under commercial or patent arbitration rules increased by almost 300% between 1987 and 1991 (Miller 1993).

The numbers however have not perhaps been as influential as the headlines. Polaroid v Kodak in 1991 resulted in Polaroid being awarded $873,158,971 damages for infringement of some of its instant photography patents and Kodak withdrawing from the instant photography market (Miller 1993). More significant though vis a vis Japan have been the numerous cases where Japanese companies have been sued by US companies for patent infringement. In one well publicised case Honeywell was paid $127m by Minolta for infringement of autofocussing patents (Takahashi 1994). In another in 1990 involving optical fibres Sumitomo Electric paid Corning $25m and quit the US optical fibre market (Tokyo Business Today 1990).

One aspect of many of these cases is that in some of them the US company suing the Japanese company may no longer be directly involved in the industry concerned other than by licensing and consequently no opportunity for cross-licensing exists (a common solution to patent disputes in Japan). As a result the options for a settlement are reduced and litigation much more likely. Even when licenses are agreed, US royalty rates have been

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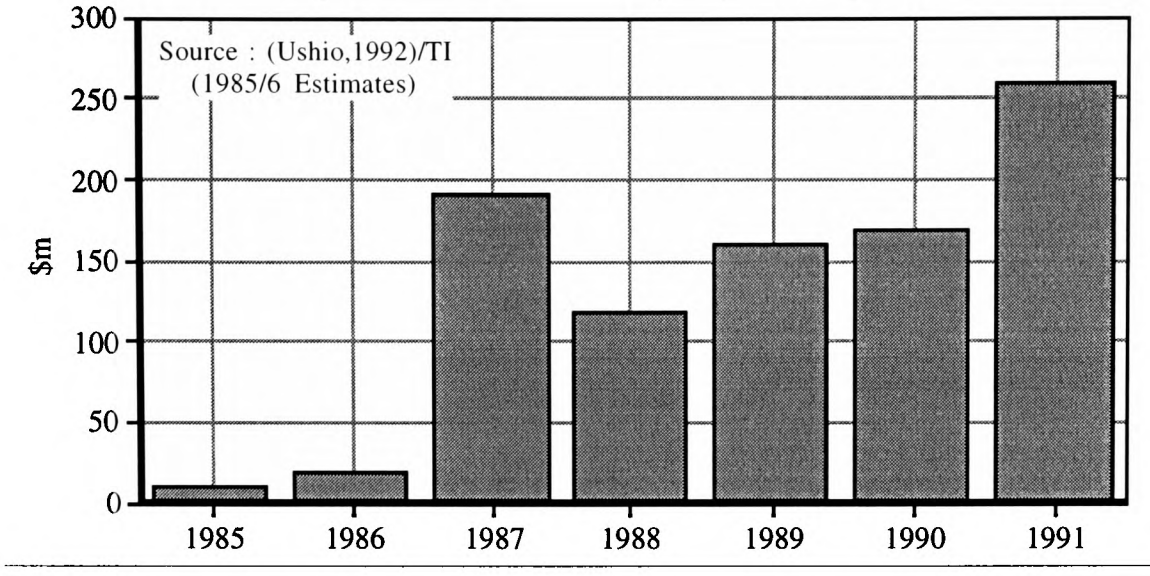
[21]Despite recent changes, the US still has reservations about Japanese IP law and Japan is still on the US Special 301 priority watch list of countries with inadequate IPRs in 1996. From the priority watch list downgrading to the lower-level watch list or even upgrading to the higher Special 301 priority foreign country status are both possible. The placing of Japan on the watch list was first prompted by fears that it might amend its copyright laws to allow decompilation or reverse engineering of computer programs. However, in late May 1994 this was avoided mainly as a result of lobbying by the US with European parties almost silent on the issue. Since then many such issues have been addressed by the JPO for example by accepting patent applications in English, promising to limit the time between application and acceptance or rejection of a patent to three years and ending pre-grant opposition. (See http://www.ita.doc.gov/industry/computers/ipr6.txt)

rising. This has perhaps been exacerbated by the recent depression and its effects on US company results for which extra licensing revenue is a direct even if not total remedy.

Figure 8 TI Patent Royalty Receipts




Texas Instruments for example following the grant of its "Kilby Patent"[22] negotiated licensing deals with most Japanese chip manufacturers. The more aggressive attitude to licensing revenue that it echoed can be seen from TI's licensing income over the past few years (Ushio and Shimura 1992). However, one result of this litigation and increased licensing revenues is that US companies are realising that their IP is one of their most valuable assets and deserves more attention. As a result for some companies what to do with IPRs is not just a sideline but the note that the annual report ends on. This was the case for Honeywell in 1992 in the wake of the Minolta case where Chairman and CEO J.J.Renier said : -

> "Because technology is our franchise, aggressively protecting our technology and patents is critical to our ability to deliver long-term value to our stockholders". (Honeywell Inc. 1992)

With all these litigious news items in the background it is hardly surprising that Japanese companies feel they cannot afford to neglect the issue. The usual attitude, expressed by one IP manager of a large electronics company is that "Many US patents are for pioneer inventions - so we need to get good patents". When talking to Japanese IP managers and asking what external events have been most influential, US practices and litigation are always mentioned.

## 4.2. Japanese Reactions to US Influence

The consequences of this mix of influences can be seen in the rate of increase of Japanese Patent Applications over the past thirty years.

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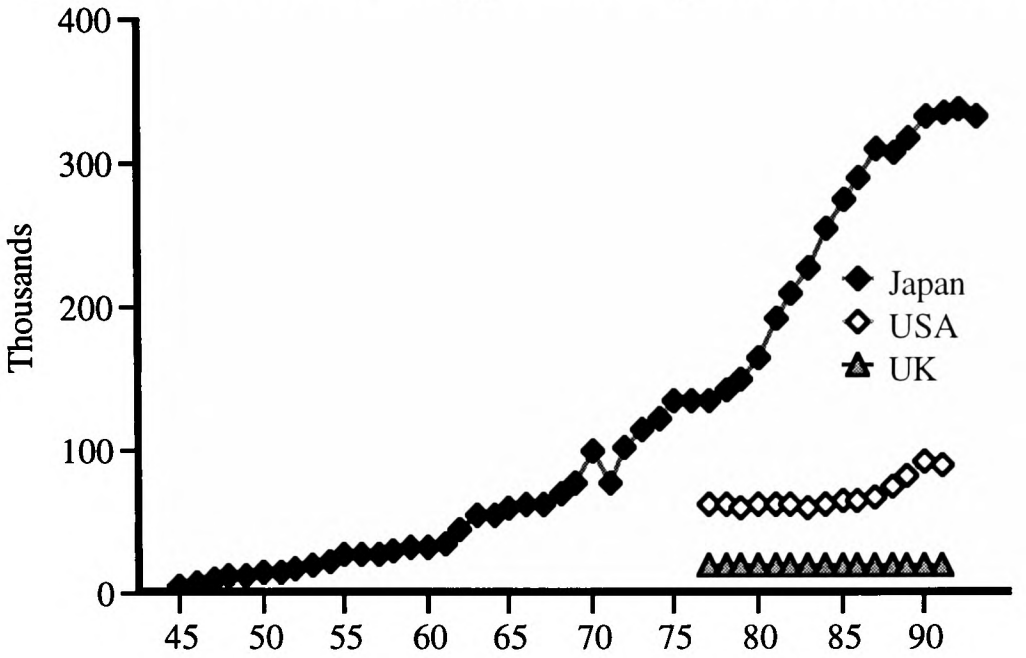
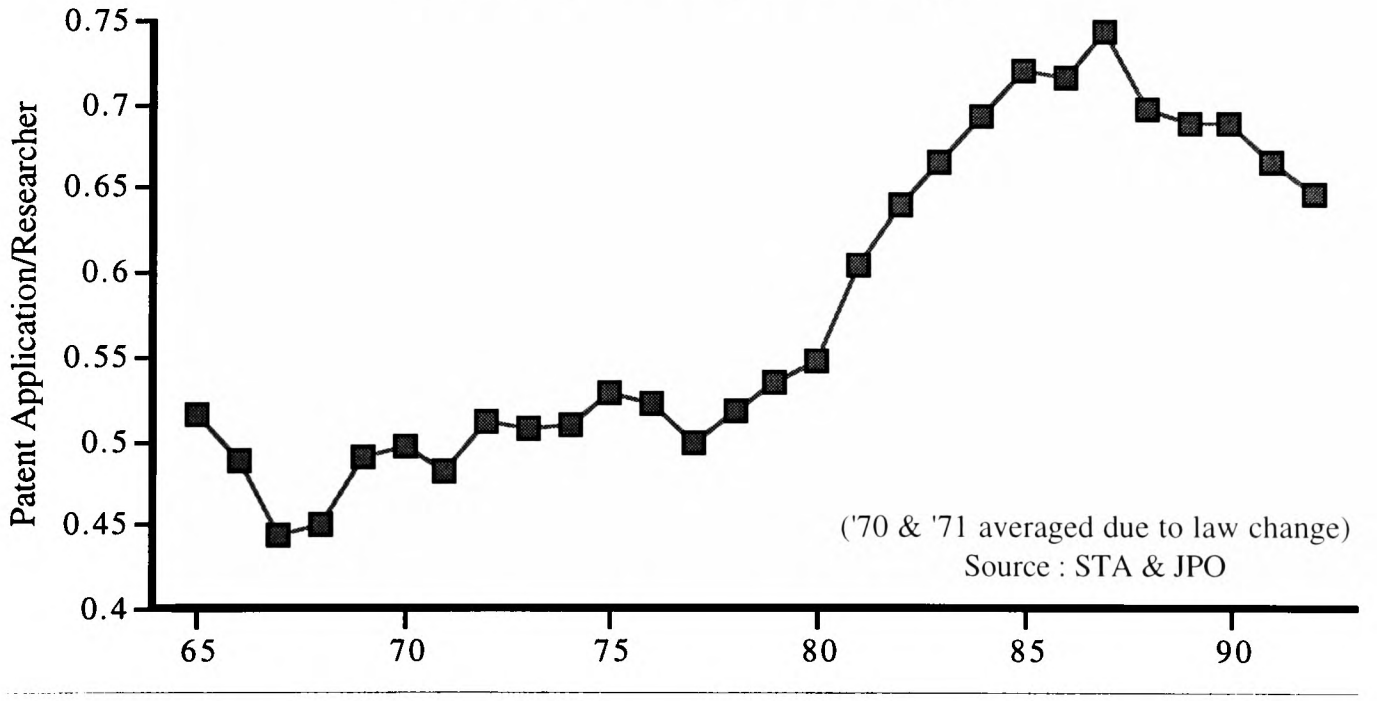
[22]A Japanese patent awarded to TI in 1989 after 29 years and named after a co-inventor of the integrated circuit, Mr. Jack Kilby. TI first applied for a Japanese patent for the invention (involving insulating transistors on integrated circuit substrates using the resistance of the substrates themselves) just before repeal of the old 1921 Patent law around 1960, but the application was unsuccessful. The old law allowed the application to survive and eventually it was granted in 1989. TI managed to negotiate higher than usual license royalties from a number of Japanese companies, though Fujitsu and Sanyo disputed the fact that it applied to their chips.

Figure 9 National Patent Applications by National Applicants




There was substantial increase in the rate of filing during the 1980s vis a vis the 1960s and 1970s rate and whilst there seems to be a slight slow down with the beginning of the 90s. In part the recent decrease in the filings of the largest companies are due partly to the recent effects of the recession but also to the guidance of the JPO and its actions to reduce application numbers mentioned earlier. Since 1988 the JPO has been organising various action plans (e.g. AP80, AP60) to try to reduce the number of applications and increase the number of applications being granted. An entire section of the Japanese language JPO annual report is devoted to such activities including tables giving the name of companies most successful in achieving a high rate of grant (日本国特許庁 1994).

Figure 10 Patent Applications per Researcher
Japanese Applications by Japanese Applicants

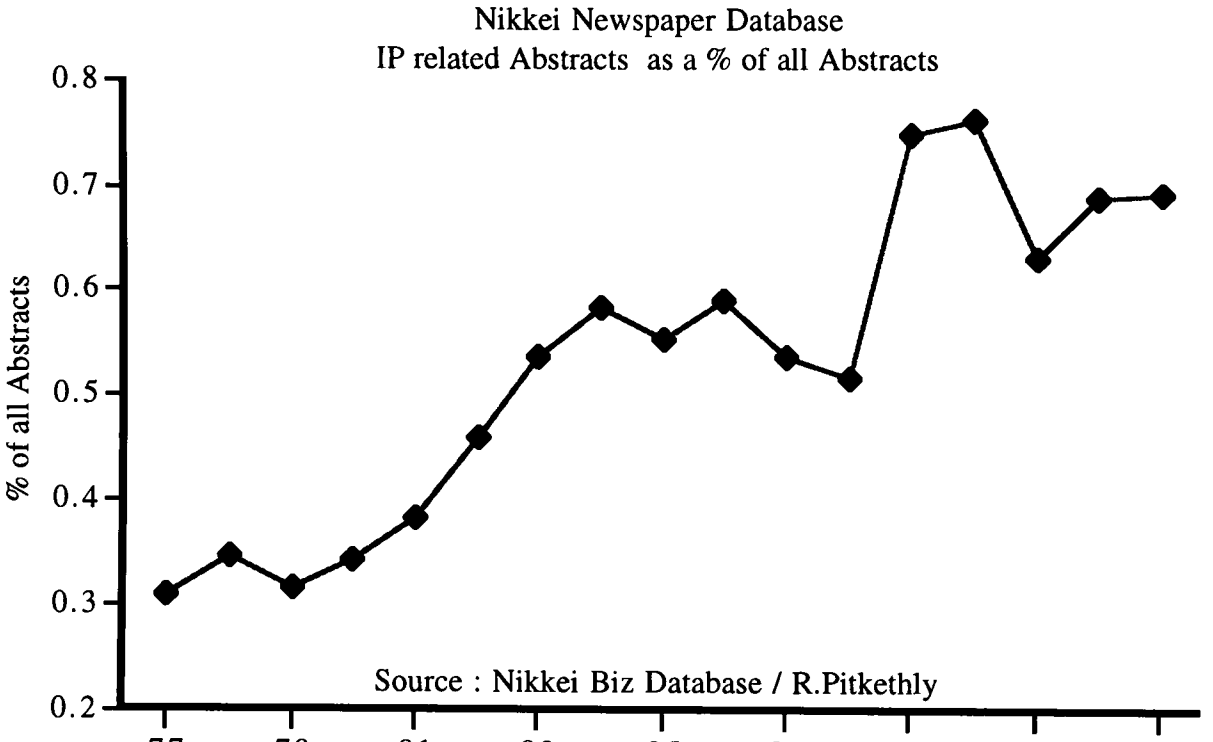



The number of Japanese patent applications filed per Japanese research worker has risen over the same period and at a higher rate during the 80s than during the 60s /70s even though the number of researchers rose too. Again even this is an understated picture since it includes all researchers in both government and industry. This higher rate of filing appears to have started around 1980, which suggests that more factors than just the U.S. CAFC implementation

in 1982 were driving the process. However whilst causation is difficult to prove the increased filing rates in Japan do coincide with the strengthening of US IPRs.

A further important factor is the increase in publicity and media attention given to IP issues in Japan beginning in the 1980s. Proving such a fact is not easy. However using the ratio of IP related articles to all articles contained in the Nikkei Biz database containing articles from the main Nikkei newspapers one can see that the relative importance of IP as a subject has risen over the period.

Figure 11 IP and Newspaper Coverage




More noticeable perhaps are the numerous books both specialist and popular books which deal with the subject of IP and in particular the various pieces of litigation involving Japanese and US companies. The following are just a few examples :

"US Japan Patent Infringement-Shaver Wars" (斎藤　吉見 1992), This book about an infringement action in the US where a Japanese Shaver Company Izumi Seiki was sued for patent infringement by Philips. The cover subtitle was "Izumi Seiki 2500 Days of intense fighting" (泉精機2500日の熱き闘い) and a wrapper proclaimed 『(米国陪審裁判)の：実例　-　もし、あなたの会社にも「訴状」が送りつけられたらどうする！』(A real example of US Jury Trials - What are you going to do if your company gets sent a "Complaint" too!). Though the Japanese company lost, the damages awarded were only $6,500. Despite that the legal expenses of $4.2m wiped out the company's profit for the year. The book was first published in June 1992 and had been reprinted before the end of July the same year. This may have been helped by the case being included in an NHK TV programme on November 17 1991 entitled "America's Patent Strategy - Targeting Japanese Business". The program even went as far as restaging the trial using American lawyers and jury members who awarded not $6500 but $175000 damages. The program was reviewed by the US Foreign and Commercial Service in the US embassy and said to have been uniformly labelled as

"outrageous" by American business people in Tokyo and criticised for not having included the American viewpoint or American lawyers in it's analysis (Kanter 1991).

The importance of patent litigation now is such that Japanese Insurance companies have been exploring the market for insuring manufacturers against litigation costs (Takahashi 1994) and even seconding staff to the IIP to conduct economic research into the field of IP.

"The Patent Mafia Targets Japan" (蒲野　宏之 1993) is aimed at an exception, a US company called Rifac which does business by buying up patents and then using them to bring infringement actions. However the practice of US companies such as TI deciding to increase licensing revenue was also referred to as another notable US patent strategy. Well-known infringement cases such as that involving Minolta and Honeywell and a computer related case involving Sega are also mentioned. The start of the policies being described is identified as being in the Carter era with Reagan's trade policy, the Young report (mentioned above) and Special 301 all being contributory factors.

"The day Japan wins through Intellectual Property Rights" (幸田　ヘンリー 1993), is marketed with a wrapper reminding potential readers in direct terms, that "Invention King" Lemelson's[23] annual income was ¥60,000m, that they shouldn't forget the "patent mafia" who had made such a financial killing and that any businesses ignorant of such matters wouldn't survive. After describing Mr. Lemelson's activities, the advent of the Pro-Patent era and explaining the term "Intellectual Property" (which in itself shows the popular nature of the book) it ends by suggesting that Japanese industry will/or is beginning to counterattack the USA by being Pro-Patent.

Many other books dealing with the subject of IP exist such as "Japan/US IP Wars" (大森陽一 1992), "Japan/US Patent Friction" (塩入　明 1993), A fear of Intellectual Property Rights - Japan/US knowledge capture strategies (下田　博次 1992), the latter has a useful summary of the main IP disputes occurring in postwar Japan which have been reported in Newspapers, about two thirds of which have occurred since 1980.

There is thus a mass of detail available on IP issues to not just specialists in Tokyo but even those wandering through the average bookshop in a department store in Kanazawa[24], station bookstores in Shinjuku and to those reading the major newspapers (where as has been shown IP related articles are not infrequent). Even allowing for bookseller's hype there must be an

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[23]A well known private US inventor occasionally described as exploiting the US patent system's ability to conceal "Submarine" patents which though in fact rare, sometimes appear to plague large companies many tens of years after they were first, speculatively filed. Lemelson though well known and now rich as a result of his activities is probably unique (Aharonian, 1995). Recent changes to US patent law have abolished the possibility of long lived "submarine" patents.

appreciable effect on not just IP specialists but the average Japanese manager in terms of awareness of the need for some action.

### 4.3. Japanese Government Reactions

One can see the influence of the US on Japanese thinking about IP issues neatly summarised by referring to the document published by the Japanese Patent Office in October 1995 entitled "工業所有権行政の問題と出願等の適正化 - 特許制度・運用の国際調和を目指して -" or "Normalisation of Industrial Property Rights Administration Problems and Applications - Aiming at International Harmonisation of the Patent System and Practice". This begins by outlining the internationalisation of IPRs in terms of increasing levels of foreign filings of patent applications both by non Japanese applicants in Japan and also by Japanese applicants abroad. The latter having increased particularly since the 1970s. The increasing importance of protecting international IPRs is then stressed with attention being drawn to the internationalisation of the economy and the increase in R&D expenditure in the developed nations especially the USA and Japan. However after this there is a discussion of the changes in US IPRs strategy since the 1980s. This begins with the implementation of the CAFC in 1982 and includes the Young Report (1985), the opening of GATT•TRIPS negotiations (1986), the amendment in 1988 of the powers under Section 337 to make filing complaints to the international trade commission easier, the introduction of the Special 301 provisions under the 1988 Trade act and their use against Japan in 1990 and 1995. This discussion of the US is then followed by a section entitled 「知的所有権を巡る国際的議論の高まり」 "The rise of International Discussion concerning Intellectual Property Rights". This lists 10 separate issues only one of which, the cost of European Patent Applications, concerns countries other than the USA. A further section then discusses various efforts towards international harmonisation of Industrial Property law. This includes initiatives involving not just the USA. For example tripartite talks involving the European Patent Office are also discussed. However the final one and a half pages of this section are concerned with bipartite talks between the US and Japan and a chart showing the topics under discussion and which have been included in which package of agreements.

The penultimate section before problems with the administration of industrial property (primarily the length of time examination takes) deals with the other geographical area of great concern to Japan in IP terms and that is the rest of Asia. Lists of the types of cooperation between Asian countries including ASEAN countries, China and APEC countries and Japan are given. On this point it is interesting to note that the 1996 Patent Office Budget

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[24] The Japanese equivalent of Bath about five hours away from Tokyo on the West coast of Japan where I once lived for three months. The following reference to a station bookshop stems from my finding books on patent management in one despite it being a tiny shop and nowhere near the Patent Office where most patent lawyers are concentrated.

Estimate request which was announced in November 1995 included a request for a 138% increase from 355 to 846 million yen in the funding for International development of Industrial Property Rights administration. Of this just over half and almost all the increase was due to be newly allocated to development of IPRs cooperation in the Asia Pacific region (発明通信 1995). In an interview reported in 1995 Mr. Takashima the head of the JPO referring to the standard of protection required of developing countries by the TRIPS agreement said that :

> 「したがって、各国がその保護水準を守れるように日本が協力することが求められている。基本的には、例えば日本の制度についてのいろいろな解説であり、情報の提供であり、それから当該国における工業所有権関係の人材の育成、官と民の双方の人材育成ですね.」
>
> (高島　章（特許庁長官） 1995)

> "Accordingly, so that each country can maintain such a level of protection, Japan's cooperation is being sought. Basically, there's, for example, various commentaries concerning the Japanese system, offers of information and moreover, training of skilled intellectual property rights related personnel in connection with the countries concerned. It's training of both Government and Private Sector skilled personnel, you see."

More comprehensive details about cooperation with developing countries can be found in the Japanese Patent Office Annual report published in 1995 (日本国特許庁 1995).

## 5. Changing Japanese Patent Law

The previous sections of this chapter have discussed how Japan's IP system developed initially and how it has been influenced by external factors and in particular the USA. It has also shown how in more recent times other Asian countries seeking Japanese technology may be a source of influence through causing Japanese industry to lobby for strengthened IP laws to preserve Japanese rights whilst maintaining a balance with Japan's continuing imports of technology. Additionally current IP related institutions in the UK and Japan have been reviewed to outline their contribution to the current IP environment.

To understand the development of Japanese IP management fully though, it is also necessary to understand how Japanese IP law differs from that elsewhere and particularly how it differs from that in the USA in an overall sense. This can be best summarised by saying that since the early 1980s the main purpose of the US system can be seen as protecting the patentee. In contrast from the US viewpoint the Japanese system is one which is intended to diffuse innovations not protect them (Foray 1992)(Ordover 1991)[25].

However, recent changes in Japanese law indicate a change in attitude to the patent system in Japan. Features which in the past have acted to favour the introduction and diffusion of technology are now in some cases being revised and account taken of the need to protect technology as much as diffuse it. In a recent survey of the JIPA reported by the IIP 51% of 295 large Japanese companies replying to a questionnaire survey thought that IP laws should be strengthened whilst 35% of small and medium sized firms also thought the same (知的財産研究所 1995a). The choice between diffusion and protection as Ordover points out is not an either or choice though(Ordover 1991). Japanese industry is now, as has been shown, in a position to both import and export technology and needs to both protect and diffuse technology. The Japanese system is thus changing slowly towards a system which promotes that.

Since the early 1980s the US pro-patent policy described above has accelerated this process. Furthermore it is increasingly in Japan's interests to strengthen IP laws as well and this has further assisted agreement. This applies not just in Japan but particularly abroad and Japan has and will benefit from US campaigns to strengthen IP laws in Asia. The most recent setbacks are that the US is continuing it's first to invent system, has yet to introduce early publication, has withdrawn from the WIPO Harmonisation treaty talks and is pursuing a policy of bilateral negotiations in IP matters as shown for example in the USPTO/JPO agreement. However, Japanese IP law is increasingly resembling European Patent law in many respects and US patent law is rapidly being left as the exception. Total harmonisation of Western and Japanese patent systems may remain a mirage not a reality for some while to

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[25]A more detailed comparison of US and Japanese law is provided in the Appendices

come but for so long as Western and Japanese interests regarding IP are converging the IP systems are likely to converge too. In the case of Japan, Japanese law will change not for justices sake but pragmatism as Japanese industry now has as much to protect as to learn.

## 6. Conclusions

The background to the IP world in Japan and to some extent the UK, which has been painted here, shows that the present state of affairs in both countries is the result of a multitude of factors which have origins which go back many years. One aspect that is particularly evident is the extent to which Japanese companies and institutions have sought and continue to seek inspiration for further developments from abroad. It would be easy to accuse such organisations of mere plagiarism and a lack of originality but in most cases it is those organisations which unprompted have gone out to look at what is going on elsewhere rather than wait passively for it to arrive. A further important aspect is that that curiosity has not diminished with the increasing success of Japan's technological development, the concept of something being NIH or "Not invented Here" being unacceptable still seems alien to Japanese culture.

The basic structures of IP organisations in Japan show fundamental similarities with those in the UK due to the similar nature of the problems faced and yet also show subtle differences due to the environment that the Japanese organisations are operating in. In the past one might just have characterised Japanese attitudes to IPRs as collectivist in contrast to more individualistic Western attitudes. Certainly the influence of MITI controls on technology imports between the 1950s and 1970s forced coordination between companies who might otherwise have competed to import technology (Lynn 1994)(Morris-Suzuki 1994)(Commission on the History of Science and Technology Policy 1991). In addition there were the effects of involvement in *high patent density* fields and the influence of patent laws promoting diffusion rather than protection. However this distinction is beginning to fade slowly as Japanese IP laws moves closer towards more Western approaches, import controls on technology imports have long been effectively abandoned and the use of IPRs to guard as much as obtain technology has come to be appreciated, even if differences still remain.

The changes described here all point to a gradual shift in Japanese company attitudes to IP which shows a movement from considering the role of IP as purely a support for technological development to one where IP both supports future development and preserves its past fruits as part of a continued dynamic process. The factors described all add up to making Japan a potentially interesting location to study IP strategy.

# Chapter 3. LITERATURE REVIEW

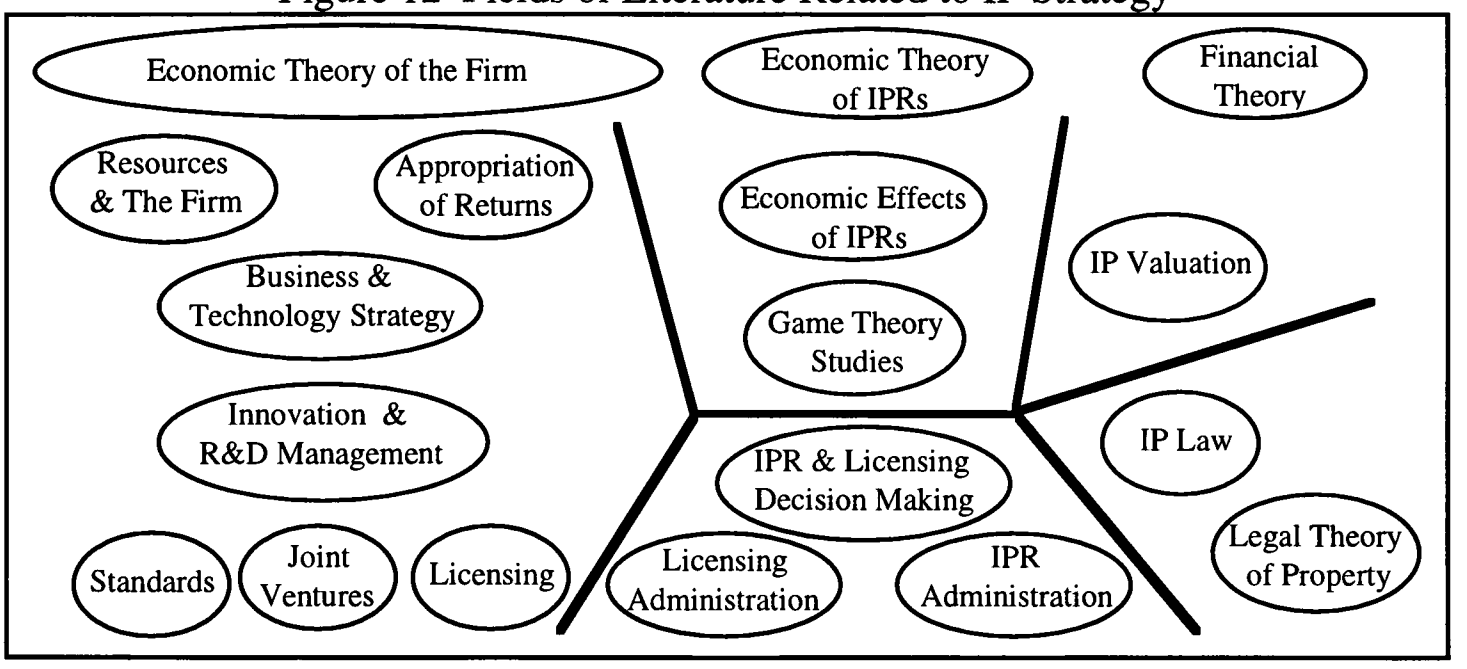
**Summary**

One may either cast a literature search too widely and cover the irrelevant or too narrowly and miss important insights in related fields. The following hopefully avoids this Scylla and Charybdis of literature searches. Its aim is to identify relevant strands of thought, issues and sources of information which will be referred to later. It also aims to set the scene in terms of the concepts and existing theories which have been considered in carrying out this work.

## 1. Introduction

The use and management of IP in Business Strategy is not acknowledged as a field in its own right. It spans many fields of study and the diversity of these fields makes a comprehensive survey difficult to carry out. Furthermore, there is both a wide range of relevant fields and a wide variety of analysis. This ranges from scholarly work by Economists, Lawyers and Business academics to practically oriented work by practising Lawyers, Businessmen and Journalists. Finally, there is the complication of parallel searches among both Japanese and English sources.

Figure 12 Fields of Literature Related to IP Strategy




I have tried to reduce the scope of these problems by searching among a wide range of English sources but a more focused range of the time consuming Japanese sources. The Japanese sources searched comprise mainly recent data, practically oriented works and "grey literature" directly concerned with the practice of IP Strategy and the administration of IPRs and Licensing. In this chapter only the major types of works and the main surveys which exist are reviewed to help define the scope of the research and the areas of literature it will draw on. The more specific Japanese literature will be discussed later.

## 2. Literature Classification

The relevant literature falls into several distinct areas. Economics, Management Studies, Law and Japanese Studies[26]. These categories have little cross referencing between them. Consequently the following separate headings will be used for the review :

3. Economics
   - 3.1 General economic theory of IPR systems
   - 3.2 Economics related to IPRs
   - 3.3 Economics studies of IPRs
   - 3.4 Game theoretical studies concerning IPRs
   - 3.5. Areas of Interest

4. Business Studies
   - 4.1 Business Strategy
     - 4.1.1 Business strategy & IP
     - 4.1.2 Resources
     - 4.1.3 Appropriation of returns
   - 4.2 Technology Strategy
     - 4.2.1 Innovation & R&D Management
     - 4.2.2 Patents & Trade Secrets
     - 4.2.3 Licensing & Joint Ventures
     - 4.2.4 Standardisation
     - 4.2.5 IP Administration
   - 4.3 Areas of Interest

5. Japan related material :
   - 5.1 General economic/business studies concerning Japan
   - 5.2 Japanese IP practice related material

## 3. Economics

In the field of economics, IP and in particular IPRs, hold the status of curiosities. By their very nature Patent systems or any IPR systems, are bound to be controversial, since they create monopolies which seem against the public interest, to further the public interest. Needless to say the economic costs and benefits to society of patents have been argued over for centuries. The existence of both laws controlling competition and law creating monopolies thus provides a fruitful source of interest for economists, income for lawyers and literature for this research even though the bulk of it is more relevant to theoretical considerations than practical management of IPRs.

### 3.1. General economic theory of IPR systems

The majority of the world legal systems designed to encourage invention are patent systems. Generally speaking the aim of these systems is to provide an incentive to invent by granting monopolies of limited scope and duration in return for full disclosure of inventions. Succinct

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[26]There is also some historical material referred to not here but in the relevant appendices.

summaries to this effect can be found in any dictionary of economics or introduction to the Patent system (Taylor and Silberston 1973) (Phillips and Firth 1990) (Bainbridge 1994).

However, there have been dissenting voices as to the best form of incentive system. The former Soviet Union had an Inventor's certificate system. Such systems are akin to that proposed by Polanyi (Polanyi 1944). They seek to reward the merit of inventions and divorce their inventor's rewards from the commercial world but are rarely successful as the case of Soviet Russia's system (Boag, Rubinin et al. 1990), Japan's system between 1872 and 1885, and others shows[27]. Such systems are the opposite of rewarding disclosure with monopoly profits as most patent laws attempt to do. Hayward and Greenhalgh list several other writers who have proposed alternative systems (Greenhalgh and Hayward 1994). Some such writers have criticised the patent system for encouraging a waste of resources in designing round patents and concentrating effort on only patentable inventions (Plant 1934). The "race" to the patent office, often studied by game theorists, has been labelled a wasteful duplication of effort.

Other overall economic reviews of the theory of the patent system exist (Penrose 1951) (Machlup 1958). Machlup's view is characteristic of such studies in saying that it is difficult to tell what the real effect is. At a micro level, as we shall see later on, this is a pervasive feature of IPR systems. They are widely assumed to be beneficial, the degree of benefit depending on the industrial sector concerned, but it is difficult to assess exactly how beneficial, the whole system, or even one patent within it is.

Since those studies were published, other works concerned with the basic theory of the patent system have been published as well as related game theoretical studies on, for example, patent scope and duration. Some work has also been done on establishing what happens in the practice of IP management, as opposed to what might be happening in theory. However, the last major study in the UK of this type was over 20 years ago by Taylor & Silberston (Taylor and Silberston 1973). Besides being one of the few studies which looks at IP management within companies in the UK, this study showed that the overall economic effect was neutral in many cases but strongly positive in particular industries such as pharmaceuticals. This and other related studies such as Silberston's later study on the Economic importance of patents (Silberston 1987) will be dealt with later.

A final class of studies on the economics of patent systems is of particular relevance to the study of the Japanese system and that is studies which distinguish between patent systems designed for diffusion of R&D results and those designed for protection of R&D results. The

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[27]The story of John Harrison's development of the marine chronometer is tied up with a UK government prize of £20,000 which was offered in 1714 for the development of a sufficiently accurate clock and which was not paid until many years after its successful invention (Mokyr 1990)(Whittle 1984).

leading article on this point is by Ordover who argues that the two objectives are not necessarily exclusive (Ordover 1991). Borrus also points out the difference and the way in which Japanese IP law has tended to favour diffusion over protection in the past (Borrus 1990). Foray[28] also supports this view arguing that the two types can coexist and that each can achieve both diffusion and protection to varying degrees as may be appropriate for various countries (Foray 1992). Foray also raises an issue discussed by David (David 1992), (David 1993) which is that present attempts to harmonise IP systems may be impractical because they will reduce the diversity of systems and the ability of countries to tailor their IP systems to suit their circumstances. However, none of these authors has distinguished clearly between the benefits of procedural harmonisation and the benefits of harmonisation of the enforcement of IP law. On the one hand, diffusion of technology by a patent system depends on ways in which publication occurs and the security provided by the system to protect knowledge disclosed. On the other hand, protection offered by a patent system depends much more on the post grant, post procedural, ability of courts to enforce patents. Obviously the scope and durability of protection provided will affect licensing aspects of diffusion to some extent but it may be possible to achieve both the benefits of harmonisation and the benefits of diversity.

In any event the issues of harmonisation raised by David and echoed by Foray are highly relevant to the case of Japan which is one of the three main patent offices in the world with a significant influence on the future of World patent systems along with the United States Patent and Trademark Office (USPTO) and the European Patent Office (EPO).

## 3.2. Economics related to IPRs

### 3.2.1. General Economic theory of the firm

Economic theories encompassing more than just IPR systems have considerable relevance to the ways in which one can think about IP as a separate issue. Fundamental to this separation of IP as a subject in it's own right is the concept of IP as a resource (in this case an intangible intellectual resource).

The role of resources is something dealt with both by Business Strategy writers (see p.56) and by writers on more general economics. From an economic point of view resources are generally linked with theories dealing with the nature of the firm. One of the earlier writers along this line was Penrose who identified both physical resources and human resources

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[28]Foray is strictly speaking incorrect on one point though in suggesting that Japan has no Trade Secret law since the law on this point was changed on June 22 1990 by the passing of a bill revising of the unfair competition prevention law in order to protect trade secrets (Hill, 1990) (Nakashi, 1993) However, it is true to say that there are still problems over the secrecy of facts disclosed in Japanese courts (The American Chamber of Commerce in Japan, 1993) and courts dealing with trade secrets would be bound by the constitution to disclose the secret in question (Holme, 1993)(Nakashi, 1993).

(Penrose 1959).

Penrose went beyond this though, to say that the inputs provided by the firm are the services rendered by the resources and observed that a lack of repeatability in the case of some services gave the firm its character, but that since increasing knowledge will increase the services available from the firm, the services of the firm are a function of an economically "slippery" variable - knowledge. However, knowledge, (or the Intellectual Assets it represents), was not clearly identified as a separate resource in its own right but impliedly as a resource in the nature of air (the classic free good), which is ignored economically as an input, even though its use is not always cost free. (E.g. in the supply of compressed air). Another view of knowledge is to treat it as Drucker (cited by Nonaka) does, as a "basic economic resource" distinct from all others (Drucker 1993)(Nonaka and Takeuchi 1995).

Various works based on Penrose's view have appeared since. Rubin for example, defined a resource as a "fixed input which enables a firm to perform a particular task. The input is made up of people and real assets that they use" (Rubin 1973). In this view, though IP is not explicitly mentioned, it must be inherent in the people who embody the experience of the firm.

Another highly relevant area is that of Schumpeter's work (Schumpeter 1942), (Schumpeter 1966). In contrast to his work as a banker and finance minister[29] his academic work has long been famous, in particular for its emphasis on innovation as a driver of economic growth, leading a dynamic process of what he called "creative destruction". Tied to this view was a preference for monopoly and oligopoly. In this view large firms are part of the price of technical progress in a trade-off between static and dynamic efficiency involving continuing innovation as Nelson and Winter put it (Nelson and Winter 1982b). The juxtaposition of innovation and monopoly though immediately leads one to think of IPRs and patents and investigations of the significance of patents have certainly been spurred by his writing as has consideration of the dynamic aspects of technological progress.

From his work and that of Galbraith two main theses emerged which have been summarised by Kamien and Schwartz (Kamien and Schwartz 1982). These are firstly, that there is a positive relationship between monopoly power and innovation and secondly, that large firms are disproportionately innovative compared to small firms. Developments of these have tended to try to explain the consequent technological progress by either "technology push" (Nelson 1959) or demand-pull (Schmookler 1966). Kamien and Schwartz however, say that the two basic hypotheses, that R&D activity increases with monopoly power and that large firms are the more efficient innovators are not confirmed[30]. However, this need not detract from the

[29] The bank went bankrupt and he was Austrian finance minister for about 6 months (Eatwell, 1987).

usefulness of Schumpeter's thinking particularly regarding creative destruction by innovative entrepreneurs. In a sense this is more connected with the use of technology in competitive strategy than with the use of IPRs, however, in the sense that technology (whatever that rather loosely used term means) is a product of IP and very often defined by IPRs it is nonetheless relevant.

Nelson and Winter's work on understanding technical change as an evolutionary change builds on but differs from Schumpeter's work in that it accepts the importance of competitive technological change but not the supposed connection between market power and innovation (Nelson and Winter 1982a)(Nelson 1987). The emphasis is again on the competitive flow of technological progress though. Another view which also draws on ideas of evolutionary biology is that of Metcalfe who emphasises technological variety as a source of competition (Metcalfe and Gibbons 1986). Particularly relevant to this research is the fact that Metcalfe refers to learning processes as a fruitful avenue of research and mentions the concept of the "technological landscape" in the context of a firm building a technology base :

> "the knowledge base of a firm builds cumulatively, through experience, formal R&D, and inward transfer of the knowledge contained in other organisations. It develops as it were as a Technological landscape"(Metcalfe and Gibbons 1986).

Landscapes require maps if one is to navigate across them, even if the maps of any sort can only tell one where one has come from or where others have been. This idea is relevant to the role of patent maps in Japan.

Another writer on technical change is Klein who stresses the role of competition. In his

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[30]In the current Japanese study R&D expenditure and R&D employees are as expected highly positively correlated with measures of company size (r=0.54-0.90). However, Patent Applications per R&D Employee are only slightly positively correlated (r=0.027 - 0.053) and Patent Applications per R&D Expenditure slightly negatively correlated (r= -0.13 to -0.14) with the total number of company employees and company sales which indicate overall company size. In the UK survey, R&D expenditure and R&D employees are as expected highly positively correlated with measures of company size (r=0.55 to 0.93). However, both Patent Applications per R&D Employee are only slightly negatively correlated (r=-0.047 to -0.069) and Patent Applications per R&D Expenditure also only slightly negatively correlated (r=-0.055 to -0.060 ) with the total number of company employees and company sales which indicate overall company size.

Analysis of variance tests of the two ratios Patent Applications per R&D Employee (p=0.83) and Patent Applications per R&D Expenditure (p=0.63) with the total Number of Employees showed no significant variation for the UK survey and no significant variation of Patent Applications per R&D Employee with Number of Employees (p=0.355) for the Japanese survey. There was a significant variation of Patent Applications per R&D Expenditure with total Number of Employees (p=0.041) but this was largely caused by only 3 replies in the 0-500 employee category and if anything the overall trend was one of decreasing number of Patent Applications per R&D Expenditure with increasing total Number of Employees in the Japanese sample.

Prima facie the current research data thus *suggests* that larger firms are no more efficient innovators, or rather producers of patent applications, than small ones, even if they may be more prolific ones and may be able to afford more expensive types of research. However, the separate and complex question of whether patent applications are a good measure of innovation remains. This is discussed further in Ch.9 where filing incentives are studied. See also Pavitt on the use of Patent Statistics as measures of innovation (Pavitt 1982)(Pavitt 1985) and on the size distribution of innovating firms (Pavitt et al. 1987).

writing on dynamic economics he argues that firms only advance if they employ a wide range of people who engage in conflict as to how to achieve generally accepted goals. Firms will only stay internally interactive and able to deal with uncertainty so long as they are prodded by their competitors (Klein 1977). This mere prodding as opposed to total creative destruction by competitors means that competition persists rather than resulting in succeeding periods of monopoly. He also criticises the assumptions that entrepreneurship is individual and vanishes in groups saying that the manner of the acquisition of knowledge has not changed over time and that the incentive of competition is not being replaced by the institutionalisation of progress. Such latter comments are interesting at least so far as they apply to the inventive side of entrepreneurship in the light of comments frequently made about Japanese companies lack of ground breaking innovations and Japanese researchers lack of freedom (Johnstone 1993). These suggest that the particular form of groups in Japanese R&D centres are conducive only to particular types of research, in particular developmental work aimed at clearly identified problems, rather than basic groundbreaking research which requires an independent individualism not encouraged by the average Japanese research laboratory. Progress may not be being institutionalised everywhere but different institutions do influence progress in different ways and some seem to stifle rather than promote it.

The emphasis on the word dynamic is however useful in that many views of IPRs are static just as the equilibria of neo-classical economics are in some senses static. Thus at least the competitive dynamics of the Schumpeterian view is needed, as much in studying IP strategy as in the economics of the underlying technology. The two most interesting areas in economics according to a recent lecture by Douglass North, are the inclusion of friction and time in economic models. This is in contrast to the models of the past which are imperfect tools for solving economic problems over time and in the face of transaction costs (North 1996). In the context of IPRs the inclusion of time as a major consideration is also important. The role of transaction costs is also critical in its role in hindering the assembly of critical resource mixes (see page 259).

One of the main features these works have in common, is that they are identifying the underlying Intellectual Assets of a company as of interest and not necessarily the IPRs which legally define and protect them. This fine distinction has been noted earlier, however it is one which runs throughout the subject along with the distinction between the technology being protected and the IPRs providing the protection. Despite this distinction though the two must be considered together if a comprehensive strategic view of such assets is to be taken. Furthermore, from a practical view the management of the IPRs is essential.

All the above writers have used a predominantly economic perspective. This is not to criticise this but to point out that there is sometimes a gap between economics studies of business and the reality of business life which needs to be bridged. One example of such a bridge is

Porter's work on industry structure. However, this is but one example of the literature built up over the past ten years which takes note of this gap and sets out to bridge it by applying economic concepts to business strategy issues.

Among this school are (Rumelt 1984), (Teece 1984), (Rumelt, Schendel et al. 1991) and also (Porter 1980) and (Nelson and Winter 1982a). Rumelt outlines the gap between the mainstream microeconomists and those studying business strategy in a direct manner saying that the two have different interests. He also makes several important points directly relevant to IP and IPRs. Firstly there is the observation based on prior work that :

> "A firm's competitive position is defined by a bundle of unique resources and relationships and that the task of general management is to adjust and renew these resources and relationships as time, competition and change erode their value."

Secondly there is the creation of the concept of isolating mechanisms, which has its origins in Lippman and Rumelt's work on uncertain imitability (Lippman and Rumelt 1982) and which is said to be an integral part of a firm's strategy :

> "A firm's strategy may be explained in terms of the unexpected events which created (or will create) potential rents together with the isolating mechanisms that (will) act to preserve them."

Rumelt lists discoveries and inventions as a source of potential rents and patents and trademarks as Isolating Mechanisms. One could generalise the statement though by saying that all IP is a source of potential rents and all IPRs and other methods of appropriating rents from IP are isolating mechanisms. One further observation, highly relevant to assessing how to use patents and other IPRs, is that :

> Firms that are lucky enough or insightful enough to make an early commitment to what turns out to be defensible positions can be stunningly successful.

By filing Patent applications and creating other IPRs at an early stage in the life of an innovation one is in effect creating options on monopoly profits from the potential success of the innovation. This is an area of thought which is highly relevant to the valuation of IPRs and embryonic R&D projects.

Teece is one writer who has pursued this resource based line of thought by concentrating on the implications of applying economic ideas of appropriability to resources and resource based views of the firm. Appropriability is sufficiently important to this study to deserve separate treatment, however, there are several articles pointing out the albeit sometimes fuzzy, boundaries between Economics and Business Strategy which touch on this area (Teece 1984), (Rumelt, Schendel et al. 1991).

### 3.2.2. Transaction Cost Economics

Rumelt, Schendel and Teece in a recent review article include reviews of Porter's work and of transaction cost economics (Rumelt, Schendel et al. 1992), an area that has been developing over the past twenty years largely as a result of Williamson's work (Williamson 1975) though its origins stretch back much further to Coase's work (Coase 1937). Williamson provides a useful review of this field (Williamson 1991). This area of study looks at the problems of bounded rationality, asset specificity, and opportunism as they affect business transactions and produce the economic friction that often distinguishes theoretical economics from the real world and which has been mentioned briefly above. Put another way it is an attempt to deal with the often misplaced assumptions that markets involve frequent low uncertainty transactions, requiring no transaction specific investment, of commodities that are tangible and easily understandable. At first sight this might seem irrelevant to the issues of IP and IPR, yet one of the specific problems which Williamson identifies as susceptible to a transaction cost approach is (Williamson 1991):

> What additional factors need consideration when contracting under a weak property rights regime? (Both channel and technology transfer decisions are pertinent).

Other writers have applied it to specific IP related issues such as make/buy decisions (Walker and Weber 1984), Multi-product firms (Teece 1984), Multinational enterprises (Teece 1986b) and Technology transfer (Teece 1981) and many others (Rumelt, Schendel et al. 1991). The issues for IP and IPRs relate in part to make or buy decisions as to whether to integrate resources or subcontract them in exploiting a firm's IP. In this respect the work ties in with work on appropriability (Williamson 1991). The considerations raised by a Transaction Cost approach are valuable in studying transactions involving IPRs, especially licensing, particularly with their inclusion of knowledge based factors. However, at the more fundamental level of considering what is being transferred in the transactions, the resource based view of IPR is perhaps more useful for the purposes of this work.

### 3.2.3. Innovation / Technology Policy

There is a considerable body of work dealing with the management of innovation and technology from an economic point of view as opposed a technology strategy viewpoint. There is a considerable overlap between the two areas. However, one aspect which is emphasised more in the economic texts is the use of patents not as a means of appropriating returns but as a means to enable economists to measure inventive activity. The largest index entry in Schmookler's book "Invention and economic growth" (Schmookler 1966) is that headed "Patent Statistics". However he identifies "Intellectual Capital" (or Technical capacity) as being much more important than the accumulation of physical capital in explaining the rise in

output per worker in industrialised countries - something that can also be found in growth accounting literature relating to the Japanese economy (Denison and Chung 1976) (Shinohara 1986). One of Schmookler's main contentions is that

> "capital goods invention tends to be distributed among industries in proportion to the prevailing distribution of investment. The central reason for this is heavily influenced by considerations of profitability".

However this view has been criticised and modified by Stoneman to say that both demand and technological opportunity determine the level of patenting activity (Stoneman 1983). It is worth remembering however, that both these studies involve patent data driven analysis and not an investigation of the reasons behind the decision to file a particular patent application, for which there are often a wide range of not always good or logical reasons. [31]

Freeman's work on the economics of innovation (Freeman 1982) includes numerous case studies and examples of the commercial exploitation of inventions. However the role played by IPRs is again mainly touched on as a measure of innovativeness. He makes a distinction though between offensive and defensive innovators for the latter of whom patents are said to play an extremely important role as a bargaining counter whereas for offensive innovators patents are said to be a critical method of protecting a technical lead and retaining a monopolistic position. Offensive and Defensive categorisations of innovators and IPR holders is a useful concept which I will return to later.

However it should be said that this categorisation is not the whole story since it implicitly assumes that decisions regarding patents are determined by the technology strategy being followed. Obviously such decisions are influenced by technology strategy. As will be shown certain sectors do favour certain strategies. However it needs to be stressed that technology strategy and IPR strategy are two interacting variables in the same situation. Companies which seem to adopt "Offensive" strategies may only be able to do so because of decisions which have been or are or can be made about the patents and licensing decisions concerned. "Defensive" strategies may be enforced on a company by a combination of technical developments and/or changes in its IP position. Indeed one might add that some authors have categorised Japanese IP strategies from a purely IP perspective into Defensive, Monopoly Seeking, Deterring and Royalty seeking strategies (Murakami and Nakata 1994). A "defensive

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[31]These may range from internal company politics, reward and assessment systems to pride, even the degree of fear of not patenting a potential money spinner, quite apart from the lure of profitability and mere opportunity. There is in practice the base level raw material of inventions which result from the initial decision to employ people to invent or who are capable of inventing, combined with their perceptiveness of profitable problems and potential solutions or their ingenuity in applying interesting knowledge as solutions to profitable problems. The second level are those steps which translate this raw material of inventions into numbers of Patent Applications and the range of factors involved in this process both legal industrial and social mean that the process is not a 1:1 relation but something which varies depending on a wide range of factors. This will be discussed again later when the issue of the number of Japanese Applications is discussed.

strategy" therefore may be as much a result of decisions about IP as about technology. Other authors using the Defensive / Offensive categorisation of IP strategies include Rabino and Enayati (Rabino 1995).

Thus both IP and Technology need consideration and synchronisation and it is by no means clear that IP strategy is always completely determined by Technology strategy. Indeed one can think of cases where an assessment which took full account of the strategic implications of the IP position would have changed the overall strategic decisions taken quite considerably[32] (See Page 52). This however remains to be discussed later on. The retention of monopoly though, whether in a defensive or offensive situation, is something much more work has been done on under the heading of appropriation. Defensive use of patents as bargaining counters is something that is also dealt with under licensing strategy and is something which is important in any consideration of the Japanese electronics industry.

Kamien & Schwartz (Kamien and Schwartz 1982) make the point that whilst realising extraordinary profits provides a motive for innovation these do not have to come using a patent but can also be reached by monopolising some other related asset or service such as distribution channels, raw materials etc. or by some first mover advantage. Elsewhere they comment on the way in which technical advance can influence market structure through the creation of entry barriers, either from patents, expertise, customer loyalty and others. They also list several advantages of monopoly power : increased ability to deter new entrants, increased ability to finance further innovation internally and increased ability to hire able people. Disadvantages are also listed : reduced motivation to seek profits, overconcern with protection of existing monopoly and reduced speed of development of new innovations. The fact that IPRs may not be the only way of trying to appropriate returns from a technology or business is something which becomes a critical element of IPR strategy in the run up to the expiry of an IPR. The story of the expiry of the patents covering the artificial sweetener Nutrasweet are particularly relevant in this respect (Chem. Week (Int. Ed.) 1994), (Gibson 1990), (Colton 1991).

Stoneman has reviewed the major developments in the field of economics studies of innovation and R&D before going on to discuss technological diffusion and several features of the impact of technology including rates of return to inventions (Stoneman 1983). In reviewing output measures he has included a concise review of the economics material relating to patents. As will become apparent later numbers of patents are not seen as a test of the quality of innovation nor are they guarantees of a monopoly. That they are not good indicators of quality is a factor which is highly relevant to any discussion of the avalanche of Japanese

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[32]Yet again the EMI CAT Scanner case can be used as the lack of watertight IPRs meant that obtaining the critical US marketing resources was not going to be any easier than for its better placed US competitors (Business Week 1980) (Berggren 1985).

patent applications which have been filed since the early 70s (Fujino 1990) (Pitkethly 1993b). Again this is a subject which will be discussed later on.

It needs to be stressed here that we are back in another variety of economic forest with different researchers employing different methods to study different aspects of the trees. There is a need for cooperation to build a better picture of the forest of Intellectual Property Rights. After all, the study of trees needs both aerial surveyors of the forest, the opinions and experience of foresters and the detailed work of botanists, biologists even biochemists to build up an integrated overall picture.

von Hippel has approached the subject of innovation from the direction of examining the source of innovation. In this context the issues of appropriating mechanisms such as patents are relevant as are the rents that can be appropriated. von Hippel's aim is to show that firms expectations of rents affect the role of innovators. To be able to say this he concludes that it is expensive for Innovators to adopt new functional relationships to their inventions. He also says that they have a poor ability to capture rent by licensing. Whilst perhaps true in the past this is something which surely is dependent on the precise circumstances and probably in need of modification in the light of recent increased US licensing revenues. One can see that the increase in profile of IP and patent issues in Japan has in large part been due to increased damages in infringement suits and demands for increased licence fees from US patentees. This might lead one to suspect that in many cases in the past technology has been licensed out at rates that are based more on the marginal cost to the licensor of producing the research results not their long term value to the licensee. Mansfield has noted that in Japan commercialisation of an innovation based on external technology takes about 10% less money and 50% less time than one based on internal technology (Mansfield 1988). Abegglen for example says concerning licensing of technology by Japanese companies:

> This massive transfer of technology from the United States and Europe in fact provided the technological basis for nearly all of Japan's modern industries. Without this critical technology transfer no amount of capital and labour could have moved Japanese companies to their present competitive position so rapidly. Yet the cumulative cost of all of that transfer over a period of more than twenty years has been only $17 billion, a fraction of the current annual U.S. research and development budget. (Abegglen and Stalk Jr 1985).

Very often Innovators may have a higher ability to capture rent by licensing than by exploiting the invention themselves. However, on this point Von Hippel concentrates on patents and trade secrets mainly on the basis of Levin's (Levin, Klevorick et al. 1987) and also Taylor & Silberston's work. From this he concludes that inventors do have a poor ability to capture rents (von Hippel 1988). However again this is not the whole story and a firms ability to capture rents in the context of IPRs is arguably best studied through the literature on appropriability. This conclusion leads us onto the work which has been done to study the actual effects of IPR systems from an economic viewpoint.

## 3.3. Economics studies of IPRs

### 3.3.1. Economic effect of IPRs

Taylor and Silberston's work (Taylor and Silberston 1973) on the UK Patent System which followed Boehm and Silberston's earlier work (Boehm and Silberston 1967) on the UK Patent Office is one of the few surveys on the operation of the patent system inside UK companies rather than from an macroeconomic viewpoint. It is now rather dated having been carried out over twenty years ago and before many important developments such as the introduction of the Patents Act 1977, the European Patent system and other changes, not least in technology itself. The survey was also rather limited in that it's core comprised replies from only 30 companies which made intersectoral and size comparisons difficult. In contrast the present survey is large enough to enable sector and size comparisons to be made in most cases. The basic conclusions of Silberston's work are likely to still be valid though.

Silberston concluded that the system was neutral except for R&D dependent industries and those for whose products strong patents are available (i.e. patents which are not easy to avoid or design around). Examples are the Pharmaceutical and speciality chemicals industries. In other industries (e.g. the electronics industry) obtaining Patents was often a necessary part of being able to participate in cross-licensing deals. This view is confirmed by the present survey and other data collection in Japan. In singling out particular industries though it is as well to remember that patents on successful inventions can sometimes be immensely valuable in any industry. The Polaroid Land camera patents for example, were the main reason for the company's survival in the face of an attempted entry by Kodak (Miller 1993).

Silberston's work also shows that UK senior management is not involved in patenting decisions other than to set general policy. However, identifying what considerations are involved in such strategy and what senior management involvement there is, is difficult. The present survey contributes to filling this gap by studying management involvement in IP related decision making and strategy setting processes. Silberston's work showed that very senior management involvement is the exception not the rule. However, whilst some authors (Economist 1987) emphasise the expense of applying for patents and some their insignificance in relation to overall R&D costs, no-one including the study by Silberston, has investigated how decisions on applying for or renewing patents are or should be made in other than very general terms such as "Managements of operating departments are consulted". The present survey reveals that invention ranking schemes are used widely in Japanese companies as a form of triage system for technology or at least the IPRs concerned and also reviews the involvement of senior management and cooperation with other departments interested in IP related decisions.

There are some other studies of the effect of patent systems mentioned earlier (Machlup 1958), and more recently another study by Silberston showing that highly patent and R&D intensive industries contributed 6.45% of UK GDP (Silberston 1987). A similar study by Phillips gave a figure of 2.6% of GDP for those industries "directly and substantially dependent on Copyright". However, these studies are macroeconomic and do not consider how the benefits to particular companies of particular patents might be assessed.

### 3.3.2. IPRs & Competition Law

In view of the obvious conflict between IPRs, competition law and anti-trust law, one would expect to find a large body of literature dealing with it, which there is though mainly confined to the legal field. European competition law is a particularly fruitful field for lawyers and this often overlaps with IP law particularly on cross-country licensing issues.

In the U.S. anti-trust laws have prompted some work such as that by Teece and Jorde (Jorde and Teece 1989a; Jorde and Teece 1989b). These however are mainly concerned with potential reforms to US anti-trust law so as to enable more joint venture and collaborative R&D as is practised in Japan and Europe. However, the Alvey project is cited by Jorde as an example to encourage Americans to amend laws to enable collaborative R&D. The work is thus perhaps more theoretical than based on the actual financial benefits. The important point though is that such laws do circumscribe the possibilities facing managers making strategic decisions and any discussion of strategy especially licensing strategy must take account of them.

### 3.3.3. Patents

Although Patents are not the only IPR or even the only one applicable to technological inventions they have attracted a substantial body of literature in economics. This deals with several issues including :

- Patent term
- Patent scope
- Patents as economic indicators
- Patents as an information source

The collection of work in the book R&D Patents and Productivity edited by Griliches (Bound, Cummins et al. 1984) is typical of this vein of work. This includes articles on a wide range of the above issues. The work seems driven by the availability of Patent statistics (something not so easily available for most other forms of IPR) and R&D accounting information in the U.S.. The articles in the book are concerned in one way or another with the question "What is the relationship of R&D investments at the firm and industry level to subsequent performance indicators such as patents" and like questions. Many of these papers relate to investigation of correlations between Patent Counts and other variables and Stock Market values.

One thing all this work has in common though is the use of Patents as an economic indicator. This is a field which has been thoroughly reviewed by Basberg (Basberg 1987). A more up to date study is that by Greenhalgh et al. (Greenhalgh, Bosworth et al. 1996). Other relevant articles are by Griliches and Pakes (Griliches, Pakes et al. 1987), (Narin, Nama et al. 1987) and (Trajtenberg 1990). One interesting feature of Narin and Trajtenberg's work is the finding that patent numbers indicate the quantity not the quality of R&D effort and furthermore that citations per patent are better correlated with financial performance than numbers of patents. These are variations on the observation mentioned earlier that Patent Numbers are not indicative of Patent quality, something which Japanese companies are now increasingly aware of and which the questions in the present survey regarding IP department slogans shows. This topic will be studied in more detail later in the context of patent filing incentives.

Another line of enquiry involving the use of Patent statistics is the use of Patents for information purposes. Obviously there is the technical data but study of who is applying for what can also give useful insights into the strategy of competitors. One particular example quoted by Eisenschitz is the Swiss watch industry which could have seen the invasion of the digital watch some time ahead of it's arrival if it had kept what patent searchers appropriately call a "watching search" over patenting activity relevant to watches. There are several writers in this area (Eisenschitz and Prosser 1988), (Mogee and Kolar 1992) (Bradford and Sen 1989) of whom Bradford gives a short list of similar articles in this rather small field. Bradford's work is based on work by the Battelle Institute who also market a computer programme designed to analyse patent information relating to competitors. Patent Information is a subject which is accorded relatively great importance in Japan as might be expected if concern about access to technology and freedom of action from restrictions due to others IPRs is great. One particular aspect of interest is the use of mapping techniques to plot technological developments and alliances in and between companies working in particular technological sectors. This technique has been used not only in industry (発明協会 1988)(中村　茂弘 1993) but also in academic studies for example that by Hirasawa (Hirasawa 1993) looking at aspects of research groups Japanese industry. The topic of patent information management is one which has received a great deal more attention in Japan and will be studied in more detail later.

Other miscellaneous and more concentratedly economics based work relating to patents include writings on litigation (Meurer,1989), invalidity (Kitti 1978), imitation costs of designing around patents (Mansfield, Schwartz et al. 1981) and the scope of patents (Klemperer 1989).

Meurer examines the case where a possibly invalid patent is licensed to avoid litigation threatened by another party. This includes the case where whether the infringer or the patentee is bluffing isn't clear. Kitti advances the theory that patent litigation is a lottery. Complaining about the cost and uncertainty of patent litigation is not a new idea though. Polanyi quotes a

reference in Nature (9th Nov. 1929) saying that "only millionaires can afford patent litigation". However, attitudes of courts do change and whereas formerly US courts were decidedly anti-patent this has been changing recently and courts are now more likely to find in favour of patentees particularly since the institution of the specialist CAFC in 1982 (The Court of Appeals for the Federal Circuit - mentioned earlier in Ch.2). Attitudes to litigation in Japan both of litigants and courts is also important and as we shall see can be a source of friction when it seems insufficiently in a non-Japanese plaintiffs favour (See references to the Fusion Systems on page 188). Klemperer studies the trade-off between Patent scope and length in order to draw conclusions about optimal profits for patentees with minimal social cost. This is a game theoretical approach and there is also further game theoretically based work on this and other such problems.

Mansfield's study of imitation costs (Mansfield, Schwartz et al. 1981) can said to be linked to appropriability since high imitation costs will deter attempts to design around patents. Mansfield identified that the variables, time to imitate and cost of imitation vary by industry and innovation but are highly correlated. Furthermore industry concentration is inversely correlated with imitation costs. Mansfield's study attempts to quantify the costs of designing around a patent. Of Mansfield's sample of patented inventions 60% were designed around in 4 years. However patenting only increased imitation costs by on average 11%. This average must be treated with care as it hides a sectoral increases of 30% for pharmaceuticals, 10% for chemicals and 7% for electronics. In some individual cases it can be substantially more. This last point emphasises that many unpredictable factors are associated with innovations and not least their appropriability and that such factors can vary considerably with inventions and industry sectors. This is shown very clearly in the data collected by the present work in Japan. A crucial point about this work though is that it emphasises the fact, well known to those who have to deal with them, that patents and other IPRs are not perfect and even if legally watertight have a limited lifetime determined by a variety of factors ranging from a patent's legal life to technical obsolescence. IP strategy therefore needs to bear this in mind when considering the subject of appropriation.

From an overall economic point of view though the broad conclusions of the existing literature are that IP & Patents in particular are neither the only important factor concerning innovation and appropriation nor a factor that can be dismissed as practically irrelevant.

### 3.3.4. Valuation of IPRs

The valuation of patents is important in making strategic decisions where the value of the assets involved is often the most critical factor in deciding strategy. Murakami whose work will be reviewed later in this chapter considers appropriate and clear methods for valuing IP to be an essential element of pursuing a creativity based model of competition (村上　輝安

1993). It is worth noting that the subject is thought sufficiently important in Japan to have prompted a report by an Institute of Intellectual Property committee on the valuation of IPRs and their use as security for loans (to compensate for the dearth of Japanese business angels, venture capital sources and other means of financing technology based start-ups) (知的財産研究所 1995b). The committee involved members from both MITI the Japanese Patent Office, Academia and major Japanese companies.

There are a variety of reasons why one would need to value an IPR. It might be for an investment decision, valuation of a stock price[33], a decision to file or renew an IPR, a licensing in or out decision, or simply to assess the overall economic benefit of IPRs. These reasons are not specifically addressed in most economic literature but they will be addressed here to avoid scattering what few references there are. The subject of valuation of IPRs is a complicated one though since there are no universally agreed and applicable methods.

The value of Patents to the economy as a whole has in general been dealt with by studies such as Silberston's which look either at a range of companies or at a range of industries and their patenting behaviour (Silberston 1987). A similar exercise has also been carried out for the copyright industry (Phillips 1985).

Another approach is that of Schankerman and Pakes (Schankerman and Pakes 1986) which looks at Patent renewal data to draw conclusions about Patent quantity and quality, among which is the finding that there are a lot of almost valueless patents and a few very valuable ones. This perhaps reflects the dilemma facing the patent agent deciding whether to file an application or save a small fraction of a total R&D budget. "If in doubt file" as one patent agent puts it (Grubb 1982), something which can be echoed by anyone else who has worked as a patent agent. Filing means more work for those in private practice and if they file anyway those in industry cannot afterwards be accused of not having sought the best protection possible for what later turns out to be an extremely valuable invention.

The potential disadvantage of the Schankerman and Pakes' study is that the authors say that one can directly assess the private value of the benefits of patents because "the renewal decision is based on the value of patent protection to the patentee". However, just as with deciding to file an application the decision to let one lapse is just as problematical. There is perhaps more information available to base the decision on but there will still be a tendency to say "if in doubt keep it in force" which may lead to an overvaluation. This is not because the value of the patent is known but because it may not be. It is the possibility that the patent

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[33]Following a court ruling that AMD could clone Intel's 486 chip, Intel's stock price immediately fell 15% and AMD's went up by a similar percentage (Black, 1993). More commonly though, where IPRs play critical but subsidiary roles in a business, their value is not easily calculated. Despite this it is possible to make some general comments about IPR values.

will become valuable that keeps many patents in force. Thus whilst for patents currently generating cashflow, renewal data will reflect their value, for many others it is not the patent's actual value in terms of extra cashflow due to monopoly pricing that is being subconsciously assessed but the option on potential monopoly profits that maintaining them represents.

A bridging and highly interesting piece of work between the economic view and the professional view of IPR valuation is the article by Pakes on treating patents as options (Pakes 1986). This approach uses an economic optimal stopping model with parameters based on data about renewal fees and renewal rates for patents. The model then produces estimates of the value of holding patents. The model works backwards to supposed patent values from the renewal data. As with most economic models it supposes rational behaviour and though Pakes does not say so it is not certain that the values implied by peoples actions are the real values. The method thus needs adapting to calculate the value of a patent application before one decides whether to make the application or renew the patent unless one is prepared to accept aggregated average valuations, and as seen earlier Patents can be highly variable in their value. Furthermore, since the data is aggregated at a high level, interindustry comparisons are not possible (though they should be in the future). The simple model which the results fit supposes that :

> Patents are applied for at an early stage with considerable uncertainty about future return, as time goes on the true nature of the patent emerges and it is either kept in force or dropped accordingly, most turning out to be valueless with the occasional "winner" (Pakes 1986).

This is what one expects from actual practice. However one aspect not accounted for in the data, is that when stating that the results show that returns to patents are nontrivial compared to R&D expenditure by private companies, the fact that significant portions of the patents granted in the countries studied are held by foreign nationals was not mentioned. This aspect will presumably have to await disaggregated analysis.

Whilst the practical applications of the above approach are not immediately obvious, another article of a more financial nature makes the link between options and at least the R&D producing the patents more explicit (Mitchell and Hamilton 1988). Mitchell and Hamilton in this paper consider R&D as an option and use this as a means to consider R&D projects. However, they do not show how such an idea can be used in practice nor how it can be quantified.

This could be a potential area of interest as valuing R&D options only requires knowledge of : the time to the exercise date (when the successful project would be commercialised), the present value of the cash flows from the project if successfully commercialised, the sum that will be required to commercialise the project if successful (the exercise price) and the standard deviation of the value of the project. Applying this to R&D projects, the non-trivial factors

are the time to the exercise date and the standard deviation. The time to the exercise date is a stochastic variable unless one says that the project must be finished by a certain date (a not unreasonable assumption in an age when the race to the market is highly important). The standard deviation though is difficult to predict - unless one uses some substitute such as standard deviations from technology stock. This is all basic option pricing which can be found in Brealey & Myers (Brealey and Myers 1984).

On the other hand one idea that may preclude a practical solution to this approach to valuation is the distinction between risk and uncertainty pointed out by North quoting Arrow (Arrow 1951) and Lucas (Lucas 1981). The latter of these said "in cases of uncertainty, economic reasoning will be of little value". North points out that Frank Knight (Knight 1921) made a fundamental distinction between risk and uncertainty for the former of which it was, given sufficient information possible to derive probability distributions of outcomes and for the latter of which it was not. If the processes involved in the success of innovations and on which the value of IPRs depends are in fact purely uncertain not merely predictably risky then it may not be possible to derive any forecastable value for IPRs at all. In any event, applying option pricing to patent renewal and application decisions in a practically useful way is something that hasn't been done to the extent that a Patent Department would use the method yet and this could be an interesting area of study[34] and more practically there are numerous other more standard methods of financial valuation which are also used to value IP.

The bulk of these other valuation methods use DCF methods to assess the value of projects. (Neil 1988) for example uses a DCF method to establish bargaining limits which give boundaries for possible values of the IP involved. Outlines of bare DCF methods, some pointing out the pitfalls, are fairly numerous in journals for professionals who may not be too familiar with them (Parr 1988) (Hodder and Riggs 1985). A further line of valuation literature is that specific to licensing negotiations (Pasricha and Butters 1989), (Cronin 1989), (Bowler 1989), (Root and Contractor 1981). Root and Contractor outline considerations affecting bargaining positions concerned with value. They point out that much negotiation involves satisficing not maximising behaviour and that there is little attention to opportunity costs.

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[34]The difficulty arises because the value is contained in hard to value options on the potential future benefits which might flow from the IPR or putting it another way in the potential future benefits and an option to abandon the application or patent. This is discussed in more detail in a working paper I have written on the subject. (Pitkethly, 1993). There is however, considerable scope for examining a number of issues in the field of patent management using an option valuation perspective. One example is the case of the high number of Japanese Patent applications. One usually unconsidered factor is the value conferred by Japan's deferred examination system. Japanese Patent Law, unusually among the world's major patent systems, allows deferral of a patent application's examination for up to seven years (Art.48.III). However, being able to defer a decision confers a valuable option. The deferred examination system in Japan must therefore act at least as a potential incentive to file patents which in a less flexible system might not be filed because they would be less valuable. It is very unlikely that any Japanese Patent Manager at present conducts a full option based valuation before filing a application. However, acting on a feeling that things could change in seven years, is in effect such a valuation.

In some senses a key observation is that those methods of valuation of IP which work best are only those which apply to assessing how valuable a currently valuable patent is. For example in assessing the potential value of an extension of patent term on a valuable pharmaceutical where current sales and monopoly profits are relatively easy to assess. Such methods are likely to be used in relatively few cases by teams of consultants or senior managers specifically assigned to studying a particular case. However, in the more common case of a Patent Department employee trying to decide whether to renew an unused patent or sue an infringer, methods of valuation are little used and probably little understood either.

A final angle on valuation of IP is provided by a reasonably large body of literature based on studies of Patent statistics and stock market prices. (Griliches 1981), (Griliches 1984), (Pakes 1985), (Cockburn and Griliches 1988), (Abel 1984), (Ben-Zion 1984). Griliches found that unexpected changes in the patent and R&D series are associated with quite large movements in stock prices though the majority of the variance in stock prices is, not surprisingly, unrelated to inventive activity. Ben-Zion found that Patent intensity (Industry patents/Industry book value) for the relevant industry not the particular firm were correlated positively with the market value of a particular firm in the industry. However, one disadvantage with using patents to give information about stockmarket prices is that there is often a considerable lag between filing or publication of patent applications and successful commercialisation of the inventions concerned. More interesting perhaps is the fact that especially towards the latter half of a long lived patent when the value lies mainly in the expected cashflow not in any option value (i.e. the variability is relatively low) the incidence of any invalidity action concerning it will put it in a position where the major variable in determining the patented products value will be the court case, raising the possibility of lawyers becoming part-time stock market analysts. The implications of this body of literature for the present work are that there is considerable uncertainty involved in many decisions relating to IPRs, especially early on in the life of a patent. This uncertainty is linked partly with the fate of the technology concerned and partly with the fate of the IPR concerned. It will be interesting to see how decisions which deal with such uncertainties are handled and who they are made by.

### 3.3.5. Licensing

Licensing is a topic which has been studied from many viewpoints. One of the earlier studies of the subject was by Arrow who wrote about the transmission of knowledge (Arrow 1969). In so doing, he likened economists and sociologists studying the diffusion of innovations to blind men studying an elephant. Licensing is however a valuable way of learning about technological developments according to a study by Levin. This used a survey of R&D executives who thought it the most effective method of learning about new technology (Levin 1988). In this context it is interesting to contrast the learning strategies of different Japanese automobile companies in the 1950s/60s. Toyota took the view that it wanted to avoid licensing

wherever possible and to learn from publicly available information, accessing what was in the public domain and modifying parts to avoid patents and IPR protection where needed. Nissan however entered licensing deals with, for example, Austin in the UK with the aim of avoiding the potential setbacks inherent in initially developing technology oneself (Cusumano 1985). Both approaches have advantages and disadvantages and which is most suitable for a company depends a great deal on circumstances and the terms that can be negotiated.

There are also several papers which use game theoretical methods to study the subject. Typical of these is Shapiro's work (Katz and Shapiro 1987), (Shapiro 1985). However, in the latter paper he states that : "drastic innovations allowing the inventor to enjoy a monopoly will not be licensed and that an innovation that is nearly drastic will also not be licensed but that it will be profitable to license small innovations". It is interesting to consider this theoretical finding in the light of cases of exploitation of inventions such as the EMI CAT Scanner and Pilkington's float glass both of which were drastic inventions (Houndsfield won a Nobel prize for the scanner). However, EMI did not initially license their invention when trying to exploit the US market critical to success and ultimately ended up selling the business just as Houndsfield received his Nobel Prize (Business Week 1980) (Berggren 1985). In contrast Pilkington's float glass process was extensively licensed and probably because it was licensed, enabled the company to dominate the business (Barker 1977). So, interesting though game theoretical models are, they can sometimes fail to fit all cases.

One possible answer to the general idea of licensing by a player in a strong position is that a player in a market may license entrants (with sub-optimal technology) to prevent them developing their own improved processes. (Gallini 1984). The critical feature is the licensor's attitude. If they intend to learn as much as possible without becoming dependent it will result in a different outcome from the player who uses the R&D costs saved from the licensing agreement for its next P&L statement not its next R&D budget. Obviously the extent of learning possible depends on the agreement but the attitude is also critical.

Transaction costs are obviously a relevant factor in licensing deals. However the departure of licensing from a perfect market situation (also discussed by McGee and others (McGee 1966)) is not confined to transaction costs. Also relevant are : small numbers of participants, impacted information and opportunism, uncertainty and risk aversion. These factors and those that favour licensing over direct investment, especially abroad, are reviewed by Caves et al. (Caves, Crookell et al. 1983). Caves et al. also considers the point of view of licensees vis a vis licensors with the possibility that the licensees emerge better off and with the licensors unable to extract as much rent as they might expect. This may well have been happening with licensees in Japan over a considerable number of years and given rise to recent increases in license fees by US licensors, as mentioned earlier. International licensing also overlaps into the field of technology transfer (e.g. see (Teece 1977)) however this is a

distinct field from the present one and by and large is less concerned with strategic issues than with issues of efficiency of transfer.

Overall the study of licensing from an economics viewpoint does not give immediate practical solutions. However the above references and others associated with them should be taken into account in considering licensing strategy theory.

## 3.4. Game theoretical studies concerning IPRs

The main areas in the study of IPRs where game theory based studies have been used are :

- R&D
- Patents
- Patent Scope
- Patent Breadth
- Litigation.

The first place to start when considering the issue and relevance of game theoretical studies to business strategy is with works which address its practicality. Three papers on this appeared in the Strategic Management Journal in 1991:(Saloner 1991), (Camerer 1991), (Postrel 1991).

Postrel's work aims at ridicule (or humour depending on one's viewpoint) but with the aim of distinguishing between what Game theory can and cannot be. Its aim is to construct useful models, instil some rigour into thought and test explanations. It cannot be all encompassing. Saloner, is less critical and identifies areas where game theory might be introduced into strategy studies. These include : resources and the firm, contract theory, the appropriate boundaries for the firm and strategic groups. The former two are directly relevant to IP, firstly IP as a resource of the firm and secondly contracting (or not) for complementary assets when trying to appropriate returns.

Camerer criticises researchers ignorance of game theoretic methods, but notes that they don't result in testable generalities and assume players are rational. He also concludes that game theory does not provide sound advice for managers but can answer some useful questions.

It is beyond the scope of this review to discuss game theory literature in further detail but the following areas of interest relevant to Patents and IP exist:

| | | |
|---|---|---|
| Patent Races | : | (Fundenberg, Gilbert et al. 1983), (Vickers 1985), |
| Licensing | : | (Katz and Shapiro 1985), (Gallini and A. 1985) |
| Technology Transfer | : | (Gallini and Wright 1990) |
| Pricing & Patents | : | (Hausman and MacKie-Mason 1988) |
| Patents & Deterrence | : | (Gilbert 1981) |
| Patent Scope | : | (Klemperer 1990) |
| Patent Duration | : | (Gilbert and Newbury 1982), (Gilbert and Shapiro 1990) |
| R&D | : | (Reiganum 1984), (Folster 1986), |

Despite the intellectual elegance of some of the models there is a tendency for them to be distanced from reality by the assumptions required to reach a solution. Nevertheless they definitely have a valuable role in prompting new ways of looking at IPR related problems.

## 3.5. Areas of Interest

Two areas of interest within the economics literature reviewed above include :

i) Using option pricing approaches to increase IP related decision making power under conditions of uncertainty. This would constitute a complete thesis on its own and will not be pursued here.

ii) Using insights from game theoretical approaches to inform discussion of various strategic options facing firms.

However, the three others which are most relevant to the present research objectives of description, comparison and theory extension outlined earlier are :

iii) The extension and updating of the research concerning IP management issues in Silberston's 1973 survey on use of the UK Patent system.
(relevant to description and comparison of IP management).

iv) The role of IP as a resource within resource based theories of the firm.
(relevant to extension of theories of IP management).

v) The application of dynamic and time based theoretical considerations in economics to practical situations involving IPRs (relevant to extension of theories of IP management).

# 4. Business Studies

In a sense much of the following literature could be classed as applied economics. However the emphasis of most of it is sufficiently different for it to be treated separately.

## 4.1. Business Strategy

### 4.1.1. Business strategy & IP

One of the initial reasons behind this research was the lack of books and research linking Business strategy with IP. Within the main business strategy literature the two type of references which come closest to this linkage are : firstly, those dealing with the management of resources and IP's role as a resource, and secondly, those dealing with the ability of a firm to appropriate returns from IP by use of IPRs and other means.

These apart, I am only aware of one English language book which attempts to bridge the

entire subject. The book, written by Momberg and Ashton (two South African Patent lawyers), is wide ranging and not written from a purely legal viewpoint, even though it quotes legal cases extensively (Momberg and Ashton 1986). The book was reviewed favourably in the Japanese language edition of the AIPPI journal in 1987 (五月女　正三 1987). Momberg and Ashton argue that:

> "i) First, the means of real production in any business is, on a proper analysis its intellectual resources or property;
> ii) secondly, this property is effectively transferred to competitors against the will of the business apparently possessing it; by provoking imitation and refinement; and
> iii) thirdly, if this property is not strategically perceived and managed from the outset of business planning, there are significant dangers not only of appropriation by competitors, but of actual dispossession."

In stating their aims they say :

> "neither text books nor any branch of IP law describe the use of IP in the marketing arena. At the same time works which present precedents for licensing with commentaries on IPRs do not meaningfully provide a key to the scope of IP as a business instrument."

and that they hope to fill that gap in the literature and identify practices which use IP creatively. Unfortunately, though many examples of successful and unsuccessful IP use are given, the general principles above are not clearly expanded. However, they do state that IP should not just be considered as a right to be possessed but as a right to be exploited. It is not sufficient, the authors argue, for businesses to treat IPRs as something to be considered only when someone else tries to infringe them. Consequently, they argue that since such an attitude induces avoiding action, some more creative way of managing IPRs must be found if their benefits are to be appropriated. This is a valuable insight but which can be put more succinctly by saying that IPRs are not to be used purely for defensive / protective purposes in business strategy because ultimately such attempts cannot succeed in the long term.

In an obscure way the book seems to be saying what is said considerably more clearly in much of the conventional writing on appropriation of R&D returns. At one point it expressly states :

> "When practical barriers to competitive entry are closely tailored to the protection available from IP law, the effect can be devastating for would-be competitors."

Furthermore, in relation to a case study involving Sony it mentions that :

> "Optimal business design stems from intelligent use of all available productive resources, even if many of the resources are not owned or sophisticated"

which is not far removed from the ideas behind the use of complementary assets in exploiting IP. It is unique though in giving a primacy of place to IP in the strategy of a firm and though

they do not discuss it, their approach could be said to be linked with resource based ideas on business strategy.

As with Momberg's emphasis on a creative approach to IP strategy; in more general business strategy similar dynamic emphases have been emerging. Porter in a recent article (Porter 1991) about dynamic theories of strategy outlines three potential lines of enquiry : game theoretical models, commitment and uncertainty based approaches and resource based views. He emphasises, though, that the resource based view cannot be pursued in isolation from market positioning. Resources are said to be valuable because they enable activities to be performed which give rise to competitive advantages. This is reminiscent of the work of Penrose quoted earlier in which inputs provided by the firm are services rendered by the resources. Porter draws a link between the imitability or otherwise of resources and barriers to entry thus linking the resource concept to his earlier work on industry structure (Porter 1980). However, despite dealing with resources in general terms, IP and associated IPRs are not addressed anywhere in any of Porter's work. Even when writing about Technology and Competitive Advantage (Porter 1985) he does not include IPRs as a specific entry barrier.

One might justify such an omission by claiming that IPRs are ineffective but it is perhaps one of the central ideas behind this work that neither the extreme view that IPRs and IP are practically useless concepts one can ignore, nor the view that IPRs are of extreme importance for being the only way to protect IP and appropriate its returns is correct. I would contend instead that IP and IPRs are extremely useful when managed as a resource amongst other resources and as part of an overall strategy. Such a strategy should be aimed at gaining the maximum benefit possible by fully utilising the IP and other resources of a firm to exploit markets it operates in. Conversely, any strategy which fails to take account of IPRs is going to be at best sub-optimal and possibly fatally flawed. One has only to have experienced seeing someone have to close down their business or abandon costly investments because of litigation they could have avoided had they incorporated a consideration of IPRs into their initial thinking to see its importance, something which some high value Patent Litigation has brought home rather forcibly to many companies. This has been particularly so with Japanese companies subject to litigation by US companies in recent years and has contributed to the increased public profile of IP and patents in Japan. There is, thus, a need for a view of business strategy which incorporates IPR issues and the approach which seems best suited to that are those based on a consideration of a firms resources which will now be discussed.

### 4.1.2. Resources

Resource based views of business strategy range from more economics based views characterised by Penrose, Dasgupta and Wernerfelt, (Dasgupta and Stoneman 1987), (Wernerfelt 1984) to those concentrating on general (Hamel and Prahalad 1990) and specific (Barney

1991; Conner 1991; Grant 1991b; Peteraf 1993) strategic concepts as well as those treating IP or "technology" as a specific resource (Pitkethly 1986; Hall 1989a).

Dasgupta and Stoneman describe "Knowledge as a commodity" in a short introduction to a book of collected papers dealing with economic policy and technology. They describe three features as being particularly notable :

> "that knowledge has the attributes of a public good, that there are strong scale economies in its production and use, and that the uncertainties involved in its use and production are acute."

The comment about scale economies could be linked to database sales through electronic networks and those about uncertainties to earlier comments made here about option based views of patents.

Wernerfelt ties a concept of a resource as "anything which could be thought of as a strength or weakness of a firm" to a Porter type treatment of entry barriers to arrive at a treatment of dynamic resource management in sequential entry into new markets (Wernerfelt 1984). Entry barriers however are distinguished from "Resource position barriers" which concern possession of resources not a market position and thus could refer to a position within an industry. M&A deals are also identified as a means of trading resources. In a later paper (Wernerfelt 1989) Wernerfelt draws links between critical resources and corporate strategy. In this, the search is for "Unique resources". Among these Wernerfelt distinguishes between those with i) fixed long-run, ii) practically unlimited, and iii) limited short-run but unlimited long-run capacity. The latter are identified as mainly cultures or team effects but those practically unlimited are said to include patents and brand names. One might dispute the description of patents, (which individually have a legally limited lifetime) as of unlimited capacity (though a registered trade mark - which can usually be renewed indefinitely - might be) the recognition of such IPRs as a resource is encouraging. Use of resources is distinguished into Independent, paired and customized applications. Paired applications are seen as those requiring co-specialised assets something referred to by Teece in connection with appropriation. However, though this approach identifies the need to analyse and use a firms critical resources the aspect of retaining control of these critical assets is not directly considered.

A more general approach to resources, though it does not use the word explicitly, is Prahalad and Hamel's article on "Core Competence". The definitions of this concept included in the article (Hamel and Prahalad 1990) include :

> "Core Competences are the collective learning in the organisation, especially how to co-ordinate diverse production skills and integrate multiple streams of technologies"
>
> "Core Competence is about harmonising streams of technology, it is also about the organisation of work and the delivery of value"

"Core Competence is communication, involvement and a deep commitment to working across organisational boundaries"

Later in the article, the phrase "Imprisoned resources" is used to describe core competencies which become trapped. The authors' treatment of "Core Competence" is thus a revisiting of resource management. In this case, mainly macro-assemblies of intangible organisational, cultural and technical skills resources and intentions. Imitability and thus implicitly appropriation is discussed, as is the search for licensing deals as a means of building missing capabilities and as a first step towards building competencies. This is similar to the idea of acquiring complementary assets discussed by Teece (see 4.1.3) In a sense therefore, core competencies can be seen as a search for valuable resource bundles. There is also some interesting work which acts as a bridge between the competencies approach and studies of patent and other literature which uses Patent data as part of a way of measuring core competence in technically based organisations (Miyazaki 1994).

Barney and Conner both writing in the same issue of the Journal of Management (Barney 1991; Conner 1991) talk about the links between Resources and Competitive Advantage and the relationship between Resource Based theory and other theories of the firm. Barney discusses four indicators of the potential of resources to generate sustainable competitive advantage : i) value, ii) rareness, iii) imperfect imitability and iv) sustainability. Before this, along with Wernerfelt and Rumelt, Barney stresses two main assumptions of resource based theory, that firms in an industry are heterogeneous concerning resources and that those resources are not perfectly mobile. The imperfect mobility of resources ties up with the friction implicit in Williamson's transaction cost approach. The sustainability of a competitive advantage though is difficult to define; the problem lying with the length of time required for the advantage to qualify as sustained. Barney quotes Rumelt and Lippman (Lippman and Rumelt 1982) saying that the definition is one of equilibrium so that the length of time is unimportant. However, Barney then says that saying that a competitive advantage is "sustainable" does not imply that it will "last forever". It only suggests that it will not be competed away by other firms efforts and that "Unanticipated changes in the economic structure may make what was, at one time, a source of sustained competitive advantage, no longer valuable..... 'Schumpeterian" shocks - redefine which of a firm's attributes are resources". The real conclusion one can draw from these definitions of "sustainable competitive advantage" is that in the long run virtually all competitive advantages are unsustainable. Sustainable competitive advantages are to be pursued but when companies rely on them and take them for granted, they become a dangerous source of complacency - like laurels they are not to be rested on. The main link though between Barney's paper and IPRs lies in the area of "Imperfectly Imitable Resources". This is where IPRs may provide a reason for imperfect imitability. However even when dealing with scientists "uniquely positioned to create or exploit a significant scientific breakthrough" it is seen that the imperfect imitability will

derive, according to Dierickx and Cool, from one or more of (a) the ability of a firm to obtain a resource being dependent upon unique historical conditions, (b) the link between the resources possessed by a firm and a firm's sustained competitive advantage being causally ambiguous, or (c) the resource generating a firm's advantage being socially complex (Dierickx and Cool 1989). IPRs are not mentioned, even though technology protected by IPRs is within the definition of "rare" resources mentioned.

Conner, compares the resource based view with other theories of the firm. In doing so Conner quotes Schumpeter on the inadequacy of a static view of competition.

> "The essential point to grasp is that in dealing with capitalism we are dealing with an evolutionary process... The fundamental impulse that sets and keeps the capitalist engine in motion comes from new consumers' goods, the new methods of production or transportation...". (Schumpeter 1942)

And emphasises the "process of creative destruction" allied with radical innovations as described by Schumpeter. This again emphasises the dynamic aspects of technological competition but not specifically in relation to IPRs. Conner does however mention IP's role mentioning the specific nature of many intangible assets, Itami's "invisible assets" and Prahalad and Hamel's work on "core competences". However in recognising the role of intangible property Conner only quotes Rumelt's concept of "isolating mechanisms" (Rumelt 1984) and the fact that IPRs can form isolating mechanisms. Conner concludes by deciding that the resource based view constitutes a new theory of the firm distinct from the others reviewed. Relevant to outsourcing IP departments (or any other department for that matter) is the distinction drawn between transaction cost and resource based theory. The former is seen as assuming that the same productive activity can be carried on either within the firm or by a collection of autonomous subcontractors (though a contrary view could be taken), whilst in the resource based view team-specific assets within the firm will be more specific to other teams in the firm than to those outside and thus more productive. Thus the firm specific nature of the resources provides an incentive for operations requiring liaison between teams or in-firm resources, to be performed in-house not subcontracted. This, the reinforcement of the relevance of Rumelt's observations and the confirmation of resource based theory as a useful basic theory are the main IP related factors in Connor's article.

Mahoney and Pandian review the resource based of the firm in the context of strategic management. They also refer to Rumelt's "Isolating Mechanisms" as an analogue at a firm level of industry level entry barriers (Caves and Porter 1977) and industry group level mobility barriers (McGee and Thomas 1986). Alchian is given as the sole reference to "Patents, trademarks and copyrights" being an isolating mechanism (Alchian 1984). Teece's work on Co-specialised assets is also referred to separately. Mahoney and Pandian's observation of two different ways of explaining heterogeneity among firms is important :

> "One approach is to integrate the resource-based view with the organizational economics and dynamic capabilities approach (Teece, Pisano et al. 1990), in which heterogeneity is explained as the outcome of a disequilibrium process of Schumpeterian competition (Iwai 1984), path dependencies (Arthur 1989), first mover advantages, irreversible commitments and complementary or co-specialised assets (Ghemawat 1986; Teece 1987; Grant 1990; Williamson and Winter 1991).
>
> A second approach utilizes the equilibrium models (Shapiro 1989) of industrial organization to explain the nature of the heterogeneous firm. Lippman and Rumelt (Rumelt 1982), for example, generate an equilibrium in which firm heterogeneity is an endogenous outcome due to isolating mechanisms and uncertain imitability."

However, this is followed by the comment that :

> "An advantage of the disequilibrium approach is that time may be viewed as the fourth dimension of resources (along with land, labour and capital, broadly defined). Time and attention are scarce resources (Becker 1965; Simon 1976) and are sources of competitive advantage that are neglected in single period equilibrium analysis. " (Mahoney and Rajendran Pandian 1992)

This brings the parameter of time into a resource based discussion of the firm which also includes IPRs as isolating mechanisms. The linking of time and IPRs is not made directly but the fact that both are considered in the same discussion is relevant. The article ends by rejecting "intellectual isolating mechanisms" forming barriers between different views of the firm and questions whether "rare inimitable resources can be a source of sustained group advantages". It might therefore be interesting to study the linkages between IPRs and industry group "isolating mechanisms", for example IPRs role in standard setting.

Peteraf builds on almost all the preceding authors including Barney, Connor, Rumelt, Wernerfelt Teece and others and builds a model of resources and firm performance (Peteraf 1993). The four key factors identified are i) resource heterogeneity, ii) ex post limits to competition, iii) imperfect resource mobility and iv) ex ante limits to competition. Again Rumelt's "isolating mechanisms" including property rights of various kinds are identified as one type of ex-post limit to competition. However Peteraf discusses the role of IPRs for example licensing, in more detail when considering the applications of the model :

> "A resource based perspective may also help a firm in deciding whether to license a new technology or whether to develop it internally. If the technology is imperfectly mobile in the sense that its potential value cannot be well communicated to others because of the risk of revealing proprietary information, it might be best be developed internally. Alternatively its marketability might depend upon co-specialised assets such as long established relationships with vendors who are reluctant to switch to other suppliers. If the co-specialised assets are held by the firm and are themselves immobile, internal development may still make sense. If the innovation is perfectly mobile, the innovators could do no better than to license the technology.
>
> Decision making would also be enhanced by considering how imitable the innovation is. If the innovation is no more than a clever and complex assembly of relatively available technologies, then no wall of patents could keep opponents out. Recognising this vulnerability, a manager might want to think more carefully about the length of the expected entry lag and whether or not there may be some advantage possible

> due to firm-specific learning or asset mass efficiencies. He might consider trying to use his head start to build other co-specialised resources that are less available (say a reputation for service on the new technology)." (Peteraf 1993)

It is worth mentioning what is patentable. In most countries an obvious collection of known parts would be unpatentable so if the "clever and complex assembly of relatively available technologies" was actually obvious there would be no wall of patents as Peteraf says. However, if the "clever and complex assembly" was inventive and not obvious, then there could be a patent which could stop others making the same assembly of parts. Yet again, if the individual technologies are patentable and not available or if more advanced and desirable versions of them can be developed which are patentable, a wall or rather net of patents may still be possible. Issues of infringement and validity can be much more complex than Peteraf makes out.

What one can say is that, as Peteraf correctly says "Decision making would also be enhanced by considering how imitable the innovation is". Sometimes as in the case of the original IBM PC there is little that is protectable - in that case just the BIOS chip was protected by copyright owned by IBM and even that could be designed around eventually. On the other hand as in the case of a well protected pharmaceutical it may not be possible to design around the patents at all. More often than not the situation is somewhere inbetween with the degree of imitability depending very much on the facts of the case. In the case where the degree of protection available is very low then Peteraf's conclusions about thinking about time to market considerations and use of co-specialised resources is valid, however this does not go much beyond Teece's more detailed discussion of co-specialised assets save to bring time into a discussion of the IPR strategy.

Perhaps the most recent discussion of firm theory using a resource based approach is that of Garnsey which proposes a new theory of the growth of the firm in which firms have to access, mobilise, generate and accumulate resources as well as overcome reversals, and competition in order to achieve sustained expansion (Garnsey 1996). The concept of resource access and mobilisation is closely linked to issues of appropriability in the case of technology based ventures as Garnsey suggests :

> "Competition among emerging firms is for funds as well as for customers. While new firms are struggling to obtain funding and to generate further resources, imitator firms will copy a successful product unless some means of protecting the intellectual property it embodies has been found. "(Garnsey 1996).

This has implications for firms ability to assemble particular resource mixes from an existing set of resources and is directly relevant to a recent Japanese IIP study which looked at IPR valuation in order to make it possible to use assessments of IPR value in raising finance for new innovation (知的財産研究所 1995b). However a further aspect of this paper is the

concept of a "maturity" phase of development when :

> "Rigidities set in over time in the firms' routines and members' outlook (their mental maps), which make it difficult for members to acquire new skills and competence or even to perceive changing conditions, thus preventing a shift in the firm' s capability." (Garnsey 1996).

The mental maps referred to here parallel the patent maps which form a key element in Japanese IP management. It is thus conceivable that Japanese company attention to continuous patent mapping and more general technology information management enables members mental maps to remain up to date as well.

Another form of resource orientated approach to business strategy is reviewed by Grant (Grant 1991a). The analytical framework recommended starts with identifying a firm's existing resources. It then searches for better uses for them, identifies the firms ability to exploit those resources and assesses their rent generating potential, appropriability and sustainability. Finally it selects a strategy which best uses the resources and capabilities relative to external opportunities after identifying and filling any remaining resource gaps. The third step of assessing the rent generating capability of the firms resources and their appropriability and sustainability seems an end in itself without the additional step of taking any measures necessary to increase that appropriability or sustainability. There is also no provision for assessing whether the resource sustainability position is capable of change just as the resource position itself is (through the feedback loop search to fill resource gaps).

However, Grant identifies Durability, Transparency, Transferability, and Replicability as key features of sustainability. Regarding appropriability Grant concentrates on considering the division of ownership of skills between a firm and it's employees[35]. One aspect which Grant discusses in looking at Strategy formulation, is developing and renewing a company's resource base, either to fill gaps or renew existing resources. This is important in the field of technology and the faster moving the field is, the more important such considerations are. Whatever the speed of progress though, the idea of a rolling wall of patents and other means of appropriation to help keep a firm permanently several steps ahead of its competitors would fall within this objective. The example of Xerox's protection of its photocopier business is one example (Ghazanfar, McGee et al. 1986). However, as Canon found out when trying to enter the photocopier market, not all walls are unending. This saga is referred to by several authors. S.Garai, Chairman of Canon Corp. is quoted on this by Kahaner (Kahaner 1992). Here again we come across the question as to whether the rolling wall is driven by continued technological progress, which it cannot exist without, or whether the search for new and protectable technology

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[35]A knowledge of the relevant law is essential for concrete statements to be made (for example in the UK judgements such as that in Facenda Chicken Ltd. v Fowler ((1986) 1 All ER 617) are relevant in deciding who is entitled to use what after their employment ends).

is being driven by the incentives and opportunities offered by the IPRs involved. However, such a distinction is perhaps not as useful as saying that any consideration of such issues must involve a consideration of the IPR issues involved.

In his book entitled "Mobilising Invisible Assets" Itami classifies knowledge into three types : environmental, corporate and internal (Itami 1986). He emphasises the importance of asset accumulation, particularly of invisible assets, in terms of information flow and ensuring that strategic decisions promote such flows. He refers to patents as a means of creating barriers to entry. However, the key feature is the discussion of "invisible assets". These might be compared with the underlying intellectual assets which IPRs protect and which I have identified as a form of business resource (Pitkethly 1987). The work is, thus, more relevant to this work than might at first appear. An interesting concept is that of managing intellectual asset stocks to ensure a dynamic imbalance, so that efforts to redress the imbalance act as a spur to progress. In the context of IP strategy this is another suggestion that a dynamic view may be helpful and also a reminder that even invisible and intangible assets need management and maintenance to ensure they are not exhausted. This is especially true with IPRs which are very much resources wasting due to expiry, technical progress or competing technology.

Other treatments of specifically technological resources or assets exist (Adoutte 1989), (Staley 1990) but these are little different from articles dealing with technology licensing (Adoutte 1989) or technology strategy in general (Staley 1990).

Finally there is a small body of literature dealing with resources under the heading of Intellectual Assets (Hall 1989b), Intellectual Capital (Stewart 1991) and Intellectual Property (Hall 1989a) (Alster 1988) (Pitkethly 1987). Hall categorises intellectual assets into i) those having property rights - Intellectual property and ii) those without property rights - defined as knowledge. So far as management of intellectual assets is concerned Hall advocates a process of identification, retrieval, processing, transmission and storage of various type of knowledge. In conclusion he states :

> "Recognition of the fact that every commercial activity is shadowed by opportunities to enhance the intellectual asset base, or to degrade it, leads to a concentration on the accumulation of intellectual assets in the core competency areas.
>
> Whilst the importance of intellectual assets is implicitly accepted, like the value of motherhood, the fact that there is little research and education in the subject suggests that a more formal recognition is overdue. In particular the role of intellectual asset management in business policy needs to be more clearly understood". (Hall 1989a)

Finally Stewart and Alster extol the need for management of a company's intellectual capital, in Alster's case concentrating on the opportunities for using IPRs in the new supportive US legal climate and on the idea that strong foreign competition comes from weak IP protection.

In 1987 I listed people, financial resources, physical property and IP as the set of resource types from which a firm had to select the resources it was going to use to carry on business (Pitkethly 1987). The view taken was more that of a start-up operation choosing between sub-contracting and manufacturing in-house than of an established business with a given set of resources to manage. However, I cited the case of the IBM PC as an example of a system where the manufacturer had bought in a large number of components and not been in full control of the IP concerned. This was contrasted with the PS/2 case which was about to be launched with a deliberately higher proportion of proprietary components. It would be interesting to look closer at the final outcome of this attempt to keep more control of the IP and try to assess which of the two strategies proved the more profitable (one difficulty would be that the nature of the competition would not be comparable). However, it does not appear that the PS/2/OS/2 system has been as successful as it's hardware or software competitors.

Two aspects of interest in such cases are the extent to which making something available to other manufacturers increases returns to the innovator and the extent to which keeping a tight hold over any IP reduces returns rather than increases them. In the case of the original IBM PC most of the benefits seem to have accumulated to Microsoft the provider of the protectable DOS operating system. The more proprietary PS/2 system has not become nearly as successful and perhaps in consequence the OS/2 operating system has likewise has failed to gain the same level of popularity. In a sense the very non proprietary nature of the majority of the components of the original PC encouraged its adoption. The ability of competitors to design around those which were protected to some extent such as the BIOS chips left the benefits of the computer's success to go to those who could best exploit the only protectable components - the operating system and application software. It is interesting to note that IBM's competitor Apple had until recently resolutely refused to license its operating system software and thus in direct contrast to the IBM PC case kept an absolute monopoly over the production of CPUs for its computers. However it is now licensing its' operating system and licensed clone products have appeared (Piller 1995). Interestingly this follows the loss of a major copyright case aimed to trying to curtail Microsoft's use of windows GUIs[36] in Windows.

A much more up-to-date example of free licenses being highly successful is the Netscape Corporation which was floated on NASDAQ for $1.07bn in August 1995. One key to it having obtained a 70% market share of the internet browser market was to "give away" the browser to certain individuals whilst charging companies for using it. This combined with a technical lead over the 20 or so rivals enabled Netscape to outpace them all in a matter of months (Bowen 1995). An interesting sequel is that having gained a 70%+ marketshare and whilst the standard setting body for HTML[37] (the language used in World Wide Web pages to

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[36]Graphical User Interface

[37] The Internet Engineering Task Force (IETF),

be read using browsers ) was thinking about a new standard, Netscape started to make its own additions to HTML standards which are incompatible with many other browsers (Chand 1996). This can make other browsers incapable of reading pages written according to Netscape's standards thus effectively locking out competitors and locking in Netscape's market share advantage. An interesting recent twist to the story though is that Microsoft is now distributing it's browser Internet Explorer free to all and not just academics. As one commentator put it : "In the odd marketplace of the Internet, economics invert: There is a free lunch, and you get infinitely more than you pay for." (Schwartz 1996). This shows that the benefits of IPRs are not just in conventional direct monopolistic exploitation but in their more general use as *control mechanisms.*

The Netscape example is one in many ways concerned with first mover advantages, pre-emption and, appropriately, network effects. However more generally, given certain preconditions free, licensing even to competitors (as opposed to customers as in the Netscape example) might be generally more beneficial than "ultimately futile attempts" (as Momberg would put it) to totally monopolise an invention. If the cost of a licence enabling competitors to avoid designing around the invention costs less than the costs of designing around then providing such licences are available before competitors have made irreversible development cost commitments and providing the licensor does not sacrifice too much lead time, the overall benefit of licensing may be greater than letting competitors learn by designing around and possibly even developing something better. This is particularly so if the deal is struck in such a way as to minimise real licensee learning. By doing this one is not throwing away one's IPRs but using them more subtly than by just refusing would-be licensees. This should be compared to Shapiro's and also Gallini's work.

The conclusions one can draw from looking at the literature on resource based views of the firm is that IPRs are but one element in a complex set of factors defining the limits within and by which the scope of a firms possible future actions are contained. IPRs are without doubt one of Rumelt's "isolating mechanisms" (Rumelt 1984) and yet IPRs have a wider role than just being an isolating mechanism. IPRs are thus recognised in the literature as having a role in a resource based view of the firm even though that role has not been fully developed.

IPRs encompass not just the mechanism to isolate resources but often define the underlying resource itself. They are more in the nature of *control mechanisms* than just isolating mechanisms. IPRs are also impermanent and their effectiveness depends on many factors. However, the connection between the various factors which dictate their effectiveness as isolating or control mechanisms is the subject of the following section on appropriation of returns using IPRs.

### 4.1.3. Appropriation of returns

The key area in the existing literature relating to IPRs and business strategy is that concerning the appropriability of the IP concerned. This is not an area that has been much written about, though there are a few influential articles notably (von Hippel 1982), (Teece 1986a) and (Levin, Klevorick et al. 1987). There are also articles in the technology strategy field which deal with improving returns from R&D. However, Foster in writing about improving such returns does not even mention IPRs or patents (Foster, Linden et al. 1985).

Von Hippel's work is concerned with showing that the degree of appropriability of an innovation will affect where that innovation will be made. Several interesting figures came out of the study though. It quotes some findings confirming Silberston's that most fields apart from pharmaceuticals do not find patent protection of significant benefit. Von Hippel only identifies three possible means of appropriating a technical advance : Patents, trade secrets and "response time" or speed of exploitation relative to competitors. This is obviously far short of the real number of ways in which one can help appropriate an innovation. (E.g. Manipulation of standards issues, licensing old technology to competitors, design rights, trade marks, copyright, selection of competitors to hinder competitive R&D, control of co-specialised resources, etc.)

Levin, Klevorick, Nelson & Winter et al. (Levin, Klevorick et al. 1987) wrote specifically on appropriating R&D returns and carried out an extensive survey of "High level R&D managers" seeking their opinion as to which method of appropriation was best. The paper's conclusions showed that IPRs and patents only improve the appropriability of returns from innovations. Lead times, secrecy, learning advantages, sales and service effort can also provide protection and are often more effective than patents. However this varies across industries and as found by Silberston some industries find IPRs more effective than others. The work by Mansfield referred to earlier also showed IPR's limitations (Mansfield, Schwartz et al. 1981). This leads to the recommendation that attempts to change IP laws should be industry selective. The only recent example is the case of supplemental protection certificates to extend pharmaceutical patents in some European countries. The study does not mean that Patents and similar IPRs are of no use merely that their utility varies. That is no excuse for failing to manage them so as to gain the maximum benefit that can be gained.

Finally Teece gives the most comprehensive overview of Appropriability and for this thesis the most central discussion of the theoretical issues involved. He takes account of Levin's findings but the core of the article discusses the role and use of complementary assets in appropriating returns from innovation (Teece 1986a). He distinguishes three main variables. The players, (comprising: owners of complementary assets, imitators and innovators), their access to complementary assets and the legal appropriability of the technology. He then provides rules for determining who appropriates most of the innovation's returns by considering

the invention's legal appropriability and the players' access to the complementary assets. This shows whether an innovator will reap the innovation's rewards or whether imitators or other owners of critical complementary assets will. Also interesting is the discussion of pre-paradigmatic phases in the introduction of new technologies, an issue which links up with that of standardisation. Timing of investment in acquiring essential complementary assets is also considered.

Teece outlines several case studies to illustrate his analytical structure, including the perennial EMI CAT scanner story. A conclusion of the study is that disassembly of corporations with increasing sub-contracting, (including contracting for the complementary asset of manufacturing ability) may not be beneficial in the long run. By doing so one may lose access to critical complementary assets and any profits associated with them. One can draw parallels between manufacturing outsourcing and outsourcing of IP department expertise which the present research suggests is happening in UK industry. However, Teece concludes:

> "It is not so much the structure of markets but the structure of firms particularly the scope of their boundaries, coupled with national policies with respect to the development of complementary assets which determines the distribution of the profits amongst innovators and imitator/ followers."

Teece's recognition of the role of complementary assets and legal appropriability in determining the distribution of the profits from innovation is extremely valuable. However there are equally some important aspects of IPR strategy that his article does not deal with.

The first aspect is that Teece's article is not concerned with the identification of players as licensees or licensors. The paper does not clearly distinguish between licensing in and licensing out as quite different contractual modes. Nor between licensing out the innovation (so that others with access to complementary assets can commercialise it) and contracting for access to the complementary assets (so that the innovator can commercialise the innovation). Thus the paper considers neither the viewpoint of a potential licensee nor that of an innovator as a potential licensor simply considering whether to take or give a license. However licensing decisions are one of the main strategic questions involved in day to day IPR management.

Where Teece deals with licensing out is in some of the cases he cites. He describes how Union Carbide exploits its IP not by internalising complementary assets such as production facilities, but by licensing out technology. This is ascribed to patent protection being "fairly easily enforced, particularly for process technology, in the petrochemical industry[38]". In the case where IPRs give strong legal/technical appropriability Teece's schema recommends

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[38]One might dispute this in the case of a standard bulk chemical produced by a process which is not detectable from the marketed product. Discovery ordered by a court based on some prima facie suspicion would be needed and this is not always an easy process in any jurisdiction. In practice though, as interviews with Petrochemicals industry R&D and IP managers show, deliberate covert infringement in the petrochemicals industry is uncommon due to the costs and risks involved.

contracting for access to complementary assets. The use of Union Carbide as an example implicitly equates the licensing out of a technology with contracting for the supply of all complementary assets needed to commercialise the innovation. Similarly the example of Merck's exploitation of Streptomycin by in-house production not licensing out is ascribed by Teece in part to weakness of the overall legal-technical appropriability. This implies as Teece goes on to state explicitly that "Had patents been more inclusive.....licensing would have been an effective mechanism for Merck to extract profits". These two examples show that Teece considers firstly that licensing out of innovations is an aspect of and equivalent to contracting for the supply of all necessary complementary assets and secondly that licensing is considered when IPRs enable strong legal-technical appropriability.

However, I would contend that not only are licensing out and licensing in obviously distinct but moreover that whilst they both involve contracts, licensing out an innovation (so that others with access to complementary assets can commercialise it and pay license royalties to the innovator) is fundamentally different from contracting for access to all the necessary complementary assets (so that the innovator can commercialise it directly). If nothing else the risk and *control* profiles of the two modes of exploitation are quite different.

In both licensing out an innovation and contracting for all necessary complementary assets (as Teece points out in the case of contracting for complementary assets) an innovator will reduce the risk involved in commercialisation by sharing the risk with the licensee or suppliers of contracted services. However, in licensing out the risk is that the licensees commercialisation will fail whereas in contracting for all services the risks are that the suppliers of services will fail and that the licensors commercialisation will fail as a result of that or fail for other reasons. In the case of licensing it may be possible by the inclusion of up front initial, lump sum payments to decrease this risk at the possible cost of some of the later returns. Similarly, in the case of contracting for services it may be possible to include performance clauses which insure the innovator against failure on the part of the contracted party. However, the risk profile of the two modes of exploitation is likely to be quite different even if it may be possible by judicious wording of contracts and licenses to make them resemble each other.

In a similar way depending on the wording of the contracts and licenses involved, the amount of control over the future of the innovation that is exercised by the innovator will be quite different if the innovation is licensed out compared with the case where all the necessary complementary assets for its commercialisation are contracted for and it is commercialised in-house. Contracts aside, in-house commercialisation is bound to enable greater control over the future of the innovation, whether the necessary complementary assets are already available, or whether they have to be contracted for.

Besides these points, Teece's main emphasis is on exploiting a particular innovation from

the point of view of an innovator and not exploiting a particular innovation from the view of either a licensor or a potential licensee. IBM is however quoted as saying that "partnering" "buys access to new technologies enabling the company to 'learn things we couldn't have learned without many years of trial and error.' " Teece also mentions the possibility that contracted partners in a "strategic partnering" arrangement might not perform according to the contract and might even imitate the innovators technology and become a competitor with the result that such arrangements are only likely to work well when the innovator's technology is well protected and the partner provides only generic complementary assets which could easily be sourced elsewhere. However, the overall emphasis despite these observations is on the innovators point of view and the ways in which the innovator can access the necessary complementary assets which form the central idea of the paper.

However, it is just as important to consider both licensor and licensee viewpoints since licensing decisions are one of the most common yet critical IPR related strategic decisions. Furthermore, there are many other considerations involved in licensing, and the impetus for licensing may come from outside companies and unconnected with the innovator trying to access complementary assets or even trying to exploit the invention. The discussion of providers of complementary assets becoming competitors suggests an important aspect of licensing only covered peripherally in the paper which is that of the learning involved in licensing. This will usually be or should be one of the licensee's main aims and it cannot be ignored or easily prevented. For any deal between businesses to be successful both parties have to be gaining something useful. It is therefore imperative to ensure that what is useful to the licensee is not detrimental to the licensor. The two way nature of licensing transactions needs consideration as well as the flow, not just of money in one direction and technology in the other, but also of information, knowledge, learning and ultimately, competitive leadership.

Teece's analysis is useful though in analysing the situation in Japan. For example in Japan it is not the Pharmaceutical Companies operating in what is usually the strongest IPR regime that are most successful but the large electronics companies operating in a relatively weak IPR regime. Using Teece's analysis it is clear that the Japanese Pharmaceutical sector lacks (Probert 1994) the complementary assets of a world wide marketing ability as well as having a hitherto underdeveloped research capability and is thus unable to exploit the advantages of the strong IPRs available for pharmaceuticals. In contrast the Japanese Electronics industry is large enough to have the complementary assets not to suffer such disadvantages despite being in a relatively weak IPR area.

Research by Mansfield has shown (Mansfield 1994), that IPR appropriability issues are important in companies' foreign direct investment decisions. The very existence of IPR laws in a developing country is a major topic for diplomatic discussion with more technologically advanced nations, as was the case with Japan in the late nineteenth century. As Teece has

also indicated a company's willingness and ability to license out or license in technology will be dependent on factors connected with the degree of appropriability conferred by IPRs and access to complementary assets. Thus weaker narrower IPRs may mean more licensing. Besides these factors though it will also depend on the company's technological position relative to other potential licensees or licensors, its need to either catch up with or stay ahead of the competition, its need to raise revenue from unutilised technological assets, its need to encourage, participate in or even inhibit standardisation, its need to be able to supply "me too" products protected by IPRs controlled by others and other factors. Furthermore in addition to a company' relative technological position a further determinant of a company's willingness to license in technology will be how willing it is to learn from other companies by taking and exploiting licenses from those companies which are technically ahead of it.

However, Teece's article primarily deals with exploiting a particular invention at a particular time. Teece considers competing followers improvements on the core innovation and also considers cases such as that of Nutrasweet where patent protection was about to lapse. However he does not explicitly consider the case of multiple inventions over a length of time or as is often the case, a series or collection of inventions, no one of which is critical on its own but which together are important. Time is considered, but only from the point of view of the time taken to assemble complementary assets and the time the "tight appropriability" offered by a patent will last and the effect all this will have on the potential outcomes. It will therefore be helpful to deal with the very important learning function of licensing and the implications for leadership of the next generation of products, of licensing technology in respect of this or an earlier generation of products.

Rather than treat licensing and especially licensing out, as a separate issue, Teece's article deals with licensing out of technology as an alternative to buying or otherwise acquiring essential complementary assets. However, it is certainly true that licensees are not always passive suppliers of a service to innovators and it would be useful to consider such situations from both licensors and licensees points of view. From a licensors point of view the long term consequences of licensing need to be considered for the maintenance and prolongation (e.g. by licensing to encourage adoption of a de facto standard) of its technological lead and from a licensees point of view the educational and improving value of taking a licence need to be considered. Licensors and Licensee also need to consider what should best be done to exploit old technology which has been superseded by a companies latest innovations. Teece's paper is thus about appropriation and contracting for the supply of complementary assets and their effect on whether innovators or imitators gain most. It is not about licensors, licensees and IP strategy in general.

One exception to such criticism is Ford's work which mentions the possibility of licensing out, but not appropriability (Ford 1988). One final article to be mentioned on appropriation is

by a non-specialist management writer (Gibson 1990) giving examples of strategies adopted by companies for when their patents expire. These show how not to rely totally on patent protection even when there is a temptation to. Patents after all expire whereas Trademarks for example can last indefinitely given the right circumstances. The case of Nutrasweet mentioned by Teece is another example of patent expiry strategy.

The key issue raised by a study of appropriation and by a consideration of Teece's paper is how the ideas of appropriability and complementary assets can be extended to provide a more comprehensive overview of IPR strategy and in particular include both licensors and licensees viewpoints and the dimension of time.

## 4.2. Technology Strategy

Much of the key literature has already been reviewed. However some remains dealing with technology strategy which is too specifically related to technology to be general business strategy and yet which includes some relevant IP related material. This includes the areas of:

- Innovation & R&D management
- Patents & Trade Secrets
- Licensing & Joint Ventures
- Standardisation
- IP Administration

### 4.2.1. Innovation & R&D Management

The field of innovation & R&D management is far broader than is relevant to this study. The overall field has been surveyed recently by McGee and Thomas. (McGee and Thomas 1989). In general, technology strategy writing is not directly concerned with appropriability or resources other than in the references already referred to. The concerns are more with what a company should research and how it should do so than with what it should do with the results. One exception mentioned above is Ford who discusses various methods of exploitation. Pavitt also mentions that there is now a shift from looking at how to innovate to how to commercialise innovations (Pavitt 1986). The SAPPHO project mentioned by Pavitt also found that patenting was not among the most critical factors for successful innovation commercialisation confirming Silberston's earlier survey (SPRU 1972).

### 4.2.2. Patents & Trade Secrets

Taylor & Silberston's work is the only study of how Patents are managed inside UK companies. One in the U.S. by Koen looks at small and large U.S. High technology company use of IPRs (Koen 1990). The study included a 1054 small and 196 large company survey of attitudes. It found that large companies are more likely to use the system than small companies and that

most companies are involved in some form of strategic alliance. Twice as many large as small companies were involved in licensing or infringement. This is probably due to the litigation costs as much as small companies are likely to settle on any reasonable terms rather than get involved in litigation. The dividing line between large and small companies in Koen's survey was set at 500 employees. In the present study no company had less than 250 employees. It is therefore not possible to compare results directly with Koen's detailed information for small companies. Moreover, Koen does not go much beyond the statistical analysis of the results and does not explore the strategic implications of the survey in any detail.

Another older U.S. survey occurs in an article by Sanders (Sanders 1964) though I have been unable to locate a copy. The age however renders it of questionable value for comparison purposes. Another study of Patents and the firm, from a more economic viewpoint, is that by Griliches (Griliches and Pakes 1984). This however concentrates on the quality of patent counts as an indicator of knowledge and on time-lags between research expenditure and patentable results.

### 4.2.3. Licensing & Joint Ventures

Many publications about licensing exist mostly aimed at licensing managers and written by other licensing managers. Representative of such works are warnings about unsolicited inventions (Crawford 1975), decisions between JVs or licensing (Killing 1980), small and large company co-operation (Quinn 1979), licensing contract check lists (Brazell 1978) and many others. There are also more management oriented offerings from Economists.

Several works which have a direct relevance to the area of strategy include (Reich and Mankin 1986) (McDonald and Leahey 1985) (Hamel, Doz et al. 1989). McDonald reviews the pros and cons of licensing in and out collected from several sources. This is not the only paper of its type, Fowlston also deals with it (Fowlston 1984) though this article treats the legal side of the issue as well. Reich appears an example of U.S. Japan phobia, with dire warnings about the risks of collaboration. Hamel, Doz and Prahalad however take an almost opposite view that, with care, collaboration, including that with Japanese companies, can be fruitful. Balance is needed though and it is easy to forget that much of Japan's rapid technological progress over the past 100 years has been achieved in the first instance by licensing in or otherwise absorbing technology or to forget cases such as that of Pilkington's successful licensing strategy mentioned earlier.

### 4.2.4. Standardisation

Standardisation is an important issue in the context of IPRs. A decision has to be made as to

whether to keep only a loose hold over IPRs, letting others access them on some terms to get a technology accepted as a standard or whether to try and deny access to others perhaps on any terms. From an economic viewpoint the subject has been looked at by David (David 1987) whose article includes a wide ranging bibliography. A book on the subject has been published by Gabel (Gabel 1991). Practical examples of the dilemma abound. The PS/2 story has already been mentioned others include the Betamax tape, (Cronin and Wusterbarth 1986) Western Electric telephone jacks[39] and others. More recently there has been the case of Netscape as mentioned earlier. The issues are complex since there is a conflict between a standard design which should be readily available to all and a protected design which only the licensed few can use. However it is an important strategy option to be considered.

### 4.2.5. IP Administration

IP administration or the practical side of running an IP department is something so obscure that the only English language paper I know of on the subject is one describing the running of British Telecom's Intellectual Property Unit (IPU) presented by Mr. M. Connor, a former director of the IPU at a meeting of the Chartered Institute of Patent Agents. The main issue of interest was the link with senior management. This consisted of a broad policy paper within whose guidelines the department was more or less left to its own devices unless something newsworthy such as another change of logo turned up. However, in the more generally available literature there is no record of what form such policy documents take or even whether most companies have them anyway.

In the past few years two journals slightly different from the average IP related journal, Patent World (1987) and Managing Intellectual Property (1990) have appeared, both dealing with IPR management issues in a broad sense. In general, writers in such journals in the UK tend to have a legal background and articles tend to be written from a legal viewpoint and not a management viewpoint. In Japanese Journals, since most industry IP staff are not lawyers, there is more concern with practical IPR management issues. In the UK even articles which do mention strategy are usually written by lawyers (e.g. (Tran 1995)). This is almost inevitable when the vast majority of IP professionals are not normally involved with business strategy with the possible exception of some licensing executives and a few heads of industrial IP departments.

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[39]Outside the UK and some other European Countries which have their own telephone line jacks the American Western Electric modular phone plug has become almost universal at least partly because licenses are available on demand at relatively low cost. Reasons for them not spreading into other countries are largely due to protection of local manufacturers using local standards. The fact that Europe lacks a common phone plug is mainly due to lack of agreement over standards.

### 4.3. Areas of Interest

The above survey of management studies literature identifies a considerable number of issues which this study could address. The subject of IP strategy is centred on the issues of appropriability, complementary assets, learning opportunities and time based considerations. Besides these central issues several related and peripheral issues such as standardisation, IP administration and IP valuation exist which have yet to be integrated in a comprehensive overview of IP strategy. Increasing understanding of the role of IP management in business policy and attempting to bridge the separate elements which make up the field could be furthered by studying the following issues :

i) How to analyse, use, retain and increase control of resources protectable by IPRs.
ii) The strategies available to appropriate a firms IP resources over time
iii) When and how one should license out or license in technology.
    a) The benefits and disadvantages of licensing technology bearing in mind licensee learning opportunities.
    b) Whether keeping a tight or loose hold over IPRs provides better returns or strategic advantages
    c) Standardisation as part of IP strategy
iv) Management of IP departments and decision making responsibilities.

The key point about all of these is that they form links between on the one hand theoretical considerations such as appropriability and time based issues and on the other hand practical management issues such as licensing decisions and management of IP departments. In this respect the last, dealing with Management of IP departments is particularly useful since it can act as a window on all the other areas and concentrates attention on areas of current interest.

## 5. Japan related material

### 5.1. General economic/business studies of Japan

There are innumerable books on Japanese management. However, they rarely, if at all, deal with issues of patents and IP management. Where mention of it occurs, it is either when a comparison of technological progress is made using patent statistics or in comments on the role of the licensing of foreign technology in Japan's technological development.

One example of such writing occurs in Abegglen and Stalk's study of the Japanese corporation. The role of patents and access to US technology playing a key role in TI gaining access to Japan and the ability to set up a 100% owned local subsidiary in the early 1960s is described (Abegglen and Stalk Jr 1985). In discussing what US and Japanese companies receive in return for their R&D expenditure they also cover the rise of the number of patent applications made by Japanese companies. McMillan in a discussion of technology in the Japanese Industrial System uses share of US patents as an additional indicator of the trade in technology.

He significantly makes the point that Japan occupies a position as a "centre of high technology/low technology societies" with a considerable amount of licensing to Asia (McMillan 1985). He notes that Japan supplied 66% and the USA only 21% of the 737 know-how agreements with Korea between 1962-1976 and also quotes Abegglen on the cost to Japan of technology purchase : "the cost to Japan of technology purchases from abroad.....has been about six billion dollars. This is little more than ten percent of the annual R&D expenditure of the United States". This raises the question as to whether licensors are really capable of valuing technology for sale at its true value to the purchaser not its value to the seller in terms of covering R&D expenditure. Correct valuation of IP is a subject which is seen as essential to creativity based competition by Murakami (see later) (村上 輝安 1993). Aoki in his microanalysis of the Japanese economy also touches on the subject of patents but again from a technological balance of trade perspective looking at the share of patent applications by various nations and the increase in Japanese applications since the 1970s. However this is linked, as with other studies, directly to increases in R&D expenditure without consideration of other influences (Aoki 1988). A recent book by Fruin on the development of the Japanese enterprise system from a historical viewpoint puts some emphasis on the importance of learning by technology transfer in the development of Japanese business (Fruin 1994). This is a commonly mentioned feature of Japan's development as has been mentioned earlier. Far more emphasis of this kind can be found in books which deal specifically with the technological development of Japan. That by Morris-Suzuki is particularly helpful (Morris-Suzuki 1994).

The present research is concerned with a comparative study of management practices and in terms of more general comparative management studies of Western and Japanese management practices which are not directly concerned with IP issues that by Nonaka et al. is perhaps most relevant (Kagano, Nonaka et al. 1989). It is useful in particular in providing an example of an international comparative survey based, as this study is, on an underlying assumption that a firms actions are at least partly contingent on its environment. Other work by Nonaka involving comparisons but dealing with knowledge creation is also relevant, though as mentioned the issue of IPRs is not included in his work which concentrates on knowledge creation as opposed to preservation.

## 5.2. Japanese IP practice related material

There have been several brief newspaper or magazine articles appearing in recent years which deal with IPRs and Japan. The recent GATT treaty negotiations and in particular the TRIPS agreement have helped ensure that this continues. Often such articles have emotive or just exaggerated titles. (E.g. "Looming Patent War with Japan" (Brunell 1992), Does Japan play fair? (Faltermayer 1992). Such titles occur in Japanese too. "The patent mafia targets Japan" (蒲野 宏之 1993), 日米知的財産権戦争 (Japan/US Intellectual Property Rights War[40]). Such rhetoric is not uncommon in this field. Rahn quotes Thomas J. Watson Jr. of

IBM as saying "we are in a war of ideas, a war of the productivity of nations that in many respects is more serious than any open conflict in which we have ever been involved" (Rahn 1988). Kahaner quotes S. Garai, Chairman of Cannon Corp. as saying "If basic patents are combined with refinement patents in the right way, Japanese firms will stand in a very dominant position in the patent war among Japan, US and EC" (Kahaner 1992). Despite the sensationalist statements, there are few academic works in English dealing with the strategy and management issues connected with IPRs in Japan. For those who read German there is one article by a German lawyer based in Japan (Einsel 1994) dealing with Patent Strategy for German companies operating in Japan and one by Rahn, also in German, dealing with the strategy of Japanese firms (Rahn 1994). Apart from this thesis, this latter article is the only article I am aware of concerning Japanese Company Patent Strategy written by a non-Japanese author which cites references in Japanese (the author was apparently brought up in Japan and thus has native fluency as well as qualification as a German lawyer). Rahn is thus able to make some interesting observations which the current research has confirmed and added to.

Firstly, he states that IP is a subject for national, popular, press coverage in Japan but virtually a taboo subject in Germany. Japan, aware of the importance to business of IP law has placed it under the jurisdiction of the trade ministry MITI (the equivalent of the DTI in the UK which "owns" the UK Patent Office) whereas in Germany it is the responsibility of the Justice Ministry[41]. He contrasts the view in Germany that Japanese IP law is inadequate with the view in Japan that German awareness of IP law is underdeveloped. In Germany the subject of IP is only dealt with at a high level in specialist publications (as it is in the UK) and the topic of Patent Strategy not dealt with at all (a situation similar to that in the UK), whilst in Japan the popular press is awash with articles and discussion of the subject.

Rahn identifies several types of Patent Strategy from the Japanese literature or rather three sources in particular (Aratama 1971) (Shirasaki 1981) (石井 1982).
These fall within five main functions :

a) The offensive function
b) The Safeguarding function
c) The Motivation function
d) The Reputation function
e) The Financial function (Shirasaki 1981)

The strategy types listed by Rahn are :

a) The Basic Patent (Ishii, Aratama)
Receipt of strong patents in a new technical field gives the opportunity

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[40]There is a possibility that an ICI Manager speaking to a Japanese Study Tour first coined the phrase "Patent War" so far as Japan is concerned (see Ch.9).

[41]This parallels the conclusions of this survey about the legal nature of UK IP Management and the more Managerial pervasive nature of Japanese IP Management (See the conclusion to Ch.8).

for obtaining the greatest possible market shares and also the possibility of free back licences and profiting from the creativity of licensees

b) Combination of Patents and Standards (Aratama)
As for example used successfully by Japan Victor Co. with VHS.

c) The Patent Net (Ishii, Aratama)
Or what is known in the USA as "patent flooding".

d) Patent Purchasing (Ishii)
To strengthen Patent Nets other companies' patent may be bought.

e) Cross-Licensing (Ishii)
The possession of a substantial patent portfolio is important when there is a possibility of solving infringement problems through cross-licensing

f) Patent Pooling (Ishii)
A form of Cross-Licensing strategy with more than two companies which despite cartel laws is not uncommon in the electronic and optical industries.

g) Motivation (Shirasaki)
The use of patents in personnel management

h) Reputation (Shirasaki)
Not only of products but also of the company as a whole

i) Combination of Patents and Trademarks (Ishii)
Association of Trademarks with licensed products

j) Patent Licensing (Out) (Ishii)
Use of patents as a source of income

In assessing the National patent strategies, Rahn first observes that the number of Japanese patent applications agrees with Clausewitz that "Superiority in numbers is in Tactics as in Strategy the general principle of victory" and concludes that the patent net is the most popular patent strategy in Japan. However whilst Rahn makes the point that several legal and strategic reasons exist for the numbers of Japanese patent applications he does not explain what they all are. These are studied later in the context of employee patent filing incentives (see Ch.9). Rahn also describes the "American attack" against Japanese companies. He describes the Japanese reaction as a realisation that they now have to pay for having based their technological progress on Western technology. Rahn concludes by saying that Japanese companies have learnt that only when patents are of equal value can numbers mean anything.

Rahn's article is thus remarkable for it's access to Japanese sources. It can also be summarised by saying that there is a change in Japanese patent management from quantity to quality in response to developments in the USA. However it does not go into the detail of "patent management" except to outline overall strategies and does not link the discussion with more general theories of IP management.

### 5.2.1. Surveys

At the commencement of this research in 1992 there were no surveys of Japanese Company IP management practices published in English. Since then two have appeared. However, both have some limitations in terms of what has been made available to the public or in terms of the size of the samples involved.

The first was a study which comparing Sweden with Japan (Royal Swedish Academy of Engineering Sciences 1993). However, there were limitations to the study. The sample in Japan comprised 25 companies (and interviews with 3) all among the very largest Japanese companies. There was thus no study of how the results varied by company size or industry sector. The general outcome of the survey, which dealt mainly with opinions was, as Rahn found in Germany, that Japanese companies were more concerned about IP than local, in this case, Swedish companies[42]. The study was based on several sub-studies, included in which were a number some useful case-studies of small Swedish companies entering licensing deals with large Japanese companies. The ideal strategy for a company in such a situation is often unclear. However, the study apart from being limited in size and scope did not go beyond recommending upgrading the importance of IP in management and training and combining its use with other factors to strengthen company positions. The study drew no conclusions about underlying theories connected with IP management nor about why or how Japan's emphasis on IP had developed to the state described.

The second and larger survey was one was published in the Licensing Executives Society magazine recently in the form of brief details of a large (1800 Companies 26.5% response rate) survey covering all industrial sectors (Murakami and Nakata 1994). This was originally carried out by the Nomura Research Institute and published in Japanese in mid 1993. The English report is (surprisingly) a direct translation of the published Japanese version. This survey deals mainly with issues of infringement and dispute resolution. Some of the replies though different are complementary to some of the results of the current survey.

Uniquely the survey ends by classifying Japanese company IP strategy into Defensive, Monopoly Seeking, Deterring Others, and Royalty Seeking types. This is reminiscent of the defensive and offensive strategies outlined by Freeman (Freeman 1982). The survey includes a question which tracks the incidence of Royalty payments or cross-licensing as an outcome of complaints of infringement. However, the survey does not include any study of more general attitudes to IPRs or any detailed study of licensing. The published survey is also fairly economical with the statistical information provided, most results just being quoted as percentages without any details of the absolute numbers responding to each question. Whilst the size of the survey is thus impressive there remain some questions about the details of the raw results. In particular the details published are not such as to enable one to make sectoral or size comparisons which the sample certainly seems large enough to make possible. It is likely too that the brevity of the report implies that sample size and complexity were traded giving a large sample but simple questionnaire. The report does not attempt to link the study to more general studies of the role of IPRs in management or to the development of the interest in IP within Japan over the last 30 years.

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[42]This is similar to Rahn's (Rahn,1984) conclusion that Germany is also less interested in IP issues than Japan.

However, another article by Mr. Murakami, the leader of the NRI (Nomura Research Institute) survey and a research director at the NRI, talks about the changing role of IP in the technological development of Japan (村上　輝安 1993). The title is "The Conversion of Japanese Industry's Competitive Style - the potential for creative competition".

Table 2 3 Japanese Competitive Styles (村上,1993)

| | Efficiency | Growth | Creativity |
|---|---|---|---|
| 1) Source of Competition | Establishment of Basic Concept | Introduction of basic concept from European/US or Other Co. | Original Concepts created as investment in creativity is activated |
| 2) Succes of Pioneer Businesses | Implementation of basic concept in products and businesses | Improved Goods based on Surrounding Concepts Investment in Business / Equipment | Original Concept Goods / Businesses Established |
| 3) Entry of Competing Businesses | Entry of Businesses using similar concept | Many Businesses enter with slightly differing concepts | Businesses enter with very different concepts or as Businesses in the same "Family" |
| 4) Focus of Competition | Pursuit of Cost Reduction | Pursuit of Scale and Speed | Pursuit of Intellectual Property |
| 5) Form of Competition | Competition based on Profitability | Competition for Market Share | Inter-Concept and Intra-Family competition |
| 6) Result of Competition | Business Selection Manager Selection | Fall in Profitability Search for New Frontiers | Coexistence of high profit & declining and exiting businesses |

The main idea being that hitherto the technological development of the Japanese economy has been based on a mixture of Efficiency and Growth based competition and that this is now changing as a result of the changing business environment to one based on creativity. The need for a new basis of competition is seen as all the more essential since Japan is facing increasing competition from countries such as Taiwan and Korea especially in the key fields of semi-conductors and personal computers.

Murakami lists four types of IP :

1) Protectable IP : Published but legally protectable
   (e.g. Inventions protected by Patents, registered designs, software protected by copyright, Business identities protected by trademarks etc.)
2) Individual IP : Unpublished but also unprotected
   (e.g. Technical know-how, Production management skills, Information systems, Standards information, Competitor Information, Trainee schemes)
3) Public IP : Published but unprotected
   (e.g. Scientific Theories, Experimental data, Technical standards, Academic articles, technical/managerial journalistic information, etc.)
4) Commercialised IP : Unpublished property of a company which is protected by IPRs when a product derived from them is commercialised (e.g. Product concepts, Business ideas) (村上　輝安 1993)

Murakami says that to promote creativity based competition Japan needs to move from promoting Individual IP with its emphasis on unprotected tacit knowledge, towards more Protectable IP and moreover Public IP. Murakami also identifies two factors as being essential to creativity based competition firstly IP which is protectable and secondly a rich source of public IP. The emphasis is thus on both publicly available IP and protectable private IP. He goes on to draw several distinctions between US and Japanese patent law which have already been summarised in Chapter 2 and draws the conclusion that the Japanese system is more angled towards allowing development of closely related concepts than the US system which discourages such incremental invention and instead promotes original inventions. This avoids the higher US penalties for infringement and higher costs of licensing in other's technology. He then suggests that the US system is ideally suited to fields where developments are not incremental but comprise smaller or larger breakthroughs, such as in the Chemicals, Pharmaceuticals and Bio technology fields but not so suited to incremental fields such as the electronics and IT sectors. This is said with the caveat that these fields are becoming more scientific so that progress depends less on incremental skills and more on scientific breakthroughs. Finally he lists three factors needed to promote creativity based competition :

1) Use of the IPR system by IPR holders
2) Presence of a compulsory license system
3) Pursuit of clarity and appropriateness in price-setting for IP

There is already a compulsory licence system present in both Japan and the UK which as Murakami points out is rarely used[43]. However the presence of the system perhaps encourages licensing which otherwise might not occur and Murakami says that correct price setting which is not too high to be self defeating nor too low to prevent fair competition is essential.

The way in which Murakami portrays the changing IP climate in Japan is interesting since it encompasses both the role of IPRs and the changing technological climate as well as the rapidly advancing nations elsewhere in Asia such as Korea and Taiwan who are now beginning to provide serious technological competition to Japan in certain areas. These all point to the increasing importance of IP and IPRs to the future technological success of Japan and emphasise the need for IP related laws and management in Japan to continue to adapt to the changing situation. The present study is not a longitudinal study nevertheless the changes which have resulted in the present situation are consistent with the views expressed by Murakami. There is however one point on which his argument appears slightly self-contradictory at first. This is that whilst on the one hand he portrays the US system as promoting creativity by discouraging imitation on the other hand he suggests that the Japanese system should promote creativity whilst allowing a compulsory licence system. Perhaps the explanation of this lies in his stated need for only a "slightly more pro-patent" 「もうすこしプロパテント」 system in Japan, not the "excessive" pro-patent policy of the USA. 「過度なプロパテント政策」.

[43]Use of compulsory licences is also rare in the UK.(See UK Patent Office Reports)

This would seem to indicate, yet again, that the largely European solution, which the UK system is an example of, is the happy medium between the former US and Japanese extremes and perhaps that the Japanese system is moving not towards a US style IP system but towards one which promotes both adaption and creation.

Koen's survey on use of the patent system by small and large US companies has already been mentioned (Koen 1990). One other survey originating in America is relevant, the 1992 General Accounting Office survey of U.S. companies "regarding their comparative patent experience in Japan, Europe, and the United States and their views on patent harmonization" (United States General Accounting Office 1993). This report is from a US point of view. However the statistics in it are worth reading. The report it should be said was proposed by politicians to see if "Japanese competitors use the Japanese patent system as a weapon against foreign firms to appropriate their technologies." This resulted from the fact that Japan had been on a watch list of countries with "inadequate protection for IP", partly because of problems with its patent system reported by American companies. The report originated from an earlier Senate Subcommittee hearing into "The effect of the Japanese Patent System on American Business" (Committee on Commerce Science and Transportation 1988) (Rahn 1988). One notable case which received wide publicity was that involving an American company called Fusion systems (Spero 1990) (See Page 188). This was subsequently the subject of a Harvard Business review article and very probably the origin of the term "Patent Flooding" which occurs in much US comment on the Japanese system. The survey showed that such action did occur but not as much as magazine articles suggest. 12% said patent flooding was 'a "very great" or "great" problem' in Japan. However 5% also reported that it was so in the USA, and 3% in Europe. The US patent system is unique among world patent systems in many ways and it is as well that the present survey is based in rather more neutral and objective Europe. The report is interesting as regards comparison of Japanese with other western IPR systems and attitudes to patents but does not consider the Japanese viewpoint. "Patent Flooding" may well be another example of an idea originally from the US being used by Japanese companies in competition with US companies, and may be said to originate in ideas such as that espoused by AT&T in the 1920s as mentioned by Borrus (Borrus 1990).

> "It seems obvious that the best defence (of market and technology position) is to... maintain such a strong engineering, patent, and commercial situation... as to always have something to trade against the accomplishment of other parties.... Ability to stop the owner of a fundamental and controlling patent from realising the full fruits of his patent by the ownership of necessary secondary patents may easily put one in position to trade where money alone may be of little value". (Noble 1977)

Besides these there have been a few Japanese language surveys published by the Institute of Intellectual Property which have dealt with IP related subjects such as Licensing, New Business, Financial Exploitation, The Economics of the Patent System and others (Institute of Intellectual Property 1991; Institute of Intellectual Property 1992b; Institute of Intellectual Property 1992a;

Institute of Intellectual Property 1994). These do not deal with the central issues of licensing and IP department management. One recent one does deal with licensing issues though and includes some data on general attitudes to the IP system (Institute of Intellectual Property 1994). Of the economic effects of the patent system the most significant effect overall is seen as "Other companies' laid open patent publications become a source of information for R&D" followed by "Profits increase by our exclusive practice".

There are some other Japanese research institutes which have carried out IP related surveys. Perhaps the most relevant apart from the Nomura Research survey mentioned above is one prepared in 1986 by the Japan Techno-Economics Society. This looked specifically at the Use and Management of Intellectual and Industrial Property Rights (科学技術と経済の会 1986). It concentrated on both IP department organisation and on more general issues such as licensing. The data collected was purely factual though and did not include any attitudinal content. However, the report was not published and only distributed to respondents to the survey which was part of a larger and confidential report on IP management prepared for a client. The report gave some idea of Japanese IP department structure in the early 80s but did not give any sector or size breakdown.

Besides the above surveys there are several others which have been carried out by organisations such as the Japan Intellectual Property Association (JIPA or 知的財産協会). However, such surveys are in general unpublished and restricted to members of the society organising the survey. In some cases results are published in the society journal (知財管理 (IP Management) formerly 特許管理 (Patent Management)) which I have found in a few libraries[44].

### 5.2.2. Other Japanese Sources

Besides the above mentioned surveys there are two other main sources of published information on Company Patent departments in Japan. Firstly, books published by the Japan Institute of Invention and Innovation (発明協会) which deal with a few major companies' Patent Management Practices,, dating from the early 1980s. From at least that time there have also been a series of small one page articles in the JIPA journal "Patent Management" 「特許管理」 (Patent Management now known as "IP Management" 「知財管理」 ). These provide a very useful though rather basic source of information where other means of access are limited.

Besides the above literature there are numerous newspaper articles and popular books describing IP issues (as pointed out in Ch.2). Another important area of Japanese literature is "Grey Literature" comprising unpublished or largely unavailable reports and other material prepared

[44]e.g. The Japanese Patent Office reference library section in the MITI 別館 (Annex) building is the most publicly available. The 発明協会 also has copies.

by societies or for conferences or by other organisations. These will be discussed later where relevant. With a few exceptions they are descriptive not analytical and rarely attempt to put the subject in a larger context of Business Strategy. One might add that since Business Schools in the West have served as the base for most writers on Business Strategy issues, it is not too surprising if parallel writing in Japan is scarce since Japanese Business Schools, are scarce. It is not unjustified therefore to concentrate the IP Management theory part of this literature search amongst English literature.

## 6. Conclusions

In this research I will concentrate on a Business Strategy based perspective using in particular the concepts of resources and their appropriability. That will provide a starting point for the theoretical part of the research. However, empirical research investigating the use and management of IPRs by Japanese and Western Business and informing the theoretical part of the research, requires a broader view to be taken if a well founded analysis of the findings is to be made. The above literature review and background study aims to provide that. The literature review has also identified several themes and questions raised by the literature which will act as a basis for the hypotheses driving the empirical research. These will be developed in the following chapter along with an analysis of the gaps in the literature which the present research could usefully fill. The main issues with potential for further study are :

The need for an up to date study of the state of IP management and IP department management in Japan and the UK capable of providing an input to development of IP Strategy theory.

The influence of the differing and changing legal, historical, and economic environments surrounding firms on the IPR strategies they pursue.

- Using results from past and present studies to study changes over time in firm's actions relating to IPRs and associated changes in the firm's environment
- Using multinational studies and in particular studies of companies in the UK and Japan to study a broad range of IPR strategies under differing environments

The role of time in a consideration of a resource appropriability based view of IPR strategy.

- at a micro and firm level in terms of technological progress and potential transition from technical followership to leadership
- at a macro and national level in terms of changing IPR strategies to suit changing environmental factors over time.

Constructing a framework capable of encompassing the range of IPR strategies both actual and potential found both in practice and in theory based studies.

# Chapter 4. RESEARCH HYPOTHESES

**Summary**

This chapter aims to discuss the gaps in the literature revealed by the literature search and in the light of the background to the research, formulate the basic hypotheses underlying the field research. These basic hypotheses are then developed into a series of more detailed hypotheses which will form a basis for specific questions addressed by the field research.

## 1. Discussion of gaps in the literature

IP strategy as defined at the beginning of this thesis includes both a firm's external dealings involving IP in which the IP is treated as a resource of the company, as well as the internal resource management within a firm aimed at managing the creation and preservation of those resources. The literature search set out to find any work which might be directly concerned with these issues and in doing so has revealed a wide range of writing connected directly or indirectly with IP issues.

At the beginning of this thesis the objectives of this research were set out as comprising three levels : description, comparison and theory extension :

i) the description of IP use and management in Japan and the UK
ii) the comparison of IP use and management in Japan with that in the UK.
iii) the use of the research results to extend existing theory about IP management.

Each of these will now be discussed in turn. It should be said of course that a number of questions and possible fields of study have been suggested by or described in the literature search many of which it is not intended to pursue here. For example Game theoretical approaches and IP valuation issues as well as establishment of a purely theoretical classification of IP strategies might have been pursued. However the research is instead based on the above three linked steps of description comparison and theory extension. This approach would seem to provide the best linkage between the Japanese and UK aspects of the research and also between the practical and theoretical aspects of the subject whilst also making the best use of the research resources and opportunities available.

### 1.1. Description of IP use and management in Japan and the UK

The first omission in the literature, is that there is a great lack of information about exactly what goes on in an IP department and exactly how IP is managed in a company and by whom. This applies to the UK but especially to knowledge outside Japan about practices in Japan. This is mainly due to combination of the language barrier and the specialist nature of

the field[45]. As mentioned the only large scale study of IP practice in Japan reported in English, is not part of an international comparison. The only study to compare IP practice in Japan with that in another country contrasts only a few large companies in Sweden and Japan. There has never been any comparative study of IP practice in the UK and Japan and there has not been any wide ranging study of IP practice in the UK for about 20 years.

These limitations leave more than enough room for comprehensive surveys of practice in both the UK and Japan to provide useful and unique information about the management of IP in both countries. Certainly in the UK such a study is long overdue and the shortage of knowledge about Japanese patent management practices outside Japan makes such a study worthwhile in itself.

A first objective of the research is thus to describe the ways in which IP is used and managed both internally and externally in Japanese and UK firms.

## 1.2. Comparison of IP use and management in Japan with that in the UK

As the chapter relating to the background to and history of the subject has shown, there are a wealth of influences past and present which have a bearing on how firms manage their IP. The environment within which firms formulate their IP strategy is thus critical but also something which has been little studied in connection with the subject of IP strategy. The relationship between IP strategy and the environment is thus another gap in the literature which can be usefully filled.

The literature contains no detailed study of the ways in which the associated external and internal management of IP are associated with environmental factors such as the state of technological development, balance of trade in technology, laws, diplomatic pressures, etc. Causation may be a difficult issue but it may be possible to show that certain internal modes of IP management are associated or not associated with certain external environmental circumstances. To do this though requires different models of IP management to compare to see whether different circumstances result in different styles of IP management.

One might as well compare the UK with any other country but despite having had the opportunity to make the comparison with Japan being the main factor in choosing Japan, there are other compelling reasons for making the choice. A study of Japanese companies' IP management and strategy is particularly interesting because, as has been pointed out, Japan is

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[45]During this research, hoping to find others interested in the subject from the same set of viewpoints I asked those I interviewed in Japan if they knew of other Japanese speaking foreign Patent Attornies or Management Studies academics studying the subject. I only heard of two, Guntram Rahn and Christopher Heath , both German lawyers associated with the Max-Planck Institute in Munich and interested primarily in Japanese IP law.

at a changeover point in it's development. Japan's approach to IP management is changing from that of a country trying to catch up, to that of a country trying to keep ahead of its competitors. The UK on the other hand has been trying to keep ahead of the competition for some time with varying degrees of success and thus provides a contrast where the different effects (if any) of the different environments can be studied.

The second objective of the research is thus to compare use and management of IP by Japanese and UK companies and study how any differences are associated with any differences in the IP environments.

### 1.3. Use of the research results to extend existing theory about IP management

The third omission of the existing research on IP use and management is that there is very little discussion of IP strategy theory and where there is, it may be only loosely connected to practice. Theories such as that of Teece et al. based on ideas of appropriation and the use of complementary assets form an extremely useful starting point and are the closest the present literature comes to an overall theory of IP strategy. It would be interesting though, if one could link associations between the practical internal and external strategic management of IP in companies identified through empirical generalisable research with a more theoretical viewpoint on the role of IP in business strategy and thus provide a more integrated view of the subject.

In searching for an integrated view, Japan provides an useful opportunity since being in an intermediary position both acquiring and supplying technology it is easier to recognise a variety of IP management and strategy styles. Japan in changing from technology follower to technology leader can view the role of IP resources more easily as temporary assets which flow both into and out of a company. In the case of companies and countries long accustomed to leading and staying ahead of their competition rather than looking for new technology to license in to add to their resources, the situation is more likely to be one of attempts to block than manage the flow of technology.

The existing surveys that have been conducted have been limited in the conclusions drawn about the strategic role of IP. The emphasis is mainly on the commonly accepted role of IPRs as one of Rumelt's "isolating mechanisms" and their use with other "complementary assets", as described by Teece, to exclude competitors. Whilst there has been some mention of it there has been insufficient emphasis on the dual role of IPRs as both a means of promoting technology input, as well as the more commonly referred to, means of restricting technology outflow. This allied with the paucity of more general writings about the strategic role of IP means that the overall concept of IP Strategy is as yet a relatively undeveloped field, particularly regarding it's role in a dynamic view of technological progress which Japan provides a

particularly good example of.

This lack of a dynamic view in studying the subject has also limited appreciation of the essentially reactive and adaptive nature of the developments in patent management in Japan. The reasons for the particular nature of the growth and development of patent management in Japan, which has produced some unique emphases compared to other countries, has thus not received the attention it deserves.

The third aim of the research therefore is to review the findings of the study of UK and Japanese use and management of IP in order to extend existing theories of IP strategy particularly concerning the dimension of time and the flow of technology.

The state of the research field can therefore be summed up by saying that whilst it is not deserted, it is fragmented and incomplete. Most telling is the fact that whilst in Japan there are many books dealing with Patent Management and IP Strategy, there is as yet no authoritative book in English on either IP strategy in general, nor any up to date book in English on the IP management or IP strategy of either UK or Japanese companies from a strategic rather than a legal perspective.

The immediate conclusion therefore is that there is scope for a broader more detailed study of the practice regarding IP management in the UK and Japan. This, together with what work has already been done, will hopefully give an insight into a more general view of the strategic role of IP than has been available hitherto.

## 2. Formation of the basis for the research hypotheses

The three levels of research objectives which have just been outlined are :

i) the description of the ways in which IP is used and managed both internally and externally by Japanese and the UK firms.

ii) comparing use and management of IP by Japanese and UK companies and how, particularly in the case of Japan, it is associated with the respective environment.

iii) the use of the research results to help extend existing theory about IP management particularly concerning the dimension of time.

The research hypotheses and the field research thus largely concern the first and second of these levels rather than with the testing of as yet unformulated theory which might result

from the third. Whilst the work of Teece and others relating to the role of resources in IP management has been mentioned, it is not the intention of the present research to test such theories even though that could be a useful exercise. Instead the primary aim is to gather facts which will give a statistically reliable view of the use and management of IP in Japan and the UK and provide a basis for additions for existing theory.

A key process in the present research though is being able to make the step from looking at the results of the detailed hypotheses to making overall statements first of all about the detailed data itself and secondly about IP strategy. Personally I believe these two steps are possible and that the detail will support such a leap. The first is merely a summarising exercise. However one must admit that with the second step of extending strategy theory there is the risk that if the leap is too great or too separated from the detail the two parts of the research : hypothesis testing of detailed facts and construction of extensions to IP strategy theory, will drift apart. There is a risk of not being able to see the wood for the trees and/or not being able to see any trees in the wood. However, against such possible criticism it should be said that since the object of the research is not to test the theories which might emerge but merely to give grounds for suggesting them, the standard of strength of linkage between the data and theory, whilst it should not be set too low, should equally not be set too high. Finally even if that view is wrong if the conclusions about IP strategy are reasonable per se and the detailed findings interesting and useful per se, the mere fact that the one led to the in my own mind is sufficient justification for making the leap. Knowledge is advanced both by risky leaps as well as by smaller safer steps. Hopefully this research includes both.

I will return to the subject of extensions to theory in a later chapter. For the moment I wish to concentrate on the first two objectives of description and comparison and to outline how they might be achieved. The first stage therefore is to describe the hypotheses on which the initial research and questionnaire survey was based.

### 3. Basic Hypotheses

The differences in the circumstances under which Japanese and UK IP law developed have already been outlined, as have several different factors contributing to the IP environment in which companies in Japan and the UK make decisions about how to manage IP issues.

Two overall characteristics can be hypothesised about the effect of these circumstances on the nature of IP management in the two countries. Firstly that the differences in environment, influences and consequent strategic objectives will give rise to differing IP management actions. Secondly that despite differences in the environment the underlying similarity of the issues and world markets facing companies in both Japan and the UK will result in similar attitudes and actions being adopted. Where the boundary lies between the sometimes

opposing influences of culture, business environment and commonality of objectives and problems is something that will vary from case to case. However the general hypothesis is that differences will exist and that where they do they can be associated with differing environmental factors which outweigh any logical common solution to the issues faced.

This hypothesis obviously needs elaborating into some specific areas where we might expect to find differences and or similarities. However, before doing so it is as well to outline the second general hypothesis which is that the environmental factors which influence Japanese and UK IP management are changing and that this will be apparent in changing practices regarding IP management as companies adapt to the changing environment. The present study is not however a longitudinal study even though it could usefully form the basis for one tracing developments in the UK and Japan over the next few years. Data regarding changes in IP management will have instead in this instance to be gathered by questioning managers about their experience in recent years.

Despite such difficulties in capturing variations over time, a third hypothesis can be added, that there is likely to be a convergence of IP management characteristics, since Japanese companies are ceasing to be purely importers of technology and are becoming vendors as well as consumers of technology, whilst UK companies are ceasing to be purely users and vendors of technology and are also importing technology.

The initial hypotheses are thus that significant differences exist between Japanese and Western companies' attitudes to and management of IP and that :

i) such differences are associated with differing environmental factors.
ii) such environmental factors are seen to be changing
iii) practices concerning IP management are felt to be converging.

This approach is based on some of the assumptions of the contingency theory of organisations as put forward in the work of Lawrence and Lorsch, Woodward and Burns and Stalker (Burns and Stalker 1961; Woodward 1965; Lawrence and Lorsch 1967). Contingency theory has also been discussed and used by Nonaka et al. in the context of an international comparative study of general US and Japanese management methods (Kagano, Nonaka et al. 1989). Nonaka characterises contingency theory in that context as providing propositions about the fit needed between a firm's environmental variety and organisational variety to provide high performance. Nonaka's work in this context is also interesting since it outlines how it's comparative study of Japanese and US management differs from prior "dominant perspective" approaches to studying Japanese management which according to Nonaka have concentrated on sociocultural issues to the exclusion of other relevant environmental issues. Nonaka also says :

> "We need to study (1) managerial aspects of Japanese companies, based on (2) the systematic collection of empirical data in order to (3) propose a more general theory of management."
>
> "To fully understand the characteristics of Japanese management, it is necessary to compare its characteristics with those of management abroad."(Kagano, Nonaka et al. 1989).

Professor Nonaka who has studied in the USA chose to use the USA for comparison purposes pointing out that Japanese firms have introduced many managerial techniques from the USA. Time, distance, money and the fact that I have extensive experience of the UK IP world[46] but not so much of the US IP world mean that this research will compare Japan with the UK. However, the underlying reasons are the same : to understand fully the characteristics of Japanese management. In this case though it is one particular aspect of management, IP management.

These approaches are in some ways linked to the Systemic Approach to strategy outlined by Whittington in which the sociological context in which strategies are formed is crucial to understanding them. In promoting a systemic approach to strategy Whittington has said that :

> 'Systemic theorists insist that the rationales underlying strategy are peculiar to particular sociological contexts.....decisions-makers are not simply detached calculating individuals interacting in purely economic transactions, but people rooted deeply in densely interwoven social systems'.... 'now more than ever history and society matter to competitive strategy' (Whittington 1993).

In this research the history of IP systems and the cultures involved are needless to say critical factors.

Usually studies based on contingency theories have as their aim the measurement of variety in organisations and variety in the environment with the aim of showing that those organisations which have the best "fit" with their environment are also those organisations which have the best performance measured on some suitable scale. In this respect this study differs in that it does not purport to try to present studies of individual companies to such a level of detail nor even when presenting results about them in bulk as for example "UK companies" or "Japanese companies" to try to measure their "performance" and deduce which company or type of company may have best adapted to fit the particular environment in question. The first reason for this is quite simply that it is extremely difficult to construct a measure of effective IP management which would be measurable. Bulk statistics and company results are affected by too many other factors. It is of questionable value to pick on the few measurable numbers that IP departments generate such as number of applications filed, staff ratios,

[46]Qualification as a UK and European Patent Attorney, over 6 years full time work in both private practice and as a Patents Manager in industry and in all over 17 years continuous membership of the profession.

foreign filing ratios, licensing revenue and the like because either they too depend on several other factors or are associated with potentially more important strategic issues which may well not be measurable. Secondly of course and in line with the non-deterministic view to be outlined below (See Ch.5), the environment, whilst providing a theatre whose bounds may influence players actions, does not determine them. Contingency theory thus provides a partial rationale behind the study and a starting point for it but due to the nature of the subject as much as more fundamental reasons, cannot provide its whole structure.

The assessment of differences between UK and Japanese companies in their management of IP is thus a good place to start not just from the point of view of learning about IP management but also from the point of view of building on existing theories.

### 3.1. Relevant Factors

The literature review drew attention to several more detailed features of IP management in addition to the more general aspects mentioned above. The following list includes just some of these :

- When one should license out or license in technology.
- Licensee learning opportunities.
- Standardisation as part of IP strategy
- Management of IP administration and IP departments
- Efficient IP decision making processes and responsibilities.

Study of the adaption of organisations in one culture will be useful to those in other cultures even if the set of factors defining the environments or the culture as a whole is unique. However, in an international situation companies have to adapt to an environment in part composed of dealings with companies based in other cultures. This is particularly so in the field of IP where many of its dealings are international. This international interaction and adaption between the various companies is a critical feature of such situations and a potential source of convergence of the previously differing international environments.

The attitude to and management of IP by a company in one country is a function of both external factors outside the company's direct control (largely Government and other factors) and internal factors which it can control. However, in an international context there will be interaction between at least two such systems. The general attitudes to and management of IP in each country become external factors facing the other country's companies. Furthermore the external factors such as legal and trade related government policies of the one country will also become external factors relevant to the other country. A considerable degree of feedback thus develops in the system which ultimately will tend to a mutual fit if not total convergence as the two systems try to compete on level terms. The effect of US law on

Japanese IP law and IP management and vice versa is a prime example of such interaction.

The immediate question is a general one as to what internal and external factors, attitudes and management methods might be relevant. These will be common to all countries even though the form they take in each country may well differ.

## 4. Elaboration of more complex Hypotheses

The management of IP can be defined as including the following main areas :

1) Overall IP Policy
   - Formulation of IP policy
   - Influences on IP policy formulation
2) External Strategic Management of IP comprising :
   - acquisition - by research, licensing in, purchase, etc.
   - exploitation - use, licensing and protection
3) Internal Strategic Management of IP comprising :
   - administration - maintaining and updating IP
   - integration - of IP decisions and Business Strategy

Thus far all that has been hypothesised is that measurement of these factors will result in different results for UK and Japanese companies in some but not all cases. This requires elaboration. As a result of working as a Patent Agent in both industry and private practice and as a result of preliminary interviews in the UK and Japan, the above categorisation of IP management was expanded to develop the following sub-hypotheses.

### 4.1. Overall IP Policy

#### 4.1.1. Formulation of IP policy

The formulation of and responsibility for IP policy is a key factor in determining how integrated a company's IP policy is with the rest of the company's strategy. The low number of patent agents in Japanese industry pointed out earlier suggests that either IP is not managed at all, which is unlikely bearing in mind the numbers of applications being filed, or that IP issues in Japanese companies are more likely to be managed by senior managers and non-specialists than in the UK. We can thus hypothesise that for example :

H1 Japanese IP departments will more often be headed by directors than in the UK
H2 IP departments in Japan will more often report to directors than in the UK
H3 Companies in Japan will have more committee meetings relating to IP issues.

In view of the popularity of IP issues in Japan at present it is also likely that Japanese companies will be more ready to formulate specific IP policies. The common practice of summarising such policies with slogans should also provide a ready means of capturing the essence of a company's IP strategy or IP related interests. We can thus also anticipate that

H4 Japanese companies are more likely than UK ones to have an explicit IP strategy
H5 Japanese companies will be likely to have slogans summarising their IP strategy

### 4.1.2. Influences on IP policy formulation

As the previous description of the background has shown there is significant evidence that Japanese companies are likely to be highly interested in what everyone else is doing about managing IP both at home and abroad. It is highly probably that not just national policy but also Japanese companies' thinking about IP will be influenced by external influences (it should be remembered that company thinking is in any event closely linked to national policy through the various organisations connected with IP which exist in Japan). Furthermore influence from abroad will be particularly noticeable and especially from the USA. We can thus suppose that :

H6 Japanese companies are more influenced in their thinking about IP by external influences than UK companies are.
H7 Japanese companies will be more influenced in their thinking about IP by US influences than those from other countries and more so than UK companies.
H8 Japanese companies will be more likely to study their competitor's actions and policy regarding IP actively than UK companies are.

The technology trade figures studied earlier and the fact that Japanese companies are likely to be more interested in licensing in than UK companies even if they are equally interested in licensing out means that we can expect that :

H9 Japanese companies will have a less positive balance of trade in technology than UK companies[47].

## 4.2. External Strategic Management of IP

Strategic management of external issues comprises decisions concerned with acquisition of IP and exploitation of IP. A key measure of this is a company's technology trade balance. Based on macro level estimates of this balance we would expect that the UK companies would have a slightly positive balance and the Japanese ones a slightly negative balance.

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[47]It should of course be noted that some data gathered to test Hypotheses 9 - 13 will overlap with data already available from overall trade in technology statistics such as those referred to in Chapter 2. In this respect the Hypotheses naturally serve the purpose not of testing well known publicly available data but of confirming the extent to which the present research sample is similar to overall Japanese Industry regarding trade in technology.

### 4.2.1. **Acquisition of IP** - by research, licensing, purchase, etc.

It is already known from publicly available data that Japanese companies file considerably more patent applications than UK companies do. However a key figure which is rather more difficult to ascertain split by industry sector and company size is the percentage of applications which are eventually filed abroad - a useful rough proxy for application worth and quality since filing abroad is expensive and only worthwhile for potentially important inventions.

Acquisition of IP by licensing is likely to be more prevalent with Japanese companies in the light of the discussion of Japan's interest in importing technology and also more likely to involve technologically advanced western countries. We would expect that attitudes to licensing in technology and the degree of active searching for technology to be greater in Japan than the UK since not only do the overall balance of trade in technology figures suggest such a situation but the general acceptability of learning from anyone or anywhere which might have an interesting solution to a problem would also suggest as much. However even if Japanese companies begin to license out their licensing in can be expected to continue unabated. UK companies will not have had any reason to increase licensing in. We can therefore expect that[48] :

H10 Japanese companies will license in technology primarily from developed western countries
H11 Japanese companies will view licensing in technology more positively than UK companies
H12 Japanese companies will actively search for technology to license in more than UK companies
H13 Japanese and UK companies will not have changed their level of licensing in activity

### 4.2.2. **Exploitation of IP** - licensing out and litigation

#### 4.2.2.1. Licensing In

Since Japanese are increasingly catching up with or overtaking Western companies technologically we can expect that Japanese companies may well be at least as interested in licensing out technology as UK companies are. Moreover the effects of the recent depression are likely to have created pressure in both the UK and Japan to increase licensing out. Bearing in mind that most of large Japanese industry is in sectors with a *high patent density* it is also likely that Japanese industry will be more amenable to cross-licensing than UK industry. We can thus expect that :

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[48]It should of course be noted that some data gathered to test Hypotheses 9 - 13 will overlap with data already available from overall trade in technology statistics such as those referred to in Chapter 2. In this respect the Hypotheses naturally serve the purpose not of testing well known publicly available data but of confirming the extent to which the present research sample is similar to overall Japanese Industry regarding trade in technology.

H14 Japanese companies will have at least as positive attitude towards licensing out technology as UK companies do
H15 Japanese companies will be at least as likely to take active steps to license out technology as UK companies are
H16 Japanese companies will have a more positive attitude towards cross-licensing technology than UK companies do
H17 Japanese companies will license out technology to Western countries but also to significant numbers of Asian countries
H18 Japanese and UK companies will have increased their level of licensing out activity

#### 4.2.2.2. Litigation

Japanese society is traditionally a litigation averse society. The history of Tokugawa era (1600 - 1868) law suits when it was not uncommon for both plaintiff and defendant to be punished equally and when pre-hearing dispute resolution by the Judge was an integral part of the system, (Henderson 1965; Wigmore 1969) have a lingering legacy in Japan. The number of lawyers per capita for example is far lower than in other major countries and whether this is because they are so expensive or because being litigation lawyers they are largely unnecessary the end result is the same. Against this there is also a view that the litigation averse nature of Japanese society has more to do with the institutional disadvantages in cost and time of solving disputes through Japanese courts than any societal pressures (Oda 1992)[49]. Certainly the issues of delay and inability of plaintiffs to recover all their costs mentioned by Oda can equally be said of IP related litigation in Japan in addition to issues regarding lack of discovery hampering plaintiffs pursuing defendants (Interview with Foreign Lawyer in Tokyo, 1994/3/4). Either way the fact remains that Japanese companies are reluctant to go to court. At least that is the commonly accepted truth. This seems on the other hand to be an area where certainly in international terms one would expect the basic similarity of the problem of dispute resolution to override cultural considerations and result in attitudes to litigation being similar in Japan and the West. It may be something which in the light of Japanese experience of being on the receiving end of US litigation, is changing. The general trend towards stronger IPR worldwide would also tend to suggest that litigation in general would be becoming more common. Since one can anticipate a certain inertia in the rate at which changes in litigation habits occur one can imagine that attitudes in Japanese companies to litigation in National courts would be more conciliatory than in foreign courts where one can be more litigious on the basis of "when in Rome...." or in 「郷によって郷に従い」. Furthermore we would expect that the bulk of infringement amongst overseas companies would originate from Japan's competitors among Asian countries and that Japanese companies would be accused of infringement most by companies in technologically advanced countries and in particular the USA. We would thus expect that :

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[49]According to Oda and the journal "Jurist" (Special Issue on State Judicial Examination 1987 p.98) there were 9199 people per lawyer in Japan in 1986/7 3468 in France 1291 in W.Germany, 879 in the UK and only 358 in the US (with which Japan is usually compared in Japan).

H19 UK companies are more likely to go to court to settle infringement actions than Japanese companies are.
H20 Japanese companies are becoming more likely to go to court to settle infringement actions.
H21 Litigation is becoming more common for both UK and Japanese companies.
H22 Japanese companies are less likely to go to court to settle infringement actions than UK companies are.
H23 Japanese companies are more conciliatory in national courts than in foreign courts.
H24 Japanese companies are more likely to be accused of infringement by US or other western companies
H25 Japanese company IPRs are more likely to be infringed by Asian companies.

## 4.3. Internal Strategic Management of IP

The internal strategic management of IP comprises not just administrative management of the IP department and associated IPRs but also actions and organisational features which help integrate IP management with general strategic management of the firm. For a specialist function such as IP this is a particularly difficult task with many line managers taking the view that they either think it's unnecessary because they don't know anything about it or that they do know enough about it and as a result don't want to have anything to do with it, preferring to leave it to legal experts.

### 4.3.1. Administration - maintaining and updating IP

One of the key decisions in IP management is whether to concentrate one's management resources in one location or distribute them to the various technical locations in the company. However, with this decision choice is only possible if there are sufficient staff and resources to enable multi-site operation. Another key feature of IP departments is as to which part of the company organisational structure they report to and belong to. With a higher proportion of legally qualified patent agents working in Industry in the UK one would expect to find that the IP or Patent department they work in was either independent or attached in some way to the legal department. Japanese companies on the other hand having a low proportion of patent agents in industry can be expected to be less associated with the legal department and more likely to be associated directly with the source of their business, the R&D department. UK companies might also be expected to use fewer outside patent agents[50] since they employ a higher proportion of them than Japanese companies do. Whether Japanese companies do so too will depend on what the IP /Patent department staff are capable of doing in the way of drafting. There may also be specialist sections within IP/Patent departments and among these we might expect Japanese companies to be more likely to have specialist Patent Information sections and less likely to have patent litigation sections. Overall we would, because of the

[50]A company may subcontract the drafting, filing and prosecution of patent applications to patent agents working in private practice if the IP department has insufficient staff capable of carrying out the technical / legal work required.

large number of applications, also expect that Japanese companies would have considerably greater and faster growing resources both human and financial devoted to IP management than UK companies do and furthermore that Japanese companies are likely to use various positive means of encouraging the large number of applications.

We can thus predict that :

H26 Japanese company IP departments will be more likely to belong to the R&D than the legal department, whereas UK company IP departments will be more likely to belong to the Legal than the R&D department,

and that Japanese companies will, relative to UK companies have :

H27 - more multi-site IP / Patent Departments operations
H28 - more Patent Information sections and personnel
H29 - fewer Litigation sections and personnel
H30 - greater IP department budgets and staff levels
H31 - faster growing IP department budgets and staff levels

whilst, relative to Japanese companies :

H32 UK companies will have a lower proportion of work sent to outside agents

### 4.3.2. Integration - of IP decisions and Business Strategy

One of the key features of a company's IP actions and policy is the extent to which they are integrated with the company's overall strategy and general management. At one extreme the patent department can be an isolated legal service department filing applications when called upon to do so and licensing in or licensing out technology when asked to do so either by company staff or external parties. The impact of the department on strategic decision making is minimal unless the issues facing general management force them to consult the IP department. One is in a sense lucky if some general managers do even that since if they do not know about IP issues they may not know that they should ask anyway. Education of and liaison with general management staff and integration of IP department staff into general strategic decision making are thus key issues for a successful overall approach to IP issues.

The fact that Japan has a low proportion of patent agents in industry can be expected to mean that more general managers will be involved in IP matters, that there will be more circulation between the IP and other departments and that the IP department will be able to involve other departments in decision making more easily than in the UK. In addition with the absence of patent attorneys in industry there are likely to be more attempts to educate the IP managers who are there but are at first non-specialists. We can thus predict that :

Japanese companies relative to UK companies will :

H33 - have a higher circulation of managers to and from the IP department

H34 - involve more other departments in decision making
H35 - give managers more IP related education

### 4.3.3. Convergence of IP environment

The international interaction between attitudes to IP issues and between IP laws should according to the arguments proposed earlier result in greater similarities in both. In addition to the above hypotheses which deal with changes and similarities between the UK and Japan we can thus hypothesise that :

H36 IP Laws will be seen to be converging internationally
H37 Attitudes to IP issues of UK and Japanese companies will be seen to be converging.

## 5. Conclusions

Thus far the hypotheses resulting from the study of the literature and the background have ranged from the positing of overall to detailed differences between Japanese and UK companies' management of IP. However, to leave the analysis there would be to limit the study to just comparative analysis. Some higher level hypotheses can thus be usefully drawn which will integrate the findings and lead on to the possibility of theory building following the data analysis.

The Japanese attitude to IP appears to be built around an strong emphasis on learning and acquisition by whatever route and from whatever source is most convenient and likely to produce successful results. Such an emphasis requires possession of good information to know where to source and how to develop technology and it also requires a strong emphasis on the development of technology once acquired. We can thus expect that issues such as incentives for invention and information management will receive a heavy emphasis in Japanese companies compared to UK companies where the emphasis is not so likely to be on sourcing and development of technology originating elsewhere.

IP is a topic whose origins lie in the law and Japanese society is not a litigious society. A high value is placed on negotiation and agreement and this may be reinforced by institutional incentives to negotiate and/or discouragements to litigate. Yet under stress there comes a point at which the distinction between "honne" (what is really felt) and "tatemae" (what is publicly acceptable and revealed), breaks down and Japanese society can be as direct and confrontational as any western society perhaps the more so for the earlier restraint. This gives scope for continued easy negotiation and cross-licensing of technology in ways which are non-confrontational and which encourage the spread of technology amongst Japanese industry. Yet it also allows for the stress of continued infringements by Asian countries of Japanese IPRs, the recession led need for extra revenue sources and increased US assertiveness over licensing and infringement issues to spur Japanese companies into a more assertive

attitude towards the management of IPRs. The fact that the two factors come from on the one hand a more technologically advanced source of technology and on the other from less advanced seekers of technology means that Japan is occupying a technological intermediary position. This still applies even if in some areas it may itself be the leader. This leads to a conflict between a pure advanced source of technology's attitude to IP which will be protective, aiming to extract the maximum royalty from technology or even to deny it's use to others altogether and a less advanced seeker of technology's attitude to IP which will be to downplay protection and to encourage licensing at minimum cost.

We can thus expect that Japan will exemplify a situation which in the future will become increasingly common, that of a technologically advanced leader / follower or a still learning leader. Gradually as the technological capabilities of nations increase there will be areas such nations are more advanced in than all others but where the original invention may have occurred elsewhere. LCD technology and Japan is one such example. In general further development will not be just a matter of indigenous invention and innovation based on a local invention base but of innovation based on an international invention base. Continuous learning and licensing in will be as important as the licensing out of past technology and technology which there are not the resources to develop fully. Old models of technological development operated with Advanced countries in the West licensing out the technology they could not exploit in Asian markets to for example Japanese companies. Japanese companies meanwhile were licensing in technology wherever possible to form the basis for further indigenous development of the technology and raising of the technological capabilities of the Japanese company.

The Western companies however had little interest in or opportunity to license in technology from Japan[51] to use in the development of their own technology. Instead of turning into just another member of the club of technologically advanced nations though, Japan appears to be merely adding Western characteristics of licensing out past technology to its continuing characteristics of trying to acquire technology from whatever source is the most appropriate, whether that means indigenous development inward licensing or funding R&D abroad. It is no surprise that Japanese companies have set up R&D facilities abroad nor that they have always seemed more than ready to license in technology or adapt and develop technology originating elsewhere. As Japan and increasingly other formerly technologically undeveloped countries begin to develop leading technology it is going to be increasingly important for Western countries to learn to learn from them whether by observation or licensing in and development of technology. The absorption of some Japanese production management methods in the auto industry perhaps provides an example of what is needed in other fields, a curiosity

[51]The Toyoda Loom/ Platt case referred to earlier is one notable exception but it is not clear that it was used as the basis for development to keep ahead of Toyoda rather than as an opportunity to buy in a method of selling the most advanced products of the time.

and a willingness to overcome difficulties of language and distance and learn, irrespective of whether that learning is driven by a need to catch up with, keep pace with or just keep ahead of others.

We can thus expect to see in Japanese companies' attitudes to overall IP policy and in particular licensing and litigation, an example of both willingness to search for and license in technology combined with a readiness to protect and exploit technology for licensing revenue and strategic reasons. This links back to the idea mentioned earlier of technology management being not a matter of simple protection but of control and flow management.

Finally we can expect to see in Japanese companies' management of IP an interaction between IP management and more familiar aspects of Japanese management such as an emphasis on job rotation, training, general management skills, broad consultation in decision making, emphasis on information gathering and observation of activities of competitors abroad and the use of implicit and explicit incentives to encourage behaviour. These factors however will all tend to integrate the management of specialist functions such as IP by placing the specialist skill outside the organisation and integrating the management of such skills within the organisation in much the same way as any other more general function. In contrast the UK is more likely to have a lack of integration of the IP function and an emphasis on legal specialisation not management skills. Obviously this is a generalisation and in very large firms one would expect specialisation to occur. There would nonetheless still be sufficient rotation and integration of managers to achieve a greater integration of IP into the overall management of the company than would be the case in the UK.

This expected greater integration would help in using IP in the assimilation and development of technology and the licensing out and dissemination of technology which are both essentially licensing and information processing operations not legal administration problems.

The other side of the advantages of an integrated approach to IP management though is that with a lack of specialisation there will be systems which are suitable mainly for non-contentious work and for managing the bargaining and collection of counters (in the form of patent applications) necessary for such bargaining. When such a situation turns to one where companies also have to control the flow of technology out of a company as well as promote the flow of technology into it through licensing, then non-specialist IP managers will need supplementing with specialists such as one might expect to see operating in larger UK firms.

# Chapter 5. RESEARCH METHODS

**Summary**

The aim of this chapter is briefly to set out the viewpoint from which the research is carried out, to explain the research methods selected and justify their selection by discussing their benefits and risks.

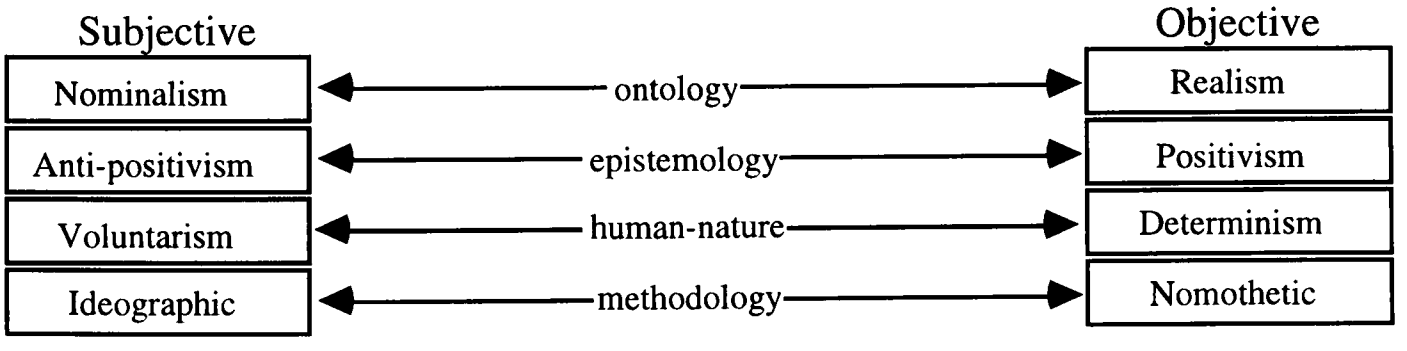
## 1. Research Methodology and Assumptions

Most management research makes some assumptions about reality, what one can know about it and about the degree of freedom of the people being studied. In other words about: Ontology, Epistemology and Determinism or lack of it. Any researcher's views on these have a bearing on what they hope to achieve in their research. This is not a subject which need be discussed at length but it needs brief mention so that this research's viewpoint can be understood. That is that the research aims, to enable more informed and expert judgements about IP strategy and if possible, to establish theoretical frameworks for considering and understanding IP strategy, even though it does not aim to make deterministic predictions. Furthermore it aims to enable more informed judgements through collecting data about current IP management practice and IP strategy in any way possible and without restricting data-collection to any particular method. This is for the following reasons.

### 1.1. Research Assumptions

According to some, a researcher's assumptions have implications for their research methodology and can be divided into subjectivist and objectivist approaches (Burrell and Morgan 1988).

Figure 13 The Subjective-objective dimension (Burrell and Morgan 1988)




The divide between these two opposing viewpoints is perhaps not so clear though. Without wishing to digress into a philosophical or quantum theoretical argument, realism (whatever one means philosophically or physically by the term) is not necessarily tied to determinism. (See (Whitaker 1996) for further discussion). Another point of view more directly related to studying organisations is that of Whittington who portrays the dichotomisation into voluntarist and deterministic orientations as "too simple" and arrives at another "realist" position which includes consideration of the environment (Whittington 1988). This is a useful approach

when considering the influence of the IP environment on Japanese attitudes to IP management, since the Japanese IP environment does not determine Japanese actions but it does, as we shall see, both significantly influence them and set the starting point from which such choices are made. However, in addition to these considerations there is a range of research methods which can be used to collect data and there is nothing to stop one employing a whole range of diverse methods to assemble as comprehensive a collection of data as possible. What matters is the nature of the data collected and ensuring that the statements based on it are justifiable. Thus in some respects the present study is highly positivistic in searching for generalisable objective facts originating in hypothesised regularities and yet it also draws on individual facts, subjective opinions and experience of those companies and individuals involved in the field. These are all used to construct a complementary web of facts and opinions of varying degrees of generalisability and objectivity but which all relate to the reality being studied. As a whole they encompass the field of study and enable a better understanding of it than would be possible from the statistically generalisable facts alone.

Perhaps the other key assumption in addition to that of a realistic view of the world is that of the extent to which human actions are determined. If they are then, but for the complexity of the problem, scientific experiments could determine how and why given social phenomena occur. However, this research holds to a view of human nature as not being determined and having a free will. This has important implications. Linked to this in a business context is the idea of the existence of strategic choice (Child 1972). The most important practical implication however is that we cannot make completely accurate predictions about human behaviour. In any event even if this assumption is wrong, when the complexity of the majority of business strategy problems, the multiplicity of factors involved and the associated problems of causality in studying them are also considered, the difficulty of constructing falsifiable (and therefore scientific according to Popper (Popper 1959; Popper 1982)) business strategy theories with predictive power becomes readily apparent. However, despite this, associations and statistically generalisable trends or facts may enable some conclusions to be drawn which are useful for enabling more informed and expert judgements in the future. Furthermore "theories" which are really *theoretical frameworks* for thinking about strategies may also be constructed. These frameworks should both largely fit and enable an ordered assessment of past data and yet not be thought of as enabling accurate prediction of the future. Thus for example the main theoretical work which has been mentioned in respect of IP is Teece's work on appropriability and complementary assets. However, whilst Teece's theory is a very interesting and useful way of analysing the situations he describes - it is despite the label of theory no more than that, an analytical framework which might be helpful but whose predictions might also be overridden by a host of other factors or unpredictable agents or events. Even though not predictive it enables more informed and expert judgement.

Thus as with Schoemaker who emphasises the heuristic, non-optimisable nature of strategy

(Schoemaker 1990), this study does not intend to make any firm predictions but its aim is the enabling of more informed and expert judgements by those faced with making choices.

Even if it is impossible to predict human nature and thus, to a large extent, management actions, the concept of management "theory" need not be a tautology. To draw an analogy with economic game theory it is often possible to predict optimal strategies given a set of rules, in effect a theoretical framework within which the game will be played and yet for the game not to be played thus because of the irrationality and unpredictable nature of the players (Schoemaker 1990). Business strategy, as has been pointed out in the section of the literature review dealing with game theory requires considerable simplification to enable any predictions to be made on a game theoretical basis. Often the simplification required is so substantial that the resulting predictions seem of little practical use but they can always be a help, a starting point, in thinking about strategy and in the same way frameworks for considering business strategy which is really a variety of game may be helpful.

Figure 14 A hierarchy of games

| | | |
|---|---|---|
| Deterministic Rational | | Game Theory |
| Indeterminate Unpredictable | Business Strategy | |
| | Complex Rules / Situations | Simple Rules / Situations |

This research is therefore concerned not just with the elucidation of details and descriptions of the complex situations IP strategy is made up of but also with trying to put a little more order into the way in which such situations can be viewed. In this sense it is about using a data collection exercise which gathers both statistically generalisable and complementary rich data as a source of inspiration for constructing useful theoretical frameworks.

The realistic, non-deterministic nature of the research outlined thus far might seem to have implications for the research methods to be used. There is a tendency to draw a sharp contrast between subjective and objective research approaches (as do Burrell et al. described above) and to imply that for example qualitative research must be associated with a subjective approach and quantitative methods with an objective approach (Bryman 1989). They are sometimes described as mutually exclusive but as Bryman says :

> "It is clearly the case, contrary to Burrell and Morgan, that quantitative and qualitative research can be combined. " and "methods do not bring a trail of epistemological conclusions in their wake. Each method should be appreciated for what it is : a means of gathering problem-relevant data." (Bryman 1989)

This is the approach adopted by this research. The limitations of and the meaning of the data collected must be considered in any analysis but there should be no hesitation in using any reliable method of data collection available if it can contribute to a better understanding.

# 2. Research Methods

## 2.1. Subject related Data Collection Problems

The present research like any other has had to overcome a series of problems. These can be divided into firstly those connected with the international nature of the study and comparing data from two different countries and cultures; and secondly, those problems connected with the particular research field of IP being studied. These will now be discussed before discussing the research methods used to overcome them.

### 2.1.1. International Data Collection Problems

The present research comprises an international data collection and comparison which depends for its success on being able to collect comparable sets of data.

Firstly we have to be certain that the subject of study is the same in both countries. This is not too difficult since IP and IPRs are international issues, the subject of International conferences, treaties and conventions for over a hundred years. There is thus a large measure of agreement about the issues involved even if the approaches to them differ between countries.

Secondly, there are international differences in the availability and accessibility of data and thus potential problems with the comparability of the data which can be collected.

#### 2.1.1.1. Publications

A notable feature in Japan is the abundance of books and printed matter being sold. This varies enormously in quality and variety but it includes a considerable amount about even a subject as obscure as IP, which has received an increasing amount of publicity in recent years (See Figure 11 Page26 ). Rahn has also commented on this (Rahn 1994). He was comparing the situation to that in Germany, but the UK situation is similar with little published in the UK about IP management. This means that greater use of published information in studying Japan might be a source of bias. However, since the aim is to gather data from as many reliable sources as possible the real question is whether the literature is a reliable guide to reality. Rahn, in commenting on the Japanese IP literature, mentions the distinction between the outward face presented to the world and the inward reality and suggested that this might be relevant to discussions dealing with Japanese IP policy :

> "Vielleicht ist die bemerkenswerte Diskrepanze zwischen Deutschland und Japan bei der Diskussion von Patentstrategien auch darauf zurückzuführen, daß die Japaner klar zwischen „Tatemae" und „Honne" unterschieden, zwischen den „formalen Prinzipien", die in der Offentlichkeit ohne weiteres behandelt werden können, und den „wahren Absichten", die man für sich behält." (Rahn 1994)

However, Rahn thought that discussions of patent strategy and in particular "patent nets" in the literature were consistent with the published data on Japanese patent applications. In my own experience I did not find any evidence of disinformation. It thus seems safe to assume that Japanese publications regarding patent strategy and patent management are representative of the true situation. The distinction between the public and private information is that the latter is more comprehensive and not everything is published. This is exactly what logic, UK practice and my own experience in an industrial IP department suggests. Company confidential material of use to competitors would not be revealed, whilst generic facts and opinions would be. Consequently published sources dealing with Japanese company IP practices can be treated as valuable even if not comprehensive sources of information.

### 2.1.1.2. Languages and Cross-Cultural Surveys

There are also potential problems in defining the research questions in different languages. This is not a problem at a general level or in an interview when there is the possibility of clarification but it becomes much more important when dealing with a self administered survey questionnaire. Besides this, there is also the more general problem of sample selection which applies to both interviews and questionnaire surveys.

Brislin et al. have discussed several potential hazards which cross-cultural studies may fall into (Brislin, Lonner et al. 1973). Selection biasses which are then compounded by the experimental method may lead to one sample responding differently. The nature of Japanese society and a positive attitude to questionnaires is more likely though to have resulted in simply a greater response in Japan than in the UK rather than a different response. Another potential problem is caused by use of measures which are irrelevant in one or other of the cultures being studied. In this case the risk is minimal firstly because the questions have been reviewed by those who have worked in the UK and Japanese environments where the questionnaire was used. Secondly the situations faced by respondents are similar in terms of the problems faced even if responses differ due to the different environment in which the problems are encountered. A further risk described by Brislin is that of administering a test standardised in one country which imposes an artificial viewpoint on the other. One solution advocated to this problem by Berry (Berry 1969) is to study only those aspects of behaviour that are functionally equivalent. Since in this case the studies in both countries relate exclusively to practice related to the same IP business problems and departments functionally equivalent aspects are being studied.

The problems of language encountered in the preparation of an international survey are obvious since a word's meaning in one language rarely maps exactly onto that in another. In this research such problems are minimised since the subject matter has a common origin. As has been described IP terminology and ideas have been imported almost totally from Western

sources and primarily French, English and German based cultures. The ways adopted to ensure there are no residual linguistic problems are described later.

Thus whilst there might be problems with an international comparative survey, the underlying common subject matter and the international nature of the subject being studied mean that such problems are likely to be minimal.

### 2.1.2. Intellectual Property Data Collection Problems

Quite separate from problems of the international nature of the research are those associated with the study of IP. Most IP work is highly confidential. Secrecy applies to as yet unpublished patent applications and company trade secrets. In comparison IP department administration and overall IP policies should not be so secret. However, two factors counter this. Firstly a tendency for paranoia about confidential information to be at its highest in the IP section (that responsible for the legal issues involved). Usually the IP section clears articles for publication and tells researchers whether they can disclose their research at conferences. IP departments are thus circumspect about what they reveal themselves. Secondly there are some IP policy areas which could be of commercial value to competitors. Assessments of the tendency to go to court may reveal a company's likely bargaining position in litigation, a companies licensing income and expenditure or R&D budgets may be useful to competitors. Details of licensing and other alliances may be confidential. With IP issues there may be more secrecy than openness and this may hinder data gathering.

This risk of difficulties with access was a prime reason for using various methods of data collection, especially in Japan. It was seen that potential difficulties with access to Japanese IP departments, might mean that insufficient or an insufficiently diverse set of interviews could be carried out to provide a generalisable data set. Added to this, there were doubts about the response rate to a survey run from abroad and some brief initial doubts as to whether the published information available would prove to be as comprehensive as it turned out to be. My own experience as a Patent Attorney in private practice dealing with Japanese clients and as a Patents Manager in Industry added to my concerns on these points but also made me think that they might be surmountable if one could build up a network of helpful contacts. Another reason for concern was that the only Western run survey on the IP at the time of the research had only surveyed about 25 companies in Japan and interviewed 3. It was thus felt that a diverse range of data-collection methods would reduce the risks run by the research and that a considerable effort should be put into collecting data in any way possible.

## 2.2. Qualitative methods

Qualitative data collection methods have been divided by Bryman into participant observation (which he describes as "closest to the position of an anthropologist visiting a tribe for a period of fieldwork"), unstructured and semi-structured interviewing and the examination of documents. For the reasons given above about confidentiality access to internal materials was limited [52]. Thus access to documents was with a few exceptions restricted to those which had been made publicly available by companies. In general these were in Japanese and thus having been able to read them has made a significant contribution to this research. To guard against failure of the survey and to support the interview program a considerable effort was also put into collecting as much published Japanese literature as possible on IP management. This proved very successful and contributed to understanding of the other data collected.

Due to the same access problems, the possibility of participant observation did not exist. It would be perfectly possible to obtain a job in some Japanese company IP departments but one would almost certainly have problems with confidentiality in describing one's work or with accessing others in the same industry. Many companies might object to employing or admitting any observers at all. Someone I interviewed in Tokyo who was searching for and eventually found a job in an IP department was told by one company that they did not hire foreigners specifically because the work was of a confidential nature. The remaining chances of qualitative data collection were thus those of interviewing IP department managers and collecting published Japanese sources of information.

Obtaining interviews in Japan turned out not as difficult as anticipated but was only possible due to building up a wide network of contacts in the Japanese IP world. In this I was fortunate in being the only UK patent agent my interviewees had met who interviewed them in Japanese which certainly helped matters. The process was necessarily serendipitous though and relied heavily on personal introductions from one contact to another. Consequently it was not possible to control the sectors with which interviews occurred as well as was necessary for a generalisable collection of data to be obtained.

The interviews were conducted in the period 1993-1994 during my stay in Japan. However in 1995 I had the chance to visit Japan again as a researcher at the Institute of Intellectual Property in connection with a project on Japanese company attitudes to Patent Law Harmonisation. During this visit I was able to conduct a further set of interviews which though based on a questionnaire concerned with Patent Law harmonisation also necessarily

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[52] I did manage to interview the patent department staff in a medium sized engineering firm I worked in before starting this research and as a result of being a staff member myself at the time was able to gain a far more detailed picture of their operations and for example training material than would normally be the case. This was an exceptional opportunity though which I took advantage of but was not able to repeat elsewhere.

involved discussion of overall attitudes to IP management in Japanese companies and gave the opportunity to check and explore previous findings.

Table 3. Interviews

| | Formal Meetings | Formal Interviews | People Involved | Organisations Involved |
|---|---|---|---|---|
| '95 Interviews in Japan | 25 | 28 | 77 | 43 |
| '93/'94 Interviews in Japan | 20 | 29 | 50 | 33 |
| '93/'94 Interviews in UK | 11 | 9 | 15 | 12 |
| TOTAL | 56 | 66 | 142 | 88 |

| Sector | Organisations Involved |
|---|---|
| Foods/Misc. | 5 |
| Chemicals | 8 |
| Pharmaceuticals | 6 |
| Electronics | 19 |
| Transport | 4 |
| Machinery | 6 |
| Patent Agent | 3 |
| Foreign Lawyer in Japan | 13 |
| Other Orgn'n | 6 |
| Government | 6 |
| Academic / Researcher | 12 |
| TOTAL | 88 |

The end result of the interview program was that a substantial number of people in Japan and the UK were interviewed. Excluding contacts, meetings and interviews in the UK not specifically related to this research but which indirectly contributed greatly to it, over 140 people and almost 90 organisations were involved in meetings or longer more formal interviews.

### 2.2.1. Conducting Interviews in Japan

Among the reasons for the lack of generalisability of the data from interviews were the conditions they were conducted under. In the majority of cases only 1 interview was possible with each organisation. In interviews with senior IP department managers it was difficult to be able to talk uninterruptedly for more than an hour. However, in some cases interviews overran and developed into tours of offices and discussions over lunch but in others the meeting was very much governed by the clock. In yet others only short meetings were possible with only the chance for a few relevant questions. One essential feature of all interviews and meetings though was allowing time for the preliminaries. These were essential.

It was vital to emphasise, that I was not funded by or linked to any competitors, that individual survey and interview data would be kept anonymous, that (where it could be used at all), the tape recorder was only to compensate for my inability to take notes quickly enough in Japanese[53] and finally and very importantly that I had been introduced by somebody they knew well and trusted. This all helped put interviewees at ease about the interview and only in one or two cases were even stricter conditions of confidentiality and no tape recording requested. These were invariably with middle managers talking off-the-record with me as a personal favour to the person who had introduced me to them and without the authority to give any formal interviews on behalf of their company. In contrast most of the other interviews I conducted were with the most senior person in charge of IP in the company or one of his[54] deputies. This meant that they were very busy people who could not talk for extended periods of time, but also meant that they could fairly be said to represent their company's view on IP issues. When I returned to Japan in 1995 and had the assistance of the IIP in organising interviews with IP department managers it was much easier to be more selective about who one interviewed. My overall experience of the interview process was that it was very useful but subject to such a degree of variability in the ease of selecting interviewees and applying a set series of questions as to be an unreliable basis for overall comparison of companies. It was far better for checking topics included in the questionnaire survey, to confirm data in published Japanese sources and for adding detail to expand and enrichen the survey based data. The interview data in this research thus does not play a central but a supporting role. The fact that in a few cases it has not been possible to identify interviewees precisely[55] so as to preserve their anonymity should not therefore prejudice the general conclusions of the research since these stand alone supported by the survey data whose collection the interviews helped prepare the way for and supported.

The overall conclusion though was that despite the subject matter and the risks involved it was possible to gather a considerable body of information on Japanese company IP use and management through interviews and literature collection. However, the lack of rigid repeatability and generalisable random selection of interviewees meant that it was all the more essential to have some generalisable survey data set to use to compare UK and Japanese IP management.

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[53]All interviews with Japanese Nationals in Japan were conducted in Japanese with the exception of one interview with a manager in the presence of more junior managers. In subsequent interviews the same manager used Japanese.

[54] "His" represents not a lack of PC language but the fact that none of the Japanese IP managers I was able to interview were female. Bearing in mind the average Japanese company's personnel policies it is quite possible that there are no senior female Japanese IP managers.

[55]In some cases, especially in the case of non-Japanese working in the IP field in Japan the numbers of people involved are so low that even sparse details such as nationality and sector would be more than sufficient to disclose identities.

The situation in the UK was different. Though some preliminary interviews were carried out in the UK once the Japanese survey had been completed successfully the primary means of comparison became the survey results and thus any emphasis on extensive interviews or literature collection in the UK became less important. Secondly, the driving reason behind the research was to investigate the situation in Japan. In that sense the research was not a balanced comparison and the requirements of the situation in Japan took precedence where there was any conflict with that in the UK. This was the case with the length of the questionnaire which was designed to maximise the data collected in Japan even at the slight risk of a lower UK response rate.

### 2.3. Quantitative methods

Given the way that the Japanese interview and literature data collection had developed it was considered vital to make every possible effort to obtain a good response rate for a comprehensive questionnaire based survey to enable not only a wide range of subjects to be covered but for some statistically reliable results to be obtained. Additionally, the attractions of a comparative broad quantitative questionnaire based survey were considerable since none existed which had both the scope of data and scope of respondents and the information gathered would thus be a significant contribution to the field of study.

The manner in which the survey was conducted is described in the following chapters but a key feature was obtaining the co-operation of the IIP in conducting the survey. I found that by negotiating the way in which the survey was carried out to take advantage of the positive Japanese company attitude to quasi-official surveys (especially those supported by organisations with strong Government and Industry links) a more than adequate Japanese survey response of 44% was obtained. It is more than likely that without the IIP's co-operation the survey response rate would have been minimal.

## 3. Research programme

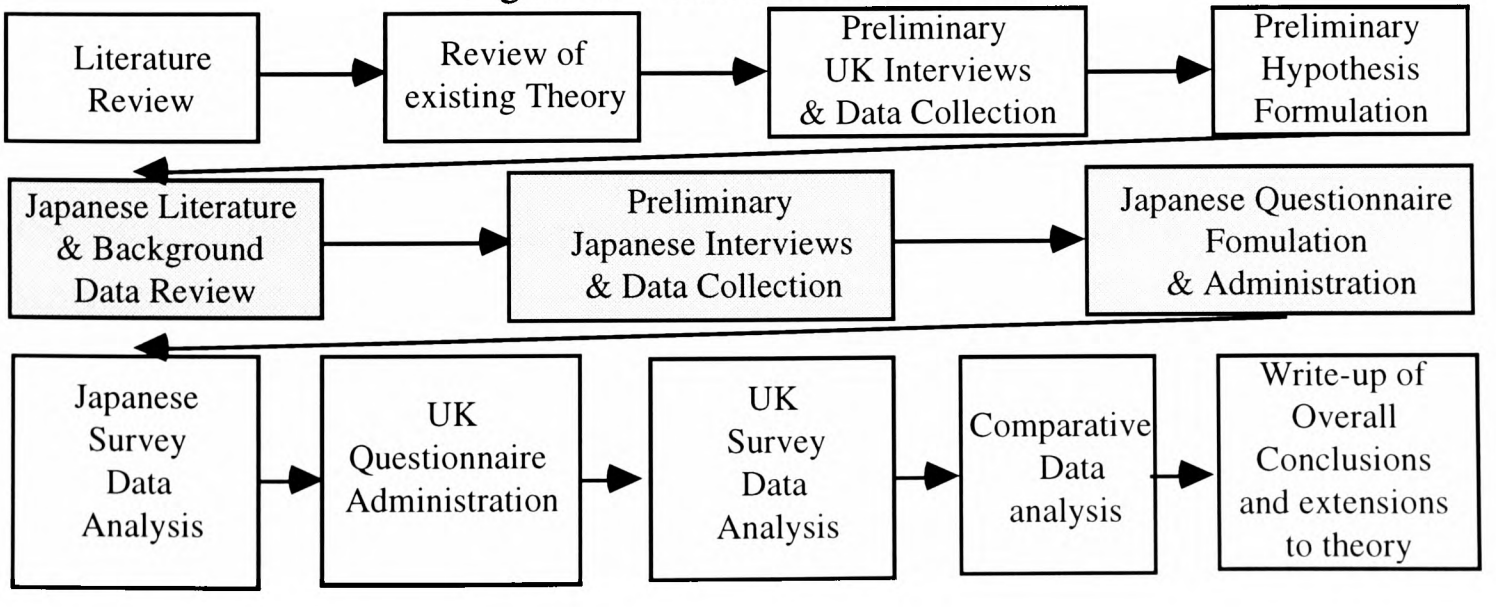
The research methods have been described in outline but not yet the way they were put together. A key point in this process is that the primary aim of the research project was to gather data on IP use and management in Japan. The research began with a review of the literature available in the UK and of the theoretical basis of the research. The English language literature was weak on practical IP management and the key issues involved, though stronger on more theoretical aspects and some preliminary interviews were carried out aimed at confirming my own views as an ex-UK IP manager as to which issues were important to UK IP managers.

The location of the research then moved from Oxford to Tokyo. After an initial Japanese

literature search and research into the background to the Japanese IP system the data gathered up to that point provided the basis for the construction of some semi-structured interview formats which acted as a forerunner of questions to be included in the postal survey. Further literature searching was a continuous process throughout the year spent in Japan since new sources were continually coming to light or being passed on to me by contacts or interviewees or new sources I had discovered or gained access to (e.g. NISTEP the research centre I was based in had access to the Nikkei Biz newspaper database which I managed to download information from). However, after some of this literature searching and further interviews had been carried out draft versions of the questionnaire were written and reviewed. The detailed process of constructing the questionnaire is dealt with later but an important point is that it was left until the latter part of the stay in Japan to be able to include as much of the knowledge gained in the earlier part of the stay as possible. If the questionnaire had been conducted on my arrival it would have contained less appropriate questions and would have reduced the data collection time available through the data analysis being carried out in Japan. In the event the questionnaire data analysis was all carried out in the UK on my return whilst running the UK survey. Following conclusion of the UK survey and some additional interviews the final comparative data analysis was carried out. The final interviews included not only interviews in the UK but also the chance to carry out interviews arranged through the IIP on Japanese company attitudes to Patent Law Harmonisation. In the course of these though there was the opportunity to discuss issues relevant to this research.

The progress of the research thus closely resembles the logical structure of a quantitative research process described by Bryman the main difference being that it involved two consecutive data collection processes and research based in two countries with the associated logistic problems that involved (Bryman 1989).

Figure 15 The Research Process




## 4. Outline of Analysis of Findings

The data analysis part of the present research would appear to be no more than the summarising

and comparative statistical analysis of two parallel surveys. However, quite apart from the amount of data collected, some means needed to be found of consolidating the survey findings with the interviews and literature search data so as to emphasise facets of the information which supported the final broad analysis and attempts at extending existing theory.

It is common to find examples of case studies of particular companies used in such situations. However to use just a few companies as examples would be to lose the breadth of the data collected as well as losing the focus on those topics which would support the final analysis. It was therefore decided to analyse and present the findings of the data collection process in the form of topic studies. These are a series of topics crucial to the subject of IP management and combine results from the statistical survey with data from the interviews and the English and Japanese literature searches. Presenting the full results of the survey would have resulted in very lengthy appendices and consequently a shorter comparative statistical analysis is given with the figures in Appendix L. In this way the mass of highly detailed and unique data gathered in the survey can be used without reducing the text to a lengthy list of numbers.

## 5. Conclusions

The present research is conducted from a point of view which allows for free will in its view of human nature and thus follows a paradigm allowing for strategic choice not determinism (Child 1972)(Faulkner 1993). The approach followed is based on the existence of a reality regarding IP management which it is possible to discover from the data collected. However, the data collection process is neither wholly subjective and qualitative nor wholly objective and quantitative but draws on both quantitative and qualitative methods.

A major quantitative survey provides the core data allowing generalisable statements to be made. This data is enrichened and supported by data gathered from interviews and literature searches of published primary Japanese sources. The survey data collected is analysed both individually and comparatively and the results combined with data from further interviews and Japanese literature searches in a series of "Topic Studies" aimed to combine data from all the sources used. These in combination with the background information to the subject presented earlier, are then used to inform the subsequent stage of theory extension.

The research thus moves through a cycle starting with study of background information and overall themes. This is used to formulate hypotheses on which the very specific questionnaire surveys are based. The data from the survey is combined with that from other sources including both interviews and printed sources. This broad but detailed collection of facts then forms a basis for the work on extensions of existing theory of overall IP management. This draws the research full circle only this time to a practical and theoretical view which is closer to practical patent strategy than that which the research commenced with.

# Chapter 6. SURVEY DATA COLLECTION IN JAPAN

**Summary**

This chapter describes the implementation of the Japanese survey. Summarised results and a comparative statistical analysis of the Japanese and UK surveys are given in a later chapter.

## 1. Outline of Survey Implementation

### 1.1. Sampling

The co-operation of the Institute of Intellectual Property (IIP) and the Japan Patent Society, enabled a mailing list for the Japan Patent Society (JPS) containing 674 labels to be obtained. Each had the name of an individual in a company Patent or IP related department in a company owning IPRs and with an interest in IP. The membership of the JPS contained 88% of the top 200 R&D Spending companies according to The Nikkei Electronic Data Book of listed companies for 1994. It also contained 84% of those companies employing in house patent attorneys. The members of the JPS can therefore be reasonably assumed to be representative of at least those large technologically based Japanese companies having an interest in IP matters and owning IP themselves.

Examination of this list resulted in the elimination of several duplicates (e.g. where both Osaka and Tokyo offices of a company were listed) or members who fell outside the industrial sectors being studied (e.g. those working for Newspapers). This left 632 labels.

Permission had been obtained and funds made available by the IIP to mail questionnaires to 500 companies chosen from the original mailing list. It was decided to select the 500 using a stratified random sample to give a possibility of making sectoral comparisons if sufficient responses were obtained. However, at the time, it was not known what response rate could be expected and thus to guard against the possibility of a very low response rate including only replies from smaller companies it was decided to reserve 20 of the 500 questionnaires for allocation to larger companies not selected in the random sample. In the event of a low response rate this might help boost the number of large company responses and thus increase the chances of making some comments about such companies.

The remaining 632 companies were thus allocated to Industrial sectors using publicly available information and then reduced to 480 by the same ratio in each sector so that the distribution of the 480 among the sectors reflected that of the original 632. The companies to be discarded from each sector were selected at random using a spreadsheet random number generator function. To this stratified random sample of 480 were added the 20 non-random companies chosen for their likelihood of yielding interesting results if the response rate was

low. The questionnaires sent out thus provided both a stratified random sample representative of the membership of the JPS and a non-random survey of leading Japanese technology based companies which could provide a fallback source of data if the data were insufficient to be able to draw statistically based conclusions about the whole population. In the following analysis the survey results refer to the stratified random sample unless otherwise specified.

## 1.2. Questionnaire Preparation

The Questionnaire was originally drafted in English and the outline hypotheses that the questions address have been dealt with earlier. The precise questions used can be seen in the copy of the UK questionnaire contained in Appendix I. A copy of the questionnaire used in Japan is also included. The preparation of the Japanese version of the questionnaire papers though was as follows.

After drafting the questions in English I translated them into Japanese. This draft was then checked by a native Japanese speaker. I then passed the corrected draft to another native Japanese speaker who is bilingual (having been educated in the UK) to check against the original English version. I then reviewed the resulting script for any misunderstandings vis a vis the IP content. To check this latter aspect again and to ensure that the questionnaire would be understood by someone working in a Japanese company IP department I then had the final draft checked again by a senior Japanese Patents Manager who had worked in an Industrial Patent department for several years. The resulting Japanese questionnaire was thus as close to the original English version in meaning whilst using as natural Japanese as possible and also as intelligible as possible to the target respondents in Japanese company IP departments.

## 1.3. Mailing

I prepared and typed the final version of the questionnaire and printed it on a laser printer on plain white paper. This was then photocopied and stapled once in the top left hand corner of the set of twelve sheets. I delivered 500 of the questionnaires to the IIP who posted them with stamped addressed IIP overprinted envelopes and a covering letter kindly provided by the IIP's director (a copy of the cover letter and questionnaire are contained in Appendix H).

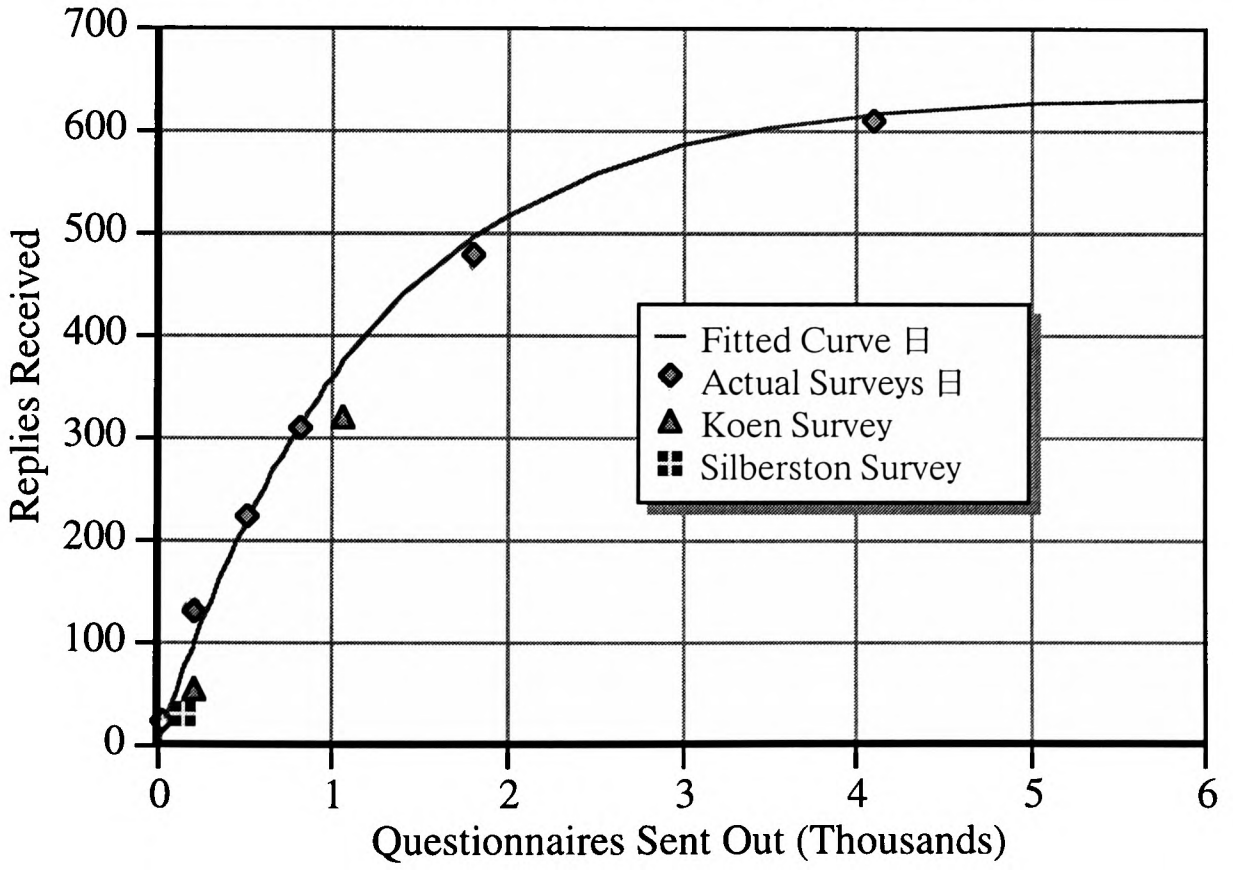
## 1.4. Response Rate

Respondents were asked to return the questionnaires by 15th May 1994 (roughly within a month) to the IIP. By the 25th May 1994 about 201 replies had been received. Subsequently another 22 replies were received making a total of 223. The possibility of sending out postcards and telephoning non-respondents to try to increase the response rate still further was investigated but proved not to be possible. Though a copy of the mailing list used was

kept for reference, telephone numbers for non-respondents and a second set of mailing labels were unavailable. Whilst this may seem sub-optimal it should be stressed that given the circumstances the response rate was very good indeed. Given that, the costs in goodwill of trying to force a few extra replies was unjustified, even if it would have worked at all - which I was strongly advised it would not[56].

Of the 223 replies received 12 were originally among the 20 added to the stratified random sample of 480. The response rate of the stratified random sample was thus 44% (211) and the overall response rate 45%. This compares well with the other surveys in the same field. A 1992 survey of patent management by Nomura Research Institute (Murakami and Nakata 1994) surveyed 1800 companies for a response rate of 26.5%. A 1993 survey by the IIP on "Research & Development and Retention/Use of Intellectual Property Right" surveyed 4100 companies for a response rate of 14.9% (Institute of Intellectual Property 1994). A Japan Institute of Techno-Economics survey in 1986 surveyed about 800 companies for a 39% response rate (科学技術と経済の会 1986). A 1993 survey by the Royal Swedish Academy of Engineering Sciences (Royal Swedish Academy of Engineering Sciences 1993) of 30 large Japanese companies had a 80% response rate. Another anonymous newspaper survey reported in Patents & Licensing a Japanese English language journal (held in the Science Reference Library in London) in 1990 claims 135 replies to a 200 firm survey (67.5%).

Figure 16 IP Related Survey Response Rates




These response rates in Japan can be fitted to a exponential curve of the shape:

$$y=636*(1-\exp(-0.000843*x)).$$

[56]This could be interpreted as a polite way of saying it was not possible to use the mailing list again.

The likely cause of this response rate prediction curve is that response rates decline as the average company size decreases. Due to the skewed distribution of company sizes, as sample size increases smaller companies are included, thus decreasing the average response rate.

In contrast to this another IP related survey in the USA which included 1054 small (<500 employees) and 196 large companies resulted in 322 replies from small companies (30% ) and 54 from large companies (27%) (Koen 1990). Silberston's 1973 survey started by selecting 150 companies who were approached and of whom 30 finally sent in completed replies (20%). Silberston still attempted some cross sectoral analysis though. In the present survey the response rate as a function of size measured by number of employees was as follows :

Table 4. Response Rate and Japanese Company Size

| No. of Employees | <500 | 500-1000 | 1000-5000 | 5000-10000 | 10000+ | Unclass'd | Total |
|---|---|---|---|---|---|---|---|
| No. of Questionnaires | 27 | 59 | 242 | 62 | 59 | 31 | 480 |
| No. of Replies | 6 | 18 | 101 | 35 | 43 | 8 | 211 |
| Response Rate (%) | 22.2% | 30.5% | 41.7% | 56.3% | 72.9% | | 44.0% |

The response rate thus increases with company size. Nonetheless the above fitted curve may serve as a predictor of likely response rates in future surveys.

A check was also made of response rates by Industry sector to see if the sample were biassed towards any particular sector or sectors. Initially as described above companies were allocated to one of 27 sectors based on Japanese standard industry classifications. Companies were asked on the questionnaire to make the same allocation. In some 68 cases this revised allocation differed from the original. As can be seen the number of replies was small in several cases. Ideally, to improve the reliability of inter-sectoral statistical comparisons the numbers of replies in each sector should be as high as possible. To help achieve this, to reduce the number of re-classifications and to simplify the intersectoral comparisons the 27 sectors were thus combined into six new sectors :

Table 5 Survey Response Rate by Original Japanese Industry Sectors

| | Questionnaire Sector | Random Sample | Original Replies | Allocation Resp.Rate | Revised Replies | Allocation RespRate | Changed Sectors | NEW SECTOR |
|---|---|---|---|---|---|---|---|---|
| 1 | Foods Manufacturing | 14 | 8 | 59% | 8 | 59% | 0 | Misc |
| 2 | Fiber Industry | 14 | 7 | 51% | 5 | 37% | 2 | Chem |
| 3 | Lumber & Wooden Prods | 0 | 0 | | 0 | | 0 | |
| 4 | Paper & Pulp Industry | 6 | 3 | 49% | 3 | 49% | 0 | Misc |
| 5 | Publishing & Printing | 0 | 0 | | 2 | | 2 | Misc |
| 6 | Chemicals (exc. Phms) | 78 | 36 | 46% | 29 | 37% | 7 | Chem |
| 7 | Pharmaceuticals | 45 | 17 | 38% | 18 | 38% | 0 | Pharm |
| 8 | Oil & Coal Products | 8 | 5 | 66% | 5 | 66% | 0 | Chem |
| 9 | Plastics Products | 7 | 2 | 29% | 8 | 117% | 6 | Chem |
| 10 | Rubber Products | 8 | 3 | 36% | 4 | 48% | 1 | Chem |
| 11 | Misc. Ceramics | 16 | 3 | 19% | 3 | 19% | 0 | Chem |
| 12 | Iron & Steel | 12 | 7 | 58% | 5 | 41% | 2 | Chem |
| 13 | Non Ferrous Metals | 15 | 7 | 46% | 6 | 40% | 1 | Chem |
| 14 | Metal Products | 10 | 2 | 20% | 4 | 41% | 2 | Mech |
| 15 | Electric Mach. & Apps | 93 | 37 | 40% | 25 | 27% | 12 | Elect/Comm |
| 16 | CommsElec& | 0 | 0 | | 12 | | 13 | Elect/Comm |
| 17 | Automobiles | 28 | 17 | 60% | 19 | 68% | 2 | Tspt |
| 18 | Other Transport Mch'y | 14 | 7 | 51% | 5 | 37% | 2 | Tspt |
| 19 | Precision Machinery | 15 | 9 | 59% | 10 | 66% | 1 | Mach |
| 20 | Genl Machs & Apps | 42 | 18 | 43% | 12 | 29% | 6 | Mach |
| 21 | Other Industry | 20 | 7 | 35% | 9 | 46% | 2 | Misc |
| 22 | Construction | 25 | 12 | 48% | 14 | 56% | 2 | Misc |
| 23 | Broadcasting | 0 | 0 | | 0 | | 0 | |
| 24 | Software&Info. Services | 0 | 0 | | 2 | | 2 | Elect/Comm |
| 25 | Comms Services | 4 | 2 | 53% | 1 | 26% | 1 | Elect/Comm |
| 26 | Other Services | 8 | 2 | 26% | 1 | 13% | 1 | Misc |
| 27 | Test & Research Institute | 0 | 0 | | 1 | | 1 | Misc |
| | TOTALS | 480 | 211 | 44% | 211 | 44% | 68 | |

5

Table 6 Revised Industry Sector Response Rates

| | Sample | Original Allocation of Replies | Original Response Rate (%) | Revised Allocation of Replies | Changed Sectors |
|---|---|---|---|---|---|
| 1. Miscellaneous | 72 | 32 | 44% | 38 | 6 |
| 2. Chemicals | 158 | 70 | 44% | 65 | 5 |
| 3. Pharmaceuticals | 45 | 17 | 38% | 18 | 1 |
| 4. Elec/Comm | 96 | 39 | 40% | 40 | 1 |
| 5. Transport | 42 | 24 | 57% | 24 | 0 |
| 6. Machinery | 67 | 29 | 43% | 26 | 3 |
| Totals | 480 | 211 | 45% | 211 | 16 |

These new sectors resulted in the number of reclassified companies being reduced from 68 to 16 and the minimum sector size from 0 to 18. The increased sample sizes should make it easier to use parametric statistical tests. The sectors were selected in part for their ability to separate different types of patent application and Patent/Product ratios. Pharmaceutical patents being at one extreme of in general using one patent to cover one product whereas Electrical and Communications and Transport based inventions generally include many inventions in the same product.

### 1.4.1. Sectoral Bias in Response rates

The response rates for all sectors were approximately equal. A Chi Squared test of the response rates gives a P value of 0.7642 confirming what is obvious from the response rates themselves. Thus the distribution of replies amongst the sectors is not sufficiently different from that of the random sample companies amongst the sectors to lead us to suspect bias towards one sector or the other. The distribution of replies reflects the random sample.

## 1.5. Corrections

Once the questionnaires had been collected figures for Sales, No. of Employees, R&D Expenditure and No. of R&D employees and industry classifications given by respondents were checked against publicly available data. The sources used were the Toyo Keizai Co. Quarterly Listed Company Data Book for Spring 1994 (Published Mar'94), The Toyo Keizai Co. Unlisted Company data book for 1994 (Published Dec'93), The Nikkei Electronic Data Book of listed companies for 1994, The Datastream service (as at Aug.'94) and The Toyo Keizai Japan Company Handbook for listed companies (in English) (Published May'94). In the main the latest figures available using these sources were those for March '93 and wherever possible such figures were used. The UK edition of the Toyo Keizai book was the main source for company R&D expenditures.

The purpose of making this check was firstly to ensure that it was clear which company was being questioned. The only data available on the mailing list was the general company name and the IP department address. An additional reason was to ensure that errors in orders of magnitude were not made by respondents in completing the figures on sales, R&D expenditure and staff numbers and that respondents assessment of the industry classification of their company was accurate. Thirdly where figures were missing from replies and it was clear that the data that was supplied matched publicly available data the data missing from the replies could be supplemented from the publicly available data. However, figures given in the questionnaire were only altered for analysis in the following 24 cases : -

a) 12 cases : Where figures in questionnaires were exactly or almost exactly a multiple of 10, 100 or 1000 higher or lower than publicly available figures the questionnaire figures were adjusted by the appropriate factor of 10, 100 or 1000.
b) 7 cases : Where R&D figures were missing but other figures for sales and total employees were exactly the same as publicly available figures, publicly available R&D figures were used.
c) 1 case : Where the sales figure given was a consolidated sales figure but the other figures were not the unconsolidated the publicly available unconsolidated one was used
d) 4 cases : Where respondents classified their company as mainly "21.その他工業21. Other Industry" this was checked against public data and in four cases a more precise allocation of an industry classification was made.

However, apart from these alterations there were still several cases (48) where unusual features of the questionnaire figures were noticed.

i) In 23 cases the R&D figures were more than 40% lower than the published figures
ii) In 3 cases the R&D figures were more than 100% higher than the published figures
iii) In 2 cases both the R&D figures were lower and the sales figures different from published ones.
iv) In 1 case both the number of employees differed from the published figure and the R&D figure was missing.
v) In 1 case both the sales and number of employees figures differed from the published figures
vi) In 3 cases the number of employees figure alone differed from the published figures
vii) In 1 case the sales figure alone differed from the published figures
viii) In 4 cases the R&D figure seemed unusually low though there were no published figures
ix) In 4 cases the R&D figure was missing and others did not match published ones exactly
x) In 4 cases IP spending seemed too high at more than 16% of R&D with no explanation
xi) In 1 case all figures for Sales, R&D and total staff numbers were missing
xii) In 1 case where the number of employees figure was completely different from published data and ridiculously high, it was ignored

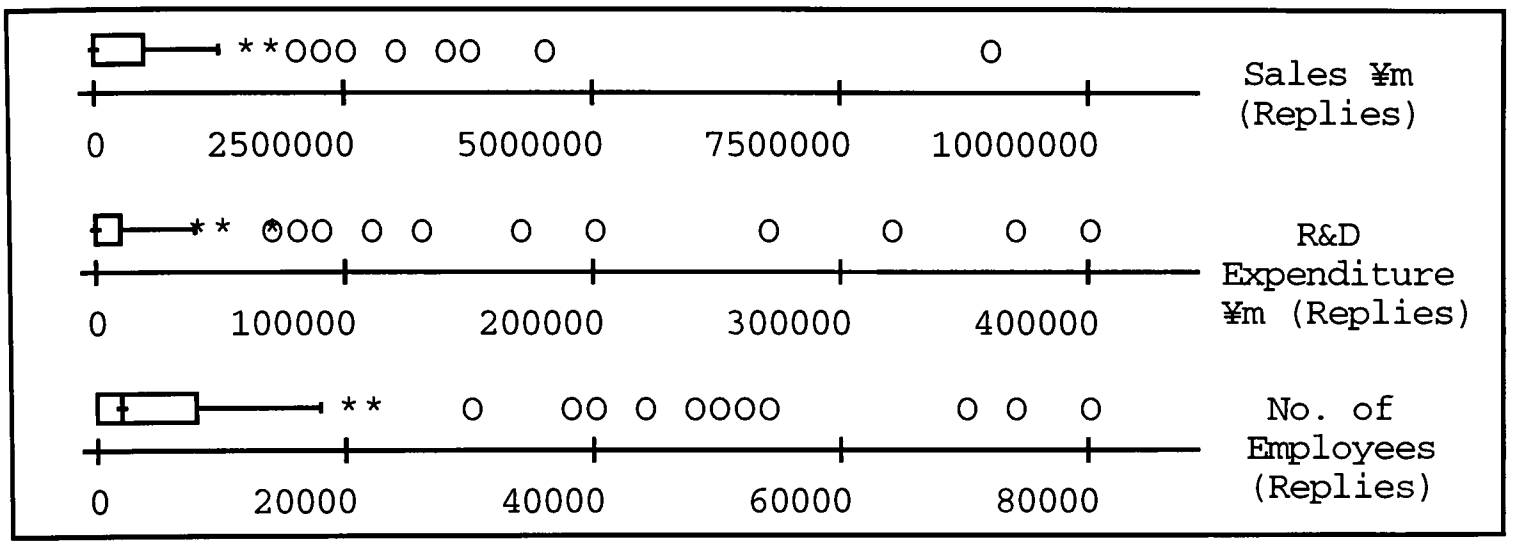
## 1.6. Comparisons with publicly available data

For the original JPS mailing list, publicly available data for the Sales, Number of Employees and in some cases Spending on R&D were available. It was thus possible to make several comparisons. Firstly these figures could be compared for the mailing list of 480 companies to confirm that the Companies selected accurately reflected the overall list of 632 companies. Secondly the publicly available data for those companies from which replies were received could be compared with data supplied by those companies in their replies. Agreement of the data supplied with published data would not necessarily prove its correctness. However if it did agree, it would suggest that either the replies are correct or that respondents are conscientious enough to copy it from publicly available figures. Both of which would tend to suggest that their other responses are supplied conscientiously.

## 1.7. Comparison Methods

As the boxplots for the random sample data shown below illustrate the above measures of Sales, Number of Employees and Spending on R&D are considerably skewed and do not form normal distributions:

Figure 17 Boxplot for Japanese Random Data Sample




This skewness can also be seen in the differences between medians and means in the following summary statistics for the published data for the total population of 632 companies sampled, the random sample of 480 and the 211 replies from the random sample and the actual data received in those 211 replies :

Table 7 Summary Statistics for Japanese Survey Samples

| **EMPLOYEES** | N | Mean | Median | STDev | MIN | MAX |
|---|---|---|---|---|---|---|
| 632 JPS Members | 587 | 5773 | 2539 | 15842 | 51 | 232198 |
| 480 Mailing | 449 | 5936 | 2583 | 14327 | 177 | 232198 |
| 211 Published | 203 | 8021 | 3715 | 12796 | 347 | 81488 |
| 211 Questionnaires | 208 | 8033 | 3503 | 12821 | 290 | 80000 |
| | | | | | | |
| **SALES** | N | Mean | Median | STDev | MIN | MAX |
| 632 JPS Members | 619 | 408505 | 116236 | 1291561 | 1800 | 16530332 |
| 480 Mailing | 470 | 437462 | 116333 | 1283459 | 1800 | 16530332 |
| 211 Published | 208 | 544426 | 187354 | 994173 | 8580 | 9030857 |
| 211 Questionnaires | 207 | 540274 | 180000 | 990334 | 1100 | 9000000 |
| | | | | | | |
| **R&D Spending** | N | Mean | Median | STDev | MIN | MAX |
| 632 JPS Members | 452 | 18803 | 4584 | 52274 | 15 | 451000 |
| 480 Mailing | 337 | 21656 | 4568 | 57969 | 15 | 451000 |
| 211 Published | 164 | 31422 | 8925 | 71159 | 81 | 451000 |
| 211 Questionnaires | 191 | 25461 | 6300 | 60038 | 40 | 401800 |

To compare pairs of non-normal distributions, non-parametric statistical tests must be used. However if the sample size is sufficiently large the central limit theorem applies and parametric tests can be used. Later when comparing smaller samples for example between sectors, if response rates are low it may be necessary to use non-parametric statistical tests. In these preliminary tests though standard t tests were used. The results are shown below.

Comparing the actual 211 replies received with the published data available for the same 211 companies using two sample t tests we find (where μ = Mean) :

UNPAIRED DATA

t Test μ Published Employees = μ Questionnaire Employees (vs NE): T= -0.01 P=0.99
t Test μ Published Sales = μ Questionnaire Sales (vs NE): T= 0.04 P=0.97
t Test μ Published R&D Spending = μ Questionnaire R&D Spending (vs NE): T= 0.85 P=0.40

PAIRED DATA

t Test μ (Published 632 Employees - Questionnaire Employees) = 0 (vs NE): T= -1.10 P=0.27
t Test μ (Published 632 Sales - Questionnaire Sales) = 0 (vs NE): T= 0.86 P=0.39
t Test μ (Published 632 R&D Spending - Quest'ire R&D Spending) = 0 (vs NE): T= 2.12 P=0.035

We can conclude therefore that the figures given by respondents regarding Sales figures, Employee numbers and R&D figures by and large agree with the published data, though in the case of the R&D figures we are less certain. At the 5% level with a paired t test it is likely that the questionnaire figures are consistently different from and usually less than publicly available figures. This is put more simply by observing as noted above that in 23 cases the Questionnaire R&D figures were more than 40% lower than the published figures. Care is thus needed in use of the R&D figures whilst the Sales and Number of employees figures are more robust. This is a help and particularly the latter fact since numbers of employees is one factor which is easily reportable and directly comparable on an international basis. The above study also shows that the respondents answers when checked against verifiable figures are in most cases reliable and even if this only shows that the respondents could be bothered to look the figures up correctly it is helpful in reinforcing the validity of the rest of their replies.

Comparing published data for the 480 company random sample with the published data for the total of 632 companies using two sample t tests we find :

t Test μ Published 632 Employees = μ Published 480 Employees (vs NE): T= -0.17 P=0.86
t Test μ Published 632 Sales = μ Published 480 Sales (vs NE): T= -0.37 P=0.71
t Test μ Published 632 R&D Spending = μ Published 480 R&D Spending (vs NE): T= -0.71 P=0.48

The random sample of 480 companies selected thus represents the overall 632 companies with a high degree of probability so far as these three parameters of Sales, Employee Numbers and R&D spending are concerned, though the p value for the R&D figures is lower.

Finally comparing the actual 211 replies received with the published data for the total of 632 companies using two sample t tests we find :

t Test μ Published 632 Employees = μ Questionnaire Employees (vs NE): T= -2.05 P=0.041
t Test μ Published 632 Sales = μ Questionnaire Sales (vs NE): T= -1.53 P=0.13
t Test μ Published 632 R&D Spending = μ Questionnaire R&D Spending (vs NE): T= -1.33 P=0.18

This last test shows that whilst looking at the Sales and R&D Spending figures, at the 10%

level we cannot reject the hypothesis that the replies are unbiassed and truly represent the whole 632 companies. However in the case of the number of employees we can reject such a hypothesis at the 5% level with P=0.041. From a study of the summary statistics above it is clear that there may be a bias so far as the number of employees is concerned towards larger companies amongst the actual replies received. This accords with the bias towards higher response rates amongst larger companies mentioned earlier.

### 1.8. Sectoral Differences

Whilst there is no strong evidence of sectoral bias amongst response rates there are sectoral differences. More detailed analysis will follow later but a preliminary ANOVA analysis for the Number of Employees, the Sales figures and the R&D Expenditure all show significant differences (See Appendix J : Analysis for Sectoral Bias in Japanese Replies). In particular the Electronics/Communications and Transport sectors have companies with higher R&D spending and numbers of employees.

## 2. Conclusions

We can therefore conclude that the replies received from the survey are representative of both the actual data in the companies and also overall, the total membership of the Japan Patent Society with a possible slight bias towards larger companies. Sectoral differences do exist and these will be studied in detail later.

# Chapter 7. SURVEY DATA COLLECTION IN UK

**Summary**

This chapter describes the implementation of the UK survey. Summarised results and a comparative statistical analysis of the Japanese and UK surveys are given in the next chapter.

## 1. Outline of Survey Implementation

### 1.1. Sampling

Using the One Source Information Services UK Private+ database which includes around 130,000 private and public UK companies, 7881 companies registered in the UK with more than 250 employees were selected.

From this list of companies those whose main line of business fell in one of the 192 4 digit SIC codes which corresponded to the 26 Sectors used in the Japanese survey were selected and each of these 3738 companies thus allocated to one of the 26 industry sectors. The same method of reducing these 26 sectors to 6 main sectors was used as for the Japanese sample and thus all replies were assigned to one of the six industrial sectors used for the Japanese survey.

Using the European Patent Offices "Bulletin" database which includes details of the some 500,000 European patent applications made between 1978 and February 1994, the 40000 applications made by applicants with addresses in the UK were identified. These applications were identified as being made by 9644 separate individuals and companies. Those of the 3738 companies identified as falling within the selected sectors which were also applicants occurring in the list of 9644 applicants were then identified. This resulted in a list of 873 companies. Duplicates caused by subsidiary companies and other such reasons were checked by identifying those companies with identical names, addresses or telephone numbers and the duplicates then eliminated. This resulted in a list of 792 companies.

One major difference between UK and Japanese respondent companies was that UK companies were far more likely to have a foreign company as the ultimate holding company. The requirement for the applicant to have a UK address was used to limit the sample to specifically those companies who managed their IP matters in the UK whether they were ultimately UK or Foreign owned companies. In a few cases where this was not so respondent companies were excluded. This criteria would for example have included a UK company wholly owned by a US or European company but which had a UK main office address for the applicants address or had a UK based Patents/IP department either of which indicate some management of IP matters by UK based personnel. In contrast a US company with a research lab in the

UK established as a UK company but which held all patents in the name of the US parent company and had no resident UK patent department and merely used UK or other European patent agents as representatives would have been excluded as not having its IP matters managed in the UK.

The 792 companies thus represent those companies with more than 250 employees, registered in the UK who are also applicants for European Patent Applications and also fall within the Industry sectors used in the Japanese sample. As an additional check the register of UK Patent Agents for February 1994 was checked to identify all UK based industrial patent departments in companies falling within the 26 sectors and the list of 792 companies was found to include all 93. This was also checked against the Chartered Institute of Patent Agents (CIPA) membership list for June 1993 though in cases of conflict the more up to date register was followed. In the case of these companies questionnaires were sent to the most senior patent agent whilst in the case of other companies questionnaires were sent to the main company trading address and addressed to "The Patents / Licensing Manager" as being the more commonly understood a term than "IP Manager". Besides being a fellow of the Chartered Institute of Patent Agents I am also a member of the Licensing Executives Society and a further check was attempted by examining the membership list of the Licensing Executives Society to see if any significant number of companies had been missed by the selection process or if more precise addresses could be identified for Patent Departments not having a registered Patent Agent on their staff. No significant omissions were found though more precise addresses were found for 16 companies which did not occur in the CIPA / Register of Patent Agents list.

One potential improvement which might have been made over the selection method used was to use UK patent applications instead of European applications. However, it was felt that the extra effort involved would have been far too great for the minimum extra accuracy. The effect of using European Patent Applications may have been to exclude some smaller UK companies with only an interest in exploiting the UK market and who thus do not make any foreign applications. For comparison, in the Japanese sample 9.7% or 19 out of the 194 companies who replied to the question asking about numbers of foreign applications (did not make any foreign patent applications. However since in the UK sample small companies are excluded by the lower limit of 250 employees it was felt that just using European Patent Applications was justified. In addition it is likely that the number of companies as opposed to individuals who apply solely for a UK patent is likely to be very small the bulk of the UK only applicants being individual inventors or start-ups establishing a priority date before seeking support for foreign filings from others.

However, using the above methods it was possible to construct a list of companies in the UK which matched as nearly as possible the list used in Japan both in scope of size of company

in terms of number of employees, in terms of industry sectors covered and also in terms of interest in Patents and IP matters as represented by applications for patents and ownership of a Patent Department including qualified patent agents.

## 1.2. Questionnaire Preparation

The questionnaire was prepared from the same master copy used to prepare the Japanese version. Exactly the same layout, paper and number of pages were used.

## 1.3. Mailing

The questionnaire was mailed from Templeton College, with a return envelope and a cover letter similar to that provided with the Japanese questionnaire (See Appendix I).

## 1.4. Response Rate

Respondents were asked to return the questionnaire by 1st January 1995. Within a short while after this from 792 mailed questionnaires 73 replies were received. Other replies were received but either only said that the respondent was unable to complete the questionnaire or said that the company did not meet the criteria for inclusion in the sample mentioned above. It was therefore decided to try and increase the response rate by sending out a reminder letter.

A reminder letter was therefore sent to the remaining respondents who had not replied saying that it was still possible to send in completed questionnaires. The 12 page questionnaire was exceptionally long by UK standards and though the 44% response rate shows that this was not a problem in Japan it obviously was a factor in the low response rate in the UK. The lower percentage of UK respondent companies having IP / Patent departments will also have been a factor. Accordingly, in the reminder letter a one page pre-addressed facsimile which included 14 key questions from the original survey was included. This reduced questionnaire had already printed on it all that was needed for the respondent to tick the appropriate boxes and drop it in a fax machine to fax it back. This mailing resulted in a further 186 replies being received in the following two weeks of which 11 were complete replies and 175 the shorter reminder replies.

The final response rate for the complete questionnaire was 10.61% (84 replies) and that for the reduced questionnaire 22.10% (175 replies). The total response for those questions included in both was 32.70% (259 replies) and thus comparable to the number received in the survey in Japan (211). Besides these replies, 23 respondents replied with just a few comments but no completed questionnaire, 20 replied refusing to take part, 12 questionnaires were returned by the post office as undeliverable and 16 replied to the effect that the nature of their foreign

ownership and organisation made them ineligible to return a questionnaire. Finally three companies replied saying they would reply more fully "later". Thus some form of response was received from 332 companies (41.92%) of the 792 companies in the original mailing.

The original questionnaire was designed with Japan in mind. It was my judgement, based on my experience of working in a Japanese engineering company not dissimilar to many of the respondents, that the most important factor in deciding whether the questionnaire was returned was where it came from and what language it was in. The length would obviously have some effect but it could be anticipated that it would be more important to ask as many questions as were thought necessary if the maximum information were to be obtained. However, in the UK it was correctly anticipated that such a long questionnaire would be less successful. For the sake of attempting to collect identical results though, an identical questionnaire had to be sent in the first instance. The questions included in the one page reminder questionnaire which followed this were selected from the full questionnaire and are therefore comparable. Checks were made for possible bias due to the different questionnaire format and these are described below.

### 1.4.1. Variation of response rate with company size

One noticeable difference between the Japanese survey and the UK survey was the variation in response rate with company size.

Table 8 Response Rate and UK Company Size

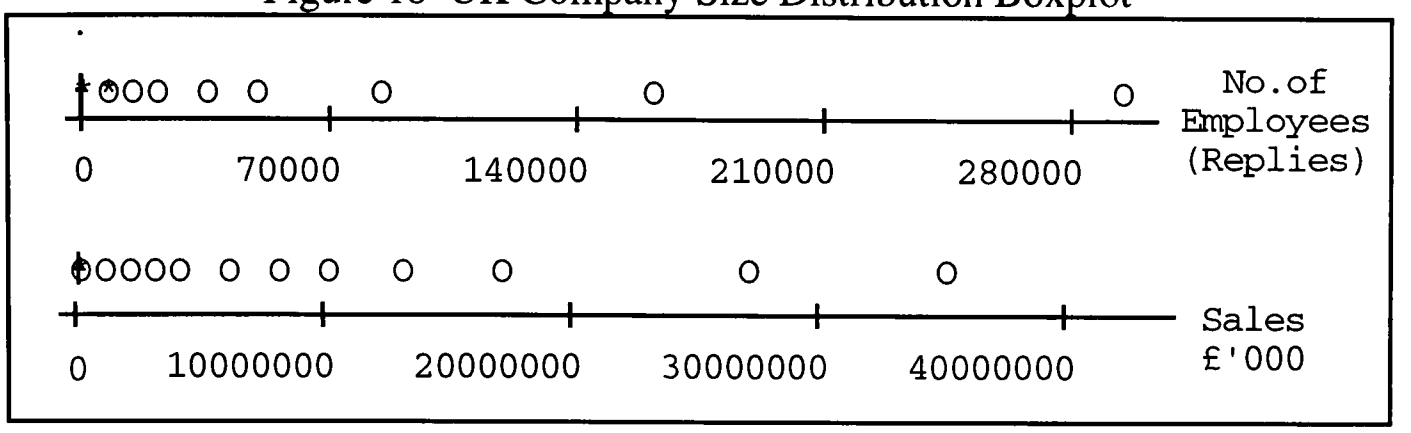
| No. of Employees | <500 | 500-1000 | 1000-5000 | 5000-10000 | 10000+ | Total | Av'g No. of Employees |
|---|---|---|---|---|---|---|---|
| UK No. of Questionnaires | 284<br>100% | 186<br>100% | 219<br>100% | 42<br>100% | 61<br>100% | 792<br>100% | 4258 |
| UK Original Replies | 24<br>8% | 20<br>11% | 24<br>11% | 6<br>14% | 10<br>16% | 84<br>10.6% | 9679 |
| UK Reminder Replies | 68<br>24% | 38<br>20% | 44<br>20% | 12<br>28% | 13<br>21% | 175<br>22.1% | 4442 |
| UK Total Replies<br>($Chi^2$ p=0.824) | 92<br>32.4% | 58<br>31.2% | 68<br>31.1% | 18<br>42.9% | 23<br>37.7% | 259<br>32.7% | 6141 |
| JP No. of Questionnaires | 27<br>100% | 59<br>100% | 242<br>100% | 62<br>100% | 59<br>100% | 480<br>100% | 5936 |
| JP Total Replies<br>($Chi^2$ p=0.017) | 6<br>22.2% | 18<br>30.5% | 101<br>41.7% | 35<br>56.3% | 43<br>72.9% | 211<br>44.0% | 8033 |

The Japanese replies were slightly biassed towards larger companies with the response rate increasing substantially with increasing company size. (Mean respondent company size 8033 mean sample size 5936). A Chi-squared test for the Japanese sample was significant at the 5% level ($p = 0.017$). In contrast in the UK a similar bias was noted though the difference in response rates was not so pronounced (Mean respondent company size 5404, mean sample

size 4248). A Chi-squared test was not significant (p = 0.824).

The Sales and Employee figures for the companies included in the sample are, as with the Japanese sample, skewed towards smaller firms and do not form normal distributions.

Figure 18 UK Company Size Distribution Boxplot




Comparison of sales figures for the original sample of 792 companies with the sales figures for the companies returning complete and reduced questionnaires show that there are no significant differences at the 10% level between the 792 companies and the combined questionnaires or reduced questionnaires. However, there were significant differences but only at the 15% level between the 792 company sample and the complete questionnaire (p=0.11) and between the complete questionnaire and the reduced questionnaire sales figures (p=0.084).

Table 9 UK Company Sales Figures

| **UK SALES (£'000)** | N | Mean | Median | STDev | MIN | MAX |
|---|---|---|---|---|---|---|
| 792 Companies | 787 | 477226 | 55204 | 2039463 | 2318 | 34950000 |
| Complete | 84 | 1429822 | 76794 | 5289409 | 2318 | 34950000 |
| Reduced | 175 | 406135 | 49809 | 1380974 | 8491 | 13675000 |
| Total | 259 | 738142 | 58910 | 3243044 | 2318 | 34950000 |
| | | | | | | |
| **JAPAN SALES (¥m)** | N | Mean | Median | STDev | MIN | MAX |
| 211 Questionnaires | 207 | 540274 | 180000 | 990334 | 1100 | 9000000 |

In both cases those companies replying to the complete questionnaire had significantly higher sales figures. This may well indicate that the smaller companies considered the longer questionnaire less relevant to their situation.

t TEST μ 792 Companies Sales = μ Total Q're Replies Sales (VS NE): T= -1.22 P=0.22
t TEST μ 792 Companies Sales = μ Complete Q're Replies Sales (VS NE): T= -1.64 P=0.11
t TEST μ 792 Companies Sales = μ Reduced Q're Replies Sales (VS NE): T= 0.56 P=0.57
t TEST μ Complete Q're Sales = μ Reduced Q're Sales (VS NE): T= 1.75 P=0.084

Table 10 UK Company Employees

| UK EMPLOYEES | N | Mean | Median | STDevn | MIN | MAX |
|---|---|---|---|---|---|---|
| 792 Companies | 789 | 4258 | 713 | 15964 | 69 | 294000 |
| Complete | 84 | 9679 | 900 | 35652 | 257 | 294000 |
| Reduced | 175 | 4442 | 700 | 15787 | 253 | 165700 |
| Total | 259 | 6141 | 772 | 24146 | 253 | 294000 |
| | | | | | | |
| **JAPAN EMPLOYEES** | N | Mean | Median | STDevn | MIN | MAX |
| 211 Questionnaires | 208 | 8033 | 3503 | 12821 | 290 | 80000 |

Comparison of the figures for the number of employees in the companies in the original 792 companies with those in the companies replying to the reduced questionnaire and to the complete questionnaire showed that there were no significant differences even at the 15% level. A t test of the mean number of employees for the Original (9679) and Reminder (4442) replies in the UK showed the difference between them not to be significant at the 10% level ($p = 0.20$). Generally though the number of employees replying to the complete questionnaire was higher on average and had a higher median value than those replying to the reduced questionnaire or those companies in the original 792 company sample. This again shows that it is likely that the complete questionnaire was less relevant to the smaller companies who were consequently more reluctant to answer the full questionnaire.

t TEST μ Complete Q're Employees = μ Reduced Q're Employees (VS NE): T= 1.29 P=0.20
t TEST μ 792 Companies Employees = μ Total Q're Replies Employees (VS NE): T= -1.17 P=0.24
t TEST μ 792 Companies Employees = μ Reduced Q're Replies Employees (VS NE): T= -0.14 P=0.89
t TEST μ 792 Companies Employees = μ Complete Q're Replies Employees (VS NE): T= -1.38 P=0.17

The Japanese sample showed a bias towards receiving replies from larger companies and it is possible that had a reduced questionnaire also been possible in Japan more replies would have been received from smaller companies. However sufficient replies have been received to be able to compare results for example from the 250-1000, 1000-5000, 5000-10000 and 10000+ employee sectors.

Table 11 UK & Japanese Surveys : Replies by Company Size

| No. of Employees | <500 | 500-1000 | 1000-5000 | 5000-10000 | 10000+ | Total |
|---|---|---|---|---|---|---|
| UK Total Replies | 92 | 58 | 68 | 18 | 23 | 259 |
| JP Total Replies | 6 | 18 | 101 | 35 | 43 | 211 |

### 1.4.2. Sectoral Bias in Response rates

Responses were also checked by company sector though no significant biasses were found. The response rates for all six sectors were approximately equal in both the UK and Japan. A Chi Squared test of the response rates gives a P value of 0.9030 for the complete questionnaire,

0.3794 for the reduced questionnaire and 0.8102 for the combined response, confirming what is obvious from the response rates themselves. A Chi Squared test of the response rates for the complete and reduced questionnaires gives a P value of 0.3748 and showed them not to vary significantly by sector. In Japan a Chi-squared test of the response rates had given a P value of 0.764 again confirming that there was no obvious bias in response rate by industry sector in Japan either.

Table 12 Response rates by Industry Sector

| Industrial Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec / Comm. | 5. Tspt | 6. Mach. | Total |
|---|---|---|---|---|---|---|---|
| UK No. of Questionnaires | 153<br>100% | 180<br>100% | 41<br>100% | 136<br>100% | 61<br>100% | 221<br>100% | 792<br>100% |
| UK Original Replies<br>($Chi^2$ p=0.903) | 16<br>10.5% | 23<br>12.8% | 5<br>12.2% | 15<br>11.0% | 6<br>9.8% | 19<br>8.6% | 84<br>10.6% |
| UK Reminder Replies<br>($Chi^2$ p=0.379) | 43<br>28.1% | 30<br>16.7% | 9<br>22.0% | 29<br>21.3% | 10<br>16.4% | 54<br>24.4% | 175<br>22.1% |
| UK Total Replies<br>($Chi^2$ p=0.810) | 59<br>38.6% | 53<br>29.4% | 14<br>34.1% | 44<br>32.4% | 16<br>26.2% | 73<br>33.0% | 259<br>32.7% |
| JP No. of Questionnaires | 72<br>100% | 158<br>100% | 45<br>100% | 96<br>100% | 42<br>100% | 67<br>100% | 480<br>100% |
| JP Total Replies<br>($Chi^2$ p=0.764) | 38<br>52.8% | 65<br>41.1% | 18<br>40.0% | 40<br>41.7% | 24<br>57.1% | 26<br>38.8% | 211<br>44.0% |

The distribution of replies amongst the sectors is thus not significantly different from that of the original sample. Furthermore the distribution of replies by sector for the complete and reduced questionnaires are not significantly different from each so that there appears to be no bias in the response rates by sector as a result of the different application of the questions in the reduced questionnaire.

## 1.5. Corrections

As with the Japanese results some minor corrections were required to the returned data. In one case a respondent replying to the reminder letter returned both a complete and a one-page questionnaire which had been filled in slightly differently. Where there were differences those most in accord with the cover letter were taken which in general meant those of the one page questionnaire. Figures for the number of R&D employees and in most cases R&D expenditure figures in companies were not publicly available to check those in the questionnaire as in Japan. However, the number of employees in companies were requested from respondents in the complete questionnaire. In one case figures supplied by the respondent were used in preference to published figures to resolve which subsidiaries to take into account. In general though the difference between the publicly available employee figures and those given by respondents was not significant. A t test of the difference between the two sets of figures showed this using both paired and unpaired data.

UNPAIRED DATA
t Test $\mu$ Published Employees = $\mu$ Questionnaire Employees (vs NE): T= -0.11 P=0.92

PAIRED DATA
t Test $\mu$ (Published Employees - Questionnaire Employees) = 0 (vs NE): T= -1.21 P=0.23

It is therefore not unreasonable to take the publicly available figure for the number of employees for all questionnaires.

In conducting the ratio analysis one company's figures for ratios involving sales were omitted since the company was an R&D based start-up company with substantial R&D and IP department expenditure but almost zero sales and the consequent ratios being many, times the average figures would have given a misleading result.

## 1.6. Sectoral differences in company size

Amongst the Japanese sample there were significant differences in the number of employees and sales figures with the industrial sectors. In contrast there were fewer such differences in the UK sample. This was found to the case with both the complete, the reduced and the combined questionnaires (See Appendix K : Analysis for Sectoral Bias in UK Replies).

## 1.7. Comparison of UK and Japanese Company Sizes and Sectors

A series of t tests were carried out to compare the size of the companies in the original Japanese and UK samples of 480 and 792 companies respectively and at the 10% level (p=0.058) they were significantly different with the UK sample having smaller companies on average ($\mu$ JP = 5936 vs $\mu$ UK = 4258 employees).

Comparing the number of employees in the respondent companies in the two countries there was no significant difference between the Japanese respondent companies and the combined UK respondent companies (P=0.28, $\mu$ JP = 8021, $\mu$ UK = 6141) nor between the respondent companies in respect of just the complete UK questionnaire (P=0.68, $\mu$ JP = 8021, $\mu$ UK = 9679). There was a significant difference though between the respondent companies in respect of just the reduced UK questionnaire (P=0.017 $\mu$ JP = 8021, $\mu$ UK = 4442) where the UK companies were significantly smaller in terms of number of employees.

There is a small but significant (Chi-square test p = 0.0000) difference between the distribution of companies among the sectors in the two countries. In the UK sample overall there are fewer transport related companies and more machinery and miscellaneous sector companies than in the Japanese sample. The difference is not significant though in respect of the Original UK replies alone.

## 1.8. Presence or Absence of IP Department

Of the 252 replies 72 were from companies having an IP department and 180 from companies without one. In contrast almost all the Japanese survey respondents had an IP/Patents department.

Table 13 % of Respondent Companies with NO IP/Patent Department

| Q.1 | | UK Original | UK Reminder | UK Total | Japan |
|---|---|---|---|---|---|
| | % with NO IP/Patent Dept. | 50.6% | 80.9% | 71.43% | 1.44% |
| | (N) | 79 | 173 | 257 | 209 |

Besides this, it can be noted that in the UK the highest proportion of respondent companies having IP departments tended to be among the largest companies and Pharmaceutical sector companies.

Table 14 % of UK Companies with an IP/Patent Department by Size and Sector

| Q.1 | UK : Industrial Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL |
|---|---|---|---|---|---|---|---|---|
| | % with IP/Patent Dept. | 8.77% | 36.54% | 71.43% | 33.33% | 56.25% | 21.13% | 28.57% |
| | (N) | (57) | (52) | (14) | (42) | (16) | (71) | (252) |
| | | | | | | | | |
| | UK : No. Employees | | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL |
| | % with IP/Patent Dept. | | 16.48% | 20.69% | 36.51% | 29.41% | 73.91% | 28.57% |
| | (N) | | (91) | (58) | (63) | (17) | (23) | (252) |

The following results where relevant are thus shown split down by industry sector, company size and by whether the UK respondent company has a separate IP/Patent Department.

More generally though, an idea of the likely effect of the presence or absence of an IP department can be gained by study of the breakdown of results by size of company since IP/Patent departments are usually absent in smaller companies. The effects are noticeable in some cases but it can be generally stated that where statistically significant differences occur between the overall Japanese and UK data, they reflect more profound differences than just those between companies having IP/Patent departments. It is therefore still useful to consider the bulk combined data for the UK sample whilst carrying out analyses for just companies with IP/Patents departments where appropriate.

The Japanese sample, being drawn from members of the JPA, might be expected to have a high number of larger companies with company IP/Patent departments. In contrast the UK sample not coming from such a society might be expected to have a lower number of companies with an IP/Patent department and lower average size. As outlined above this was the case, however, the overall UK results can be said to be representative of UK industry in the sectors concerned and to include sufficient data for segments such as just those companies with IP departments to be studied as well. The only data which might give some indication of

whether IP departments are overall more common among Japanese industry is the survey reported by Murakami (Murakami and Nakata 1994) which reported that 35.2% of some 477 responses came from companies with either a special IP or special Patent department. Care however needs to be taken with this figure and comparing it with the figure above for the UK sample of 28.5% of respondent companies with an IP department as the definitions and sampling are not the same. It is safe to say though that Japanese companies are probably more likely on the information available to have an IP department than UK companies and that if comparisons are made between companies with IP departments meaningful comparisons can be made.

## 2. Conclusions

We can therefore conclude that the replies received from the UK survey are representative of the original sample of 792 companies with a slight bias towards large companies as in the case of the Japanese Survey. The size of companies in the UK sample is smaller than in the Japanese sample but the size of respondent companies in the UK is not significantly smaller than the size of the respondent companies in Japan unless one compares just the respondents to the reduced questionnaire. Differences concerning whether the companies surveyed had an IP /Patents department or not exist but should not prove a hindrance to the gathering of useful data. Further analysis of the results by company size will be able to determine whether significant differences by company size exist which might affect aggregated international comparisons of the UK and Japanese data.

# Chapter 8. COMPARATIVE ANALYSIS OF SURVEY DATA

**Summary**

The aim of this chapter is to compare the results of the Japanese and UK surveys with each other and with the original hypotheses and to draw some preliminary conclusions. In order to simplify the presentation of the results, this chapter is divided into two main sections. The first provides a roadmap to the detailed comparisons and a summary of the main findings. The second part comprises a more detailed description of the comparisons. This also refers to data tables which are presented in Appendix L. Readers can thus read an outline of the comparisons and a summary of the conclusions drawn from them before either exploring the data in detail in Section 2 or moving straight on to Chapter 9.

## 1. Outline and Conclusions of Comparative Analysis

### 1.1. Introduction

The conclusions that can be drawn from the comparative data analysis relate to i) Operational Management, ii) Strategic Management and iii) Change and Convergence. These are discussed in this first section. However these conclusions are based on comparisons of data concerning the following areas which are discussed in more detail in Section 2 of this chapter :

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First of all a summary is given of the general conclusions drawn from the comparison of the survey data. The detailed description of the comparison in Section 2. may then be studied in the light of these conclusions or skipped by those wishing to move straight on to Chapter 9.

## 1.2. Summary of Results

The two surveys resulted in the collection of a very large amount of data. This chapter aims to present the survey results without omitting any major elements of the survey but also without going into too much detail. The analysis carried out has been straightforward and there is scope to carry out further analysis involving for example correlation analyses. However, the aim of this section is to summarise the main findings of the survey. These can conveniently be divided into those about the operational management of IP, those concerning the strategic management of IP and those concerning change and convergence.

### 1.2.1. Operational Management

The simplest way to characterise the difference between IP management in UK companies and Japanese companies is to say that whilst there are almost certainly exceptions, in general, UK company IP/Patents departments are in effect largely acting as in-house firms of Patent Attorneys. In contrast Japanese IP/Patents departments, though still sources of expertise, appear much more an integral managerial part of the organisation. There are a wide range of facts which emerge from the present survey to support this view.

As company size increases in the UK, IP department size increases (Q.7) but the percentage of work sent to outside agents falls as more work is done in house (Q.68) by the high numbers of patent attorneys (Q.9) in large UK IP departments. In contrast in Japan as IP department size increases the percentage of work sent to outside agents stays constant emphasising the fact that the aim of increasing the IP department size must be to cope with increased work levels not a desire to bring work in-house. Features which abound in general management jobs such as training (Q.65-67), incentive schemes (at least for inventors)(Q.61), training abroad (Q.10/12), transfer between other departments (Q.14), use of written plans or policies (Q.19), increased allocation of resources in terms of staff as a percentage of total staff (Q.7), at least slightly greater involvement of other departments in decision making and committees (Q.72, 73, 77), greater incidence of reporting to senior management and board members (Q.4) all point to a more business oriented approach to IP management. The UK approach is perhaps characterised by the fact that as company size increases the IP department becomes increasingly located in the company legal department (Q.2).

Besides these differences there are the more obvious ones related to the size and sector of the businesses concerned. Japanese numbers of patent applications (Q.28), IP department staff (Q.7), IP budgets (Q.16), in general dwarf those in the UK. In the UK the key IP business area is in the Chemicals/Pharmaceuticals field which does not have such an emphasis on numbers as the mechanical and electrical fields which comprise a high proportion of Japanese IP activity. Besides these basic differences whilst the recent recession may have slowed

activity down over the past five years Japanese IP budgets have grown in real terms and UK ones fallen (Q.17), and IP staff levels have also grown in Japanese companies but fallen in UK companies (Q.8). It is quite possible that the in-house professional, as opposed to business managerial nature, of some UK IP departments and the fashion for outsourcing in-house company services may lead to further decreases in IP staff numbers in the UK.

### 1.2.2. Strategic Management

As regards Strategic Management of IP there are several similarities between Japanese and UK companies approaches. In many respects attitudes in the two countries to licensing in (Q.34) and licensing out (Q.38), cross licensing, litigation, study of competitors, changes in the incidence of licensing (Q.36, Q.42, Q.46), willingness to negotiate and avoid litigation (Q.47) and active marketing of technology to license out (Q.41), have much in common. This confirms that there is a certain extent to which the nature of the problems faced by IP departments and companies dealing with IP issues are the same wherever they are located. However there are equally, several critical differences which the survey reveals, which in a sense are an extension of the differences in approach noticeable in respect of the operational management of IP.

In particular the following differences are notable, Cross-licensing is consistently rated as being more important by Japanese companies (Q.35, Q.39) and active searching for technology to license in is much more common in Japan (Q.37). This is despite Japanese companies only paying slightly more on average for technology than they receive in license fees, whilst the balance for UK companies is only slightly positive. The financial difference is thus not that great but the approach to licensing in is. Japanese companies are also more prepared to license out important technology to receive a cross-licence if need be (Q.44). UK companies license to and from many kinds of overseas company. Japanese companies in contrast tend to license in from large overseas companies and license out to small overseas companies (Q.32).

These factors are associated with the fact that Japanese companies consistently rate "gaining a lead over competitors by protecting IP assets" as the most important role of IPRs whereas UK companies consistently rate "To protect your IP assets from free use by others" as the most important role (Q.22). Typically a Japanese firm will be licensing in technology from the USA and gradually licensing out old technology to the USA and Korea (Q.33) whereas UK companies will also be licensing in from the USA but licensing out to the USA and Japan (Q.33). Licensing out to a source of technology such as the USA is a function of the need for technology to cross-licence to gain advanced technology but should not be used as a source of income using a companies most advanced technology. These are just indications that perhaps Japanese companies have more strategic uses for IP as a means of both gaining a lead and preserving it as opposed to just a means of keeping out competitors. This need not

be an explicit strategy and may be as much caused by circumstances and the IP environment as by design.

Besides these features another key feature highlighted by the data is the proportion of applications which are filed abroad. The Japanese Patent Office has also commented in it's 1994 annual report, on the low rate of applications made abroad by Japanese applicants in comparison to the numbers of applications filed in Japan (日本国特許庁 1994). At first sight the proportion of applications filed abroad is much greater for UK companies than for Japanese companies (Q.28). However, it should not be forgotten that when one takes into account the much greater numbers of Japanese domestic applications the number of UK foreign applications are still considerably outnumbered by foreign applications from Japan.

Despite this there is still a vertiginous heap of Japanese patent applications in Japan to be explained. Gathering together facts from the survey data and the background chapter we can see that the high numbers of patent applications are reflected by a high number of researchers. This is in part caused by the greater population in Japan but also by the higher ratio of researchers to total employees in Japanese Industry and also by the high number of patent applications filed by each researcher. These facts are revealed both by this survey and overall national statistics as described in chapter 2. These two factors explain away most of the differences between the level of UK patent applications and Japanese patent applications since there are roughly two to three times the number of patent applications filed by each Japanese researcher, roughly five times as many Japanese researchers and about twelve times as many Japanese Patent applications as UK ones. This mountain of Japanese patent applications requires management and the size of Japanese IP departments and funding is in large part due to the large numbers of people required to manage them. What is not so clear though from the numbers alone is whether the costs of these applications are justified. It would be not be so surprising and more consistent with Japan's export led economy, if the ratio of filing these patent applications abroad were the same as for other leading countries and if at that ratio Japanese applications abroad were relatively numerous. However as we have seen whilst they are numerous abroad it is despite the low ratio. This implies that there are a lot of patent applications which are either essential for business success in the Japanese market alone or are a non-essential waste of effort. The reasons will be studied in more detail later when looking at Japanese incentives for filing patent applications.

### 1.2.3. Changes

The changes that the survey results showed to be occurring are in general not dramatic. Both UK and Japanese firms amount of licensing in and out and cross-licensing has been largely unchanged recently (Q.36, Q.42, Q.46). Similarly there has been little change in UK or Japanese companies' attitudes to whether courts are used to resolve infringement disputes

(Q.53, Q.59). However, even though the methods of resolution have not changed there are more reports of increases in the incidence of litigation (See Q.51, Q.60). Furthermore, Japanese companies are reporting greater increases in allegations of infringement against them than UK companies (Q.60). Thus external change is perhaps faster than internal changes in attitudes.

These changes in litigation are perhaps helping to counter any downturn in Japanese patent application numbers. These have declined more at home than abroad for Japanese companies and more than for UK companies (Q.31/31). Taken together the overall effects of such changes are increased IPR budget and staff levels (Q.8, Q.17).

These same increased and relatively high IP department staff levels have almost certainly given Japanese IP departments the staff and capacity to develop skills such a patent information management despite having a lower percentage of their overall IP staff working on such issues than in UK IP departments. There are thus considerable advantages of scale especially when it comes to peripheral issues such as information management and planning activities.

### 1.3. Conclusions

Overall the particular hypotheses the present surveys have been based on are thus largely supported. Additionally, the initial hypotheses that lead to the particular ones are also supported. Significant differences do exist between Japanese and UK companies attitudes to and management of IP and these difference are associated with the environment which has already been shown to be different and changing. Finally practices concerning IP management are felt by most of those concerned with it to be converging (Q.79) even if such change is slow.

The study has thus shown that Japanese IPR management has several distinct characteristics. It is integrated with other business functions. Informed by management and analysis of patent information. Important enough to senior management to merit substantial investment in terms of people and money. Adaptable and adapted to suit the changing conditions facing Japanese Industry and last but not least, dynamic in the sense that it is concerned with both technology leadership and followership comprising the continued absorption of technology. These factors whilst particular in many respects to Japanese companies need not be exclusively Japanese and can therefore be usefully included in a more general discussion of IP Strategy applicable to companies in any country.

It now remains to illustrate some of these and other features of the survey by the study in greater detail of some IP related topics and an integrative discussion of the implications of the studies and the above survey results for more general IP strategy. However, those wishing to consider first the specific comparisons described above in more detail may read Section 2 before moving on to Chapter 9.

## 2. Detailed Comparative Analysis

### 2.1. Introduction

In general, the main differences between UK and Japanese companies are marked enough to occur whether only those UK companies with IP departments or all UK companies are studied and irrespective of industry sector or company size. However for the sake of completeness and to take account of those cases where this was not so, the results were in most cases broken down by the total number of employees, industry sector and in the case of UK companies the presence or absence of a separate Patent/IP Department.

### 2.2. Comparative Analysis Methods

Those questions included in both the UK reminder and the original UK questionnaire have a sample size of N=c250 whereas those only present in the original UK questionnaire have N=c80. In most cases results of tests of statistical significance are given in terms of p values, usually for t tests of similarity between mean values, Analysis of variance (ANOVA) tests analysing variance in data between company sectors and sizes and Chi-squared tests for similarity between distributions among categories. The term significant has been used to indicate data where $p < 0.10$ and the result is significant at the 10% level of confidence unless otherwise specified, though in some cases much higher degrees of confidence were obtained. Some cross sectoral studies or analyses by company size especially with the UK data involved low numbers of companies in each category and where this is so the meaning and limitations of the statistical test results should always be considered with this in mind. The UK sample, as has been stated, was in most cases analysed so as to present data from those companies having an IP department as well as from the whole sample. To distinguish these in tables of data the terms "UK" for data from the whole set of UK responses, "UKIPD" for those responses from UK companies having a specific IP/Patent department and "UKNoIPD" representing responses from UK companies not having a specific IP/Patent department were used. In tables of data the relevant question number is also given (e.g. **Q.61** ). The Data Tables referred to can be found in Appendix L.

### 2.3. Comparative analysis

#### 2.3.1. IP/Patent Department Organisation

Whether to have an IP department at all and if so whether to have a single centralised office or a distributed IP department are perhaps the first question to be asked regarding IP administration in a company. In the reminder questionnaire respondents were only asked whether or not the company had a separate IP/Patents department. Answering "No" to this

question was equivalent to answering "5." in the original questionnaire.

Data Table 1 : Type of IP/Patent Department Organisation

A Chi-squared test of the replies for types 1-4 (i.e. where there is a definite IP/Patent department present) shows that significant differences exist in the distribution of types of IP/Patent departments (p=0.000) between the UK and Japan. In Japan central departments without managers based in factories/R&D departments (Type 2) are most common. In the UK, IP organisations with both central departments and managers based in Factories/R&D centres (Type 1) are slightly more common. Overall though the results only just supported the hypothesis H27 that Japanese Companies have more multi-site IP / Patent Departments operations. 31.55% of Japanese respondents had organisation types 1, 3 or 4 (Central with dependent (1) and independent (3) satellite departments or independent departments (4)) whilst 29.63% of UK companies did. If just companies with >10000 employees were studied 62.79% of Japanese companies had type 1,3 or 4 structures whilst 70% of UK respondents did. The largest Japanese companies tended to have a more varied range of types of organisation than the largest UK companies and 60% of the largest UK companies had Type 1 structures with both a central office and distributed offices. However in both the UK and Japan multi-site organisations were associated with larger company size.

In Japan as has been mentioned, almost all those companies surveyed had some form of IP department (Only 1.5% had none). In the UK though, 71% did not and as might be expected IP departments became more common the larger the company. An interesting fact communicated to me about an unpublished survey carried out in Japan in 1986, was that about 24% of Japanese companies with some form of patent function in 1986 had no independent patent or IP department. The sample for that survey comprised companies with a size distribution not significantly different from that of the present Japanese survey's sample. This at the very least suggests that the incidence of such departments in Japan is increasing. This is probably not the case in the UK based on the other data gathered in the surveys, particularly that relating to staff and budget changes.

Which part of the company the Department dealing with IP/Patents belonged to varied significantly between the UK and Japan.

Data Table 2 : Company Department owning the IP/Patent Department

Japan was more likely to have the IP department established as an independent department or as part of the R&D department. In the UK independent departments were much less common and though membership of the R&D department was common, membership of the legal department was much more common than in Japan. This supports hypothesis H26 . These

features had some minor but statistically significant variations with industry sector but more interestingly with company size. In Japan, with increasing company size, the occurrence of the IP/Patents department within the R&D department decreased and its occurrence as an independent department increased. In the UK this was also true, but more noticeable was the fact that the occurrence of the IP/Patents department within the legal department increased with company size. Only in the Pharmaceutical sector was the legal department an at all common location for IP departments in Japan (26%).

There was no significant overall difference between UK and Japanese respondent companies as to whether the head of the Department managing IP / Patent matters was a director or not. In both cases about 34% were. This implies rejection of hypothesis H1 that Japanese IP departments are more often headed by directors than UK ones. There was some indication that this increased with increasing company size in Japan but decreased with increasing company size in the UK. This trend was not quite significant in the UK ($p=0.1027$) but was just significant in Japan ($p=0.0979$) at the 10% level. For companies with over 10000 employees, in the UK 10% had a director as head of the IP department but 51% did in Japan.

Data Table 3 : Is the Head of the Dept. Managing IP/Patent matters a Director

There was a small but significant difference (t test $p=0.019$) between the 86% of Japanese respondent companies whose IP department reported directly to a company director and the 72% of UK companies whose IP departments did so. This therefore supports hypothesis H2 . Again the difference was far greater in the case of large (>10000 employee) companies (88% of Japanese Companies and 40% of UK ones). There was no significant variation with industry sector in either country, but the number of UK patent departments reporting directly to a company director decreased significantly ($Chi^2$ $p=0.0566$) with increasing company size.

Data Table 4 : Does the IP Department report directly to a Company Director

In the UK it seems that smaller companies will tend to have IP/patent matters dealt with by personnel who are or are in direct contact with company directors. As the firm size increases and specific IP/Patent Departments become more common, direct contact with senior management decreases. In Japan any such trends are less noticeable except that if anything the incidence of patent department heads who are company directors increases with company size. Caution is needed though in equating the role of "directors" in UK and Japanese companies, but despite this it appears on this measure that IP issues receive more top level attention in Japan.

### 2.3.2. IP Department Responsibilities

Companies were asked whether the part of their company responsible for IP/Patents dealt with various IPRs. As expected almost all dealt with the more common forms of IPR.

There were almost no significant variations with industrial sector in either the UK or Japan save that in Japan, Chemical and Pharmaceutical companies, unsurprisingly, tended to have no specific department responsible for Computer Software or Semiconductor Mask Works.

Data Table 5 : IP / Patent Department Responsibilities

The only variation with company size in the UK was with Trade Marks, which as company size increased, became less likely to be dealt with by the IP/patents department. Bearing in mind the incidence of IP/Patent departments in Legal departments in larger companies, this may be due to Trade Marks having a separate department within the legal division or being dealt with by the legal department if separate. In Japan there were variations as to which types of IPR were dealt with by the IP/Patent department depending on company size. As company size increased the extent to which the IP department dealt with the IPR concerned increased. Only how "Know How" was dealt with showed no significant variation with company size. In both countries as company size increased the number of companies saying that they had no specific department responsible for a particular IPR decreased.

A further aspect of IP/Patent department responsibilities is the incidence of specialist sections or parts of IP departments responsible for particular functions.

Data Table 6 : Specialist IP/Patent department sections

Such specialist sections are in general significantly less common in UK respondent companies than in Japanese ones. However, though the number of respondent companies is low, there was no significant difference in the incidence of such sections when only those UK respondent companies with IP departments were compared with Japanese respondent companies. The only exception was concerning Computer Software where UK companies were less likely to have specialist sections than Japanese companies. In the UK there was no significant variation with either industry sector or size though as one might expect, specialist sections became more common with increasing size. In Japan the same variations occurred significantly with company size but not significantly with industry sector. In both countries the most common specialist section was for Patent Information and 49.3% of Japanese companies had such sections. 50% of UK companies with IP departments did as well, though overall only 38% of UK companies had such a Patent Information section. A similar situation exists regarding specialist litigation sections where there was no significant difference in their occurrence

between UK and Japanese companies. In the case of UK companies with IP departments therefore hypotheses H28 and H29 can be rejected. In terms of staff numbers though Japanese companies have many more specialists as Question 11 shows (See Table 16).

### 2.3.3. IP Department Personnel

A considerable difference between UK and Japanese approaches is noticeable when it comes to the number of personnel involved in IP/Patents work in companies. In all cases Japanese companies employ more, often many more, staff in IP/Patents work even when compared with just UK companies having IP departments. The differences in mean numbers of IP staff between Japanese (c30) and UK companies (3.4) are all significant (p=0.000 for all). This clearly supports Hypothesis H30 .

Data Table 7 : Number of Staff involved exclusively in IP work

There is significant variation with both Industry sector and Company Size in the number of IP staff. In Japan the sector having the most IP staff is the Electronics/Communications sector whereas in general in the UK it is the Pharmaceutical Sector.

Data Table 8 : Number of IP Staff by Industry Sector

Data Table 9 : Number of IP Staff by No. of Employees

though numbers of both Japanese and UK company IP staff increase with increasing company size whether one compares just UK companies with IP departments or all UK companies with Japanese companies, at all company sizes Japanese respondent companies have larger numbers of IP department staff. The ratio of IP Staff to total Company Employees is also significantly higher in Japanese respondent companies than in UK respondent companies. In both Japan and the UK this decreases significantly with company size, though for UK respondent companies with IP departments alone the decrease is not significant at the 10% level (ANOVA p=0.155).

Data Table 10 : IP Staff per 1000 Total Employees

Not only do Japanese respondent companies have larger numbers of IP department staff but significantly more Japanese respondent companies reported increasing IP staff levels.

Data Table 11 : % of companies reporting changes in IP Staff levels

By using the present number of IP department employees and the percentage changes in IP staff levels over the past 5 years, the average number of IP staff employed five years ago can

be calculated and average growth rates calculated. The present overall UK average figures differ slightly when the reminder replies are included however the differences are not great and the overall trends are the same. Japanese Company IP staff numbers have been increasing and UK company IP staff levels decreasing over the past five years. This supports Hypothesis H31 that Japanese company IP department budgets and staff levels will be faster growing.

Data Table 12 : Growth Rates in Numbers of IP Staff over the past 5 years

The make up of IP/Patent departments also differs significantly between the two countries. Studying the average number of employees by function shows that qualified attorneys are common in UK companies but not in Japanese companies, whereas engineers and technical assistants are more common in Japanese IP departments than in UK ones. The term technical assistant in the UK includes any technically qualified IP department member who is not also a qualified Patent Attorney. In Japan however, IP department Engineers fitting such a description are still specialists. Given different career structures for company employees compared to independent attorneys many may be as just as skilled as qualified attorneys despite not being formally qualified.

Data Table 13 : Average Numbers of IP Staff with given roles

The majority of respondent companies both in the UK and Japan concentrated most of their IP staff in the main IP/Patent department rather than dispersing them among R&D Departments. This means that staff located in distributed sites are likely to be staff carrying out a liaison role with the main administration being carried out by the central office, where one exists. Only a few of the largest Japanese companies in the mechanical and electrically based industries had staff based abroad. In the UK there were similarly only a very few respondent companies that had staff based abroad. In most cases this was in connection with foreign subsidiaries of UK based multinational companies to which staff had been seconded. There were some instances of staff being sent abroad for training by Japanese respondent companies but none by UK respondent companies.

Data Table 14 : Average Numbers of IP Staff in given locations

Staff who specialise in litigation, licensing or patent information work naturally become more common as company size increases. There are also some sectoral differences with specialist litigation staff mainly occurring in the electronics sector in Japan but also in the chemicals sector in the UK. The electronics sector in Japan for example has 80% of all specialist litigation staff in the Japanese survey. The number of such specialist litigation staff as a proportion of total IP staff is higher in the UK. However, the total numbers of such specialist staff is higher in Japan due to the larger average size of IP/Patents departments in Japan.

This is also true of other specialist functions in Japanese companies such as patent information. These findings contrast with the results of question 6 and lead to support for hypothesis H28 that Japanese companies will have more specialist Patent Information personnel and rejection of hypothesis H29 that they will have fewer specialist Litigation personnel than UK companies.

Data Table 15 : Average Numbers of IP Staff in given specialisations

Data Table 16 : Specialist IP Staff based overseas

Invariably when Japanese respondent companies had staff based abroad they were based in the USA whether for work or training (Q.12). Among respondent Japanese company IP staff based abroad, 3 out of a total of 68 were based in the UK, 9 in Germany the remainder in the USA. They were evenly divided between work (34) and training (34).

Data Table 17 : IP Staff language skills

From the total number of respondents who replied to the question on language skills (Q.13), among Japanese respondent companies 14.6% of their total IP staff could discuss IP matters in English but of the about 4990 staff involved only 6 (0.12%) reported using French and 15 (0.30%) German. Among UK respondent companies of 378 staff concerned 1 (0.2%) could use Japanese (though this person may have been Japanese bearing in mind the size of the company). However 16.9% of IP staff could use German and 19.9% French. The European Patent Office is located in Munich and Japanese company patent applications are handled mainly by UK and German agents. UK staff qualifying as European Patent Attorneys must be able to translate technical French and German. For Japanese staff the fact that virtually all German Patent Attorneys can speak English simplifies the problem. Nevertheless, language skills are important for both UK and Japanese staff.

How IP department employees joined the department also differed between UK and Japanese respondent companies. Combining percentages with figures for the total number of IP related staff (Q.14 & Q.7) we can also obtain figures for the overall gross numbers and thus percentages of staff joining by the various routes. On average roughly the same percentage of IP staff join directly via the IP department in the UK as in Japan. However, in the UK the percentage is significantly higher for those respondent companies which have an IP department. The result is that overall a greater proportion of IP staff in UK respondent companies join the IP department directly whilst in Japan an higher proportion are transferred from the R&D department and other departments. Another interesting fact is that Japanese companies have a higher proportion of IP staff being transferred into other departments something which is rare in UK companies. These facts support hypothesis H33 that Japanese companies have a higher circulation of managers to and from the IP department than in the UK. Added to this a

higher proportion of UK staff leave to join other companies. The differences may be more pronounced than the figures shown suggest since the figures for UK staff leaving are partially confused by respondents including cases where nobody left and if a correction is made for this the proportion of leaving staff who left for other employment rises to c55%, those retiring to c29% and those moving to other departments remains a low 6%. These corrected figures are approximately the same for companies with IP departments.

Data Table 18 : Staff origins and destinations

The length of time IP staff spend in IP employment also varies between the UK and Japanese respondent companies. A higher percentage of UK IP staff have been in IP work for more than 10 years. In Japanese companies staying for less than 10 years is slightly more common.

Data Table 19 : Length of stay in IP/Patents department of IP Staff

### 2.3.4. IP Dept. Budget

We have already seen that employment and staff levels indicate a difference in the allocation of resources to IP functions in Japanese and UK companies. Only in the pharmaceutical sector does UK absolute spending on IP even approach Japanese spending on IP management. IP spending is highest though in the Pharmaceuticals sector in the UK and in the Electronics sector in Japan. Obviously staff numbers are directly comparable but levels of financial spending less so. However, financial figures can give useful information when used in ratio form so as to make them comparable.

Data Table 20 : IP Expenditure to Sales & R&D Expenditure Ratios

IP expenditure as a proportion of sales is significantly higher in the UK than in Japan, especially when just respondent companies with IP departments are considered, though it is lower if just those companies without IP departments are considered. The ratio of IP to R&D expenditure is roughly equal in both Japan and the UK (though the number of replies involved is not very great in this case). R&D Expenditure to Sales is significantly higher in Japan than in the UK and incidentally significantly higher in UK respondent companies with IP departments as one might expect. Obviously IP budgets in both Japan and the UK increased with company size. However there was no significant variation in IP expenditure or IP expenditure to Sales ratios with size or company sector in Japan. There was a slight decline in IP expenditure to Sales ratios in both the UK and Japan which was not statistically significant. In the UK both IP expenditure and IP expenditure to Sales ratios were highest in the Pharmaceutical sector though only 4 pharmaceutical companies replied to the question concerned.

When questioned about changes in IP budgets over the past five years roughly the same proportion of respondent companies said that spending had increased, decreased or remained the same with slightly more tending to say it had increased in Japan. Neither country showed any significant variation in this with industry sector or company size. These figures though do not take account of inflation as those in Data Table 22 do.

Data Table 21 : Changes in IP Budgets

Data Table 22 : IP Budget Growth Rates

Using the changes reported and the current IP budget figures, average figures for IP expenditure five years ago and overall growth rates can be calculated. If account is then taken of inflation UK budgets are seen to have fallen 1.43%pa in real terms and Japanese ones increased 0.99%pa in real terms. This supports Hypothesis H31 that Japanese companies will have faster growing IP department budgets and staff levels.

There was no significant difference in the incidence of transfer charging for IP department services to other departments. In both the UK and Japan around 30% used such methods. This did not vary significantly with company size but did vary significantly with company sector in both countries. Interestingly, its incidence was higher in Chemical and Pharmaceutical sectors in the UK and higher in Electrical and Mechanical sectors in Japan. This may well indicate that IP departments in other sectors in which IPRs are less important nationally are not so financially accountable, or that the sums involved are too small to justify the extra administration. The existence of "Free" IP department services may result in greater use being made of them, whilst the use of transfer charging may cause more judicious use.

Data Table 23 : Incidence of Transfer Charging

### 2.3.5. Overall IP Policy

Whether respondent companies had a written basic IP plan or IP policy varied significantly between Japanese and UK companies with 70% of Japanese companies having such a plan or policy but only 39% of UK companies. Even considering just those UK companies having an IP department only 47% had such a plan or policy. This confirmed hypothesis H4 . However in the case of the very largest UK companies 70% did have some form of IP policy.

Data Table 24 : Presence of written IP plan/policy

In Japanese companies slogans are often coined to encapsulate and promote implementation of policies. Companies were asked whether they had an IP slogan. 40.20% (N=204) of

Japanese respondent companies had such slogans but only 5% (N=80) of UK respondent companies did. This confirmed hypothesis H5. Slogans were significantly more common among larger companies but showed no significant variation in occurrence among company sectors. The various texts of the slogans are discussed in more detail in the discussion of IP policy in a later chapter. However, the main ones are highlighted by the slogans are Utilisation of IP & Patents, Strategic Use of IP / Combining Business & IPStrategy, Quality of Patents or Inventions and Respect for others' IPRs / Avoidance of Infringement.

Data Table 25 : Japanese Company IP Slogans

Data Table 26 : Presence of Japanese Company IP Slogans

Which company departments contributed to the formulation of Company IP policy also varied between the UK and Japan.

Data Table 27 : Involvement in IP Policy Creation

In the UK there was significant variation in the involvement of the IP department with company size (ANOVA p = 0.001) and 80% of respondent companies with over 10000 employees involved the IP department in IP policy formation. Involvement of directors and board members in UK companies also varied significantly with company size and decreased significantly with increasing company size (ANOVA p = 0.005) being only 20% for the very largest companies. However overall, directors and board members in UK companies were significantly more involved in IP policy formation than in Japanese respondent companies where similar declines did not occur. This is connected with the slightly smaller average company size of the UK sample. Involvement of the R&D department was significantly greater in UK respondent companies than in Japanese respondent companies. However whilst such involvement declined with increasing company size in Japan, probably reflecting the increased power and independence of IP departments in large Japanese companies it did not vary significantly with UK company size.

The results of this question are obviously influenced by the size of the company replying. However it seems that in Japan Directors and Board members are involved in all sizes of company whereas in UK respondent companies involvement of Directors and Board Members occurs primarily where the company is too small to have an IP department to delegate the issue to. As soon as a sizeable IP department is in place Directors and Board members abandon such issues to the IP department. The high involvement of the R&D and Sales and Marketing departments in UK companies is perhaps a reflection of the need for liaison with the R&D department in the absence of engineers/technical staff seconded from R&D and other departments in UK companies (See Results of Question 14).

## 2.3.6. Management Attitudes to IP & Influences

Data Table 28 : Management Attitudes to IP

a. A source of Revenue through licensing OUT technology
b. A source of Technology through licensing IN technology
c. A source of Technological Information
d. For use in cross licensing to allow your company to act freely
e. To protect your IP assets from free use by others
f. To monopolise your IP assets and make free use by others difficult
g. To help have your technology adopted as a technical standard
h. To gain a lead over competitors by protecting IP assets

The main point to note about the data in Data Table 28 : is that the greatest differences between UK and Japanese company opinions occurs concerning **a.b.c.** & **d.** all of which respondent Japanese companies are significantly more in favour of than UK companies. That said, the order of preference for both countries is not greatly different, being for the UK : **e,h**,f,c,d,b,**g,a**, and for Japan : **h,e**,f,c,d,b,**a,g**. It might be said that e,h & f are all obviously important. Whilst there is no significant difference between Japanese and UK respondent companies concerning e and f they do differ significantly concerning h. "To gain a lead over competitors by protecting IP assets" which Japanese respondent companies rate more highly. This in a sense agrees with the higher rating given to the licensing related factors a.b and d. which show the greatest differences. One could thus interpret the results to this question as indicating that whilst both UK and Japanese companies see IP's primary roles as being based on the protection they offer; Japanese companies put more emphasis on using this in a dynamic and licensing role and thus see IPRs main role as being that of providing a lead in a dynamic race with competitors. It is arguable that this is shown by their placing h first in order of importance. Among Japanese company replies h. is also that which is rated highest by all industrial sectors and all sizes of company and shows no significant variation with industry sector which all other questions do to a greater or lesser extent. It also shows no significant variation with company size. Among UK respondent companies e. fulfils this role but shows some variation in how highly it is rated among industry sectors. Factors other than e,f and h are significantly less highly rated than e,f & h in the UK, whereas in Japan there is less difference between the various factors and no clear dividing line between those that matter a lot and those that do not matter so much. This reinforces the view proposed above that Japanese companies have a more varied and flexible view of the role and importance of IPRs than UK companies do, who tend to view it in terms of gaining a lead through protection alone.

In studying influences on company thinking about IP, Japanese companies are found to attach more importance to a wider range of factors than UK companies. Both rate employee experience as particularly important and also studying competitors but Japanese companies attach much more importance to government policy whether at home or abroad than UK companies do.

This supports hypothesis H6 .

Data Table 29 : Extent of influences on thinking and actions relating to IP

The country with the greatest effect on Japanese companies views on IP is not surprisingly the USA. This supports hypothesis H7 . It should be noted that UK companies gave multiple replies to this question and cited a range of countries whereas Japanese companies in general only cited one country.

Data Table 30 : Most Influential Countries

Despite this it is noticeable that in Japan almost the entire sample of 211 companies (88.8% of respondents) cited the USA whereas in the UK only 69.0% did so.

When companies were asked how often they studied competitors policy and actions relating to IP. Around 70% of UK respondent companies did so at least occasionally whilst around 80% of Japanese respondent companies did so at least occasionally. There was no significant variation in this by company sector or company size. If the answers to Q.25 are scaled 1(Never) to 7(Continually) there is no significant difference in the average value between the value for Japan (4.70= Occasionaly/Often) and the UK (4.48) p=0.33, or UK companies with IP departments (4.95) p=0.43. This therefore tends to reject hypothesis H8 that Japanese companies study their competitors more than UK companies.

Data Table 31 : Active study of competitors IP policy and actions

### 2.3.7. Strategic Management of IP

In terms of overall financial payments to/from other companies in the preceding financial year more companies were paying more for technology than they received than vice versa in Japan. In the UK the reverse was the case. This supports hypothesis H9 . This did not vary significantly by industry sector or company size in either country. However, the balance of trade in technology becomes less negative as firm size increases though the trend is not statistically significant. The balance of trade is also much more negative for Pharmaceutical sector firms in Japan. Among UK Companies with IP departments there were significantly more companies with positive balances.

Data Table 32 : Payments for Technology

Companies are on the whole reluctant to divulge details of their financial dealings in technology. Despite this an attempt was made to obtain details of the split between income and payments

from home and overseas. However, in the UK survey only 6 companies replied with details of both income and expenditure on technology. All six reported positive balances (receipts exceeding payments) but these are insufficient to draw any firm general conclusions from. In Japan also, only a low number of replies was received to questions asking about specific financial dealings in technology. However some 104 responses gave details of both Income and Payment details and from these it was possible to draw some conclusions.

The overall balance of trade in technology from the 104 responses was just positive at 1.056. However this almost certainly over-represented companies with positive balances and using the previous question an estimate of a corrected value gave a lower overall ratio of income to payments of 0.751. This is not too dissimilar from the NISTEP estimate of "Somewhere around 0.6" between the BoJ figure of 0.46 and the MCA figure of 0.96 (Takuzo 1993). The possibility that reporting of negative balances may be lower than reporting of positive balances and that those negative balances that are reported may only be those which are small may mean that further analysis by company sector and size will almost certainly be unreliable.

Data Table 33 : Income and Payments for Technology

### 2.3.8. IPR Acquisition - Research

The numbers of Utility models, Design applications and Semiconductor Mask works were so small that they will be excluded from the following analysis. The two key facts to note regarding patent applications though are the relatively high numbers of applications made in Japan and the relatively low percentage filed abroad compared to UK companies. By combining the original numbers of applications given by respondents with the numbers given for corresponding percentages of applications filed abroad, true total percentages of the number of applications filed abroad were obtained. The higher percentage of foreign filings in the UK in part accounts for the high level of IP related expenditure relative to sales in the UK.

Data Table 34 : Patent Applications
Data Table 35 : Patent Applications by Company Size and Industry
Data Table 36 : Recordal of Copyright Works

Around 90% of respondent companies in both Japan and the UK do not record copyright works created (Q.29). This is not a legal requirement as copyright (unlike patents and other registered IPRs) comes into existence automatically. However, some form of recordal and preservation of original documentation is good practice to make litigation simpler and easier.

Whilst overall only slightly more companies saw a decrease in domestic patent applications than an increase, there were significant sectoral differences in Japan but not in the UK.

Data Table 37 : Changes in Domestic and Foreign Patent Applications

In Japan 46-55% of Companies in the Electrical and Mechanical sectors saw a decrease whilst only 11-34% of other companies did. In part these decreases in the filings of the largest companies are due to partly the recent effects of the recession but also to the guidance of the JPO and its actions to reduce application numbers mentioned in the discussion of background issues earlier. There were however no significant differences between companies of different size in either Japan or the UK. Regarding foreign applications a higher proportion of UK companies had seen an increase in foreign applications than in Japan. In Japan there was some significant variation with industry sector but not with company size and pharmaceutical companies showed the highest proportion of increases. There was no significant variation with company size or sector in the UK.

### 2.3.9. Licensing - General

Replies to questions about the nature of alliances companies were involved in in Japan were complicated and had a lower response rate at around 30% than most other questions had of around 45%. The question was in retrospect overambitious but it was nonetheless possible to draw the following conclusions about Japanese alliances.

i) The average number of alliances with large and small companies is about the same

ii) Alliances with National companies are more common than with Foreign companies. (This fact must be borne in mind when considering the licensing revenue figures from Q.26/7 since they show a high proportion of income and revenue coming from and going to abroad. The implication is that alliances within Japan involve less money changing hands than those with companies abroad.)

iii) Cross licensing with large companies in Japan is more common than with companies abroad.

iv) Licensing in from abroad is more common than Licensing out to overseas when large companies are concerned but the reverse is true for small companies though the difference is less pronounced. This illustrates the flow of technology from large foreign companies into Japan and out to smaller Asian firms.

v) Joint ventures are much more common with companies abroad than with national companies whether small or large.

vi) Unsurprisingly subcontracting/contracting relationships are predominantly with small national companies.

The picture built up is of an internal licensing market which is concerned with trade in technology not with financial gain or perhaps is more concerned with relatively minor deals from a financial point of view. These relationships include a fair amount of cross licensing and relatively few joint ventures. In contrast relationships with companies abroad are much more financially significant and in the case of larger deals are concerned with importing

major technology from large foreign companies. This is achieved either by direct licensing or through joint ventures or cross licensing. At the same time there is a smaller outflow of technology.

It was not possible to make reliable statements about the national licensing by UK companies. However, the main feature emerging from the data concerned the proportion of licensing in and out alliances with small and large overseas companies that respondents were involved in. In the UK companies appeared to license out more than license in irrespective of whether the other party was large or small, though this result was not statistically significant. In Japan, companies tended to license in from, not out to, large companies and tended to license out to small companies not in from them. There was also considerably more licensing in from large overseas companies than was the case with UK companies.

Data Table 38 : Licensing Alliances with Overseas Companies

The countries involved in licensing alliances differed considerably even though the number of UK replies was low.

Data Table 39 : Incidence of Licensing Alliances

The only common factor was the involvement of the USA. Japanese companies licensed in technology almost exclusively from the USA and to some extent Germany whilst licensing out to a range of countries but mainly the USA and Korea. The flow of technology through Japan thus flows from technologically developed countries and companies to less developed ones. This supports hypotheses H10 and H17. The main recipient of licenses from UK companies appeared to be Japanese companies.

### 2.3.10. Licensing in

Company attitudes to licensing in do not vary significantly with company size however they do vary significantly with industry sector for both Japanese and UK respondent companies. In both cases the Pharmaceutical sector views licensing in particularly positively. A t test showed no significant difference between the UK and Japanese overall figures (UK = 3.304 : JP = 3.173 p=0.20). This leads to rejection of Hypothesis H11 that Japanese companies will view licensing in more positively than UK companies. However this result must be compared with that for Question 37.

Data Table 40 : Attitudes to Licensing In Technology

Data Table 41 : Attitudes to Roles of Licensing In Technology

In the UK there is no significant variation in responses by industry sector concerning attitudes to a range of roles of Licensing in of technology. In Japan there was some significant variation and Pharmaceutical companies viewed c. Saving R&D costs and d. Saving R&D development time as being more essential than other sectors did. The only significant variation with company size occurred in Japan where the importance of saving R&D development time decreased significantly with increasing company size (ANOVA $p = 0.028$).

There were some noticeable but just significant differences between the UK and Japanese figures. UK companies did not view d. Saving R&D development time and e.Developing what cannot be developed in-house as essential as Japanese companies did. More noticeable was the fact that Japanese companies viewed cross-licensing as more essential than UK companies did. This last point was less pronounced if just UK companies with IP departments were considered.

Around 60% of companies reported no change in licensing in activity which supports Hypothesis H13 that Japanese and UK companies will not have changed their level of licensing activity. The percentage of Companies reporting an increase in licensing in also did not vary significantly between the UK and Japan and there was no significant variation by company size or sector, except that in Japan a higher proportion of Pharmaceutical companies than others reported an increase.

Data Table 42 : Changes in Licensing In

Perhaps the most interesting result of all regarding licensing in though bearing in mind the lack of difference in answers to overall attitudes to licensing in is that significantly more Japanese than UK companies actively search for technology to license in. This supports Hypothesis H12. The difference does not vary significantly with company size in either country but does vary with company sector with companies in the Pharmaceutical sector in both Japan and the UK being most likely to do so.

Data Table 43 : Active Search for Technology to license in.

This general difference in approach to licensing in technology is except the Pharmaceutical Industry, common to all sectors with Japanese companies being considerably more likely to actively search for technology to license an UK companies are. This arguably, since it is unlikely that all 75% of Japanese companies are only catching up and since there is little variation with company size, supports the overall view that in Japan licensing in is not just something which is done to catch up with competitors but something which is a continuous process necessary whatever one's state of technological development.

### 2.3.11. Licensing out

Attitudes to licensing out technology were not significantly different between UK and Japanese respondent companies, though companies generally preferred to license out not in, except for the Pharmaceutical sector. This supports hypothesis H14 .

Data Table 44 : Attitudes to Licensing Out Technology

Larger Japanese companies were significantly more likely to be in favour of licensing out than smaller ones though this was not significantly so in the UK. UK Pharmaceutical sector companies were significantly more likely to be in favour of licensing out than those in other sectors but the same feature though present, was not significantly so in Japan.

T tests to compare the attitudes to licensing in and out in questions 34 and 38 showed that the Pharmaceutical sector was significantly more positive about licensing in than licensing out in both Japan and the UK. In Japan the transport sector was significantly more positive about licensing out than licensing in. Other mechanical/electrical sectors in both Japan and the UK were also more positive about licensing out than licensing in but not significantly so. Overall in the UK attitudes to licensing in were slightly more positive than to licensing out but this difference was not significant. ($p=0.45$). In Japan, overall attitudes to licensing out were slightly more positive than to licensing in but again this difference was not significant either ($p=0.13$).

Data Table 45 : Attitudes to Roles of Licensing Out Technology

To some extent the differences between the overall attitudes to roles of licensing out between UK and Japanese companies are mainly the result of differences with UK companies without IP departments.

However, UK company attitudes to c. acquiring access to technology via cross-licences are significantly different from Japanese company attitudes as are those to f. increasing competitors dependence on your technology, whether one studies UK companies with IP departments or not. Both c. and f. are considered more essential by Japanese companies. Both are more than just quests for financial exploitation of technological assets perhaps illustrating a more strategic approach towards licensing out by Japanese companies.

It is worth noting that compensating for lack of manufacturing ability or lack of other resources (j. & k.) was seen as a reason for licensing out by significantly more Japanese firms than UK firms of whether they had an IP department or not. Also contractual requirements were more often the cause of licensing out for Japanese firms than UK firms (l.). This would agree with a higher incidence of cross-licensing where licensing out is necessary for Japanese firms to

acquire technology by cross-licensing in.

There is little significant variation by industry sector or company size in the UK. Only c. acquiring access to technology via cross-licences shows some significant variation (ANOVA p = 0.087) due to UK Chemical Sector firms considering it more important than companies in other sectors. h. reducing the financial burden of exploiting technology alone is considered significantly more important by the smallest UK firms (ANOVA p=0.082). In Japan the same significant difference is observable for h. reducing the financial burden of exploiting technology alone. a. receiving money as licensing fees also varies significantly with company size (ANOVA p = 0.077) being lower for medium sized firms (500-5000 employees).

There are some other significant variations with industry sector in Japan concerning a. receiving money as licensing fees (ANOVA p=0.060), c. acquiring access to technology via cross-licences (ANOVA p=0.020), g. having your technology adopted as a technical standard (ANOVA p=0.009), h. reducing the financial burden of technology alone (ANOVA p=0.093) and i. compensating for lack of marketing ability (ANOVA p=0.051). a. is considered less essential by Chemical sector companies, c. by the Miscellaneous Sector companies, and g. by Pharmaceutical Sector companies who also consider h. and i. to be more essential than companies in other sectors do.

The technology that companies are prepared to license out does not differ significantly between Japanese and UK respondent companies nor is there any great variation in this by company sector or company size. The only significant variation (ANOVA p=0.061) occurs with licensing out b. Technology at the same level as competitors technology, where Electrical sector companies appear more willing to license out such technology than companies in other sectors. In general though, as might be expected, companies are increasingly ready to license out technology the older and less up to date the technology is.

Data Table 46 : Technology which Companies will License Out

Just as interesting as the question regarding active searching for technology to license in, is that regarding whether companies actively market their technology for licensing out. Unlike the situation with active search for technology to license in, there is no overall significant difference between UK and Japanese companies in this respect (Japan 30.65% vs UK 24.36% : t test P value = 0.15) though those UK companies with an IP department resemble the Japanese respondent companies more closely. This supports Hypothesis H15 . The difference between companies in Japan actively licensing in and out was obviously very significant (p = 0.0000). Respondent companies in both Japan and the UK showed no significant variation with company size. There was a significant variation with company sector and in both cases the Pharmaceutical sector companies were more likely to actively market their technology for licensing out.

Data Table 47 : Active marketing of technology for licensing out

Respondent companies in both Japan and the UK had no significant difference in the percentage of companies reporting changes in licensing out activity. In both cases about 60% reported no change. This does not support Hypothesis H18 However in both the UK and Japan there was a noticeably higher incidence of an increase in licensing out being reported by the largest companies (10000+ employees) which supports Hypothesis H18 .

Data Table 48 : Changes in Licensing Out Activity

### 2.3.12. Cross licensing

Besides those about licensing in and licensing out, questions were also asked about companies' cross-licensing activity. This is an area where there is considerable uncertainty as to the level of activity since most forms of data available on licensing rely on the recordal of financial transactions. In many cases cross-licensing may not involve financial payments or there may only be balancing payments which do not truly reflect the scale of technology transfer. There was no significant difference between UK and Japanese companies willingness to enter cross-licensing agreements (Japan 86.02% vs UK 88.06% t test p = 0.67). This does not support Hypothesis H16 that Japanese companies would be more in favour of cross-licensing than UK companies. However this is in large part because UK companies too are very much in favour of it. Willingness to enter cross-licensing agreements did not vary significantly by industry size but did vary by industry sector in both countries.

Data Table 49 : Willingness to enter cross-licensing agreements

To discover what technology companies would be prepared to include in a cross licensing deal and whether such technology would differ from that included in a straight licensing agreement a similar question to Question 40 reported above was asked. Only in two cases were slight but significant differences found and these were not present when only UK companies with IP departments were considered.

Data Table 50 : Technology which Companies will Cross-License Out

Among both the UK and Japanese respondent companies there was no significant variation in response with company size. However, there was some variation with company sector in both Japan and the UK. It is also interesting to study the relative willingness to license out the various types of technology depending on whether the agreement is a plain licensing out agreement or whether it is part of a cross-license agreement.

Most interesting is the fact that Japanese companies are significantly more ready to license their most advanced technology when it is involved in a cross-licensing agreement than in a plain licensing out agreement. A similar but not so pronounced trend can be seen in the data for a. Your most advanced technology for just UK companies with IP departments but the difference in this case was not significant (t test p=0.25) nor for any of the other IP department only data (all t tests p>0.3) as the number of companies involved was low (N=30).

Data Table 51 : Differences between willingness to license and cross-license
Data Table 52 : Blanket Cross-licences

In dealing with cross licenses UK respondent companies were slightly more willing to enter blanket cross-licenses covering any technology in a given field subject to balancing payments than Japanese companies were (Q.45). 17.74% of UK respondent companies would enter such an agreement whereas only 5.20% of Japanese companies would, preferring to operate on a case by case basis. This must be contrasted with the openly stated policy of some large electronics companies in Japan of making their technology openly available for licensing. However, this difference is significant (t test p=0.017).

Overall there was no significant difference in changes in the level of cross-licensing between companies in Japan and the UK. As with other forms of licensing most companies reported no change though the average percentage doing so was higher at c80% in both Japan and the UK than for other forms of licensing.

Data Table 53 : Changes in Cross-Licensing Activity

### 2.3.13. Infringement of IPRs

There is a considerable body of opinion to the effect that Japanese Society is litigation averse. The USA is equally well known for being a litigation prone society and in comparison to the USA, Japanese society is clearly less litigious. What is not clear is how litigious Japanese commercial society is relative to societies other than the USA.

In reply to the question "Whether one is right or not - it is always better to negotiate a settlement than to go to court" it was clear that there was no significant difference in the extent to which Japanese or UK companies agreed with the statement on a scale of 1.Strongly Disagree to 5.Strongly Agree. There was also no significant difference between the answers from UK companies with IP departments to those without IP departments (With (3.691) vs Without (3.7758) : t test p=0.61). There was no significant variation in these figures with either industry sector or company size. In the same way as most would decry war before one has started, few companies would want to enter litigation if it were avoidable and this is a universal feeling it

seems. These findings would seem to support rejection of Hypothesis H19. However, what happens once litigation has been commenced is another matter.

Data Table 54 : Attitudes to Negotiating or Litigating Disputes

### 2.3.14. Infringement of Respondent Company's IPRs

Data Table 55 : Complaints of Infringement made by Respondents
Data Table 56 : Infringer's Country

The most noticeable factor about the incidence of initial complaints of infringement made by respondent companies against others infringing their IPRs is that Japanese company IPRs are mainly infringed by Japanese companies and UK company IPRs are mainly infringed by companies overseas. This result is significant at least for large companies infringing UK and Japanese respondents' IPRs (t test p values = 0.0000 and 0.089 respectively). In the case of the UK it is also significant for small companies (t test p values = 0.003) who are significantly more likely to be infringers overseas than large companies (t test p = 0.003). The country most likely to be involved as an infringer of respondents IPRs in Japan was Taiwan followed by the USA. This supports Hypothesis H25. In the UK it was the USA followed by Germany. However, the number of cases is low, with only 46 responses (Q.49) in Japan and 41 in the UK.

Data Table 57 : Resolution of disputes involving respondent's IPRs

The way in which disputes involving infringement of respondents IPRs were resolved showed some similarities between Japan and the UK. Opponents were categorised into Large Companies (>500 employees) Small Companies (<500 employees) and other organisations (there were only 4 cases involving the latter category and Japanese companies and it has therefore been omitted from the following analysis). By combining the results of question 48 and question 50 it is possible to estimate the total number of cases resolved by the various methods listed for each of the categories of Q48.

In the UK overall 87% and in Japan 80% of cases are resolved outside court either by simple notification or by negotiation resulting in settlement. There is little difference in either country between overall figures for national and overseas companies. However for UK companies' IPRs, understandably, large overseas companies seem more likely to go to court to defend an action than small overseas companies. For Japanese companies' IPRs, small overseas companies seem more likely to give in on simple notification rather than by settlement out of court than small national companies. Large overseas companies seem more likely to defend actions in court. However, the number of such cases is still small.

Overall the number of cases of infringement was not seen to be decreasing by either Japanese or UK companies and the majority (c60%) saw it as not having changed or as increasing (c35%). The reply to Q.51 would seem to at least partially support Hypothesis H21 . However, in the case of allegations of infringement against respondents (Q.60) more Japanese companies report an increase. The number of companies having seen it increase was slightly higher among UK companies with IP departments but this difference was not significant. In both countries there was no significant variation of this by company sector or size though there was a noticeable increase in litigation in the Pharmaceutical sector in both the UK and Japan.

Data Table 58 : Changes in Cases of Infringement of Respondent's IPRs

Questions were asked to determine if companies had different attitudes concerning whether to settle or take to court infringement cases involving their IPRs. In general in both the UK and Japan willingness to go to court increased with increasing probability of success. It did not differ significantly between Foreign and National courts but all companies were slightly more in favour of court action in national courts. UK companies were slightly but significantly more likely to go to court.

Data Table 59 : Propensity to litigate when respondent's IPRs are infringed

There had been almost no change in the past five years in respondents use of courts in resolving infringement of their IPRs either in Japan or the UK. This does not support Hypothesis H20 .

Data Table 60 : Changes in Resolution of Infringement of Respondent's IPRs

In both the UK and Japan companies carry out infringement clearance searches before launching new products. Very few conduct no such search but the frequency of such searches does differ. 72.8% of Japanese respondent companies always conduct such searches whereas only 29.87% of UK respondents always do. This may reflect a certain paranoia in Japanese companies about being sued for patent infringement. However the effectiveness of such searches is something that is difficult to assess. The frequency of such searches increased slightly in both the UK and Japan with increasing company size but not significantly. There was a significant variation with industry sector. In the UK the Pharmaceutical sector conducted searches more and the transport sector less frequently than others and in Japan the Electronics and Miscellaneous sectors conducted searches less frequently than others.

Data Table 61 : Frequency of Infringement Clearance Searches

## 2.3.15. Allegations of Infringement

Data Table 62 : Complaints of Infringement made against Respondents

Prima facie it would appear that despite the very common infringement clearance searches referred to earlier, Japanese respondent companies report being alleged to have infringed others IPRs more on average than UK companies report such allegations. The differences are statistically significant despite the small sample size. That said it should be emphasised that alleged infringement is not the same as infringement which has been found by a court of law. Japanese respondents tend to be accused of infringement predominantly by large national companies followed by large overseas companies. In contrast UK companies tend to be accused of infringement most by large overseas companies followed by small overseas companies. For UK companies allegations overseas are more likely to involve chemical than electrical/mechanical sector companies whereas for Japanese companies the reverse is true.

It is worth noting that whereas large national companies in Japan are just as likely to be involved in infringing respondent companies' IPRs as having theirs infringed, overseas large companies are significantly more likely to be complaining of having their IPRs infringed by respondent companies than be the subject of complaints from respondents, though again the number of cases are considerably smaller than national ones. This may be as much due to a greater willingness to complain on the part of foreign companies as a greater incidence of actual infringement as confirmed by a court of law. However, infringing other companies IPRs is a source of concern in Japan which was highlighted in the slogans appearing in Q20.

Data Table 63 : Overseas sources of allegations of IPR Infringement

In Question 56 the most frequently cited country concerning allegations of infringement against Japanese companies is the USA followed a long way behind by Germany. This supports Hypothesis H24. This is also true for allegations of infringement against UK companies, though the difference between the USA and Germany as a source of allegations of infringement is not so pronounced.

Data Table 64 : Resolution of disputes involving alleged infringement by respondent's of others IPRs.

The number of replies from UK respondents to Question 57 is hardly sufficient to make general statements. However, using the results of Q55 and Q57 it is possible to estimate the total number of cases resolved by the various methods listed for each of the categories of Q.57. Furthermore, a Chi-squared test of the total numbers of cases resolved in each of the above four ways for Japanese and UK respondents shows that they differ significantly ($p = 0.0000$). It would thus appear that court litigation is slightly more likely to result when UK

companies are accused of IPR infringement than when Japanese companies are. This appears to be particularly so when companies are accused by large foreign companies. For Japanese companies though there seems to be a greater (though still small) likelihood that court action will result when the IPR holder is a foreign company than when it is a Japanese company. This may indicate that dispute resolution is easier within Japan than when dealing with parties abroad. A Chi-squared test comparing the outcomes of such accusations against Japanese companies by Large National Companies as opposed to accusations by Large Overseas Companies showed a significant difference (p=0.0101).

According to Question 58, UK companies were slightly more willing to go to court to defend infringement actions than Japanese companies but the difference was not significant (according to Q.58). However, companies in both countries were more likely to settle actions if defending (Q.58) or prosecuting (Q.52) infringement actions in courts abroad than at home. This does not support Hypothesis H23 that Japanese companies are more conciliatory in national courts than in foreign courts. However it should be noted that this only applies when there is a moderate amount of doubt (75% -90% chance of success). However both Question 52 and 58 also show that Japanese companies are less likely to go to court to settle infringement actions than UK firms are which supports Hypothesis H22 .

Data Table 65 : Propensity to go to court when accused of IPR infringement

There was no evidence of increased use of court proceedings to resolve disputes over the past five years, either with Japanese or UK companies, whether at home or abroad. This does not support Hypothesis H20 .

Data Table 66 : Changes in Resolution of Alleged Infringement by Respondent

However, there were more Japanese companies reporting increases in allegations of infringement against them than UK companies. ($Chi^2$ p=0.0003 n.b. some cell counts <5). In the UK this did not vary significantly with company size or sector. However in Japan it did and with increasing company size allegations of infringement rose. Allegations of infringement were absent from the Pharmaceutical sector but otherwise roughly equal across industrial sectors. Whilst this supports Hypothesis H21 referred to earlier it shows that disputes seem to be becoming more common for large Japanese companies than large UK companies.

Data Table 67 : Changes in level of allegations of Infringement

### 2.3.16. Operational Management of IP

Incentives to file patent applications are one area of operational management of IPRs in

Japanese companies which differs quite distinctly from that in UK companies.

Data Table 68 : Incentives for Patent Application Filing

The most noticeable difference between Japanese and UK respondent companies regarding incentives to encourage the filing of patent applications was their scarcity in the UK where few companies gave any financial incentives to file applications. The only incentives used in the UK appeared to be verbal encouragement and suggestion schemes.

The few financial reward schemes reported in the UK (c11) were started at various times between the 1960s and 1990s. In Japan where some 182 schemes were reported their introduction was spread over the period from the 1920s to the 1990s.

Data Table 69 : Introduction of Financial Filing Incentive Schemes in Japan

Most schemes began in the 1960s, 1970s and early 1980s. They are associated with the rise in patent applications but do not explain all of the increases. In particular greater increases in the 80s occurred despite more reward schemes being instituted in the 60s and 70s.

One potential explanation for the greater introduction of incentive schemes over the past thirty years is that the effect is just due to an institutional memory effect which prevents any record surviving of any scheme instituted before the career of any respondent started. According to the questionnaire c50% of the Japanese respondents were of division manager rank which means they must have been aged at least 40+. With retirement ages around 55-60 that would put the start of most of their careers in the period after 1960 which agrees with this potential explanation. However this does not mean that it is true and there is good reason to believe that the increase is as shown since turning the argument around there should be little reason to doubt the statistics for the period between 1975-1990 which is well within most respondents careers.

### 2.3.17. Education

Companies in both countries carried out IP training of some sort. The extent to which they did so though differed significantly.

Data Table 70 : IP Training of IP and R&D Staff

Education of IP department and other staff about IP matters was mainly achieved by on the job training and correspondence courses in Japan for IP department staff and on the job training and in-house courses for R&D staff. R&D staff are given at least one and 46% are

given at least two days training in their first year of IP related training, only 0.5% received none. 64% of companies train R&D staff to draft applications and only 32% just expected inventors to describe inventions to their patent department. In contrast in the UK though the same methods of training were used they were all much less common. 24% of R&D staff received no training at all. Only 26% received at least two days training in their first year of IP related training. This supports Hypothesis H35 that Japanese managers receive more IP related training. Only 7% of companies train R&D staff to draft patent applications and 80% of respondents expected staff to just describe inventions to IP department staff, the complete opposite of the situation in Japan. The number of days training for R&D staff does not vary by industry sector significantly but does increase significantly with company size though only in Japan.

Data Table 71 : Drafting of patent applications by R&D Staff

Expecting R&D staff to draft applications for review by IP department staff did not vary significantly by industry sector or size in the UK but in Japan as company size increases the amount of training increases. The sector which least expects staff to just describe inventions to IP department staff is the pharmaceutical sector and the Machinery sector shows a higher proportion of companies expecting staff to draft applications ready for filing. Overall there is an appreciable amount of education and awareness among R&D staff in Japan about IP issues and the need to draft and file patent applications. It is not something left to the specialists even if their specialist knowledge is needed to vet R&D researchers actions and drafting.

### 2.3.18. Use of external patent attorneys

A further difference between UK and Japanese Patent Management occurs with the way in which Patent Attorneys are employed. The percentage of work that is sent to outside agents by Japanese respondent companies is 70%. This is, unusually, almost the same as the average figure for the UK sample. However, this is misleading as for those companies without IP departments the percentage is not surprisingly almost 100% whilst for those companies with IP departments the figure is only 42.32% and 32% for the largest companies. This supports Hypothesis H32 that UK companies will have a lower proportion of work sent to outside agents.

Data Table 72 : Utilisation of Outside Patent Attorneys

As company size increases in the UK, IP department size increases and thus the proportion of work sent to outside agents might be expected to decrease as in-house agents do more of a company's IP work. This indeed happens and there is a significant decrease in the percentage of work sent to outside agents as company size increases (ANOVA p=0.002). However in Japan, although virtually 100% of respondents have an IP department and that numbers of IP staff increase significantly with company size, there is no significant decrease in the proportion

of work sent to outside agents as company size increases. Furthermore even the largest IP departments send 80% of their work to outside agents.

Data Table 73 : Method of Dealing with Foreign Laws

The replies to questions regarding how companies dealt with issues involving foreign law (Q.69) were complicated. However in general companies dealt less with national attorneys and more direct with foreign Attorneys the larger the company. Such variations were not significant in the UK but were in Japan where Miscellaneous and Chemical sector Japanese companies tended to deal with such issues more via national agents than other sectors.

Data Table 74 : Numbers of external Patent Attorny Firms
Data Table 75 : % of work sent to external firms of Patent Attornies

A further difference in how Japanese companies deal with outside patent attorneys lies in the number of attorneys firms which are employed by each company (Q.70). In Japan respondents employed 7.6 on average for national patent work. This number increased as company size increased and was an average of 14.8 for companies with more than 10000 employees. In contrast UK respondent companies employed an average of only 1.22 for national work. This did not vary significantly by whether the company had an IP/Patent department or not, nor with industry sector or company size. Companies sent on average 35% of their work to their most frequently used patent agent (Q.71). In the UK this figure was 67.7% reflecting in part the lower number of agents used.

### 2.3.19. Integration

An indication of how much importance is attached to IP issues is also given by the number of committees which meet regularly to discuss IP matters. However the average number of IP committees per company was not significantly different between UK and Japanese firms which. This does not support Hypothesis H3 .

Data Table 76 : IP Committees

The low UK response rate renders the UK results on this point potentially unreliable. However the general similarity in the trends can be seen as can the fact that there is a slightly lower number of IP committees among UK companies in general but much the same number of them among UK companies with IP departments.

The composition of such committees is an important indicator of the extent of integration of IP functions company as are the involvement of other functions in making IP decisions.

Data Table 77 : IP Committee Members

The low response rate in the UK is a hindrance. However the meaning of the data is nonetheless clear. Involvement of the IP department is obviously near universal where there is one. Both Japanese and UK companies involve both IP and R&D departments (though the latter slightly less in the UK) and directors/board members to more or less the same extent in IP committees. In the UK, Board Member/Director involvement is higher in non IP department owning companies. When an IP department is present, Director level involvement drops from 83% of companies to 43%. This difference is statistically significant (P=0.015). However, in the UK, Sales/Marketing department involvement is higher than in Japanese companies and Production department involvement lower than in Japanese companies. This again emphasises that IP issues tend to be delegated to IP departments in the UK once the company is large enough to justify having a specialist IP department.

Key steps in gaining the co-operation of researchers in IP matters include giving a quick service for clearing articles for publication and for filing applications. In both respects Japanese companies appeared slightly faster than UK companies. Averaging based on the midpoints of the categories and assuming "greater than 10 weeks" to be 12 weeks enable estimates of average waiting times to be calculated. For Japanese respondents these were 5.54 weeks for filing applications and 2.03 weeks for clearing articles for publications. The corresponding times for UK respondents were 5.74 and 2.94 weeks respectively.

Data Table 78 : Waiting times for application filing and publication clearance

In deciding whether to file patent applications and in making other decisions about IP issues it can be useful to have some standard comparable method of assessing inventions against objective criteria. Respondents were asked whether their company used any ranking system and if so which departments were involved in deciding the rankings.

Data Table 79 : Ranking of Inventions / Applications

Far fewer companies used such schemes in the UK than in Japan, even when one just looks at companies with IP departments. Their use did not vary significantly with industry sector or company size in the UK but did in Japan. The use of such schemes was more common in the electrical and mechanical sectors than the pharmaceutical and chemical sectors and also increased with company size. This may be due to the higher volumes of work in the Electrical/Mechanical sectors necessitating some form of triage system. Such schemes were in use in about 80% of large electronics / communications sector companies but only around 40% of small or miscellaneous sector companies.

Data Table 80 : Departments involved in ranking inventions/applications

Trying to assess who was involved in ranking inventions was possible in Japan but the low response rate combined with the fact that some UK respondents replied to the question even though they did not have ranking schemes complicated the replies. Only ten replies were received from UK respondents where the company had both an IP department and a ranking scheme. This was too low to provide statistically reliable results but despite this the areas involved were similar with the exception that UK companies appeared to involve Sales & Marketing and Production departments more than in Japan. The UK result is not reliable enough to base further judgements on. Questions were also asked about the involvement of various departments in a wide range of IP related decisions. This involved questions about the decisions listed in the following table.

Question 77 asked which departments contributed to making several common IP related management decisions.

Data Table 81 : Involvement of Personnel in IP related decisions

Whilst a large quantity of difficult to present data was obtained from this question the main finding was that overall across all questions Japanese companies tended to involve R&D and Production departments more in IP related decisions than did UK companies having IP departments. The only exception to this was on the initial decision to file a national patent application where UK companies tended to involve the R&D department more than Japanese companies. This difference was statistically significant (t test $p=0.005$).

UK respondent companies had a slightly greater overall tendency to involve Sales and Marketing Departments and Directors and Board Members in decisions. However, this tended to be not so much regarding strategic decisions such as licensing and litigation (where Japanese companies involved the R&D and production departments as well as Directors and Board Members as much if not more than UK companies) but regarding application filing, and abandonment decisions. This perhaps reflects UK IP departments greater concern with legal processes than with strategic decisions. This perhaps it also reflects the smaller size of some UK companies. UK companies without IP departments[57] tended to have IP decisions made by the R&D department or directors and board members. Overall the Hypothesis H34 that Japanese companies will involve other departments more in decision making was thus not wholly supported but was in the case of the more strategic decisions such as licensing in and out and cross-licensing. However this should be contrasted with the result of Question 21 which

[57](N.B. About 6 UK companies without IP departments anomalously replied including their (non-existent) IP department. This must have been done in error as it was inconsistent with all other data in their replies)

showed that UK companies involved Directors/Board Members more in IP Policy creation than in Japan. However it does beg the question of what companies understand by the term IP Policy even if the same words are used in each language. It may be that IP Policy to UK companies is more concerned with Legal Policy Issues and less with more General Management Strategy issues than is the case in Japan.

### 2.3.20. Environmental factors

Companies in both countries by and large agreed that IP law is converging internationally though there was more optimism in Japan that Japanese and Western attitudes to IP are converging. The differences in this case were significant but merely one of difference as to the speed of change. Virtually no respondents in either country thought they were diverging. These results support Hypotheses H36 and H37 .

Data Table 82 : Opinions on Changes in IP law and Attitudes to IP

### 2.3.21. Respondent Details

Due to the relatively uniform nature of Japanese job descriptions and the fact that about 50% of respondents supplied details it was possible to gain an estimate of the experience of the person completing the questionnaires in Japan. Reassuringly almost all bar 4% of the respondents giving details were senior staff and over 50% heads of division.

Data Table 83 : Respondent Details

### 2.3.22. Ratio Analyses

Besides the above analyses it is possible to study some ratios among the basic data regarding the two samples and to study the variance of these ratios with company size and industrial sector. First of all it should be remembered that the data regarding R&D expenditure was found to be different from published figures in many cases and thus can perhaps be viewed as less reliable than the data on company sales and employee numbers. Furthermore one UK R&D based start-up company's sales ratio figures were excluded since it had made zero sales despite high R&D and IP department expenditures resulting in ratios of R&D to Sales and IP expenditure to Sales figures some 3000 times the average figures for other companies. However given these caveats the following conclusions can be drawn.

Data Table 84 : Ratio Analysis Tables a. - l.

a). IP department expenditure per total company sales was found not to vary significantly with sector or size in either the UK or Japan, though the ratio was slightly higher in the UK.

b). IP department expenditure per R&D expenditure did not vary significantly with either company size or sector in the UK but was considerably higher than in Japan where it varied significantly with both company size and sector. In Japan it was lower in the Pharmaceutical field reflecting the low patent density in that sector and highest in the Machinery sector. It declined with increasing company size which it also did in the UK though the decline was not significant there. This decline possibly indicates an ability to economise in larger companies but it may equally indicate that small companies still consider IP department expenditure a critical expense to be maintained even if the R&D budget is smaller than with some larger companies. The high figure for the ratio in the UK may be connected with the high ratio of foreign filings which can be particularly expensive.

c). In Japan IP department expenditure per patent application varied significantly with sector but not employee numbers. In the UK it did not vary significantly with either. It was significantly higher in the Pharmaceutical sector in Japan. This may reflect the higher rate of foreign filing and the lower patent density in this sector, though in the UK the same effect was not very noticeable.

d). IP department expenditure per IP department employee was found not to vary significantly with sector or size in Japan. In the UK it did not vary significantly with sector either but did vary significantly with company size being much greater for firms in the range 5000-10000 employees. However since this was caused by only two firms in that range it is not a figure that can be relied on.

One point to note about the above ratios in c. and d. is that at an exchange rate of c140 yen to the pound the IP department expenditure per national patent application in Japan is £11000 (as opposed to £25400 in the UK) and the IP department expenditure per IP department employee c£143000 (as opposed to c£141000 in the UK). Thus since the cost of living in Japan is higher than in the UK either Japanese Patent departments are much more efficient than UK ones or more likely they file far fewer expensive foreign applications corresponding to each national application. The figure of 13.24% of Japanese as opposed to 73.7% of all UK national applications from companies with IP departments being filed abroad according to Q.28, would seem to support this view.

e). The ratio of the number of IP department employees per total company employees varied significantly with both sector and size in Japan. It was lowest in the transport sector and highest in the chemicals sector, both of which perhaps reflect the size of the workforces involved. It also declined significantly with increasing company size perhaps reflecting

economies of scale as the firm size increases. In the UK the ratio was much lower almost 25% of the Japanese figure and varied significantly with size but not sector. As in Japan the ratio declined significantly with increasing company size but was highest in the Pharmaceuticals sector even though the variation was not significant by sector.

f). The ratio of the number of IP department employees per R&D Dept. employee varied significantly in Japan, not by sector but with total number of employees being higher for smaller companies. Again this probably reflects economies of scale available to larger companies. In the UK the ratio did not vary significantly with either size or sector but was higher than in Japan.

g). Since the ratio of R&D employees to total company employees is five times higher in Japan than the UK it is obviously largely the low number of R&D employees causing the high UK ratio of IP department employees to R&D Dept. employees.

h). The ratio of the number of Patent applications per IP department employee varied significantly with both sector and size only in Japan and not in the UK. In Japan it was lowest for Pharmaceutical companies reflecting the lower patent density and in general increased with company size. The increase with increasing company size may again be a sign that larger companies can function more efficiently through economies of scale. The ratio was almost three time greater in Japan. However against this apparent greater efficiency must be put the fact that a higher proportion (73% as opposed to 42%) of work is sent to outside agents in Japan (Q.68). Taking account of this one could say that the corrected ratios should be 5.37 in Japan and 4.38 in the UK (rather than 19.96 in the UK and 7.61 in Japan).

i). In Japan the ratio of the number of patent applications per R&D employee varied significantly with Sector only at just over the 10% level ( P = 0.101) being lower for the Pharmaceutical sector and higher for the Electrical and Mechanical sectors. It did not vary significantly with company size and varied with neither in the UK. The ratio was over twice as high in Japan as in the UK. For further comments on the balance between quantity and quantity in Japanese patent applications see the later section which deals with the specific subject of inventor incentives (See Page172).

j). In both Japan and the UK the ratio of R&D expenditure to the number of patent applications was highest in the Pharmaceutical sector as one might expect but did not vary significantly with company size. The difference between the ratio of £405000 per patent application in Japan (at 140 yen/£) compared to £189000 in the UK will be affected by both differences in cost and type of research as well as any efficiency effects.

k). In Japan, R&D expenditure per R&D employee only varied significantly with the

number of employees (P = 0.004 by Employees, P = 0.136 by Sector) being higher with larger companies, presumably reflecting their greater financial resources. R&D expenditure per Company Sales though varied significantly with Sector being significantly higher for the Pharmaceutical and Electronics fields. In the UK neither the level of R&D expenditure per R&D employee nor the level of R&D expenditure per Company Sales varied significantly with either company size or sector.

l). However, the ratio of R&D expenditure per Company Sales was twice as high in Japan as in the UK (0.0475 Japan, 0.0238 UK), so the high number of Japanese patent applications is probably not entirely due to factors other than R&D spending.

## 2.4. Conclusions

A summary of the comparative analysis has already been provided in Section 1.2. (See p.134). However to reiterate this, overall the particular hypotheses that the present surveys have been based on are largely supported. Additionally, the initial hypotheses that lead to the particular ones are also supported. Significant differences do exist between Japanese and UK companies attitudes to and management of IP and these difference are associated with the environment which has already been shown to be different and changing. Finally practices concerning IP management are felt by most of those concerned to be converging (Q. 79) even if such change is slow.

The study has thus shown that Japanese IPR management has several distinct characteristics. It is integrated with other business functions. Informed by management and analysis of patent information. Important enough to senior management to merit substantial investment in terms of people and money. Adaptable and adapted to suit the changing conditions facing Japanese Industry and last but not least, dynamic in the sense that it is concerned with both technology leadership and followership comprising the continued absorption of technology. These factors whilst particular in many respects to Japanese companies need not be exclusively Japanese and can therefore be usefully included in a more general discussion of IP Strategy applicable to companies in any country.

It now remains to illustrate some of these and other features of the survey by the study in greater detail of some IP related topics and an integrative discussion of the implications of the studies and the above survey results for more general IP strategy.

# Chapter 9. IP TOPIC STUDIES

**Summary**

The aim of this chapter is to expand on the findings of the literature review, background study and surveys by looking in detail at several topics in IP management in Japan which exemplify features revealed by the work so far.

## 1. Introduction

The present research has produced a great variety of detailed information which it is difficult to present easily. Obviously a comprehensive analysis of all the information gathered in this research would take too long. However, by confining the discussion to particular key topics one should be able to gain a useful and broadly based understanding of IP management in Japan whilst retaining the richness of much of the information gathered.

The topics selected for analysis comprise :

Internal Topics

i) Japanese Patent application filing incentives
ii) Patent information management in Japan
iii) Japanese IP department staff management

External Topics

iv) Japanese companies and IP Litigation
v) Japanese companies and Licensing
vi) Japanese IP policy

These six topics may be said to comprise the most characteristic features of Japanese IP management and each as we shall see in varying degrees reflects distinctive features at the level of the whole Japanese economy, at the level of the Japanese business system and finally at the firm and individual level. They are all linked by being key issues involved in promoting the creation, preservation and exploitation of a company's IPRs in a competitive environment.

## 2. Patent application filing incentives[58]

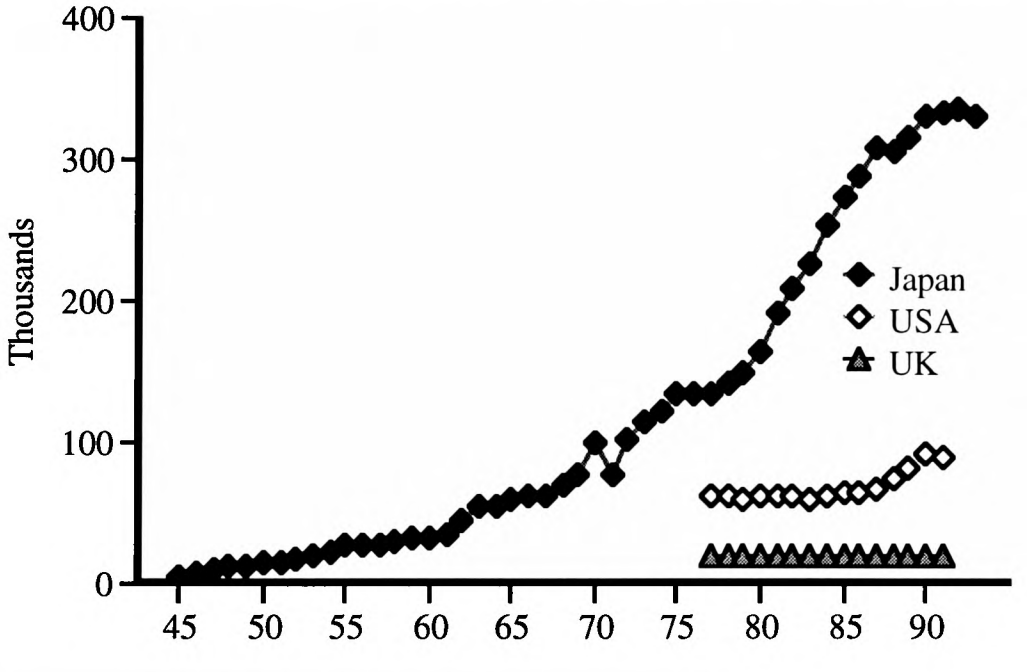
### 2.1. Introduction

Quantity is still the main feature of Japanese patent applications despite recent promotion of quality. The plethora of Japanese patents is caused not just by inventiveness but also legal, industrial and social factors. This section concentrates on one, the encouragement of applications through financial incentives and numerical targets. These are common in Japan but rare in the UK. They form an important factor in accounting for trends in the number of Japanese patent applications and have broader implications about Japanese IP management.

### 2.2. Causes of high patent application filing rates

Patent applications filed by Japanese nationals in Japan in 1991 outnumbered those by US applicants in the US by a factor of almost 4 and those by UK applicants effective in the UK by a factor of almost 14.

Figure 19 National Patent Applications by National Applicants




Furthermore 14.8% of applications effective in the UK and 21.7% of US applications were made by Japanese applicants in 1991. The percentage of applications also filed abroad one year after their initial home filing though is a measure of quality. Companies will not pay the high costs of foreign filings for relatively worthless applications. US applicants filed 91410 applications in the US in 1990 and 14991 applications in the European Patent Office (EPO) in 1991 or 16.4% of their initial filings. Japanese applicants in contrast filed 333230 applications in Japan in 1990 and 12272 applications in the EPO in 1991 a ratio of only 3.7%. Does this mean that Japanese patent applications are of lower quality than US ones? This is difficult to

[58]A version of this section formed a paper at the 1995 Conference of the Association of Japanese Business Studies in Ann Arbor, Michigan and was published in the Best Papers collection (Pitkethly 1995).

answer but the quantity and quality of Japanese patent applications are an important issue.

Explaining the reasons for the mountain of Japanese patent applications is not easy. Rates of invention are strictly speaking not the same thing as rates of filing patent applications. Given a resourceful inventor or patent agent innumerable patent applications can be derived from an "invention". Thus changes in numbers of inventions is an insufficient explanation. As mentioned part of the explanation is that there is a higher ratio of researchers to total employees in Japan. However that still leaves the high number of patent applications filed by each researcher to be explained (See Page 136).

Hull and Azumi have pointed out in a study of Japanese Invention Rates that "Japanese patents on average represent less novelty than those in the U.S." (Hull and Azumi 1991). However, it is difficult to compare patents internationally. The inventive step or technical advance over the prior art and also the scope or breadth of protection offered by a patent may vary considerably from patent to patent and especially from country to country even where the patents are based on the same underlying invention.

However, this suggests that there is a range of legal, social and environmental factors, apart from inventiveness, which can influence the quantity and scope of patents. These are highly relevant to any study of patent application filing rates and yet do not fall within the scope of studies seeking to explain differing rates of invention between countries. Fujino has highlighted the need to consider social and psychological factors in assessing the reasons for the large number of patent applications in Japan (Fujino 1990).

In studying these factors there are two issues. The propensity to invent, and the propensity to patent inventions. Much work has been done on these two areas and the use of patents as economic indicators and several extensive reviews of the subject exist (e.g. (Griliches 1990), (Basberg 1987)). In Japan though, the propensity to patent is particularly affected by Industry sector, Legal and Social factors. The latter include, expectations of and incentives for researchers to file patent applications.

Several studies have shown that the number of patents involved in any inventive activity depends greatly on the technical area involved (Scherer 1983), (Griliches 1989). One factor in Japan's high level of patenting is the concentration of its industry in *high patent density* areas which involve many inventions per product. These include Electronics, and Physics based industries; for example, VCR and LCD technology and the automobile industry. In 1993 around 57% of Japan's home patent applications were in Electrical, Electronics and Physics related sectors. Furthermore, these high patent density sectors cannot easily be dominated technologically by any one player. This is an incentive to cross license which may benefit both parties when they need to use the other's inventions. Such situations impel

companies to acquire a portfolio of patents to trade their way out of litigation and gain access to technology. One Japanese patent attorney working in an electronics company IP department when interviewed referred to the need for 「バケツ一杯」(Bucketsful) of patents to be able to trade them with others and maintain freedom of action (Interview, 93/12/9).

The legal factors affecting Japanese companies' large numbers of patents are largely concerned with their scope. In particular until 1988 it was not possible to have multiple independent claims in a Japanese patent application. The law has changed to allow them but there remains a tendency in the patent office and the courts to construe patent claims narrowly. This is changing but there remains a tendency to use larger numbers of narrow patents than fewer broader ones for the same coverage (Kotabe 1992), (Japanese Patent Office 1988)(日本国特許庁 1994).

The other area which affects Japanese researcher's propensity to invent and to file patent applications is the extent to which they are generally influenced and more specifically expected and encouraged to file patent applications by their managers. Many general factors have contributed to Japanese manager's awareness of IP issues, including the need for patents to counter US litigation by having patents to cross-licence. Application numbers have also become a field of comparison and by implication competition, in themselves. The "Invention News" (Hatsumei Tsushin 発明通信) a monthly IPR related newspaper, publishes tables of patent application numbers by company which are serialised each month.

A 1981 JIII survey entitled "Technological Innovation and the Patent System" (発明協会 1981) found the greatest individual incentive to researchers to promote technology development was winning in industry competition followed by academic interest. Prize money came low down the list. However, incentive schemes are known to be common. A recent IIP survey found that only 5 of 170 respondent companies had no incentive scheme (知的財産研究所 1995a). The report also referred to another 1994 JIPA survey which reported 49 of 50 respondents having some form of incentive system. However, whilst little has been published on the scale of such incentives or their prevalence in other countries Japanese managers are well aware that patents and thus patent applications are important.

### 2.3. Discussion of Survey Results

The relevant survey results have been presented in an earlier chapter. These will now be discussed in more detail.

Only 21.11% of Japanese companies had systems where a researchers bonus and/or assessment is influenced by the number of patent applications they filed. This is presumably due to most

bonuses being fixed and paid biannually in Japanese companies. Apart from this other indirect written and verbal incentives to encourage researchers to file patent applications are common in Japan and significantly greater than in UK companies (See Question 61).

In the case of direct financial incentives only 4.4% of Japanese companies gave no financial reward at all for filing applications. This was almost the complete reverse of the situation in the UK where about 85% of companies gave no financial reward at all for filing applications. Publication in the UK and Japan is automatic but on grant which obviously depends on the quality of the application only 11.2% of Japanese companies did not give any financial reward. In the UK again the reverse was true with 86% of companies giving no financial reward. Rewards on use or licensing of an invention were not quite as common as on application or grant in Japan, but were still much more common than in the UK with almost 80% of companies giving such rewards. Financial incentive schemes connected with patents are common in Japan and significantly more common than in the UK.

UK patent law contains provision for rewarding inadequately remunerated employee inventors but only those of outstandingly successful patented inventions. Such cases have been extremely rare though and are of little importance to the inventor of ordinary inventions. Japan too has similar provisions in its law[59]. To implement these rules some Japanese companies use their incentive programs and one patent department manager interviewed in the course of this research suggested that there was an implicit statement in the awards that by making the award the company had compensated the employee for the invention and thus could not be pursued for further compensation as the patent law suggests might be possible. One law textbook gives details of a scheme adopted in a court case to assess inventions which sets an apparent maximum award of ¥50,0000 (c£3500) (吉藤　幸朔 1992), not much financial consolation if one has invented a world beating invention for one's employer. The primary role of the rewards is thus to encourage applications. Even more so than in the UK, the average Japanese employee would be no more likely to sue his or her employer for inadequate remuneration than resign. In any event as a recent study by the IIP points out the payments are incentives and not just to fulfil the requirements of this law (知的財産研究所 1995a).

In the case of Japanese companies who had some form of financial incentive scheme the dates such schemes had been introduced varied widely. However the bulk had started in the 1960s and 1970s with a continuing number of schemes starting up in the 1980s and 1990s. One Japanese industrial patent attorney interviewee suggested that the boom in interest in patents in Japan really began back in the mid 60s and in the period following the first oil

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[59]Article 35 (3) of the Japanese Patent Law provides that "The employee etc. shall have the right to a reasonable remuneration when he has enabled the right to obtain a patent or the patent right with respect to an employee's invention to pass to the employer etc. or has given the employer an exclusive right to such an invention in accordance with the contract, service regulations or other stipulations" (AIPPI Japan Translation).

shock when the need for indigenous technology began to be increasingly important and companies began competing on the basis of technology. In contrast the few UK reward schemes for which start dates were reported (11 in all) all occurred evenly over the period 1970 to 1990.

Besides such financial incentives and explicit verbal and written encouragements the use of numerical targets for filing patent applications is also common in Japan. 58% of respondent Japanese companies reported such schemes but only 6% of UK respondents.

Table 15 Japanese companies numerical targets for patent applications

| | % Targets (120) | % No Targets (87) | (N) |
|---|---|---|---|
| 1. Miscellaneous | 47.37 | 52.63 | (38) |
| 2. Chemical | 64.06 | 35.94 | (64) |
| 3. Pharmaceutical | 5.88 | 94.12 | (17) |
| 4. Electronics | 76.92 | 23.08 | (39) |
| 5. Transport | 69.57 | 30.43 | (23) |
| 6. Machinery | 53.85 | 46.15 | (26) |
| ALL (n) | 57.97 | 42.03 | (207) |
| CHI-SQUARE = 28.859 DF = 5 p = 0.0000 | | | |

The above table though shows a significant variation in the use of such schemes by industry sector in Japan. In particular in the Electronics sector 76% of companies reported use of such targets and in the Pharmaceutical sector only 5%. In the UK no such sectoral variation could be detected since such targets were almost non-existent. being used by only 3% of respondent companies. The use of targets in the high patent density electronics field and not in the low patent density pharmaceuticals field confirms the above comments about the influence of patent density on the need for large numbers of patents and thus for incentives.

## 2.4. The Significance of Incentives

Study of the reasons behind the large number of Japanese patent applications and even the use of patent numbers as a measure of innovation, often ignores the circumstances in which patents are applied for and the pressures on the people making filing decisions. The present research shows quite clearly that Japanese inventors are subject to many influences, financial incentives and other encouragements to file patent applications and more so than UK researchers. However, the financial incentives offered in Japan are small. 88% of the average reward for filing an application would not buy more than about 10 paperback books in Japan (c¥10000 / £66 / $100). A recent IIP report quotes a JIPA survey report saying that since most companies view the effectiveness of the incentives offered as "not so bad" but not "conspicuous" active consideration is being given by many companies to revising the systems by increasing incentives (知的財産研究所 1995a). However the message of the incentives that do exist is clear.

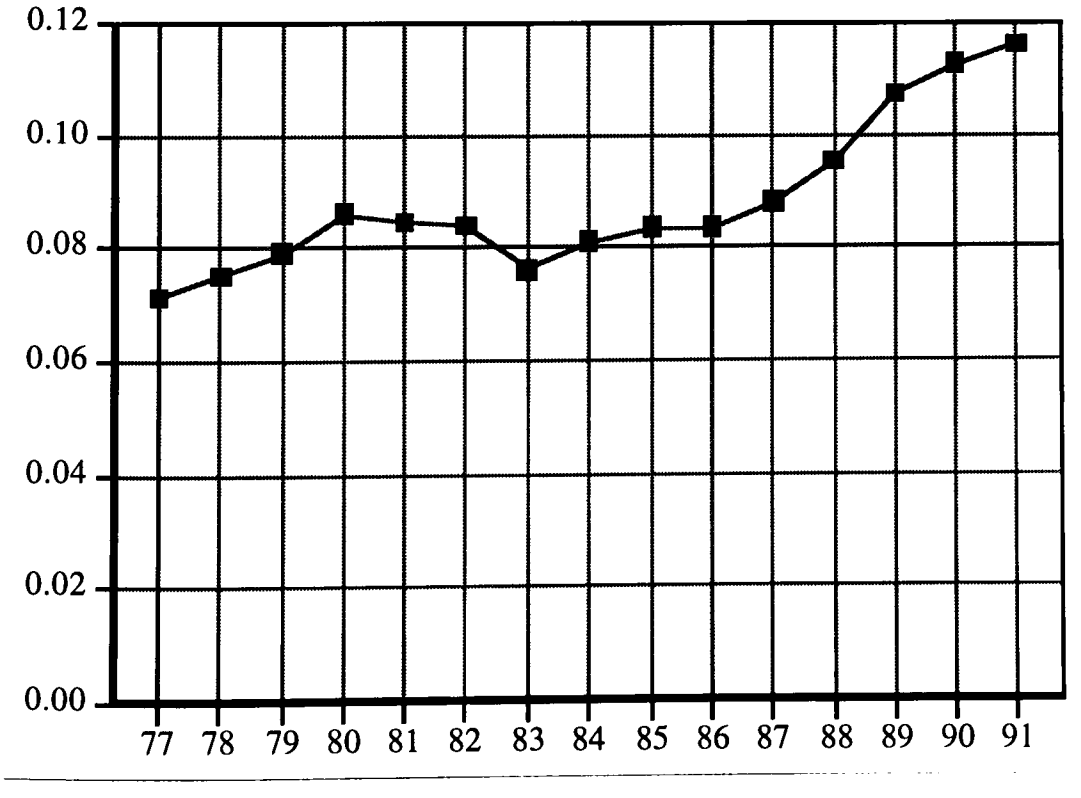
Their incentive value lies in their role in reinforcing the implicit but sometimes explicit understanding that management will be pleased to see more patent applications filed.

The significance of the above incentives compared to other causes of the large number of Japanese patent applications is not easy to judge. Study of the introduction of incentive schemes though, along with common sense, would seem to indicate that the surge of patent applications which occurred in the 1980s was due to more than incentive systems alone, which were mainly introduced in the 1960s and 1970s. Pressure on researchers to produce applications may well have intensified and been transmitted to researchers through such channels though. The scale of rewards has risen and the incidence of companies offering no financial rewards at all for filing applications has fallen according to one interviewee who had conducted some research on this point in 1986. It would seem therefore that incentive schemes have been a significant factor in increasing Japanese patent application numbers. Whilst they are not the only factor they are certainly one that cannot be ignored.

## 2.5. Implications

Earlier I mentioned lagged ratios of applications as a measure of quality. In fact, the lagged ratio of patent applications by Japanese applicants in the USA to applications in Japan the previous year has been slowly increasing over the past 10-15 years. A similar study made by Kurt using patent information databases to study the occurrence of foreign equivalents to Japanese applications also shows that the large increase in applications has not resulted in a large drop in the quality of foreign filings (Kurt 1991). One can conclude that Japanese patent application quality is rising. However this has been hidden by the huge increase in numbers of patent applications.

Figure 20 US / Japanese Patent Applications by Japanese Applicants
Applications in USA / Applications in Japan a year earlier



This view is consistent with studies published in the 1993 National Science Board's Science & Engineering Indicators publication (National Science Board 1993). This found that in respect of three critical technologies (Genetic engineering, Optical fibres, and Robot technology) Japanese applicants led in two of these sectors in terms of numbers of highly cited patents but in all three sectors did not produce the same ratio of such highly cited patents that their share of all the patent families concerned would lead one to expect. In short, quality was being obscured by quantity.

In Hitachi an early 1981 campaign to obtain "strategic patents" included the provision of "strategic patent prizes" for inventors. These along with the inventions themselves were graded into Gold Silver and Bronze levels according to their importance and are an example of a form of shift from quantity to quality, though at the time quantity too still counted per se:

| | |
|---|---|
| Gold : c25 / Year | Extremely difficult for competitors to evade; World Class top level invention |
| Silver : c75 / Year | Extremely difficult for competitors to evade; National Class top level invention |
| Bronze: c75 / Year | Extremely difficult for competitors to evade; Invention forms sales point of an intensively used main company product. (日立 1983) |

However, as mentioned in the background study, the Japanese Patent Office, since at least 1985 has been repeatedly requesting large companies to review their applications to see if their numbers can be reduced and the quality increased(日本国特許庁 1992). The peak of patent application growth now appears to have been reached and in the current survey 37% (55% in the electronics sector) of Japanese companies saw their home patent applications declining in recent years. Whether this is the Patent Office's message or the Recession striking home remains to be seen. A middle ranking manager in a major Japanese electronics company patent department I interviewed said that he thought that the level of applications had dropped quite a bit in many companies, was still decreasing and that the advice from the Patent Office had percolated down to researchers who were therefore filing fewer applications. In contrast to this he also said that prizes were still being offered for patents and that the amounts offered had increased over the past few years. Researchers were thus being encouraged to file applications but also told to file fewer (Interview, 93/12/3).

There is thus a shift, or at least a wish for a shift, from quality to quantity. The 1992 English Language version of the Japanese Patent Office report referred to the phrase "'From Quantity to Quality". The 1995 Japanese language Patent Office report also referred to a campaign for higher quality patent applications. In interviews and in replies to questions regarding IP department slogans, I have also heard the phrase "From Quantity to Quality" quoted several times as a company IP department slogan.

## 2.6. Conclusions

This study shows that researcher incentives for filing applications are still being used to encourage the filing of applications and to a greater extent in Japan than in the UK. The question for the future is whether the present volume of applications can be converted to quality or whether it can only be reduced to it. Either way Japanese companies view of patent applications as an important business resource, especially in the context of international trade, is unlikely to change quickly. The study also shows the critical importance of considering and accounting in some way for the various detailed practical and social factors influencing the filing of patent applications (including how many are filed) when considering their worth as indicators of innovation.

# 3. Patent Information Management

## 3.1. Introduction

Japanese patent applications and those of many other countries are published at 18 months[60] from their priority date[61]. Patent applications thus reveal a vast amount of up to date information[62] about company R&D interests and activities, details of what may be protected by patents and a huge amount of technical information.

Japanese companies are concerned to avoid infringement, to avoid re-inventing things[63], to learn from other's technology and perhaps license it in, and are always interested in what is going on elsewhere in the world that might be relevant to their business. It is thus not surprising that Japanese companies are very interested in the subject of Patent Information Management (PIM) nor that PIM is in many ways one of the foundations of Japanese IP strategy.

The objectives of this section are to study Japanese PIM using the extensive Japanese literature on using, analysing and managing patent information and to supplement this with comments on relevant findings from the survey and interviews. Conclusions will be then be drawn about PIM's overall role in Japanese IP Management.

## 3.2. Background

### 3.2.1. The Development of Patent Information

The history of the UK and Japanese patent systems has several features which are relevant to the development of attitudes to PIM.

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[60] This is also the case in most major patent systems in Europe. The idea originated in Holland and was quickly adopted by Germany. And is now used by the European Patent System and most major European Patent Systems. However, it has not yet been adopted in the USA where publication only occurs on grant.

[61]The date of the first application in any country from which the application in question claims priority under the International Conventions which allow filing abroad within one year of the original filing date.

[62]Information in a UK patent application for example quite apart from a description of the invention itself and how to implement it includes i) the applicants name and address, ii) the names of the inventors (and in some cases addresses), iii) details of other relevant applications found in the patent office search, iv) details of relevant patent classification headings under both UK, and International schemes, v) details of prior developments leading up to the invention vi) details of corresponding prior applications abroad.

[63]According to the UK patent office, annual spending on wasted research in the EC has reached £20bn and those marketing the Patent Offices services recount stories of companies failing to be aware of 30 year old inventions patented by their own company (Mead 1992).

In the UK the patent system reforms of the mid nineteenth century furthered the idea that patent information was a valuable source of technical information and that the patent system rather than inventors could disseminate technical knowledge. This was done by arranging the wide distribution of publicly available sets of patent specifications.

In the development of Japan's first workable patent system, the information value of printed patent specifications was appreciated by those involved in forming the system. Kanda Takahira's list of objectives of a patent system included : "ii) the teaching of things invented in another country..." He also commented that the office responsible for the system would publish details of new inventions each year (日本国特許庁 1984). Added to this there was the Emperor's charter oath of 1868 stating that : "Knowledge shall be sought for all over the world" (Fox 1969). In the subsequent wholesale investigation and absorption of two centuries of Western learning, patents were a useful information source. For example, Hitachi has been filing patent applications since 1911 and has had a patent division since the mid-1920s (日立 1984). Furthermore, Hitachi's early patent department devoted considerable effort to assembling a collection of all Japanese patents issued since 1889 (Morris-Suzuki 1994). This would include many ready translated descriptions of Western as well as indigenous technology.

Thus information gathering from patents has been a feature of both UK and Japanese technological development for some time, even though it has received more attention of late.

### 3.2.2. Foreign Influences on PIM in Japan

The origins of Japanese industry's quality improvement activities can be found not just in the US as well as Japan. In the occupation era US experts, who helped revitalise Japanese industry in part to produce supplies for the Korean war, made a significant contribution to this (Morris-Suzuki 1994). The Deming Prize for quality in Japan is named after an American and the contents and layout of a 1992 Japanese "Kaizen" process instructors card are identical to a 1945 one issued by the US "Training Within Industry" organisation who introduced it to Japan (Robinson and Schroeder 1993)[64]. In the same way Japanese Patent Information Management (PIM) has also had an appreciable input from abroad.

One example of this is a 1975 report published following a study tour of the European and US companies made by a group from the Japan Patent Association[65]. The recommendations made as a result of the tour included : -

1) Improvement of the standing of specialist patent information organisations and encouragement of links with overseas organisations.

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[64]cf the comments of Takahashi Korekiyo about copying the US patent system's paperwork in 1886 (See Appendix D).

2) Improvement of public search rooms
3) Extension of use of IPC (international patent classification)
4) Importance of cooperative activity among enterprises
5) Strengthening of PIM structures in enterprises
(Japan Patent Association 1975)

The team also commented that : -

> "it is desirable that we should reappraise the importance of a thorough-going application of patent information to the effective promotion of R&D and change our priorities from "studies" to actual information management on European and U.S. lines" (Japan Patent Association 1975).

Thus in 1975, before the major 1980s boom in patent applications but during the steady increase which lasted throughout the 1960s and 1970s, Japanese industry was investigating and learning from western PIM. As will be described key PIM techniques such as "patent mapping" benefited substantially from such input from abroad.

The current state of PIM in Japanese companies has developed in the light of continual observation of what is going on elsewhere and what is considered best practice outside Japan. However, as with quality the most influential long term influences are perhaps not the origins but the subsequent developments in Japan due to Japanese industry's particular environment.

## 3.2.3. The Patent Information Infrastructure in Japan

### 3.2.3.1. Patent Information Institutions

Two institutions in Japan apart from the Japanese patent office have been influential in the development of PIM in Japan[66]. Firstly, the Japan Institute of Invention and Innovation (JIII / 発明協会) which has 47 branches throughout Japan. These form part of the network of 106 regional patent inspection offices located in libraries, local government and association offices throughout Japan[67] (日本国特許庁 1994). Secondly, the Japan Patent Information Organisation (JAPIO / 日本特許情報機構) which has a wide range of activities related to providing patent

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[65]The Japan Patent Association (特許協会) is Japan's leading industrial patent department association whose members file some 80% of all Japanese industry owned patents. The membership of the JPA in 1994 contained 88% of the top 200 R&D Spending companies according to the Nikkei Electronic Data Book of listed companies for 1994. It also contained 84% of those companies employing in house patent attorneys according to the membership list of the Japanese Patent Attorneys Association. The members of the JPA can therefore be reasonably assumed to be representative of at least those large technologically based Japanese companies having an interest in IP matters and owning IP themselves.

[66]Further details on these and other organisations can be found in the Appendices or the Japanese language version of each year's Patent Office Report.

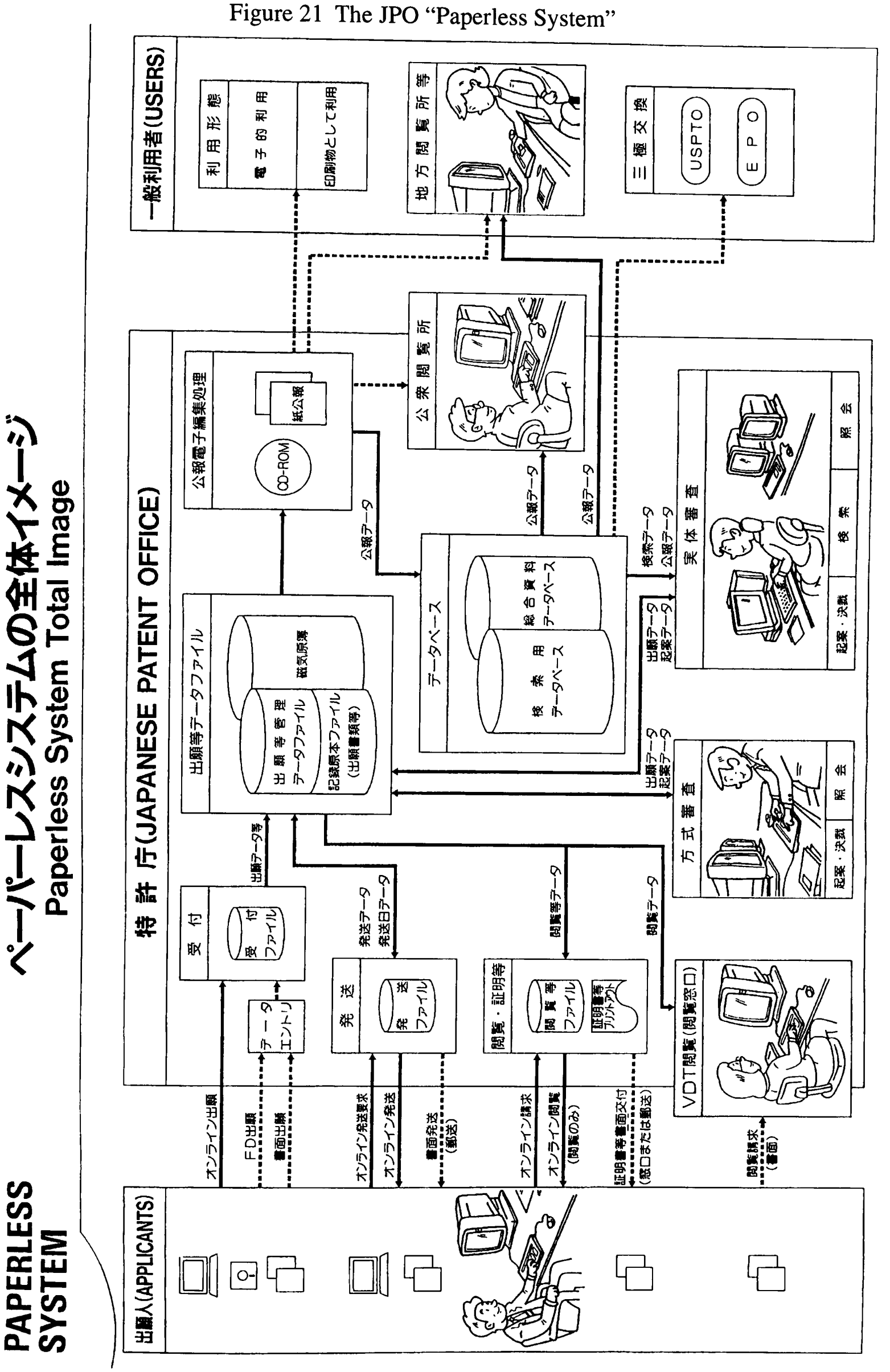
[67]As mentioned earlier there were in the UK by 1880, 469 complete sets of patent specifications distributed around public libraries (UK Patent Office, 1993). Whilst today the number of patents is somewhat larger there are now patent information facilities at just 14 main public libraries in the UK.

information in association with the JIII. JAPIO is responsible for the PATOLIS on-line patent information service and other official information services related to Japanese patents. The JIII and JAPIO are also responsible for organising the bi-annual Patent Information Fair held in Tokyo. This fair has no real equivalent in the UK and involves a display in central Tokyo of a vast array of patent searching and patent management equipment and services. In 1995 some 61 firms and organisations had stands at the fair.

### 3.2.3.2. "The Paperless System"

An additional help in promoting PIM is the fact that the Japanese Patent Office now accepts electronic filings. The "Paperless system" as the system is called has been under development for several years now and a whole six page section of the annual patent office report is devoted to it (日本国特許庁 1994) (See Figure 21 The JPO "Paperless System" on Page 184 ). The JPO began to accept electronic filings in December 1990. The long term advantage of this system is that it not only enables more efficient processing of applications but enables full text searching more easily. The long term advantages of such a system in promoting the flow of information will be considerable and will flow to those who read Japanese. Paradoxically it might make searching of patent literature easier for non-Japanese speakers if bilingual search software and translation software becomes a useable option. This may take some while though.

Figure 21 The JPO "Paperless System"




Source : (日本国特許庁 1995)

### 3.2.3.3. Japanese PIM Hardware and Software

Quite separate from the JPO IT initiatives is the fact that most of the larger electronics companies in Japan both use and sell versions of their own patent management software and hardware. These are exhibited every two years at the JIII (発明協会) Patent Information Fair in Tokyo. All patent information originally comes from patent offices and thus foreign sources of information will always needed to study foreign patents. What may vary from country to country though are the facilities for accessing and analysing the raw information. Thus whilst apart from the indigenous patent database PATOLIS, original database sources in Japan are largely of foreign origin, the hardware and software available to make their data accessible and analysable is almost totally provided by Japanese companies. Examples are numerous :

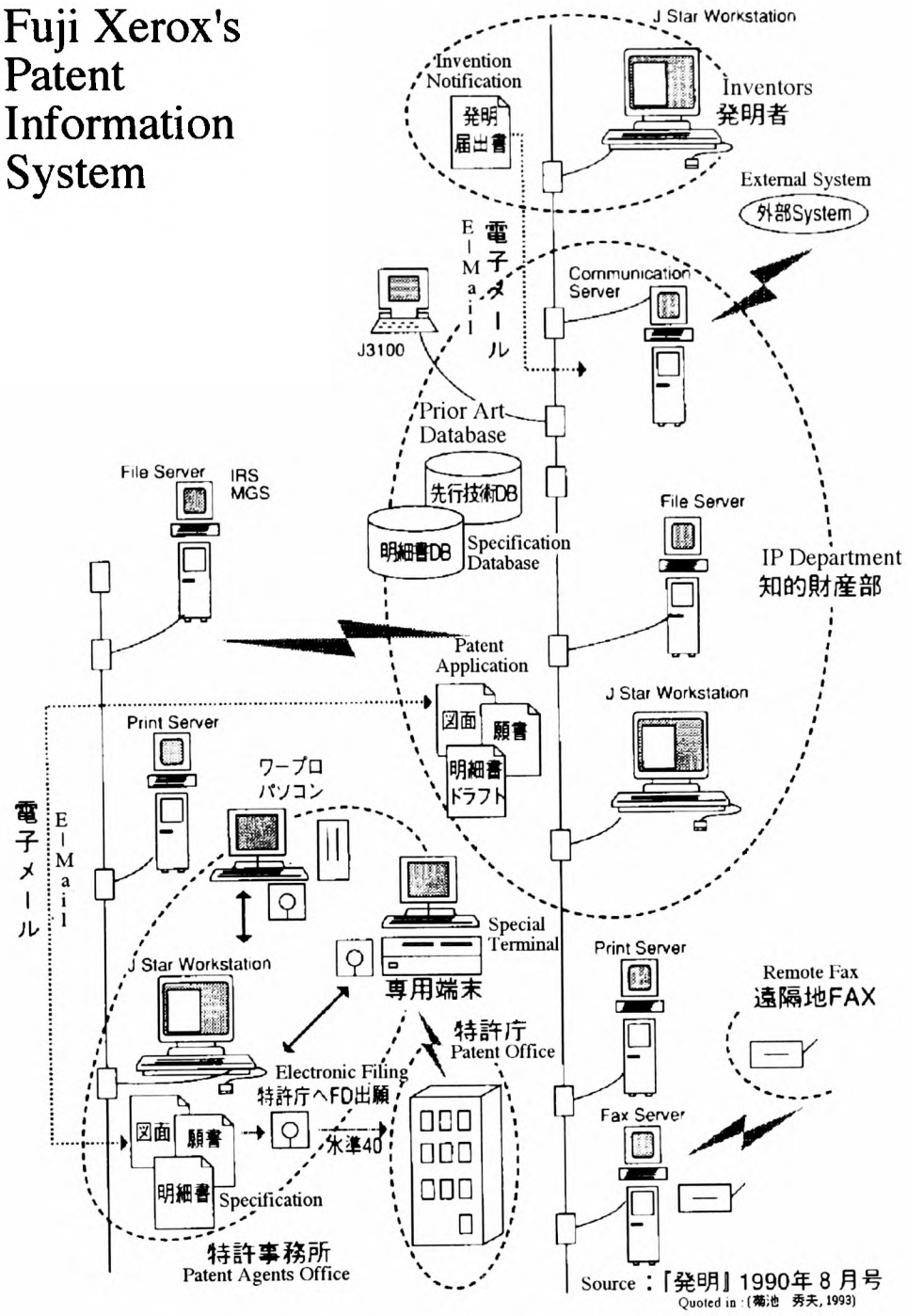
Table 16 Japanese IT Patent Management Systems

| **Company** | **Product** |
|---|---|
| NEC | Electronic Patent filing and management system |
| Toshiba Information Equipment Co. | Toshiba CD-ROM patent searching system<br>Toshiba Optical filing system |
| Hitachi | Hitachi Electronic application terminal system<br>Hitachi Electronic publishing system<br>Hitachi HitFilE6500 (filing system)<br>Hitachi Application terminal & patent management system<br>Hitachi Patent information searching system |
| Onda Techno Corp. | Foreign patent application management system<br>Patent management and analysis software development<br>Patent Map production |
| Nippon Steel Corp. | Patent information management system PSEARCH |
| LTCB Systems Ltd. | PAS Company general patent management system |
| Techno Research Co.Ltd. | Automatic patent mapping service |
| Toshiba Corp. | Patent information management system |
| Fujitsu Limited | Patent retrieval systems ATMS/CD<br>Patent database information retrieval systems ATMS/IR<br>Patent Management System - ATMS/PMIII<br>Electronic patent filing and inspection system |
| Ricoh Information Systems | Ricoh general patent information system |
| Mitsubishi Electric Corp. | Patent Monitoring System |
| Matsushita Electric Industrial Co.Ltd. | Patent Information Enquiry System |
| Hitachi | Hitachi patent strategy information management system |

Source : Guide Book & Manufacturer's Literature
Patent Information Fair Tokyo 9-11 Nov.1993

Japanese PIM software developed by major Japanese companies is perhaps less likely to be sold to non-Japanese companies even though the basic filing system hardware (e.g. Optical Disk storage systems) might be. Fuji Xerox's PIM system shows the elements involved in such systems.

Figure 22 Fuji Xerox's Patent Information System




(富士ゼロックス株式会社 1993).

## 3.3. Japanese PIM

### 3.3.1. Overall Surveys of Japanese PIM

There have been a few general Japanese studies of Patent Management which have included questions relating to PIM. In 1978 a JIII survey produced an index to measure the state of companies patent management activities, including the state of their patent information activities (発明協会 1978). These included :

i) Producing Patent Maps of prior technology before starting R&D work
ii) Investigation of one's own and other companies' technology trends
iii) Forecasting product changes
iv) Investigation for infringement of one's own company's IPRs whether national or foreign
iv) Investigation for conflict with IPRs of other companies whether national or foreign
v) Collection of Information
Type and Scope of Information Collected
vi) Internal Circulation of Patent Information

Processing and Analysis of Information
Offering Information to Related Sections
vii) Information Management
Information reference arrangement methods
Distribution or Concentration of activity
Use of external specialist organisations

The weighting factors provided by the committee working group conducting the research and separately by survey respondents give an idea of the relative importance attached to the various areas of patent management covered. Patent information ranks highly in both cases.

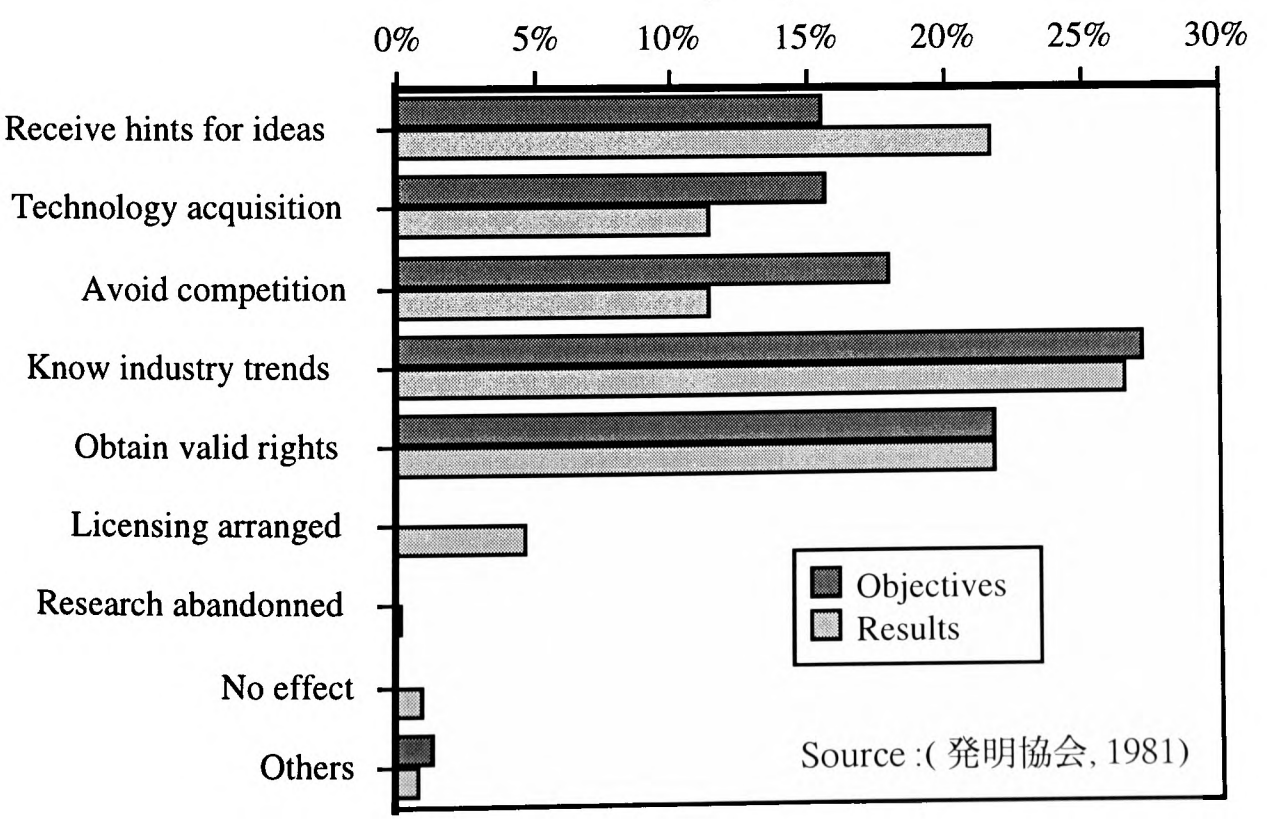
Table 17 Relative Importance of Patent Management Topics

| Patent Management Topic | Survey Replies | Working Group |
|---|---|---|
| Converting Applications to Rights (Getting applications granted) | 33.17 | 18.00 |
| **Information Collection and Use** | **15.74** | **15.00** |
| Supporting technology development | 11.60 | 17.50 |
| Presevation & Use of Company's rights | 11.40 | 15.75 |
| Dealing with Patent Disputes and Contracts | 11.02 | 11.25 |
| Actions regarding other Companies | 9.91 | 11.25 |
| Encouraging Invention & raising Patent Awareness | 7.52 | 11.25 |

Survey of 250 members of JIII and Japan Patent Assoc'n members with 130 replies
Figures = relative importance of topic (Total =100) Source : (発明協会, 1978)

A 1981 JIII study of patent related issues entitled "Technological Innovation and the Patent System" (発明協会 1981) also asked about patent information usage. The sample covered 350 companies and some 850 research themes. Overall related technology searches were made in 90% of cases. The search objectives and results varied as the figure shows :

Figure 23 Related Technology Survey Objectives & Results



Whilst the research objectives are largely achieved, searchers were more likely to receive hints for further ideas than avoid competitors. This confirms the survey's findings which show that Japanese companies conduct more infringement clearance searches (Q.54) but still have more infringement problems than UK companies (Q.55). Additionally in terms of making inventions surrounding other's existing technology, searches which are successful at providing hints for ideas are ideal.

The importance of Patent information has been summarised by the JPO as arising from:

1) Competitive analysis of markets and assessment of potential for technological development from both a legal and technical viewpoint.
2) Analysis of past technical trends and industry trends
3) Analysis of IPRs to preserve own company IPRs and control IPRs belonging to other companies. (日本国特許庁 1985).

This last point has a bearing on the case of Fusion Systems and Mitsubishi. Fusion Systems, is a small US lamp maker. Mitsubishi filed a large number of patent applications in the area surrounding Fusion's lamp patents and produced a lamp which Fusion alleged copied its lamp and infringed it's patents. Much publicity was created by the CEO Donald M. Spero who presented the case before a Senate Subcommittee hearing on the Japanese patent system (Committee on Commerce Science and Transportation 1988) as well as publishing it in the Harvard Business Review (Spero 1990). A briefer summary giving the other side of the story appeared in the Japanese produced English language journal Patents & Licensing (Patents & Licensing 1988). This put the respective cases as being :

Table 18 Mitsubishi - Fusion Systems Claims

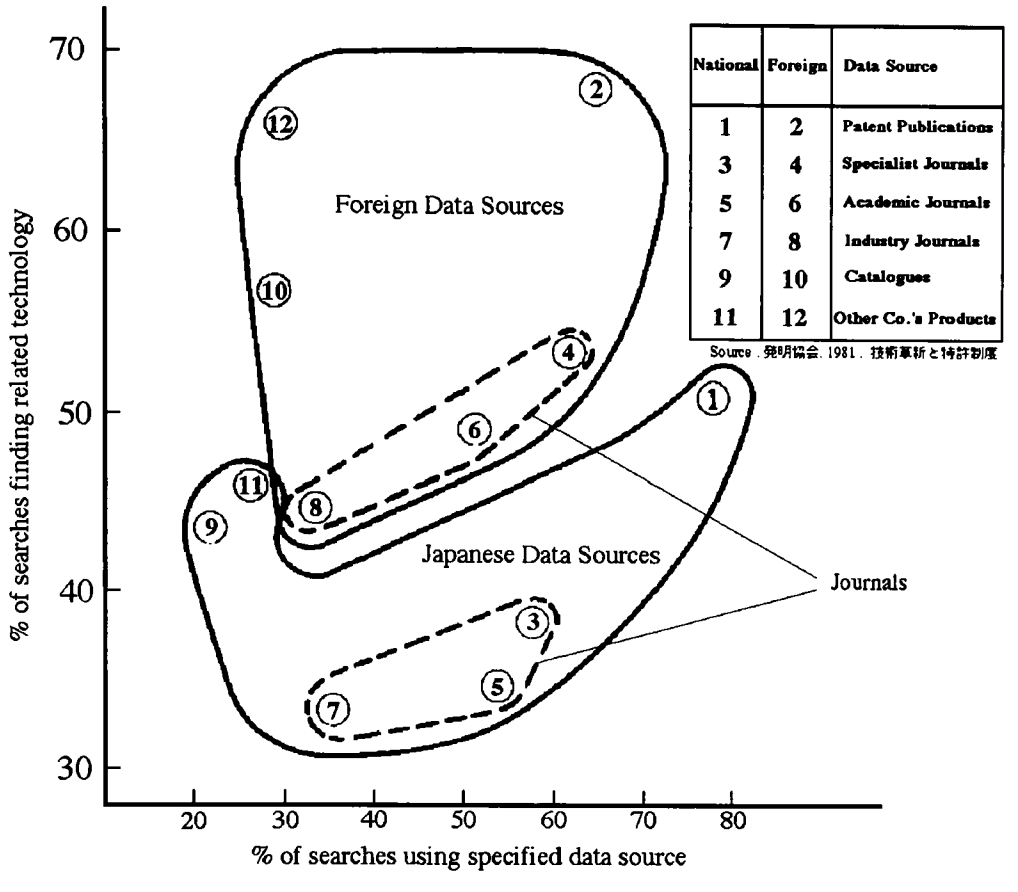
| Points at Issue | Fusion | Mitsubishi |
|---|---|---|
| **Basic Technology** | Fusion developed it from scratch. | It was published in the 1950s and so widely known. |
| **Application System** | A flood of narrowly defined applications was possible under the Japanese System. | Mitsubishi was justified both legally and commercially in filing their applications. |
| **Licensing** | Mitsubishi should license its technology. gratis | Due compensation is demandable. |

It is easy to imagine how the situation came about if Mitsubishi engineers were keeping a close watch on patent information in the field concerned and were ready to develop technology to fill gaps and protect their position or exploit one they could see opening up. If one takes the Fusion side, then Mitsubishi is nothing short of plagiaristic if one takes the Mitsubishi view it is not a question of "fairness", just a "mere commercial dispute" as MITI put it.

The sources used for carrying out related technology searches are interesting since the most often chosen one is patents according to the above JIII study (発明協会 1981). Furthermore,

the most effective data are foreign patents and foreign competitors goods and catalogues.

Figure 24 Technology Searches - Data Sources and Success Rate
(発明協会 1981) (Translation : RHP)




There is thus a considerable advantage to be gained by complementing traditional information gathering methods by conducting patent searches through foreign patent applications. The end result of these findings is to suggest that Japanese PIM activities will promote the acquisition of patents surrounding existing western patents - such as the Fusion patents.

A more recent study carried out for the EPO reviewed (inter alia) use of patent information by small companies (<250 employees and thus not directly comparable with the present survey) in Europe (Berger 1994). However comparisons were provided with samples from around 100 companies in each of the USA and Japan. The survey found that patent applicants in the USA and Japan attributed more importance to patents as a source of technical information than European companies. Japanese non-applicants also rated patents as a source of technical information more highly than US or European non-applicants.

A recent study of 20 Swedish and 30 Japanese large multinational companies' showed that use of patent literature was thought to have increased more in Japan recently and that Japanese companies thought using patents as a source of information more important than the Swedish companies did (Royal Swedish Academy of Engineering Sciences 1993). These surveys thus confirm the importance attached to PIM by Japanese companies.

### 3.3.2. Objectives & Uses of Patent Information

Japanese attitudes towards the large quantity of patent information available are not limited to finding out whether a given product infringes a particular patent. Patent information is also treated as a valuable input to medium and long term strategic planning regarding technology.

Some of the ways in which patent information is used are, according to the Patent Management Research Committee (a JIII committee), as follows :

Use related to general management strategy
- i) Basic analysis of technological trends
  Assessment of future growth trends and developments
  Assessment of technical development in special fields
- ii) Analysis by Companies and Technical Fields
  Assessment of entrants to new fields
  Assessment of strengths of competitors over time
  Analysis of inventors by name and numbers
  Analysis of Industry Groupings via joint applications

Use related to the research process
- i) Prevention of duplication of research
- ii) Technology crevice strategies (Analysis of patents may reveal room for me too products or developments)

Use related to patent applications
- i) Removal of wasted applications
- ii) Improvement of patent applications by basing them on prior art searches.

(PM研究会 1991).

Another book on patent mapping and information strategy by the Patent Map Study Group of the JIII emphasises the strategic nature of the subject using a discussion of the role of intelligence in military strategy in WWII[68].(発明協会 1988). However, this is quickly developed into a more up to date discussion of the merits of patent information in business. Current advantages though, are largely obtained through searching electronic databases of patent information. Whilst there are many ways of accessing such databases such systems have in general developed four main functions within patent departments :

1) A system for obtaining and using patent publications
2) An on-line searching system.
3) An internal company computerised management system
4) A system for analysing general searches. (発明協会 1988)

One added feature of such systems is that they enable the summarised results of the analysis of searches to be presented to top management in a simplified form. This is not only useful from a strategic planning point of view but also helps raise the profile of patent and IP matters in the company (発明協会 1988). The Swedish survey on Japanese and Swedish

[68]On the subject of WWII perhaps the most bizarrely titled book on Patent Management in Japanese is "Hitler's Patent Strategy" (「ヒトラーの特許戦略」) a translation into Japanese of a book by a G.Ryman. (G。ライマン) referred to by the 発明協会's book. I have not managed to locate any copy of the book though nor any record of an English / German or US version.

patent management mentioned earlier noted that Japanese respondents reported an increase in top management attention to patent matters. This increased profile is mainly driven by outside events, but an easy way to present complex patent issues would enable Patent Departments to be understood more easily and have a higher profile.

It should be remembered that whilst IP departments have a high profile now (See Page 215 ) this has not always been so. For example in 1985 according to Mitsubishi Heavy Industries one of the indirect benefits of their Patent Review process involving monthly meetings to discuss Patent Information with other departments were :

> Improvement of the recognition of the Patent department within the company.
> Improvement of the Patent Department's opinion of itself within the company.
> (発明協会 1985)

According to Mr. Marushima, Canon's senior managing director in charge of IP, the importance of the role of IP has increased of late and he is quoted as saying : "Ten years ago, I would never have made it to the board, It was extremely rare in Japan then for specialists in legal affairs to become directors." (Nikkei Weekly 1994)

### 3.3.3. Methods of Analysing Patent Information - Patent Mapping

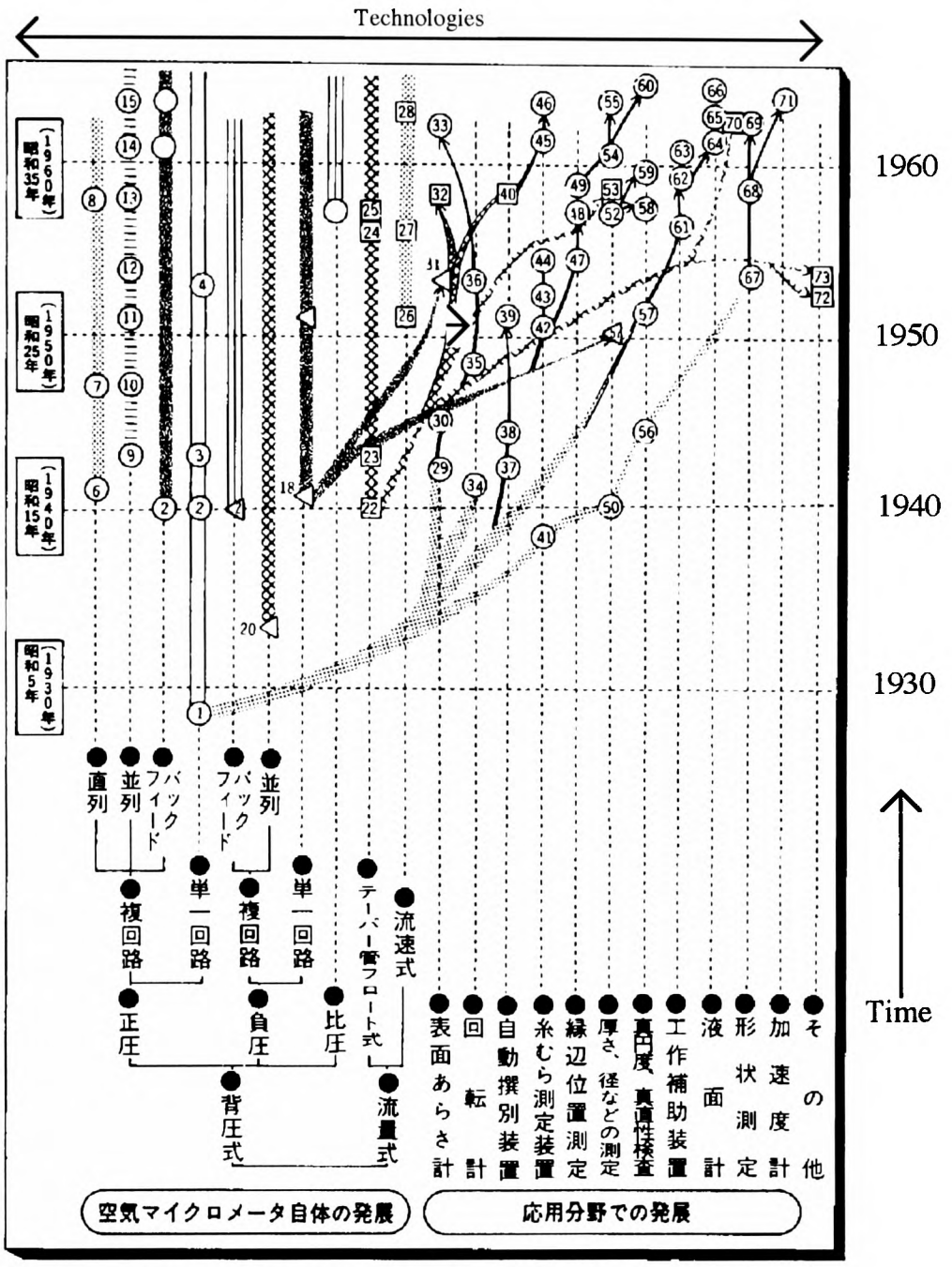
There are several PIM analysis techniques used by Japanese companies but perhaps the most characteristic are those involving making "Patent Maps" of various kinds.

According to one writer the making of patent maps originated in 1968 with a publication by the Japanese patent office entitled 「明日をひらく特許」(Patents that open up tomorrow). This used maps of successive patents to plot the flow of technology, in particular of Micrometer technology from the 1930s to the 1960s (発明協会 1988).

This resulted in patent departments, for example that in Fujitsu, producing "Patent Flow Surveys" (特許の流れ調査). In 1971 a Russian author published a book entitled "The problems of Technology Forecasts" describing a Russian research establishment's, card based indexes to abstracts of foreign patents used in the forecasting of important technology. In 1972 a report was published following an investigative team's visit to the Russian research centre. In the same year Mr. Simpson, head of IBM's patent contract department gave a speech at a Japan Patent Association meeting entitled "Patent Mapping". This marked the real beginning of Patent Mapping activities in Japanese companies (発明協会 1988). A further development occurred in 1984 when a Russian author I.Ivanov gave a speech at the Moscow symposium of WIPO which described the use of patent citations to study technology trends in US patents.

Figure 25 1968 Japanese Patent Office - Patent Map

The spread of air micrometers related to measuring technology



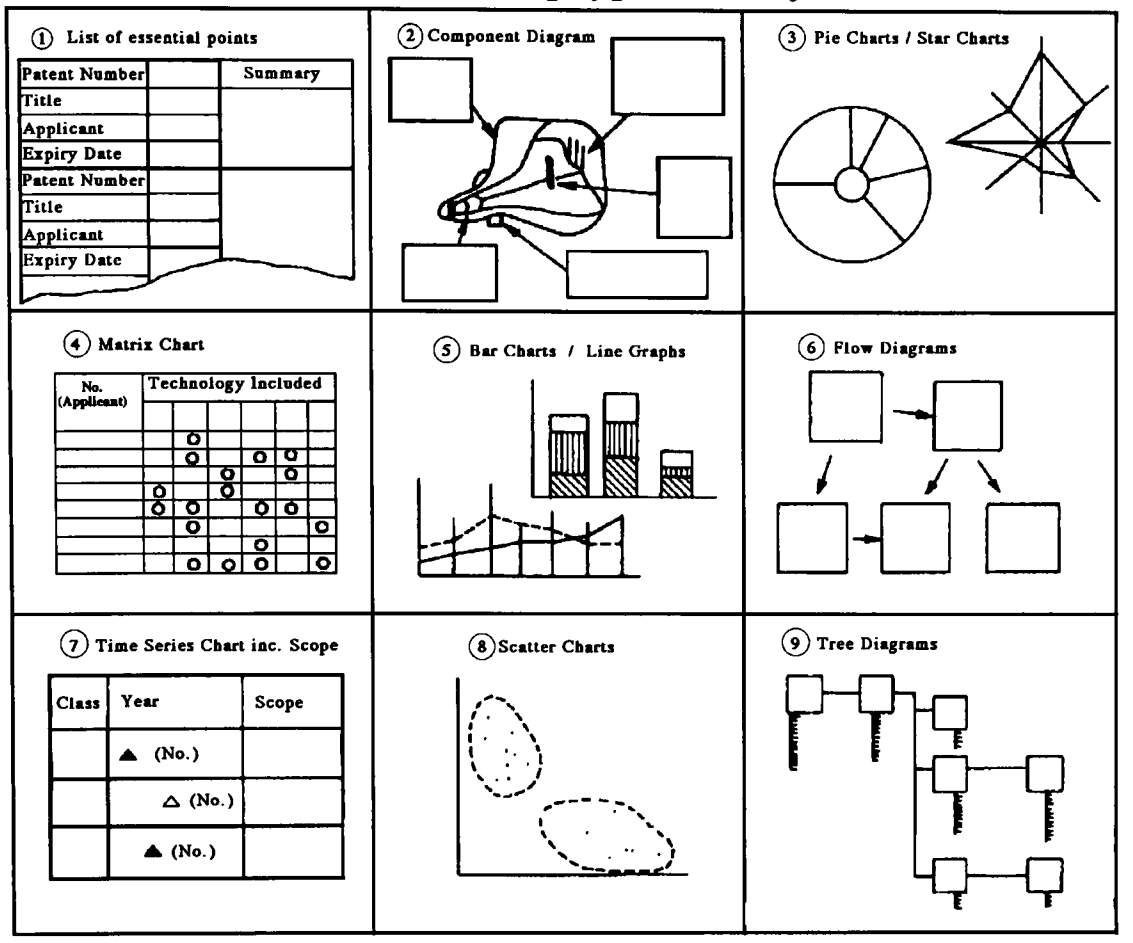

Source: 昭和43年「明日をひらく特許」Quoted in 発明協 1988 パテントマップと情報戦略

Thus whilst Patent Mapping can be viewed as a peculiarly Japanese practice, as with the development of Quality initiatives many of the origins lay outside Japan.

Types of patent map include : Technology classification diagrams, Line Graphs, Stick Graphs, Circular Graphs, Graphs showing Technology development over time, Citation based Patent Maps, Technology Life Cycle maps, Industry analysis maps, Inventor Maps and many others.

Some of these diagrams can be produced by the main Japanese patent database PATOLIS. However other PIM software will produce such maps automatically from data downloaded from patent databases. One example is the Automatic Patent Map System from Techno Research Co. Ltd which uses JAPIO data to produce ranking maps, leader maps, new entry maps, matrix maps, correlation maps and time series maps of patent data (発明協会・日本特情報機構 1993).

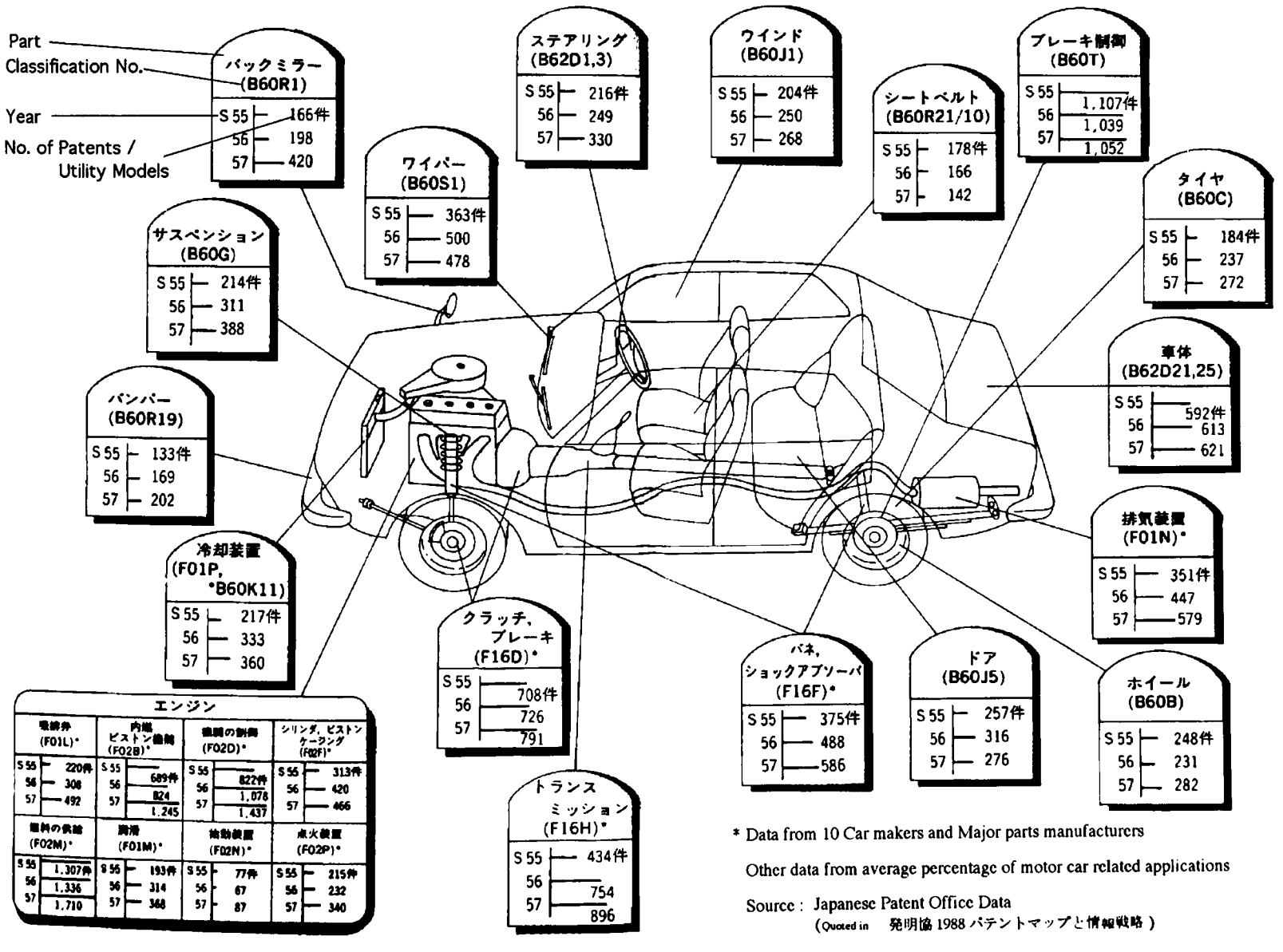
## Figure 26 Patent Map types used by Toshiba




Source : ( Norichika, 1994 )/( 発明協会 1985 わが社の特許情報活動 )

## Figure 27 Technology Classification Patent Map

### Patent & Utility Model Applications for Main Car Parts : Technological Classification Patent Map




* Data from 10 Car makers and Major parts manufacturers

Other data from average percentage of motor car related applications

Source : Japanese Patent Office Data
(Quoted in 発明協 1988 パテントマップと情報戦略 )

There are many books which have been written on the specific subject of patent mapping and it is not intended to discuss the various methods in detail here. However it is worth noting that recent books on the subject are going beyond mere charting of technological progress and are becoming linked to product improvement and quality measures. One scheme entitled DREAM (Driving Force Early Analysis Method for New Products) and described by a former Hitachi Metals employee uses patent mapping as an integral part of a method for developing new products. The scheme described involves seven stages :

1) Analysis of New Products and market demands
Analysis of state of new products
2) Analysis of specification of product environment
Assessment of level of new products
3) Comparison of competitiveness of rival products
Specification of own products strong points
4) Collection and analysis of information
Analysis of customer trends / Patent mapping
5) Formation of ideas for the creation of new products
6) Embodiment of product according to assessment techniques
7) Scheduling of embodiment of new products and foreseen problems and solutions.
(中村　茂弘 1993).

### 3.3.4. Japanese PIM and IP Strategy

An indication of the importance attached to PIM in the overall R&D strategy and operations of Japanese companies comes from a review of 24 R&D organisations selected by the Japan Efficiency Society (日本能率協会). In each case the companies commented on their management of IPRs and technical information management. In almost all cases companies had a specific PIM section or department usually allied with or part of the IP or patent department (日本のう率協会 1990) (See Appendix M).

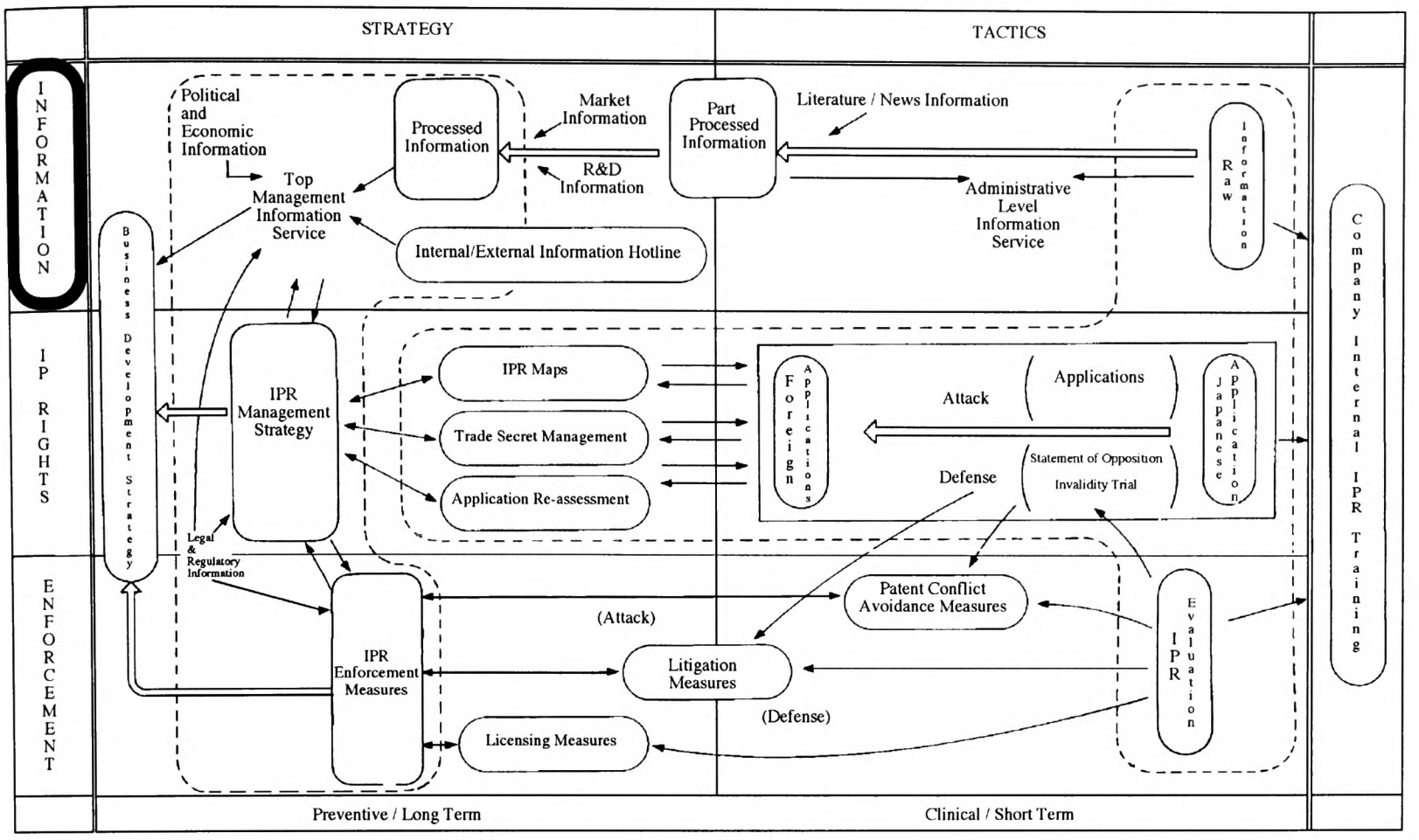
Japanese companies use Patent Information in most stages of their R&D processes. Dr. Mifune a former head of Teijin's IP department and of LES Japan has listed a representative list of such stages and their components and in each, Patent Information plays a prominent role (Mifune 1994) See also (御船　昭 1993).

Table 19 Patent Information and Patent Problems in R&D (Mifune,1994)

| **Research Stage** | **Problem** |
|---|---|
| Search of Research Theme | * Patent Information Analysis<br>Science and Technology Trends<br>Needs in Peripheral Areas |
| Planning and Intitiation of Research | * Patent Information Analysis<br>Correction of Target<br>Avoidance of Conflicts<br>* Strategical Survey on Acquisition of Patent Rights<br>* Study on Necessity and/or Possibility of Patent License |
| Execution of Research and Development | * Patent Information Service<br>Hints for Improvement<br>Assessment for Steering<br>* Rapid and Effective Patent Application<br>* Forming of Strong Patent Network<br>* Protective Action in Opposition and Invalidation<br>* Clarification on Patent Status of own technology<br>* Study on Necessity and/or Possibility of Collaboration and Early Stage Cross-License<br>* Recommendation for Avoiding Patent Infringement<br>* Oversea Patent Strategy |
| Model Plant and Commercialisation | * Patent Information Service<br>* Back Up of Marketing<br>Trade Mark Application and/or Acquisition<br>* Patent and Know How License and/or Cross-License<br>* Back up and Follow up of Technology Transfer<br>* Patent Approval on Public Relations, Advertisement and Scientific Reports<br>* Patent Protection and Negotiation<br>Watching on Patent Infringers<br>Watching on Third Parties New Patents |
| Miscellaneous | * Education or Training on Patent<br>* Patent Award System<br>* Information Exchange with Competitors and/or Related Industries |

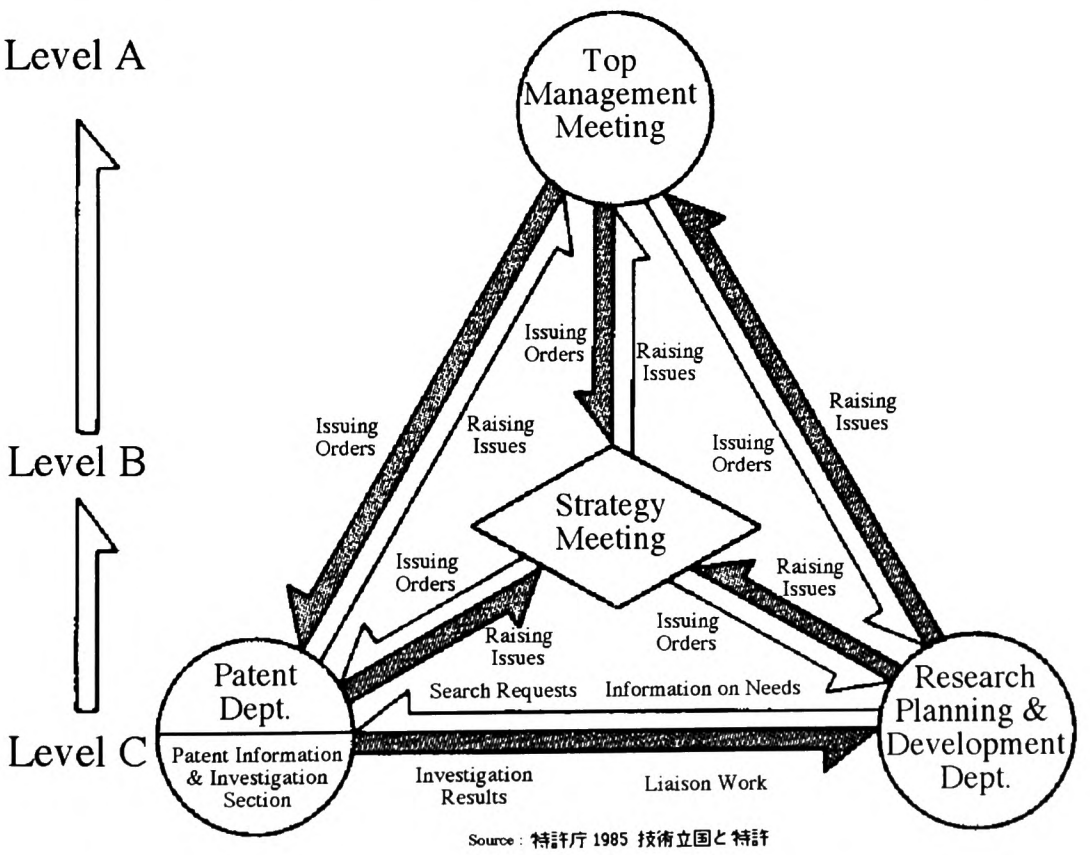
Patent Information also plays a very prominent role in Dr. Mifune's outline of IPR strategy in which it forms a critical part of both tactical and strategic activities and on of three critical elements of Information, IP Rights (Obtaining & Maintaining them) and Enforcement of IP Rights.

Table 20 Organisation of Strategic Use of IPRs (Mifune,1992)




A final example of the importance of Patent Information in business strategy occurs in a book by the JPO in a section entitled"Business Strategy from Patent Information" and is from a Japanese Pharmaceutical manufacturer with a "high standard of patent management".

Figure 28 Strategic Use of Information by a Japanese Pharmaceutical Manufacturer




In this Patent information also plays a fundamental role in the formation of technology strategy and a critical element in the communication between specialist IP management and General management.

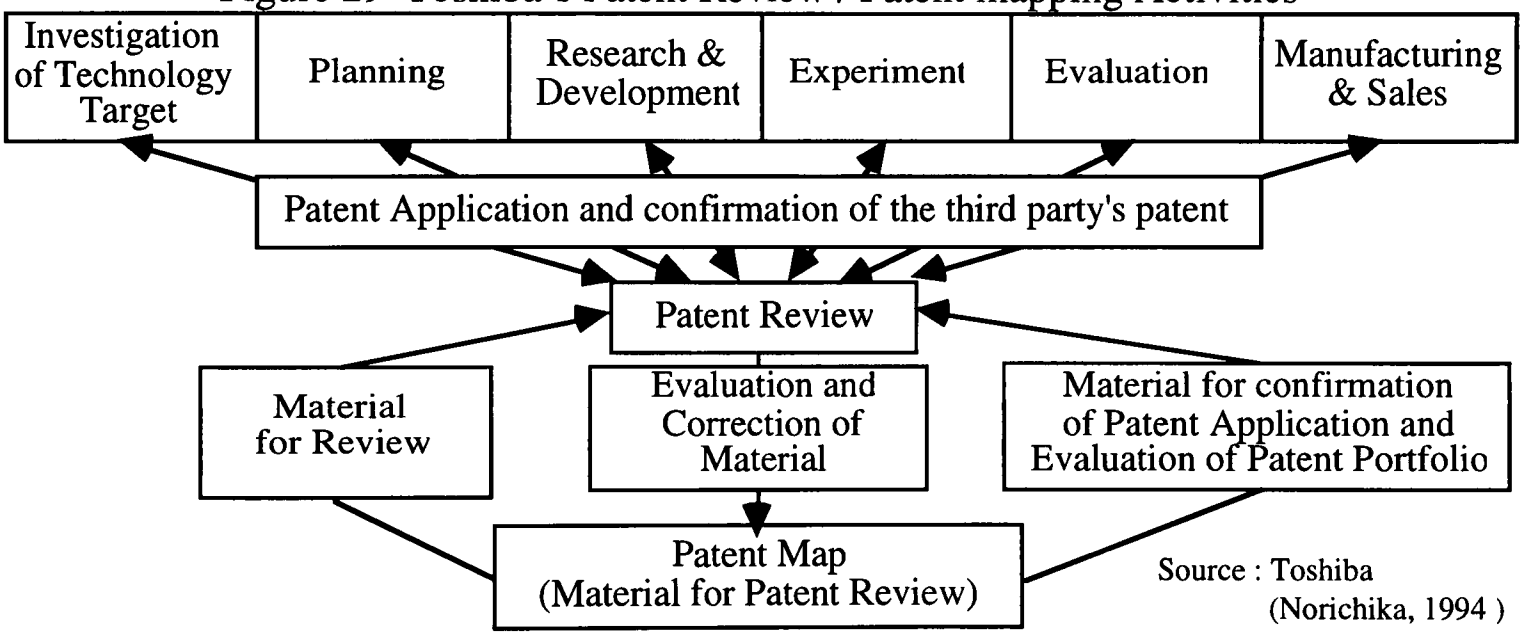
### 3.3.5. Japanese PIM - Current Japanese Company Practice

#### 3.3.5.1. Japanese Company PIM Organisation and Activities

In general Japanese companies with sufficient interest in IP matters to have a patent or IP department will also have a section or even a separate department responsible for patent or general technical information management.

Toshiba for example has a Patent Information centre within its IP division. This includes a sizeable patent database. Besides the main in-house elements of the IP department organisation Toshiba also has some external companies with substantial links to the organisation, usually through staffing with retired Toshiba personnel, a not uncommon arrangement with larger companies. Use of the information provided by the centre is used in two main ways. Firstly in filing applications and defending patents from infringement. Secondly as technical information in applying for patents and reviewing others patents and in more general patent mapping activities. (Norichika 1994) (Interview Mr.K.Norichika 94/2/2).

Figure 29 Toshiba's Patent Review / Patent mapping Activities




Source : Toshiba
(Norichika, 1994 )

Toshiba formed its Patent Information Centre in 1970. It is worth noting that Toshiba has at least 4 information centres in the company : The main company information centre run by the general planning department, the technical information centre, the patent information centre and various centres in research centres and factories. Besides a wide range of information services connected with the company's numerous patent applications the patent department also provides patent analysis services making the patent data presentable in particular by the use of various patent maps illustrating the flow of technologies and the mutual relationship between them (発明協会 1985). Patent maps are not just one off maps but are regularly updated to take account of new developments (東芝株式会社 1990).

By way of contrast Company S, a medium sized equipment manufacturer based outside

Tokyo, has a Patent and PR department which though small (only 10 members as opposed to Toshiba's 350), has its own patent information system. This is arranged according to a home made classification system[69] adapted to the particular technology the company deals with. Though company S files at most only 90-100 patent and utility model applications each year the system is used to monitor competitors patent applications and fire off prior art citations to the Office before the applications are examined so that prior art can be submitted without the expense and delay of the (formerly post grant) opposition procedure. The system is also used to reduce filing costs by searching before filing applications. Some companies send draft applications to attorneys who will file them before searching for prior art but by carrying out in-house prior art searches obviously invalid patent applications can be avoided. Patents of particular relevance are circulated to engineers to keep them up to date with the latest developments. Old patent specifications which are either US or Japanese patents are kept on microfiche cards or card or sheet abstracts but recently a Toshiba optical disc filing system has been acquired for use in classifying, filing and easy searching of the specifications. (Interview Co. S Patent Dept. employee with 7 years experience in Patent Work, 10/12/91).

A feature of Hitachi's attitude to patent information is the service known as SDI or Selective Dissemination of Information (日立 1983). This term is used by other companies as well but signifies the selection of relevant patent information by patent department personnel who send it to relevant researchers and others who might be interested. A key to this process is that there must be good liaison between the information users and selectors for the system to work well. However in essence it is the same as Company S's circulation system above.

At the opposite end of the scale to Hitachi a series of books looking at small and medium business's use of IP includes the case of a Japanese filter company Toyo Filter. In 1978 Toyo Filter had only 105 employees and the example shows that Patent Information is not confined to large companies. The objectives of using patent information in this case were listed as :

"1) Comparing own company and patented technology and assessing their relative superiority or inferiority.
2) Assessing whether their is a possibility of using ones own technology in products.
3) Assessing weak points of ones own technology and obtaining hints as to how to make it successful.
4) Using the information to assess whether there is a possibility of technology export or not.
5) To establish the absolute superiority of one's own company's technology and products (斉藤　優 1981).

---

[69]In 1980 Japan adopted the International Patent Classification (IPC) scheme which is now used by countries either alone or in addition to their own national classification system. Adoption of this system advantage in that it made simultaneous analysis of Japanese and foreign patents that much easier. However in addition to this companies often have their own classification systems as did Company S and as do companies such as Nissan, Bridgestone and Sumitomo Metal Works.

On a rather larger scale Toyota in describing it's patent management activities has emphasised (like Company S above) saving application costs as a reason for conducting pre-filing patent searches (牧野　孝之 and 中野　謙一 1984). Toyota also uses patent searching to :

"1) Detect other companies' technological trends
2) Pick out other companies' problem patents
3) Abstract data to invalidate problem patents
4) Discover usable patents which are about to expire
5) Confirm the originality of own-company technology."

And its importance is due to :

"1) If one knows the scope of competitors patents one can develop technology without problems
2) If there is a useful patent one can use it by taking a license and avoid duplicating investment.
3) One can find data to invalidate problem patents
4) If the scope of one's own company's patents can be clearly distinguished from prior patents one can effectively strengthen one's rights.
5) One can confirm one's own company's originality
6) It's useful in deciding the direction of development because one can forecast the level of progress and the aims of other companies' developments.
7) It's possible to receive hints on methods of solving development problems from...patent specifications." (牧野　孝之 and 中野　謙一 1984)

For Toray, the three main points behind using Patent Information are to gain information on IPRs, Technical information and Market information (東レ 1987). The aim is to investigate whether the technology being developed meets market needs, whether it is comparable with competing technology and whether the technology being developed can be exploited exclusively. However in common with other companies Toray also has a process known as "Patent Confirmation" which involves a patent clearance search to ensure new products or plans will not infringe others rights. A similar expression which occurs is that of the "Patent Review" as used by Toshiba. According to Toray though other companies use the expression "Patent Confirmation" to mean a review of the coverage of company patents and a review of whether company technology infringes other companies' patents. In Toray it is intended instead to mean a review of the development of a technological field from the point of view of the patents and other information which covers the field and a comparison of the companies technology with that of other companies in the field (東レ 1987).

Fujitsu in common with many other companies has a specific IP and Technical Information division (Interview with Fujitsu Employee, 13/1/94) within its legal and IP department (Yada 1992). One element of Fujitsu's method of analysing patent information is the significantly named 「特許情報による技術の流れ調査体制」 its "Method for investigating the flow of technology using Patent Information". This is useful not only for drawing attention to the concept of the flow of technology but also shows the use of patent data for more than just a response to specific R&D problems and for more strategic purposes. Fujitsu's thoughts

prompted by the subject of patent information are summarised as :

1) Inventions of the same trend are often repeated in 10 or 20 year cycles
2) Even if something can be called today's new technology, the basic invention has often been born 20 years earlier.
3) If one divides up patent specifications by technical field and puts them in order of the application number then one can clearly see the history of the technology related to the inventions.
4) One can look for themes for new technological developments in past patents.
5) Even if there is some past basic patent if it hasn't been implemented, if when it is implemented there is some added indispensable condition for doing so, it may be possible to obtain a new basic patent again.
(松岡　宏四郎 1985)

With the occurrence of litigation by US companies based on "basic" patents and the need for other patents, especially "basic" patents to counter them, obtaining "basic" patents has become a major concern in Japanese companies. It can also be linked to moves into funding basic research centres both in Japan and abroad. These factors all make a thorough investigation of the past patent activity in any technical field a considerable help in both planning R&D and making the best use of technology. The technology flow chart therefore acts as a key link between the patent department and the R&D department in R&D planning.

Ricoh has a strategy section in it's IP department but in addition the company has a subsidiary company in charge of patent information services called the Ricoh Techno Institute. This not only provides patent information services for the main company but any other companies linked to Ricoh. The use of a subsidiary resembles the arrangement mentioned earlier which Toshiba has. Besides this service there is also a company patent database called RIPS (Ricoh Patent Information System) (リコー株式会社 1990).

Toyota's central research laboratories, which are a separate company from the main Toyota company, only employs 970 employees though they are obviously linked to the larger organisation. The company not only makes use of patent information but does so at each stage of R&D planning. To improve the efficiency of operations a "Patent Information Investigation Manual" has been written whose main contents concern the timing of patent investigations, the stages involved, methods of analysis, using the results and making patent maps (豊田中央研究所株式会社 1991).

### 3.4. Discussion of Survey Results

The survey included several questions concerning Patent Information Management and whilst the results have been presented in outline in an earlier chapter the results will now be discussed further.

About 50% of Japanese companies in the survey had specialist patent information sections and this was not significantly different from the situation in those UK companies with IP departments (Q.6). This did not vary significantly with industry sector in either Japan or the UK though in both countries specialist Patent Information sections were more common in the Pharmaceutical sector. Of the specialist department types patent information was the most common with only licensing sections being anywhere near as common.

A further question (Q.11) relating to the specialisations of IP staff showed that the percentage of staff working as patent information specialists was highest in the pharmaceutical sector but that the numbers of staff working as Patent Information specialists was highest in the Electronics sector in Japan. In the UK the response rate was low but the chemical and miscellaneous sectors had both the highest numbers and the highest percentage of staff in patent information work. It must be stressed though that since the size of patent departments in Japan is far greater than in the UK the overall average number of people employed in a specialist function such as patent information is far higher than in the UK even though overall the UK has a slightly higher proportion of its IP staff employed in patent information work.

This is reinforced by the fact that in a question about the role of IP, Japanese respondents rated the importance of patents role as a source of technical information significantly higher than UK respondents did (Q.22, $p=0.0000$). This was true whether the UK total sample or only those companies with an IP department were considered. The difference was also not part of a consistent difference in absolute ratings between Japanese and UK respondents and thus represents a genuine absolute difference. In terms of the order of relative importance though both UK and Japanese respondents placed patents role as a source of technical information in the same 4th position relative to other roles that were asked about.

One can conclude therefore that Japanese companies represented by the sample used in the present survey in absolute terms devote more resources to and have a higher opinion of the importance of patent information than the UK companies surveyed whilst UK companies nonetheless devote a considerable proportion of their limited resources to the issue.

### 3.5. Conclusions

This review of patent information management has concentrated almost exclusively on the Japanese point of view. However, it would be unfair to give the impression that the issue was not also important to UK companies. This is shown by the high proportion of resources devoted to the subject even if the total resources are much smaller and more limited than is sometimes the case in Japan. Any patent system produces information which those concerned with the technology ignore at their peril.

However, that said there are substantial differences in the degree of emphasis placed on the subject. Wyatt et al. pointed out in 1985 that Japanese companies seemed to view patent specifications as a more important source of technological information than US or European companies did (Wyatt, Bertin et al. 1985). In addition the differences can be said to originate in part from the investigative curiosity which has always characterised Japanese development of any technology or institution in the modern era. They are also shown in the present survey by differences in attitude to the importance of the issue and the absolute number of staff involved. Also by the high number of public libraries and offices where patents can be inspected in Japan, the fact that Japanese electronics makers view the patent information sector as a valuable market for information systems and the holding of specialised trade fairs for patent information services. Even the fact that the JPO has been the first patent office to introduce electronic filing of applications.

Whittington points out that Japans GDP growth over the last three decades has been seven times that of the UK and that therefore Japanese strategies might have something to teach UK managers (Whittington 1993). Combining this with the growth accounting literature dealing with Japanese growth (Ito 1992)(Denison and Chung 1976)(Shinohara 1986) which shows that over fifty percent of Japanese economic growth in the period 1950-1980 came from technological progress, one conclusion that can be leapt to is that much of what Japanese growth has to teach the UK is to do with technological learning.

Japanese companies interest in Patent Information Management also has a wider implication in that it impinges on most of the critical processes in the management of patents, their creation and preservation and the avoidance of infringement of, or licensing of, others' patents. That involvement in both catching up with, keeping aware of and keeping ahead of the competitions' patents might be said to be another way of characterising Japanese companies' attitude to IP management as not just something defensive and reactive but something proactive. It is very noticeable that many of the PIM activities described are pro-active rather than reactive.

Finally, the great interest in Patent Information as a means of acquiring strategic advantage is something that one might associate with firms in a follower mode of competition. Such firms one would expect to be concerned with learning about other firm's new technology, with avoiding protected features and with trying to design around them to gain their benefits. However, the case of Japan makes it quite clear that even as firms become technological leaders Patent Information does not diminish in importance. Patent Information is just as important in retaining and increasing a lead as in catching up and decreasing a competitors lead and furthermore is linked to other features of IP management in Japan in its role in enabling control of and access to areas of knowledge useful in the wider context of a company's overall strategy. The larger IP departments' Japanese companies' larger filing

rates have engendered have also enabled greater resources to be allocated to a variety of tasks including critically Patent Information Management.

Thus Patent Information Management is not the preserve of just the derivative copyist but instead a source of information for the well informed technology strategist on the lookout as much for interesting developments as for potentially competing or encircling designs by others. Patent Information management thus has a role not just as a source of commercial intelligence but as a means of monitoring the various sources and flows of technology which are important to a company's business. It is a essential part of gaining and maintaining a lead in a dynamic technological environment.

## 4. IP Department Staff Management

### 4.1. Introduction

Several features characterise "Japanese Management". Lifetime employment, company unions, seniority based wage increases, annual fixed bonus systems, low staff turnover, group decision making processes, in house training, quality control circles, job rotation schemes, company dormitories, group based working, early retirement, secondment to other organisations. Some of these as well as other more specialised features also define Japanese IP Staff Management and make it differ from that in the UK. Study of these helps understanding of another component in the environment in which Japanese IP strategy is formed.

### 4.2. Background

The first patent section in Japan was formed in Toshiba in 1912, some 27 years after the start the first practical Japanese patent system (発明協会 1985). Others followed but the ChôYôKai, the industrial patent department association was only formed by 10 electronics companies in 1938[70]. In 1944 Toshiba's patent section became a "Patent department" and in 1989 the "IP department". Similarly the ChôYôKai became The Japan Patent association in 1958. Simultaneously increasing technological competition put an increased emphasis on patents, reflected in their increasing numbers during the 1960s and 1970s. In 1995 the association became the "Japan Intellectual Property Association". These renamings may seem insignificant but as mentioned earlier 「名は体を表す」, "the name expresses the body" (See Page 247) and as with the era name on an Emperor's succession, Department and Society name changes too mark the beginning and end of eras. Thus one might call the recent change one from the *特許時代 (Patent era)* to the *知的財産時代 (IP era).*

Changes in IP departments' names have heralded changes in the resources both financial and human that have been assigned to IP matters. Two factors led to recent increases. Firstly the underlying gradual increase in patent application numbers necessitating extra staff to cope with the extra work loads. Secondly, the recent increase in accusations of infringement against Japanese companies arising in the USA and also increases in infringements of Japanese company IPRs (Q.51 & 60 in the survey). This has highlighted the need for more staff not only to deal with the consequent 1980s further increase in patent applications but also with the litigation work itself which is quite different in nature and in the skills required to those

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[70]The Society was founded on 9th September, The Chrysanthemum Festival and was at first known as the ChôYôKai or literally The Chrysanthemum Festival Society or 「重陽会」. 重 also happens to mean heavy - as in heavy electrical industry and 陽 also occurs in 陽電気 meaning positive electricity - again making a link to the electrical industry connections of the first members.

needed for a simple patent filing operation.

The increased resources devoted to IPR management have led to not only a greater profile for IP departments but also an increased ability of IP departments to promote activities such as PIM referred to earlier which do not receive so much emphasis in smaller IP departments such as in the UK. The need to greatly increase the size of IP departments and to increase other employee's awareness of IP issues has also had implications for IP staff qualifications and training, staff rotation and organisation which all contribute to the distinctive character of Japanese IP staff management.

## 4.3. IP Staff Management Literature

There is no literature on the management of Japanese company IP department staff available in English that I am aware of, apart from a few comments in the Swedish and Nomura surveys referred to earlier. The first of these makes the point that in the sample concerned, Japanese companies had more centralised IP departments and more IP managers and discussed IP matters more at board meetings than did Swedish companies (Royal Swedish Academy of Engineering Sciences 1993). The Nomura study showed that IP department staff numbers had increased over the past three years and that, as has been shown, IP departments in Japanese industry are being strengthened in the light of US originated litigation (Murakami and Nakata 1994). Other than these two surveys though there is no information available on how the key elements of "Japanese Management" as it is commonly thought of, interact with the task of IP management.

## 4.4. Japanese IP Staff Management Surveys

The number of surveys dealing with IP Staff Management issues published in Japanese is limited too. The study conducted by the JIII in 1981 entitled "Technological Innovation and the Patent System (発明協会 1981) included few details about staff issues. The 1978 JIII survey which produced an index of patent management activities (mentioned earlier), also assessed Patent Education (発明協会 1978). The survey indicates that education is an important issue in IP management in Japan. The questions asked about the number of Off J-T (Off job training as opposed to OJT "On the Job training") courses IP staff members attended or organised and the number of courses for non-patent specialists such as R&D personnel, Engineers, New entrants, managers, office and factory staff. Interviews with a Japanese academic researcher who had carried out a commercial study of IP management in the mid 1980s identified not only patent education but the responsibilities of researchers, external patent attorneys and in-house IP staff regarding patent drafting, the number and qualifications of IP department staff, and the past employment history of IP department staff as key issues. There is no publicly available data on such topics so they were included in the present survey.

## 4.5. Japanese IP Staff Management - Current Practice

Survey information on IP staff management practices in Japan is thus sparse and on practices in the UK virtually non-existent. However in Japan the large quantity of articles and books in Japanese dealing with individual company approaches to IP management gives a ready source of information on the subject. This combined with insights gained from interviews and the results of the present surveys enables a clearer overview of the situation to be put together. This is best done by looking at several characteristic areas : Patent Education, IP Department Organisation, IP staff responsibilities, numbers, qualifications and rotation.

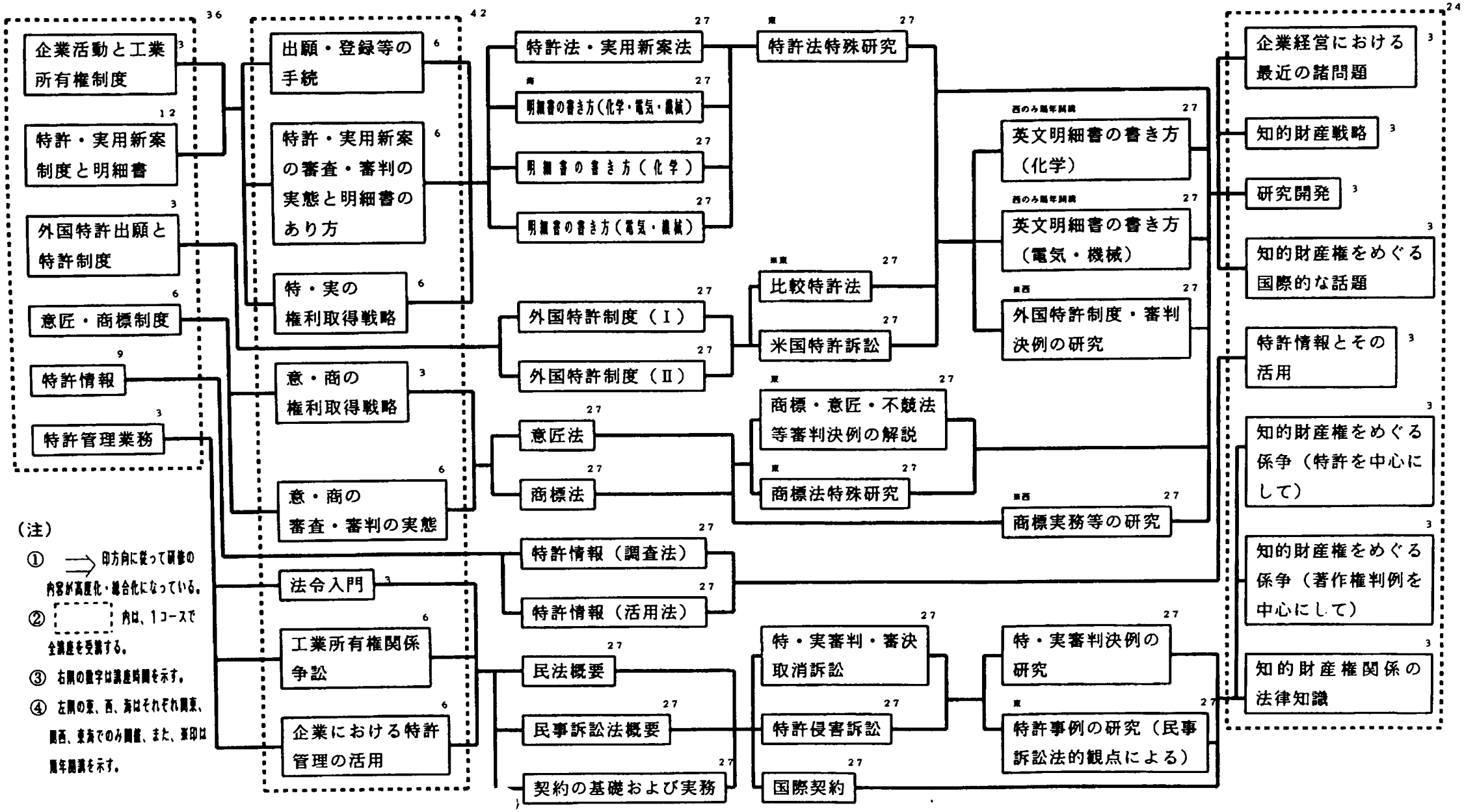
### 4.5.1. Patent Education

IPR training in Japanese companies is in some senses very similar to training in other aspects of management practice and includes the same mix of on-the-job off-the-job training combined with internal and external courses and even overseas training of varying degrees of specialisation and complexity. Such general management training has been described very thoroughly by Okazaki-Ward (Okazaki-Ward 1993). IPR related training is a specialised subject. The Japan Intellectual Property Association is the main provider of IPR training courses in Japan. These take several forms ranging from introductory courses (A Courses) through beginners, middle and advanced courses (B, C and D courses) to Research and finally Overseas study tours (E and F courses) as shown above. In the UK the only IP courses of any note are revision courses for those taking the Patent Attorney's exams and not all examinees take such courses anyway.

# 日本特許協会研修会［定例コース］の体系

Introductory A入門コース ⇒ Beginners B初級コース ⇒ Intermediate C中級コース群 ⇒ Advanced D上級コース群 ⇒ Research Course E研究コース群 ⇒ General Course S総合コース（管理者向けコース）

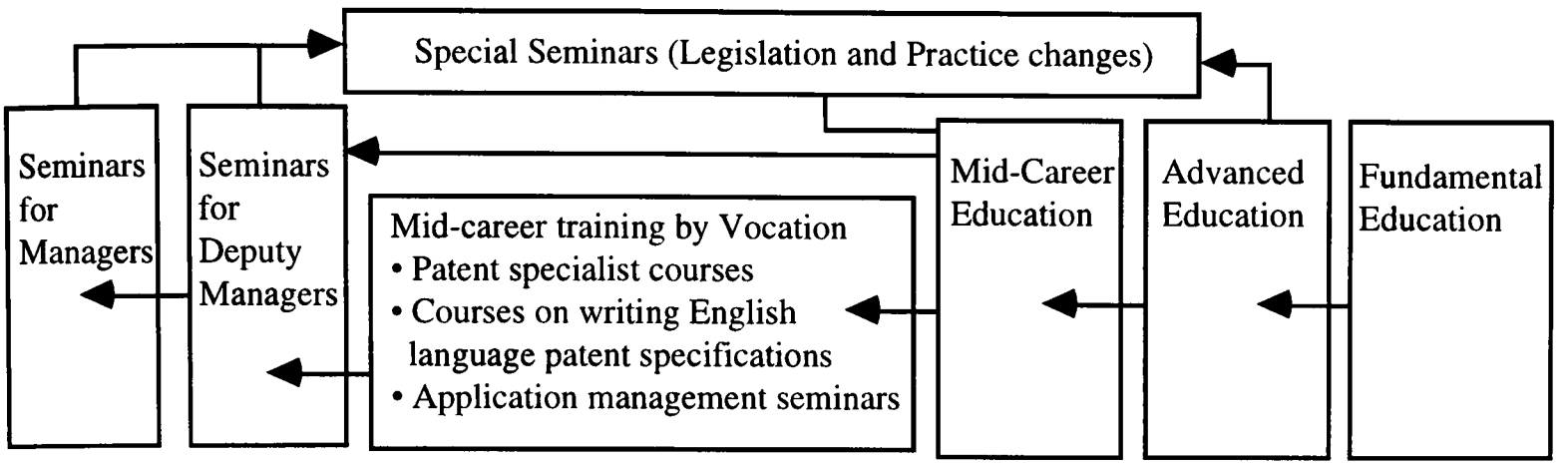
Overseas Course F海外コース ↓




（注）
① ⇒ 印方向に従って研修の内容が高度化・総合化になっている。
② [ ] 内は、1コースで全講座を受講する。
③ 右肩の数字は講座時間を示す。
④ 左肩の東、西、海はそれぞれ関東、関西、東海でのみ開催、また、数印は隔年開講を示す。

There are many examples in the Japanese literature of specific training activities. Canon organises a series of in-house courses at the mid-level and Supervisor level of employees (Canon 1994). Toshiba runs an education program for IP Staff members :

Figure 31 Toshiba Education Program for IP Staff Member




Source : (Norichika 1994)(Interview Mr.K.Norichika 94/2/2).

Fujitsu has also been organising patent training activities since at least the mid-1980s, not just for patent specialists but also members of each department who might need training. In addition all new staff are given 2-4 hours basic training about the company's patent operations and basic details of the patent system (松岡　宏四郎 1985). Hitachi too has training programs for R&D personnel, not just IP specialists (日立 1983). Toyota has various in-house training manuals and courses at several levels (牧野　孝之 and 中野　謙一 1984).

Patent training is not the preserve of larger companies though. Company S the medium sized engineering firm with 10 patent department staff I have mentioned earlier had a well established patent education course for R&D and Factory staff when interviewed in late 1991. The course included an educational booklet tailored to the particular procedures used in the company but also including a basic grounding in patent and IP law. Design engineers are "educated" once every two years and given the educational booklet (a 31 page A4 paperback book). Other staff receive the book on demand. The design staff concerned are not patent specialists but the course makes them at least IP aware, which can save a company from many IP disasters. Rather as an emergency recussitation course does not make someone a heart surgeon it does give them a chance of keeping the patient alive until the surgeon arrives.[71] Besides this non-specialist's education, new IP department members are given a 6 month correspondence course teaching them in more detail about IP matters even if not to the level required to pass the patent attorney's exams.

Education schemes both internal and external ones, as run by the JPA/JIPA above, are thus almost universal throughout Japanese patent departments.

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[71]The most common cause of disaster is the publication of inventions prior to patent applications being made which means no valid patent is possible in the UK and many other countries. Use of contracts ignoring IP issues are also a common problem source.

Training specialists is obviously necessary. Training non-specialists also has its reasons. Some companies including Sony and Omron train inventors to draft invention descriptions suitable for use by the patent department (SONY 1990) (オムロン株式会社 1990). Two interviews with researchers working for Hitachi (both on 93/10/1) showed that Hitachi researchers are also trained to write patent specifications. Such training may save drafting costs. There are also the benefits of a basic training in preventing IP disasters mentioned above. However, Saida notes that another reason for educating non-specialist managers is to enable them to judge the quality of inventions and not just rely on numbers of patents or inventions (斎田 雄一 1993). Thus training also has links to the trend to emphasis not just Quantity but Quality of patent applications.

Mention should also be made of the increasingly common practice in the larger companies of sending staff abroad for training. Toshiba started the practice in 1972 (Norichika 1994) (and interview). Hitachi have since the early 1980s sent trainees to train in UK Patent Attorney's Offices for 6 months to a year. Most however go to law offices in the USA emphasising the greater importance of US law to Japanese companies.

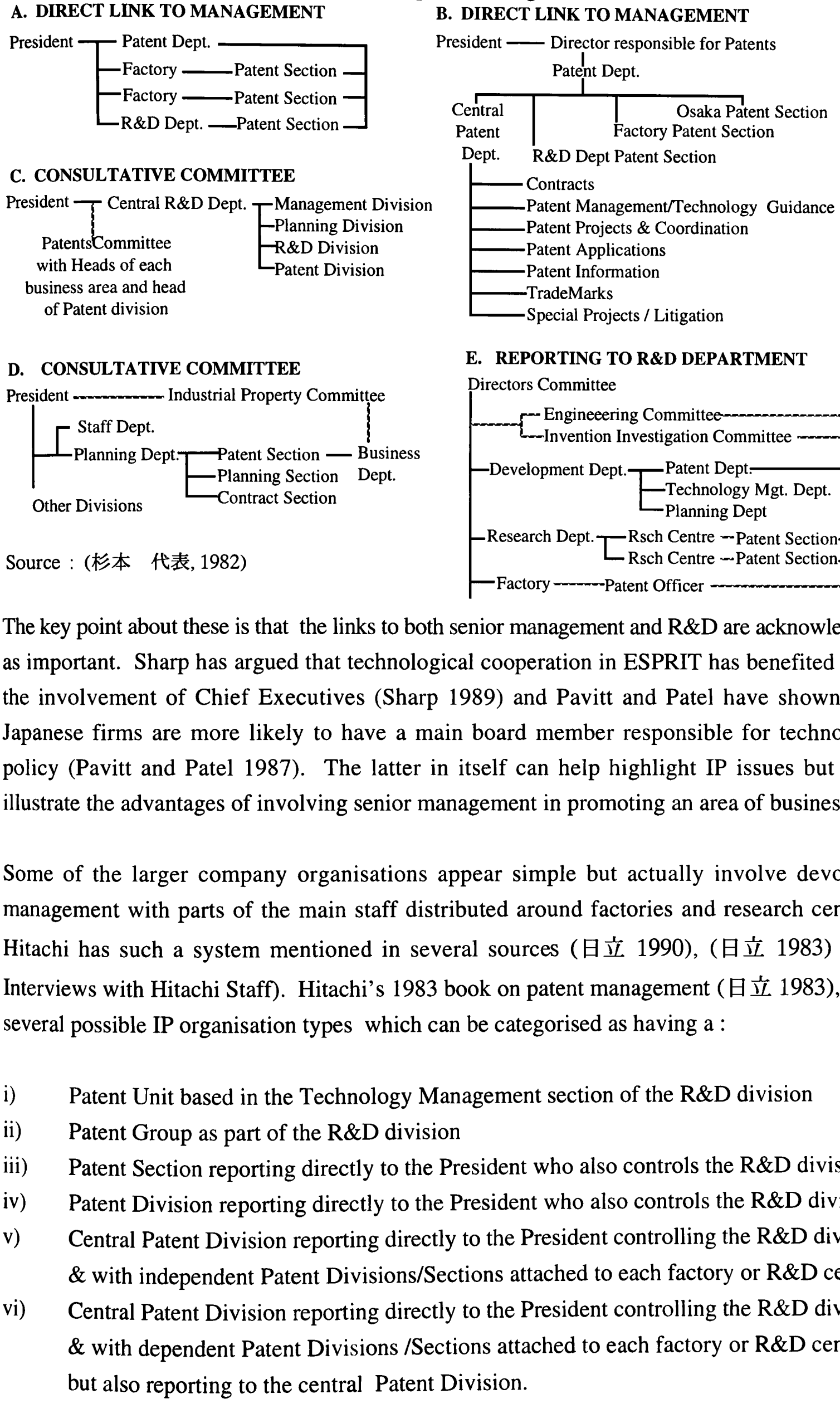
Many companies talk about the importance of raising "Patent Awareness" within their company mainly with an eye to avoiding being sued by a large US company. However, these are not the only benefits of a wide ranging education program. Raising awareness of and knowledge about IPRs also allows greater integration of IP matters into the general business of the firm.

### 4.5.2. IP Department Organisation

IP department organisations takes a variety of forms and names. The tendency for name changes has been mentioned. However, the main differences between the various forms of organisational diagram concern which department the Patents/IP department reports to, how close to senior management those with senior operational responsibility for IPRs are, how centralised or distributed management of IP matters is and how closely linked with other functions such as the R&D or legal departments the IP/Patents department is.

One useful collection of examples of the various types of organisation which occur is contained in a Patent Management Manual by Sugimoto which is intended as a guide to how to set up and run a patent department and was published in several volumes (杉本 代表 1982). These can be summarised in the following diagram :

Figure 32 IP department organisation




Source : (杉本　代表, 1982)

The key point about these is that the links to both senior management and R&D are acknowledged as important. Sharp has argued that technological cooperation in ESPRIT has benefited from the involvement of Chief Executives (Sharp 1989) and Pavitt and Patel have shown that Japanese firms are more likely to have a main board member responsible for technology policy (Pavitt and Patel 1987). The latter in itself can help highlight IP issues but both illustrate the advantages of involving senior management in promoting an area of business.

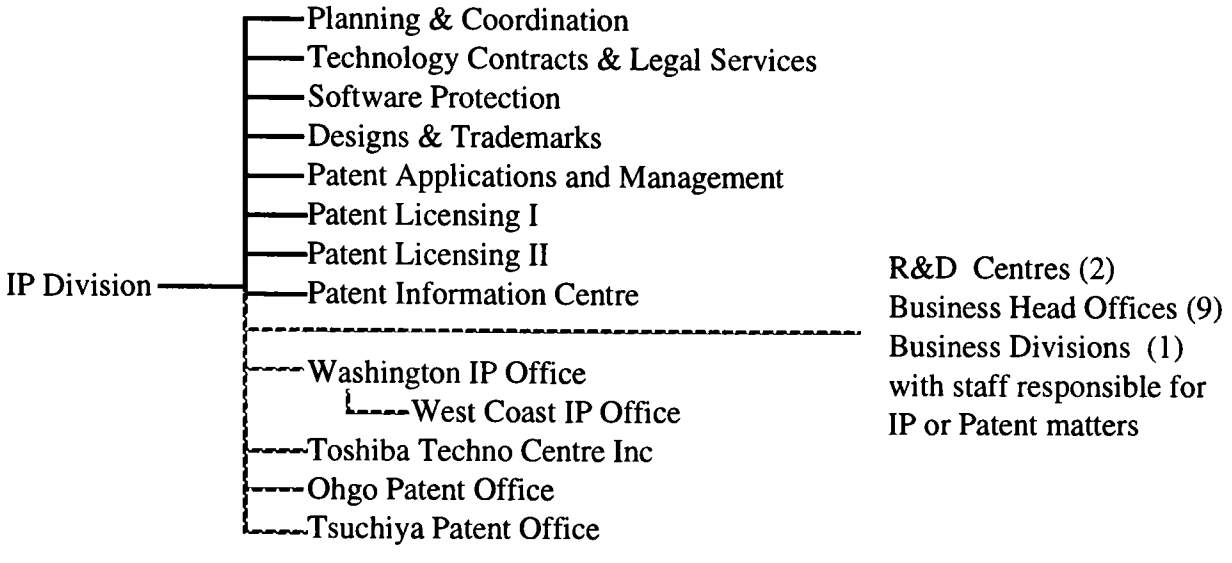
Some of the larger company organisations appear simple but actually involve devolved management with parts of the main staff distributed around factories and research centres. Hitachi has such a system mentioned in several sources (日立 1990), (日立 1983) (and Interviews with Hitachi Staff). Hitachi's 1983 book on patent management (日立 1983), lists several possible IP organisation types which can be categorised as having a :

i) Patent Unit based in the Technology Management section of the R&D division
ii) Patent Group as part of the R&D division
iii) Patent Section reporting directly to the President who also controls the R&D division
iv) Patent Division reporting directly to the President who also controls the R&D division
v) Central Patent Division reporting directly to the President controlling the R&D division & with independent Patent Divisions/Sections attached to each factory or R&D centre.
vi) Central Patent Division reporting directly to the President controlling the R&D division & with dependent Patent Divisions /Sections attached to each factory or R&D centre but also reporting to the central Patent Division.

Hitachi's organisation comprises the last of these having the advantages of direct links to both the president and R&D centres. Toshiba's organisation similarly involves connections between several outposts in R&D centres and factories and the main IP office.

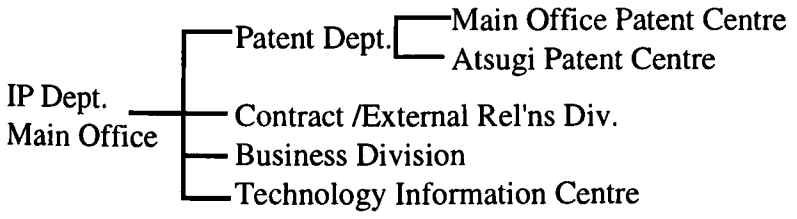
Figure 33 Toshiba's IP Division Organisation

Source : (Norichika 1994)

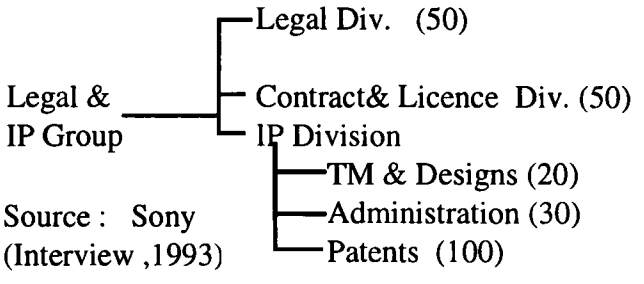



According to one interviewee who worked on a consultancy project studying Japanese Patent Management in the mid 1980s, comparing this project's survey results with the situation then, shows that the proportion of companies without IP departments has decreased and the proportion of companies with dependent distributed organisations has increased. A more recent trend is the amalgamation of legal and IP departments to provide an overall in-house service capable of dealing with a whole range of issues including most importantly foreign litigation. In a 1990 article the Sony IP department was listed as comprising a contracts division but having no direct links with a legal division. More recently these have been created :

Figure 34 Sony IP Department Organisations 1990 / 1993




Source : (ソニー,1990)

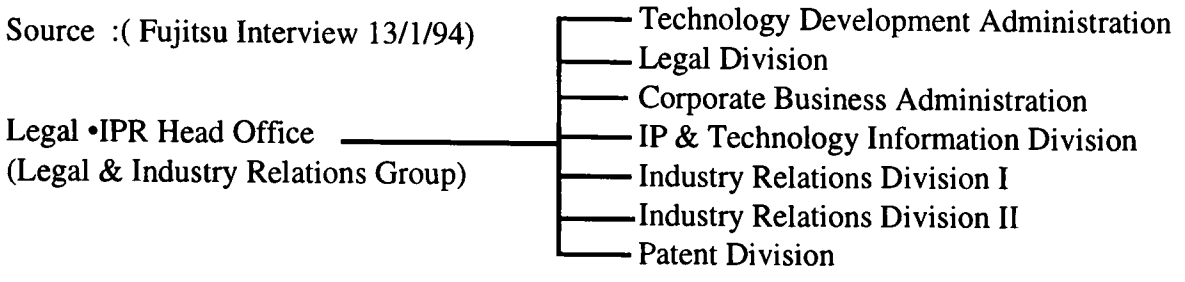



Source : Sony
(Interview ,1993)

A further example of the involvement of the legal department in IP matters in another large electronics company is in Fujitsu where recently the IP department was reorganised to form a "Legal and Industry Relations Group"[72].

[72]This is Fujitsu's English translation, the original Japanese version I was given reads 法務・知的財産権本部, which translated literally means : Legal and IPR Main Office

Figure 35 Fujitsu IP Department Organisation




The department head is a director and the department includes several divisions, for example industry relations divisions, which aim to deal with litigation and other inter company business.

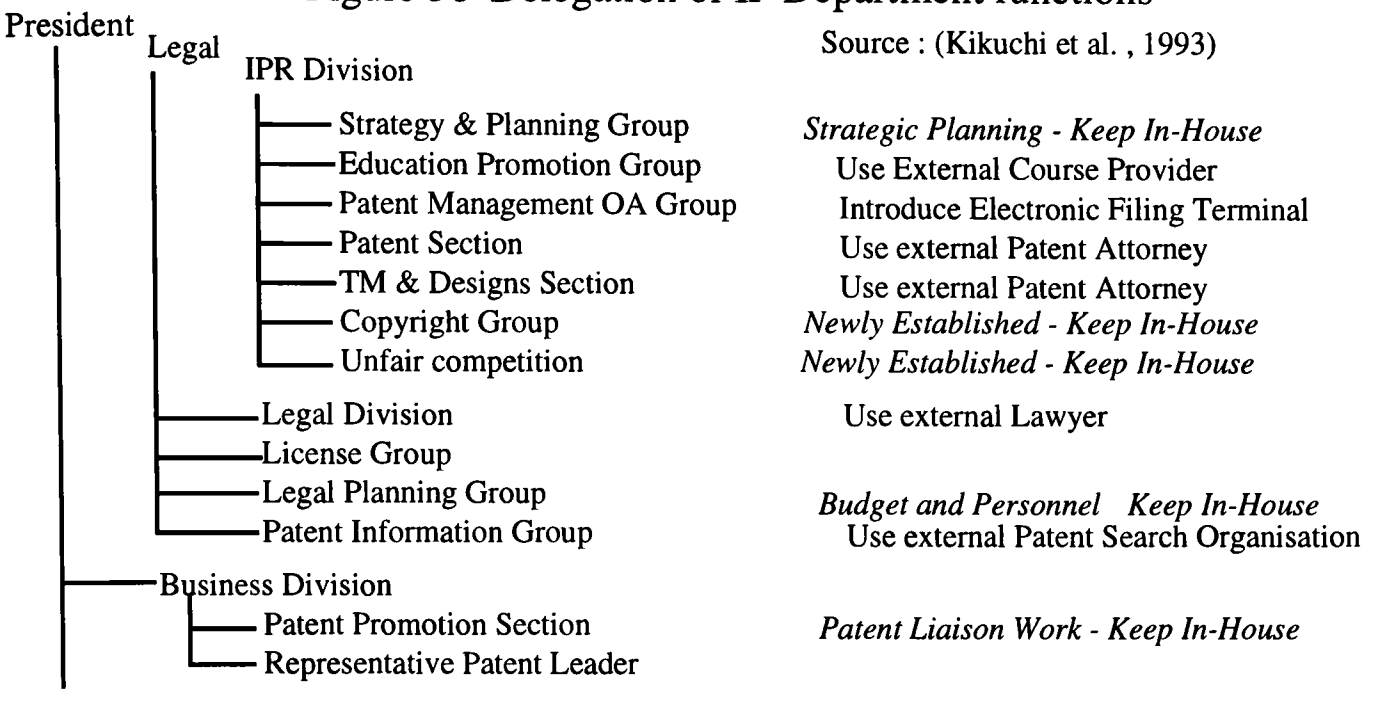
It would be wrong to think that a high proportion of Japanese IP departments are closely allied with the legal division. However, the above examples do show that the influence of the legal environment and specifically whether litigation is a significant issue for the company can have an effect on organisational structure in some cases.

One final observation on links between strategy and structure in Japanese IP departments concerns the establishment of offices abroad. This is separate from the overseas training mentioned earlier. Toshiba, as can be seen from the above diagram has a representative office in the USA. Several companies have IP representatives based in the US and Europe. Hitachi for example has a representative based in Europe and Matsushita has stationed a total of seven experts in the U.S., Singapore and China and is also planning to base staff in Germany. The report concerned with Matsushita notes that "The move is aimed at making intellectual-property rights a part of overall management strategy and establishing a kind of property business" (Nikkei Weekly 1995), this illustrates the link between the organisation of the IP function and its intended IP strategy. As Japanese companies' IPR interests become more global so do their IP organisations.

### 4.5.3. IP & R&D Staff Responsibilities & Use of external patent attorneys

Delegation of work to outside agencies is almost ignored in the literature. I have already described some instances where companies have subsidiaries dealing with patent searching. For example, Toshiba (See Page 211) has nominally independent firms of patent attorneys, which are at least indirectly controlled by the main company. Such subsidiaries are sometimes staffed by retirees or secondees from the main department. However there is also the more common case of the delegation of work to patent agents in private practice. This is essential for foreign filings when either a local and a foreign agent are used or a foreign agent alone is. Otherwise such delegation is optional.

Figure 36 Delegation of IP Department functions




A recent book by Kikuchi et al., distinguished between tasks that are delegable and those that are not using a diagram based on Ricoh's organisation. Finally there is the factor mentioned in the background chapter and the survey results (Q.9) that there are very few qualified patent attorneys working in Japanese industry which tends to increase the amount of work delegated to outside attornies (Q.68).

### 4.5.4. IP staff numbers

The main point to note about IP staff numbers in Japan is that they are increasing. The recent Nomura survey predicts an 11% rise in IP staff numbers over the next three years and found a 25% increase over the past three years (村上 輝安 1993; Murakami and Nakata 1994). This is considerably higher than the increases found by this survey (12.54% over 5 years or 2.4%pa) but if true indicates that smaller companies (the Nomura survey must have included more smaller companies due to the larger sample size) may be increasing IP staff levels even more than large companies are. By starting from a small base, high percentage increases may not be that difficult to achieve. Media comment about increasing IP department size is not uncommon. One article in 1990 for example refers to a "recent newspaper survey" (unspecified - I have not been able to locate the original article) of IP departments showing increases "by on average 20% over next 3 years in anticipation of mounting competition". Sharp was said to have almost doubled its IP department to the present 130 in past 3 years and to be intending to increase this to 300 in the next three years (Patents & Licensing 1990).

Before the extra spur of US litigation began to take effect Japanese IP departments were probably among the largest in the world simply due to the sheer volume of applications being processed. The recent increases in litigation work have merely added to this, or at the least compensated for the slight decline in patent application filings as the emphasis shifts from quantity of applications to their quality. This means that the resources being devoted to IP

matters by Japanese companies ought to put Japanese companies, with the staff to devote time to more long-term thought on IP matters, in the vanguard of IP strategy thinking and practice.

### 4.5.5. IP staff Recruitment, Rotation and Liaison

A recent book by Matsubara (松原　治 1994), outlines three ways in which IP departments can acquire staff. Recruitment of new graduates, Transfer of personnel from other divisions and recruitment from outside the company. Concerning the latter, Mr. Ejima one of that rare species, Japanese Headhunters, has said "Legal managers, who take charge of corporate IP, are especially in strong demand from manufacturers and software houses, and the number of requests we receive for them has tripled over three years." (Nikkei Weekly 1994). But despite this, head-hunting of IP personnel is still a rarity in Japan and direct recruitment and intra-company transfers more common.

More common is the case of an Engineer I interviewed who worked for a large printing firm and having worked in the company for several years was undergoing training to join the company's IP department where he expected to stay for about 10 years (Interview 94/5/15). Another example occurs in the fictional cast of "typical" characters whose conversations are used to provide an introduction to a book about Patent Maps (中村　茂弘 1993). The author Mr. Nakamura worked for many years at patents work in Hitachi Metals and thus should have a good idea of what is typical. The backgrounds of the cast are given here in paraphrased form :

A君　Age 30. On joining following graduation, worked in R&D for 2 years, Production engineering for 5 years and then for 3 years as a production quality improvement specialist before moving to patents information work.

B君　Age 20. On joining following graduation worked for two years in the patent department, undergoing patent related training.

Cさん　Age 30. On joining following graduation, worked for 5 years in production engineering then in Patent department. Currently working on a Patent Strategy project

Dさん　Age 30. On joining following graduation, worked for R&D centre 7 years and in the planning section for 3 years following that. Also did a 2 year university course in the USA and is now working in the R&D division.

Section Head T　Age 50. Just transferred to Patents work. Past career spent in production engineering in factories, has worked in factories and been involved in the construction of new plant. Became a deputy section head three years ago after the factory was put into operation and has interests in the development of new technology. Has now been given three years to turn the Patent Dept. into a Strategically pro-active division.

Sさん　Age 50. Joined company via process division factory. Then worked in planning and R&D. 15 years ago became patent representative for the factory. 10

years ago moved to the main office. Has become a Patent Work "Veteran" and is currently trying for the Patent Attorney's exam. Carries out patent training for the company.

Mさん Age c50. Foundry division Patent officer. Has worked in patents work for 17 years. Has also done a large number of types of work, ranging from production work to quality control work. When first started patent work was responsible for the Patent System which is now the basis of the present system. Another patent work veteran. (中村　茂弘 1993)

The profiles of these, albeit imaginary, workers are typical and resemble the backgrounds of many of those I have interviewed. The essential factors behind such backgrounds though are firstly the practice of "rotating" staff on a regular basis and secondly the practice of not employing too many, if any, qualified Patent Attorneys who would be too specialised and too costly[73] to rotate out of patents work.

The status of Patent work has changed in the past few years as the comments by the Canon manager above show and it is no longer a potential backwater, which means that the willingness of managers to spend some time in IP work is much greater than it was twenty years ago[74]. Even in 1987 an increasing number of people wishing to transfer to IP work was being noted (東レ 1987).

So long as the scarcity of qualified agents in industry persists, there are thus several benefits, as well as disadvantages, to the system. On the benefit side, rotation of staff into the IP department brings in awareness of technical matters elsewhere and improves the quality of the IP department's work. It can also improve the appreciation of IP in other sections when former IP managers are rotated out. For example an Japanese manager I interviewed in the UK who worked at a Japanese company R&D laboratory in the UK formerly worked in patents work when in Japan. Though it is still slightly unusual, Toshiba's top director for all engineering technical activities in Toshiba was once a General Manager for the patent

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[73]The Japanese patent attorney's exam is notoriously difficult to pass. There is an initial exam, a final exam and a final interview. However each year the pass rate is only of the order of a few percent. This is because a large number of people take at least part of the exam. The end result is that there are about the same number of qualified agents per head of population in Japan as in the UK (c3500 agents per 120m people in Japan vs 1200 per 52m in the UK). However, in the past with the far larger number of applications in Japan there has been a shortage of agents resulting in a sellers market for patent agents services. Patent attorneys have thus hitherto been well paid. For someone working in an industrial patent department to remain in the department on qualifying would usually not appear to make economic sense. Furthermore it would be socially unacceptable for a qualified person to report to a patent department middle manager who was unqualified. As a result there are few patent agents in Japanese industry except at the top of the largest industrial IP departments. Recently with the slight downturn in business caused by the recession and the shift from quantity to quality it has perhaps been harder to start up a new practice than it used to be but the tendency to leave Industry and go independent is still there (渡部　温, 1993). The result is that it is quite normal for all but the largest patent departments to be run as the examples above show, by non-specialists rotated in from other departments.

[74] Such an increased profile of patent departments was noticed in the survey by Granstrand et al. (Royal Swedish Academy of Engineering Sciences, 1993) which reports an increased status of patent activities in Japanese companies compared to Swedish companies.

division for a year. Thus at all levels coordination and appreciation of IP matters can spread throughout the company. Toray rotates managers both into and out of the IP department and has described these and other benefits. Toyota too rotates IP managers both within the IP department and between the IP and other departments. In 1982 it rotated about 20% of staff internally and 10% of staff between the IP department and other departments (牧野　孝之 and 中野　謙一 1984). In some, albeit rarer, cases managers are rotated out of the IP department and then back into it bringing to the IP department a degree of self-awareness it might not otherwise have (東レ 1987). The downside is the fact that the managers who control IP matters may be not as expert as they would be if they were career patent professionals with full qualifications as patent attorneys. As the above examples show there are patent "Veterans" in IP departments but probably fewer specialists than there would be in the equivalent UK company as we shall see in the survey results. Which is better is a moot point. In general the larger electronics companies has perhaps the best mix with a mixture of patent professionals with full qualifications and also a pool of rotating non-specialist managers spreading the benefits around the company of having worked for a while in IP work and vice versa.

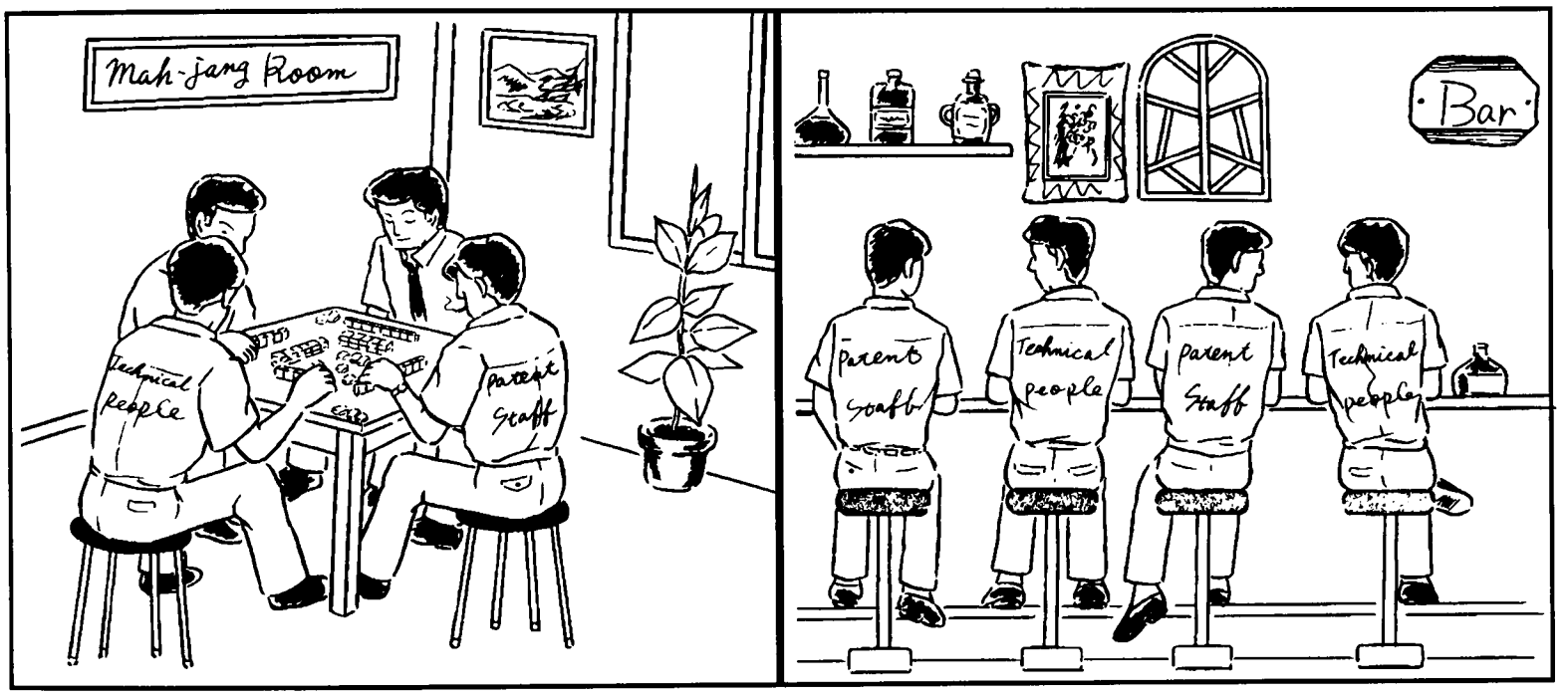
More general studies of rotation in Japanese companies do exist. One of the most recent is that by Lynn which shows that among Japanese engineering companies intra-firm rotation is greater than inter-firm rotation. The study also found that job rotation was higher in Japanese than US firms and that Japanese managers were more likely to be rotated later in their careers and to areas they were not specialised in more often than in the USA (Lynn, Piehler et al. 1993). It also showed that the expected benefits in terms of increased numbers of contacts and sharing of information may not be as great as expected. Whittaker in a study of Japanese and British factories stated that :

> "Mobility, however slow, was a normative concept in the Japanese factories.....whilst the reverse was the case in the British factories."(Whittaker 1990)

Surprisingly in spite of this some Japanese opinion about rotation in IP departments is that there isn't enough of it (See page 250 line 16). Okazaki-Ward has also cites a Ministry of Labour survey showing that 60.5% of firms with more than 5000 employees practised rotation (Okazaki-Ward 1993). Sasaki has also commented on job rotation in Japanese companies and the inclusion of both specialist and generalist tasks amongst those assigned to those destined to become general managers (Sasaki 1981a). What is certain though is that even if the range of contacts and information sharing is not increased the knowledge gained in one department can be transferred to and used in another department simply by transferring the manager to the other department and that such transfers are common in Japan. There thus must be more benefits in the spread of knowledge than might be expected, even if it is reduced to the effects of managers distributing knowledge by taking it with them.

One further comment on staff rotation is that even if the rotation does not build up intra-firm links as much as expected they are nonetheless important in IP department work and especially in the linkage between R&D personnel and patent department staff responsible for drafting patent applications. A researcher working for Hitachi who had also worked in a major US computer firm contrasted the two firms attitudes[75] saying that US company lawyers were formal requiring appointments for interviews, whereas Hitachi IP staff were informal, lived in the same building and one could just phone them up. This may well be a result of the more usual technical managerial background of most IP managers. This is reinforced by the stress in the literature on IP management on keeping close to the customer as regards IP/R&D links. Another example of this occurs in the following two illustrations which came from a book describing Toray's patent management (東レ 1987).

Figure 37 IP / R&D liaison at Toray




Source : (東レ, 1987 )

Finally, the large number of often popular and introductory books about IP issues which seem to sell successfully, since many are reprinted several times before finally going out of date, may be ascribed in part to IP staff rotation. Someone about to move to an IP section is going to be acutely aware at first that he is in a specialist area he knows nothing about and will want to learn about it as fast and painlessly as possible - hence perhaps the success of many books meeting that need.

## 4.6. Discussion of Survey Results

The survey results in general confirm the outline of the various topics described above and the following comments about them can be made in the light of the above information.

UK IP departments and especially the larger ones are more likely to be part of the legal

[75]Interview on 93/10/1.

department than in Japan (Q.2) and more likely to have a high number of patent attorneys among their staff (Q.9). A higher proportion of IP department heads were directors among large companies in Japan (Q.3) and larger companies IP departments were more likely to report to a company director in Japan (Q.4). Both the absolute and relative numbers of staff involved in IP work in Japan far exceeded those in the UK at all levels and in all sectors (Q.7). The numbers in Japan had been increasing of late in comparison to the fall in UK numbers (Q.8). Japanese company IP department staff are more likely to have transferred from other departments and to leave by transferring to other departments than UK IP department staff are (Q.14). However the length of stay in the IP department was not much different for the two countries. This may well be because a far higher proportion of UK IP department staff leave for employment in other companies which is rare in Japan. This higher inter-firm transfer rate compensates for the lack of intra-firm transfers to other departments in the UK.

So far as training of IP staff is concerned again there is, in virtually all cases, (save the rare case of sending R&D staff abroad), more training carried out by Japanese companies than UK companies. This applies not just to Japan's specialist IP staff which, comprising fewer qualified attorneys, might be expected to require more training. It also applies to the amount of training given to non-specialist R&D staff (Q.65/66). This is shown by the extent to which R&D staff are trained to draft patent specifications (Q.67) where significantly more of such training is given in Japan than in the UK. An even more pronounced difference lies in the extent to which outside patent attorneys are used by Japanese companies being almost 80% for Japanese companies and only c42% for UK companies with IP departments (Q.68).

In an attempt to measure the involvement of non-IP departments in IP related decisions, questions were asked about the ranking of inventions[76] and who was involved in such decisions. The low response rate in the UK and the low utilisation of such methods (a form of triage for inventions) meant that the UK results were not comparable. The Japanese results though, showed that R&D sections were almost as involved as the IP section was (Q.76) which must indicate a high degree of coordination. A study of the involvement of non-IP departments in a range of other IP related decisions (Q.76) also showed that Japanese companies involved the R&D and Production departments more in decisions than those in UK companies.

## 4.7. Conclusions

From the research and literature outlined above it can be seen that several key features of more general "Japanese Management" also play a significant role in defining Japanese IP staff management Many of the above features of IP staff management are not unique to IP management but occur throughout Japanese management practice. These include; graduate

[76]A system of making decisions about IPRs easier by ranking the associated inventions in terms of their overall financial and strategic worth according to some pre-determined set of rules.

recruitment, low staff turnover, relatively little job hopping, group decision making processes, in house training, job rotation schemes and secondment to other organisations (as with staff seconded to the IIP and JIII). The effect of these can be seen most clearly in the organisational structures of IP departments, the patent/IPR education and training schemes in Japanese industry, the structure and use of patent attorneys both in and outside industry and the practice of staff rotation and the encouragement of interaction between the IP function and other areas of the company.

In an article on IP management linked to Business management, Mr. Ogawa the head of Hitachi's IP division outlines several key issues in IP management. Among these is establishment of an organisation which is directly linked with business management whilst still promoting IPR specialisation. As means to further such an objective he mentions :

i) Strengthening cooperation with top business management
ii) Promoting internationally up to date IP specialists
iii) Activation of rotation (of staff)
iv) Strengthening of Education of new recruits and transferees

(小川　勝男 1993)

This rather succinctly summarises much of this section in that it draws attention to the fact that much of Japanese IP management actions are aimed at integration of the IP function into the general management of the company whilst still maintaining and upgrading the specialist skills that an IP department requires. Obviously such a mixing of roles is easier in the larger IP departments which high Japanese filing rates have made possible. However, there is no reason why scaled down versions of such objectives could not apply to smaller IP departments.

In practice in the UK they do not and one must therefore conclude that whilst Japanese IP management is characterised by integration with the rest of the company, UK IP management is on the contrary characterised by less integration, and shrinking IP departments resembling the external patent agents offices they may well become if enthusiasm for "outsourcing" reaches the IP department. The trends in Japanese IP management have also been shown by the above research to have been largely directed by the IP and Business environment in Japan notably, the large numbers of patent applications, the structure of the Patent Agents profession and the range of "Japanese Management" practices outlined above. These have combined to give Japanese IP departments an increased profile and resources which it seems every likelihood that they will take on and use to develop the field of IP and their role in it to their companies' advantage in the years to come.

Mr. Ogawa has identified one of the key issues for the future of Japanese IP management. In the past IP management was largely a generalist's task of managing the filing of applications, the cross-licensing of the "buckets" of patents collected and sometimes the licensing in of foreign technology. With the increasing need to manage the outflow of technology as well as

its inflow, the need for higher quality not quantity of patent applications, and the increased incidence of litigation; the need for specialists has increased. At the same time a substantial technology inflow remains and the need for generalists remains. As Mr. Ogawa says an organisation structure is needed to integrate both business management and IPR specialisation.

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The above features of IP Staff management are thus not stand alone features but ones which integrate with the overall IP policies and other features of IP management in Japan aimed at efficient exploitation of the knowledge base controlled and or accessible by companies as much as avoidance of problems associated with the knowledge base controlled by competitors.

10

# 5. Attitudes to IP Litigation

## 5.1. Introduction

In discussing the hypotheses behind the present research, the view that Japanese society is traditionally a litigation averse society was mentioned. The persisting influence of the aversity to litigation of the Tokugawa era (1600 - 1868) and other factors discouraging litigation have also been referred to (See Page 95 ). The usual assumption is thus that Japanese companies are still reluctant to go to court. This is true but also, as we shall see, an over-simplification.

Helfgott claims that the Japanese IPR system has differences "resulting from cultural distinctions" (Helfgott 1989). However, this is derived from the idea that the Japanese system is biassed towards diffusion compared to a US bias towards protection and that this rather than any deeper reasons (such as any socially embedded effects of the Tokugawa era) constitutes a cultural difference per se. Promotion of diffusion rather than protection has also been outlined by Ordover et al. (Ordover 1991). In any event, Oda points out that whether the 'non-litigiousness of the Japanese" is a myth or not has been a point of contention for some years (Oda 1992). However, one needs to consider both underlying cultural influences as well as more recent and more rational influence of Japan's current technological situation in considering Japanese attitudes to litigation.

The combined effect of these considerations can be said to be summed up by Mr. Nakajima who in reviewing recent Japanese Utility model law has said "Litigation in Japan is still a rather new method of enforcing one's rights" (Nakajima 1994). However, the advent of the current pro-patent era in the USA and the growing need to protect Japanese technology has helped litigation become rather more familiar than it was. A key question now is whether past attitudes in Japan of seeing IPRs as a technology dissemination mechanism are turning into viewing IPRs more as the protection mechanism they are commonly seen as in the West and thus whether the socio-legal concept of IPRs is changing in Japan. The other possibility, which this research seems to suggest, is that a combined approach is now beginning to be pursued and that, as Ordover (Ordover 1991) suggests, dissemination and protection are not mutually exclusive.

## 5.2. Literature relating to IP Litigation

Despite the readiness of most Japanese companies to discuss most IP management issues at length, both in print and in interviews, when it comes to the contentious subject of litigation there is much less said or written.

A good example occurs in the journal「特許管理」(Patent Management). In February 1992, Minolta paid Honeywell $96.35m damages for infringement of autofocussing patents and by March had agreed to pay $127.5m in licensing fees. The case also involved $15.6m legal fees. Minolta subsequently reported its first ever loss (Inoue 1992). However, 9 months later in an article describing Minolta's patent activities the word Honeywell did not appear at all and only in the penultimate two lines under the heading "Future Issues" was it said that the company, based on its "litigation experience connected with the USA", would strengthen its risk management procedures (ミノルタカメラ株式会社 1992). In such a case reticence is understandable though one might feel that a US firm might have been less reticent in discussing what went wrong.

Where litigation does occur as a topic in the Japanese literature it concerns either i) action to discover and prevent infringement by others of one's own company's patents or ii) what is called 「他社特許対策」(Tashatokkyotaisaku) or "Other company patent countermeasures" aimed at avoiding or mitigating the effect of other companies' patents.

The overall impression from the Japanese literature dealing with individual companies is that one is unlikely to find out how Japanese companies really think they will act during litigation, and that rather than reading this form of literature, interviews with those involved in litigation with Japanese companies and the results of general surveys of attitudes will be more informative.

### 5.2.1. IP Litigation Surveys

The only recent survey on Japanese litigation practice is the Nomura survey which was published shortly after the current Japanese survey had been run (村上 輝安 1993). The survey found that on average 56% of companies had had some form of complaint of IPR infringement made against them in the past five years and 18.4% had been involved in a lawsuit in that period. This varied by industry with some sectors such as precision instruments being far more prone to litigation (100% of companies had experienced disputes and 37% a lawsuit). As with the present survey, the most common accusations of infringement from abroad came from the USA whilst the most common location of companies whom complaints of infringement were made against came from Asia. The survey found that Japanese firms charged with infringement settle in 80.5% of cases before reaching court, 11.3% after a lawsuit is filed and 8.2% are settled by the courts. Interestingly, the form of settlement arrived at varied depending on the opponent's nationality :

Table 21 Settlement of IPR litigation against Japanese companies

| Opponent Nationality | Opponent withdraws claim | Cross-Licence | Royalty Payment | Withdrawal from Business |
|---|---|---|---|---|
| OVERALL | 39.8% | 5.90% | 50.40% | 3.90% |
| Japanese | 41.30% | 6.30% | 49.50% | 2.90% |
| American | 29.60% | 6.50% | 61.10% | 2.80% |
| European | 50.00% | 10.70% | 32.10% | 7.10% |
| Asian | 50.00% | 0.00% | 50.00% | 0.10% |

Source : (Murakami, 1994)

The Swedish survey mentioned earlier only found that both patent infringement and patent litigation were thought to have increased more in Japan than in Sweden (Royal Swedish Academy of Engineering Sciences 1993). There is one other report by Hasegawa about a 1990 Japan Machinery Export Association survey which had 173 respondent companies (長谷川 俊明 1993). This showed that :

i) of 404 cases involving claims of IPR infringement against Foreign Companies; 87 cases involved patents and 317 cases Trademarks.
ii) of 221 cases involving claims of infringement by Foreign Companies; 207 cases involved Patents and 13 cases Trademarks. (155 cases were from USA, 52 from Europe & Canada, and 13 from others, 1 was missing)
iii) Of the cases involving the US in the past 10 years 138 were dealt with by court litigation
iv) Of the cases involving the US in the past 10 years 281 were dealt with before court litigation. (219 involved financial payments, 29 involved the handover of special technology, and 36 cases involved cross licenses (multiple answers were allowed)).

One can conclude that US companies would seem to have been more intent on Patent litigation than Japanese companies or other countries and that a high number of cases of alleged infringement ended up with the Japanese company retaining access to the IP concerned. However this particular survey comes from only the machinery sector and thus generalising from it must be treated with caution. It does however confirm the strong influence of the US in litigation matters.

Perhaps the most dramatic contrast between litigation in the US and Japan is referred to in a recent IIP report which quotes Japanese Supreme Court and US Courts Administrative Office statistics for the years 1987 to 1992. These show that not only is IPR related litigation in the USA far more common than in Japan but that it is also quicker. In 1992 newly received cases involving IPRs in Federal District Courts in the USA totalled 5830. In Japan in 1992, 407 civil cases involving IPRs were received by district courts. In 1989 of 5557 IPR cases pending before US courts 440 (7.9%) had been pending for more than 3 years. Of the 322

cases pending in 1989 before Japanese courts 94 (29.2%) had been being tried for more than 3 years (知的財産研究所 1995a). In short Japanese IP litigation could be characterised as not just uncommon and slow but uncommonly slow.

## 5.3. IP Litigation - Interviews

Among the more useful interviews in respect of the subject of litigation were several involving foreign lawyers working in Japan. They were perhaps more prepared to talk on such a sensitive subject compared to Japanese managers who had the potentially embarrassing task of talking about their company being in dispute with other, usually foreign companies.

### 5.3.1. Reluctance to Litigate

The general opinion among those who commented on attitudes to litigation in Japan was that Japanese companies are still reluctant to litigate but that there are some signs of change.

According to one Japanese researcher whilst some electronics companies have begun to use patents in a strategic way, "in many companies, patent departments exist it seems, in order not to infringe other rights". (Interview, 93/7/15)

A US citizen based in Japan and closely connected with both a Japanese company IP department and US companies it was negotiating with, thought that Japanese companies would do anything to be accepted, given licenses and to avoid litigation. Furthermore, the image of Japanese companies as aggressive litigators, where it did occur, was often a result of errors on the Japanese company's part and sometimes due to their foreign subsidiaries (Interview, 93/11/13).

A US IP lawyer who had worked in both Japan and the USA drew a distinction between the two saying that : "Japanese companies are reluctant to enforce rights against US companies in the USA". The reasons he gave were that they wished to avoid adverse publicity and felt that as they might be discriminated against, they should keep a low profile. He thought that this would change but that at present, though Japanese companies have acquired huge numbers of patents, litigation involving them is negligible.

So far as suing Japanese companies for infringement was concerned he thought that, once the first case connected with a particular IPR was successful, Japanese companies were like "Elephants in line waiting to pay up". The same US lawyer thought that another factor militating against much litigation by Japanese companies was the lack of any corporate litigation culture or any corporate structure to support major litigation. A contributory factor he saw in this was the fact that many Japanese company senior IP managers are not IP specialists but transferees who will eventually posted to another job. US companies on the

other hand allowed people to stay put and thus build up specialisation in a field, often working 15 years in the same area. In his experience every senior Japanese IP manager he has met has been without overall experience of IP matters in depth[77]. He thought that US companies are much more concerned to manage patents to ensure maximum protection by use of amendments, reissues and other legal tactics. He didn't think that anyone in Japanese companies with the authority to lapse patents did any more than rubber stamp renewals. In short no-one is going to make any hard decisions unless they absolutely have to and unless the operation is meant to be a money making operation. However, the concept of patent portfolio management for profit isn't very developed in Japan compared to the USA. This may be because IP centres in Japan are viewed as cost centres not revenue centres - resulting in a lack of pressure on profits and the need to generate revenue - which may well change as a result of the depression (Interview, 94/5/5).

The "traditional" Japanese view though is still one of promoting discussion not litigation. According to a senior IP lawyer in a well known Japanese electronics company so far as litigation is concerned "It's still most important to reach a settlement by talking it over". He also said that in Japan "if one gets as far as litigation the idea of reaching a solution through discussion is mutual. Well that's the fundamental Japanese way of thinking which I don't think has changed much". The same manager also thought that solving litigation problems was easier if the other party was Japanese and in such a case a solution could be reached far quicker. (Interview, 8/7/93).

### 5.3.2. Strengthening attitudes to litigation

As the research concerning IP staff management has shown, whilst on average Japanese managers may well be lacking in legal qualifications, there are equally, especially in the larger IP departments, many managers who are career IP specialists and highly qualified. Consequently, the situation may be changing and accusations of a lack of experience only now be valid for those Japanese companies without very large IP departments. However, with this increasing professionalism and even the influence of many staff having trained in US law offices, attitudes may be changing slowly.

A senior IP lawyer working in Japan for a major US computer company said that negotiations with Japanese companies were getting harder as they had more on their side of the table, and were more aware of the need to protect it. He thought that there was an increasing willingness to litigate (Interview, 93/12/21). The situation is summarised by a comment by a Japanese Lawyer trained at a US law school and law office :

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[77]This must mean that he has not met some of the senior managers in some of the largest firms who are in general fully qualified Japanese Patent Attorneys. Managers in smaller and medium sized firms may well not be qualified or have as long standing or detailed knowledge of IP matters.

" The attitude of avoiding law suits may be widely accepted in Japan, but this does not work in the American lawsuit society. Unless the Japanese businesses courageously employ aggressive strategies that encourage us to take cross action if we are sued, we will never be able to stand on the same platform". (樫葉　幸夫 1993)

### 5.3.3. Overall Impressions

The overall impression gained from the above interviews and others with similar opinions is that litigation involving Japanese companies is characterised by the following features :

i) extreme reluctance to go to court on the part of Japanese companies
ii) a dislike of adverse publicity
ii) a preference for discussion and compromise especially with other Japanese companies
iii) a preference for discussion and compromise even on the part of lawyers and Judges
iv) a willingness to use IP litigation when all else fails
v) an increasing willingness to use litigation especially against non-Japanese companies.
vi) a concentration of more aggressive tactics in larger Japanese firms with more expertise and international experience.

## 5.4. Discussion of Survey Results

The survey results it should be stressed are comparisons with the UK and not the USA which is the country most often compared with Japan. There may well be differences between UK and US practice and attitudes as between UK or US ones and those in Japan. My own feeling is that UK practices and attitudes lie somewhere between those in Japan and the USA though confirmation of this will have to await funding for a comparable US survey.

Respondents in both countries would rather negotiate a settlement than go to court (Q.47) however this probably conceals differences in readiness to go to court.

Table 22 Average Number of Complaints of Infringement

| | + - - - - - Nationally based companies- - -+ | | | + - - - - - - - -Companies based overseas- - - + | | |
|---|---|---|---|---|---|---|
| | Small Co.s <500 empl. | Large Co.s >500 empl. | Other Orgns | Small Co.s <500 empl. | Large Co.s >500 employees | Other Orgns |
| **Q.48** | Average number of Complaints of infringement by Respondents in the past five years | | | | | |
| a.JAPAN | 2.703 (158) | 3.867 (158) | 0.000 (159) | 1.000 (159) | **0.503** (159) | 0.038 (159) |
| b.UK | 1.238 ( 63) | 0.613 ( 62) | 0.230 ( 61) | 2.081 ( 62) | 1.476 ( 63) | 0.016 ( 61) |
| t test a:b p = | **0.015** | **0.0000** | 0.16 | 0.13 | **0.032** | 0.46 |
| **Q.55** | Average number of Complaints of infringement against Respondents in the past five years | | | | | |
| c.JAPAN | 1.164 (165) | 3.163 (166) | 0.164 (165) | 0.808 (167) | **1.616** (164) | 0.463 (164) |
| d.UK | 0.219 ( 64) | 0.312 ( 64) | 0.032 ( 64) | 0.344 ( 64) | 0.812 ( 64) | 0.032 ( 64) |
| t test c:d p = | **0.0002** | **0.0000** | **0.026** | **0.096** | **0.0081** | **0.0011** |
| JAPANt test a:c p = | **0.0068** | 0.36 | - | 0.58 | **0.0001** | **0.0010** |
| UK t test b:d p = | **0.0022** | 0.28 | 0.23 | **0.013** | 0.16 | 0.66 |

The results from the survey have already been reviewed, however in the light of the above additional findings the following comments can be made. Infringements of respondents IPRs was mainly by nationals in the case of Japan and mainly by overseas companies in the case of the UK, the differences being significant in the case of large overseas companies and national companies. There were more complaints against Japanese companies than against UK companies on average wherever the complainant came from. However in Japan more complainants against respondents came from Japan than from overseas whereas in the UK the reverse was the case.

In both Japan and the UK there were significantly more complaints by than against respondents in the case of small companies, which was also true of large companies though the difference was not significant. However, for overseas companies the situation in the case of Japan was reversed with UK companies complaining more than being complained against and Japanese companies being more complained against than complaining, at least in the case of large companies.

These results show that the Japanese companies surveyed are perhaps more sinned against than sinning, at least concerning smaller Japanese companies. In respect of overseas companies though Japanese respondent companies are perhaps more sinning than sinned against, at least concerning larger overseas companies. This would be consistent with a reluctance by Japanese companies to pursue infringement actions against overseas companies and difficulties for overseas companies pursuing infringement actions in Japan.

The survey also shows (Q.56 / 65) that levels of infringement against respondents IPRs are rising in both countries but that allegations of infringement against respondents are rising more against Japanese than UK companies. Hardly any companies in either country had seen a decrease in litigation so overall litigation levels are almost certainly rising.

Despite the increase in litigation neither country had seen any change in the ways in which disputes were resolved. This may indicate that the social factors determining how readily companies resort to litigation are slower or less amenable to change than might be expected (Q59 / 53). However there were differences in the propensity to go to court as opposed to settle infringement actions. Both Japanese and UK companies were slightly more inclined to settle in a foreign court than on home ground. Japanese companies were also slightly but significantly less likely to go to court to pursue infringers than UK companies (Q.52) and slightly but not significantly less likely to go to court to defend against allegations of infringement than UK companies (Q.58).

These results show that Japanese companies are indeed more inclined to settle infringement actions than UK companies. However, the questions about the ways in which disputes are

settled (Q.50 / 57) confirm that resolving them via the court is rare in both countries.

A final and most important point concerns the origin of litigation. Allegations of infringement from abroad come mainly from the USA though in the case of UK companies there are more cases originating in Germany and France than is the case in Japan (Q.56). In the case of the infringement of respondents IPRs the most commonly involved country was Taiwan followed by the USA and Korea in the case of Japanese respondents and the USA and Germany in the case of UK respondents. Though the response rate was low (c41-46 replies in each case) they do confirm the earlier findings that Japanese companies are likely to be accused of infringement by US companies and in turn accuse other Asian countries of infringement of their IPRs.

## 5.5. Conclusions

The original hypotheses regarding litigation expected that :

- H19 UK companies are more likely to go to court to settle infringement actions than Japanese companies are.
- H20 Japanese companies are becoming more likely to go to court to settle infringement actions.
- H21 Litigation is becoming more common for both UK and Japanese companies.
- H22 Japanese companies are less likely to go to court to settle infringement actions than UK companies are.
- H23 Japanese companies are more conciliatory in national courts than in foreign courts.
- H24 Japanese companies are more likely to be accused of infringement by US or other western companies
- H25 Japanese company IPRs are more likely to be infringed by Asian companies.

These were, except H20 and H23 confirmed by both the survey and other data collection methods, though there are some indications that H20 might come to be true in the future according to some sources. Overall, these results add further weight to the view that Japan occupies an intermediary position in that it is at risk of infringing technology imported from the West and particularly the USA whilst it is also at risk of having its own technology infringed by companies in Asian countries. The approach to litigation adopted by Japanese companies is thus a mixture of an at times defensive approach, when the need arises to protect IP from unfair exploitation by others and also a disseminative approach when the need to raise licensing revenues, cooperate with other firms in the same field and keep followers one step behind arises. The socio-legal environment in which IP litigation occurs is also seen to have a noticeable effect on attitudes to litigation and negotiation. However, such variations are not so strong as to fly in the face of logic and, as much in the UK as in Japan, all companies would wish to avoid litigation if at all possible (Q.47).

## 6. Attitudes to IP Licensing

### 6.1. Introduction

Licensing is one of the key issues at the heart of IP strategy. The decision not to license may cause litigation, prevent market entry and may hinder standardisation of a company's products. Granting licenses may help standardisation, prevent litigation, increase earnings and allow market entry and it may also help or entrap competitors.

Within the IP management field it is the area least populated by legal specialists. Licensing work is sometimes carried out by legally qualified personnel but even in UK companies, licensing managers will more often be general managers who having negotiated agreements in principle leave the fine detail for the lawyers. In Japan there may be even less need for lawyers since, in contrast to the US or UK where legal agreements comprise thick agreements covering every possible eventuality, in Japan they may be no more than a few pages long with a much greater reliance being placed on implicit understanding「 暗黙の了解」(Anmoku no Ryôkai) between the parties.

However, this section is not a taxonomy of licensing strategies nor an analysis of job specifications. The aim is to dicuss general attitudes towards and practices regarding licensing in Japanese companies and to compare them with those revealed in the UK survey. The reason for this objective is that the comparison is based on a view of Japanese companies as occupying a middle ground in flows of technology. They are thus both licensing in from more advanced sources and licensing out to less advanced users of technology and thus as we shall see neither reluctant to license in nor hesitant to license out technology given the right circumstances.

As discussed earlier, bulk Japanese technology import and export statistics are available and the direction of flows of technology can be studied from them as well as from some of the data in the current survey. However, quite apart from the statistics there is also the question of the attitudes to licensing which underlie the figures.

### 6.2. IP Licensing Literature

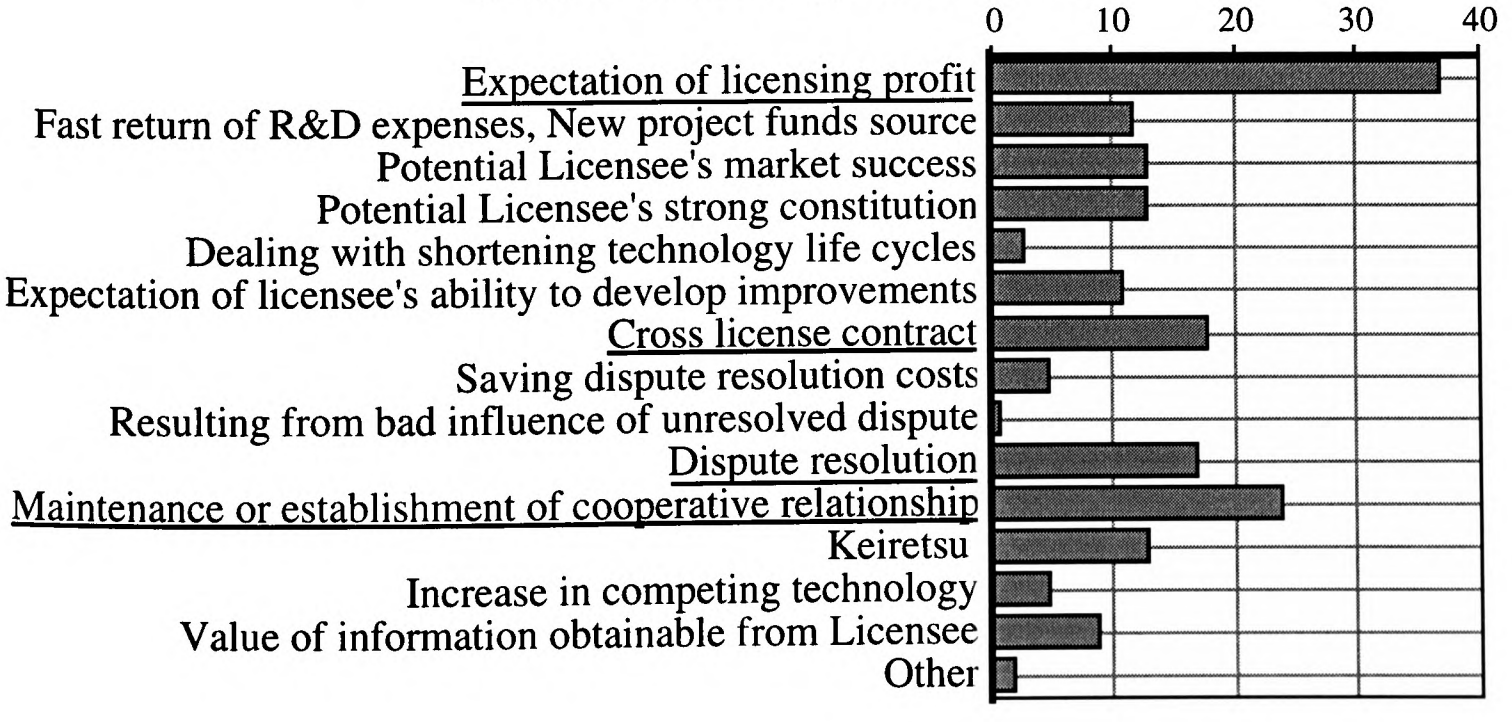
Perhaps the most common licensing articles are "How to" articles written by and for licensing executives. Some of the more academic articles on licensing have already been mentioned in the literature review. However both of these are perhaps less interesting than the few surveys on licensing in Japan and the variety of sources of information about current licensing practice which can be found scattered among the descriptions of companies' patent management practices.

## 6.3. IP Licensing Surveys

The two main surveys on IPRs in Japan from Sweden and Nomura referred to earlier did not ask many specific questions about licensing. The Swedish survey did however reveal that Japanese companies' propensity to license out, in and cross-license are all greater in Japan than in Sweden (Royal Swedish Academy of Engineering Sciences 1993).

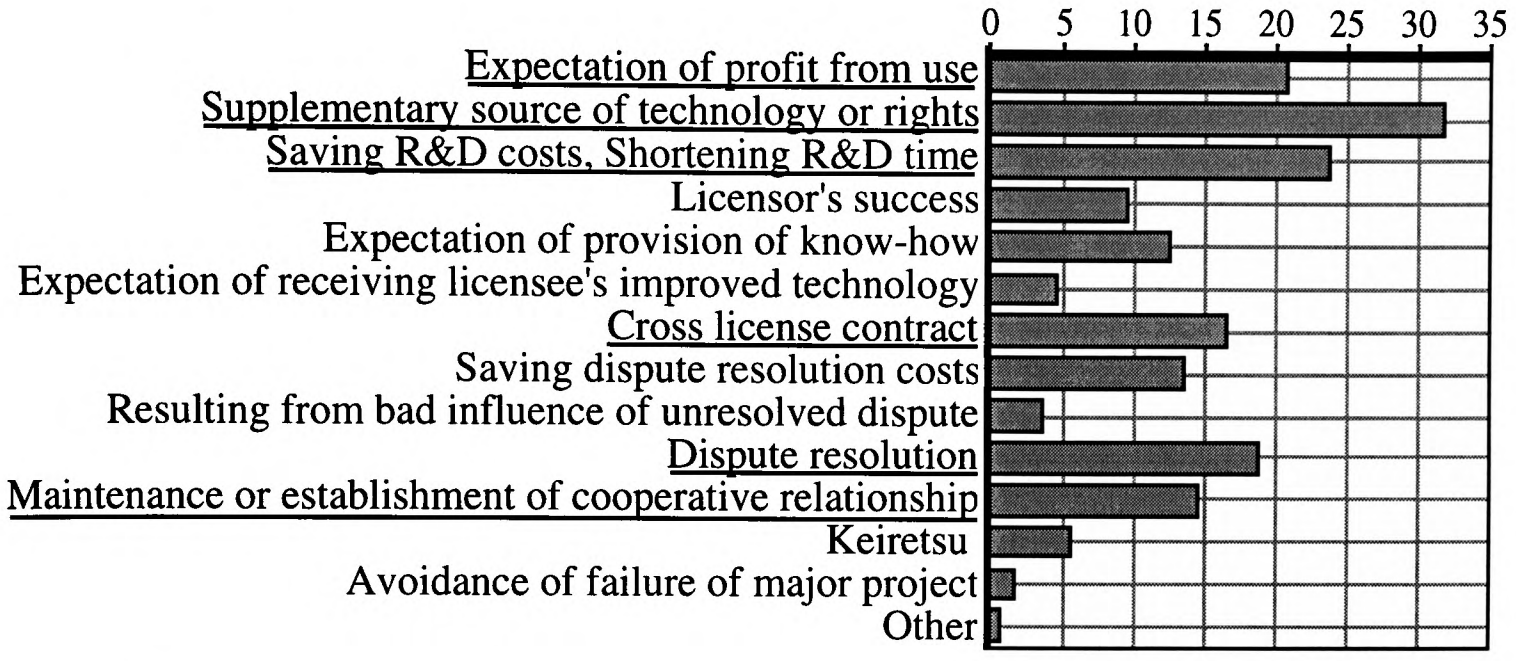
There are however one or two other published surveys which have a closer bearing on licensing in Japan. In 1992 a survey was carried out into licensing practices by the IIP (Ishii and Fujiono 1994). This surveyed 46 of 200 LES[78] members. The survey mainly covered royalty rates and the factors involved in setting them but also revealed that the 46 respondents had a fairly evenly matched number of agreements for licensing in and out with foreign and Japanese companies. There were 58 licenses to Japanese companies and 63 to foreign companies and 54 licenses from Japanese companies and 68 from foreign companies. Of the 46 respondents 29 had a surplus in their balance of royalty payments and 17 a deficit. This is rather more positive than was found by the present survey (See Q. 27) but the sampling method of the IIP survey (which concentrated on LES members) may account for this. There are also several other surveys which deal with licensing royalty rates some of which appear as part of a JIII series (発明協会 1993). Another survey by the Long Term Credit Bank (Long Term Credit Bank 1992) revealed that 9 out of 26 companies had open-license policies and another 8 were planning to introduce one. A further survey by the JIII (発明協会研究所 1992) also studied licensing royalties and included data on the reasons for companies licensing in or out of patents and know-how.

Figure 38 Japanese companies reasons for licensing OUT
(発明協会研究所, 1992)(No. of companies)




[78]Licensing Executives Society - an international professional association with branches in most countries including the UK and Japan.

Figure 39 Japanese companies reasons for licensing IN
(No. of companies)(発明協会研究所, 1992)




Profit, technology access, dispute resolution, cross-licensing, and cooperative relationships drive most licensing agreements with access to technology and cost savings an added incentive in the case of licensing in technology.

Probably the only source of data regarding cross-licenses in Japan is that published by the Science and Technology Agency. However this deals with cases involving foreign companies which in passing through the Fair Trade Commission come to official notice. The only remarkable fact about the figures, which have hovered around the 100 cases per year level for several years, is that around half of them involve the electronics industry. This agrees with the image of the industry as a high patent density field in which cross-licensing would be common. However, there appears to be no means of estimating the amount of intra-national Japanese cross-licensing. For the moment one can only accept interviewees assurances that it is common which the present survey suggests is correct. This view is supported by the 1985 survey by Wyatt et al. which found Japanese companies rating the objective of patenting "in order to have a patent portfolio with which to negotiate licensing agreements with other companies" higher than US or European companies (Wyatt, Bertin et al. 1985).

## 6.4. IP Licensing - Current Practice

Attitudes to licensing out of technology in the USA electronics industry were profoundly affected by the consent agreements of the 1950s which AT&T and some other companies were made subject to (Tilton 1971). Some provisions of these remain but by and large the patents have now expired. However, the attitudes engendered live on. Perhaps the main one of these is the idea of making licenses freely available, sometimes in return for cross-licenses.

For example one major US manufacturer involved in the past in such agreements and active in Japan, currently practises an "Open Licensing Policy" in its core business area. The idea is

that licensing deals will involve cross-licenses to all technology developed by either party during a set period with balancing payments being made to cover any shortfall in the value of technology licensed by one side or the other. The objective of such an approach is again to maintain the company's freedom of action in its core field of activities. This idea of freedom of action is one that is also found among Japanese electronics companies. A senior manager in a Japanese large consumer electronics company said that his company "obtains Industrial Property in order to act freely". (Interview, 8/7/93)[79]. Where the US company mentioned above developed something which fell outside its core field of activities it would be dealt with on a case by case basis since the company would not benefit from any cross-licensing but only from any licensing revenue obtainable (Interview, 93/12/21). The interesting factor about such arrangements is that they are publicised in Japan and I learnt of the above information from an interview in the Tokyo office of the company. It is thus not too surprising that some of the larger Japanese electronics companies are also adopting such licensing practices.

For example, Hitachi's attitude to licensing has since 1970 been one of a 「特許解放政策」 or an "Open patent policy". Hitachi's technology is thus in principle open for purchase by all (日立 1983). Several other Japanese companies practice similar attitudes to licensing, however despite the openness, any such licensing policy is always subject to it being possible to agree terms, whether involving licensing payments or cross-licenses or both.

The present survey found that only a few (5.2%) Japanese companies would enter blanket cross-licensing deals (Q.45) with automatic licensing. However, the number of "open licensing" policies similar to Hitachi's which allow grant of licenses on demand even if not compelling blanket cross-licensing in return seems to be increasing. The Long Term Credit Bank survey referred to above (Long Term Credit Bank 1992) revealed that 34% companies had open-license policies and another 31% were planning to introduce one out of a sample of 26 companies.

One recent example of an open cross-licensing deal also illustrates the transfer of technology from Japan to Asia. In April 1992 South Korea's Samsung Electronics Co. and Fujitsu Ltd. entered a five-year broad cross-licensing agreement that allows each access to the other's microchip technologies patented in the U.S., Japan and Europe. Under the agreement Samsung also paid Fujitsu ¥4bn to compensate for Fujitsu's technological edge. This was some 25% of Samsung's 1991 pre-tax profits and the first time that Fujitsu had received royalties from a Korean firm in a cross-licensing agreement. A Japanese industry official, who asked not to be identified was reported as saying that "Paying large royalties will boost South Korean makers' production costs, making it hard for them to pursue

[79]A JIPA journal article dealing with IBM Japan's patent management practices has also emphasised the need to preserve freedom of action and licensing and cross-licensing of patents as key activities(頓宮 孝一, 1991).

their low-cost, low-price business strategy". (Miyake, Yoshikawa et al. 1992).

The idea that a potential competitor can be disadvantaged by the imposition of large licensing fees is probably derived from the increase in licensing fees paid for US technology by Japanese companies during the 1980s. However, this again emphasises the general point that Japan is no longer just trying to catch up with the West. It now holds technology which is important to competitors now trying to catch up with it and seeking technology from Japan. Whilst this process began some years ago the technology now being sought is the most advanced available and the hardening of IPR systems now also works in Japan's favour concerning other countries seeking its technology. Some comments from managers in the Korean company Samsung quoted in the Financial Times recently are illustrative :

> "The Americans and Japanese are pushing us into a corner over patents. That's why we have to have our own new technologies."
>
> "Someday we want to be eye to eye with a company like Sony but the key is bargaining for technology". (Jackson 1993)

At the same time Japanese patent managers are saying things such as "We need effective counter-patents" to protect their freedom of action in the event of an infringement action.

The head of the patent department of a major Japanese medical electronics company said that in deciding cross-licenses the most important thing is the balance of the technology involved, the main aim of patent applications being to protect inventions but also to provide the company with the ammunition to balance this cross-licensing deficit with (Interview, 94/1/30). This again emphasises the role of IPRs owned by a company in ensuring its freedom of action in the face of other companies' patent portfolios and particularly in high patent density sectors such as electronics.

One potential disadvantage of cross-licences and the like is that without care being taken there is a strong possibility of cross licence, patent pools and grant back[80] provisions falling foul of anti-monopoly laws. In general though, open cross-licensing and patent pools would not conflict with such laws if other parties are free to participate[81].

A middle ranking manager in a major Japanese electronics company patent department said that in contracts between Japanese companies it was easier to come to an understanding and

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[80]The provision for grant back to the licensor of a licence to the licensee's improvements.

[81]In the case of Japan most licensing agreements with foreign companies have to be screened by the Fair Trade Commission of Japan within 30 days of signing. The rules governing the process were altered in 1989 to detail black, grey and white clauses which were respectively unacceptable, possibly acceptable and acceptable in a system resembling the Black, Grey and White clauses of EC competition law. Whilst mutual and equal non-exclusive grant back provisions are usually acceptable, the majority of problems with contracts in the past have involved grant-back restrictions and restrictions on competing technology (McAbee, 1989).

in any event Japan was not a "contract society", not a "litigation society" and not a "court based society". However, whilst it was thus easier to deal with Japanese companies, competition among Japanese companies was so intense that it was often easier to form an alliance with a foreign company. The licensing department of the company was divided into two sections reflecting this. One for international business and one for national business. (Interview,93/12/3). This preference for joint ventures with foreign companies rather than Japanese companies is confirmed by the present survey results in Q.32.

The information available on licensing practices from existing literature and surveys thus reveals some general trends. The overall statistical data mentioned in earlier chapters shows that licensing in of technology from the West is increasingly being balanced in Japan by licensing out of technology to Asia. This is supported by comments from Japanese companies about for example Korean and other Asian companies seeking Japanese technology. At the same time as the licensing out of technology and continued licensing in of technology is occurring there is also within Japan a considerable amount of internal licensing in and out of technology between Japanese companies.

### 6.5. Discussion of Survey Results

The survey questions on licensing had a varied response rate in the UK. The results from Japan though were more than sufficient to confirm the above findings and add some interesting additional facts.

The data concerning the sources and destination of international licensing involving Japan was confirmed with most technology coming into Japan from the USA and Germany with an appreciable amount of licensing out to not just the USA but also Asian countries such as Korea.

Attitudes to licensing in did not differ greatly between the UK and Japan and were consistent with the surveys mentioned above. In particular profit formed the main driving force behind licensing out even if in Japan the importance of cross-licensing and furthering cooperative relationships received more attention than in the UK. The importance of cross-licensing was also greater in Japan than in the UK concerning licensing in of technology.

The present survey suggests that there is an appreciable amount of cross-licensing occurring since the answers to Q.26/7 in the survey show that there is a higher proportion of licensing payments being made between Japan and other countries than within Japan and yet Q.32 shows that alliances between Japanese companies are more common than between Japanese companies and overseas companies, (joint ventures however are more common with overseas companies than between Japanese companies). Thus a fair proportion of alliances between

Japanese firms are likely to be low or no financial cost, non-joint venture deals such as cross-licensing arrangements.

The common occurrence of cross-licensing is ascribed to the superabundance of patent applications in Japan and companies being hindered in their use of technology unless they enter into cross-licensing agreements with each other. (東レ 1987). Mifune has also distinguished Japanese post war chemical industry history into five main eras characterised by the main type of licensing activity occurring in Japan. In order these are i) 1945-1955 One way importation of technology, 2) 1956-1965 Improvement of imported technology. 3) 1966-1975 Export of refined technology, 4) 1976-1985 Cross-licensing and early information exchange 5) 1986 - Joint research and overseas investment. He comments that the 1970s saw a turning point in licensing activity when cross-licensing and joint research became substantially more popular. He sees further increases in such activities in the 1990s. Perhaps the change that will and indeed is occurring is in who the cross-licensing and joint ventures involve. In the past the cross-licensing activity was between Japanese companies allowing them freedom of action between themselves primarily in attacking markets overseas. In the future with access to technology from abroad becoming tighter and others wanting access to increasingly advanced Japanese technology the cross-licensing and joint venture activity may increasingly be between Japanese companies and those in other technologically advanced nations.

One can conclude that considered as independent unrelated decisions, attitudes to licensing in and out in Japan and the UK are subject to the same considerations and are very much the same problem. However it is when it comes to considering them in practice that the differences become apparent. The importance of cross-licensing and particularly the degree of active searching for technology to license in or active promotion of technology to license out are noticeably different. In Japan the degree of active searching for technology to license in is very much greater in Japan than in the UK (Q.43) even though the degree of active marketing of technology to license out is much the same (Q.47). This difference is so pronounced and evident in all sectors and sizes of company and whether or not the UK companies have IP departments or not, that it denotes a marked difference in approach to IP and technology strategy between UK and Japanese companies. The fact that this profound difference is not reflected in responses to questions about attitudes also shows the importance of also trying to include questions about matters of fact whenever questions about opinions are being asked.

The most important factor in licensing out technology is the licensor's hope for profits from the exploitation of technology which is not going to greatly disadvantage the licensor. Both Japanese and UK companies were similar in being readier to license out old rather than new technology (Q.46). Of late the depression at the end of the 1980s and in the early 90s has made Western companies especially in the USA more attentive to increasing licensing revenues. A similar effect can be noticed in Japan where at least one Japanese IP department manager

admitted that whilst the primary objective of IP was freedom of action perhaps the most influential reason for licensing out technology was to try to redress their negative balance of trade in technology 「赤字なんですよ」("It's due to being in the red") as one company patent attorney said (Interview,13/12/94). Thus actions regarding licensing out of technology are not dissimilar between the two countries.

However in the case of licensing in the primary objective is technology acquisition. This is, despite Japan's increasing technological leadership in many fields, still being pursued with enthusiasm. A further indication that Japanese companies are more prepared to license in technology than UK companies lies in the fact that Japanese respondent companies are more prepared to license out valuable technology in a cross-licence than a straight license out than UK companies are (Q.40/44 - see Chapter 8 Page 157)

.

It is interesting to note that few Japanese companies reported decreases in licensing out and cross-licensing activity but several reported decreases in licensing in technology even though the overall trends were probably increases in licensing activity (Q.36/42/46). If this is to be reconciled with the considerable degree of searching for technology that goes on the obvious conclusion is that it is gradually getting harder for some Japanese companies to find technology worth licensing in.

Japanese companies especially those operating in high patent density areas such as electronics have a wide range of expertise but not necessarily in all fields. This acts as an extra incentive for cross-licensing. In fields where technology becomes increasingly complex we can expect that a Japanese approach which has been outlined here of equal stress on licensing in and out and widespread use of cross-licensing will become increasingly common. Japan however has an advantage in this approach in that, as has been shown in the background material, there is a greater cultural and technological history of external sourcing of ideas. However at the same time there is an increasing need to develop leading technology which will enable the development and preservation of valuable IPR positions. The interesting question is as to which countries will be able to develop a comprehensive approach to technology strategy which combines the ability to source technology from multitudes of sources both internal and external and combine this with both unique basic research and developmental resources.

## 6.6. Conclusions

The original hypotheses regarding licensing included the ideas that Japanese companies will have at least as positive an attitude towards and be at least as likely to take active steps towards licensing out technology as UK companies. Also that they will license out technology not only to Western countries but also to significant numbers of Asian countries whilst also

having a more positive attitude towards licensing in and cross-licensing technology than UK companies do. These are confirmed by the present research except that there is a distinction between attitudes to licensing in and actions regarding active searching for technology for licensing in.

In the West the emphasis appears to have been on keeping ahead and keeping out competitors not catching up and cooperating in the technological race. The overall impression of Japanese companies' attitude to technology is that it is something to be acquired, sourced, created and developed from whatever source provides the best and fastest means of obtaining it. Furthermore that once obtained and developed it is to be used in whatever provides the best and most advantageous means of exploitation whether that means licensing, cross-licensing or not licensing it to others. This, when combined with a technological position which is in some respects that of a leader and in others that of a follower ready to learn from others, seems to comprise a more dynamic approach to IP and IPRs than that of companies in the West.

## 7. Attitudes to Overall IP Policy

### 7.1. Introduction

This section explores what IP managers in Japan understand by the terms IP Strategy and Patent Strategy and what overall IP policies exist in Japanese companies. The aim is to provide an overall discussion of Japanese IP Policies, before beginning a discussion of IP Strategy theory in the final chapter.

The use of the term strategy in Japanese in the context of IP and IPRs is not unusual. One can find the terms 知的財産戦略 (IP Strategy - Chitekizaisan senryaku) and 特許戦略 (Patent Strategy - Tokkyo senryaku) in many articles and books on IP Management. However as the following review of Japanese literature shows, a clearly defined role and content for IP strategy is only beginning to emerge in Japan.

Using Mintzberg's classification (Mintzberg 1985)(Mintzberg 1987) a business strategy may on the one hand merely be a label applied ex post facto to a series of responses to situations facing a company from which a "strategy" thus "emerges". On the other hand it may be a "deliberate" series of actions carefully planned in advance and designed to deal with situations which have been well recognised and understood.

In Japan whilst there are many activities related to IP there is no consensus yet as to what IP strategy comprises. Whilst it is thus impossible to point to a single characteristic Japanese IP "Strategy" it is possible to identify activities characteristic of Japanese IP management and IP administration. These would include the assiduous use of patent information systems and analysis, close liaison between managerial and specialist IP functions, personnel policies promoting such liaison (e.g. job rotation), countermeasures against basic patents, the acquisition of large numbers of IPRs to encircle opponents IPRs or to ensure freedom of action in licensing negotiations, the education of specialist and non-specialist IP staff and other measures.

In some cases these and other actions are carried out with deliberate strategic objectives and in others they are just reactions to a situation or imitations of what everyone else is doing. In some cases consideration is also being given to the overall IP strategy a firm should adopt. However, it is a mistake to assume, because characteristic features of Japanese IP management are missing from UK practice, that Japanese companies are highly organised, efficient IP managers and strategists. This is not necessarily how the Japanese companies view themselves and from a Japanese viewpoint there may even be a temptation to downplay the IP management practices that do exist. A Japanese concept of IP strategy is thus only beginning to emerge, even if one can identify the key elements (discussed in the present topic studies) which make

up existing IP management in Japan. The first stage in clarifying what is emerging though is to study the origins of Japanese Patent and IP Strategy.

## 7.2. Origins of Patent Management

In the Japanese language literature relevant to this study it is possible to trace a development from a purely administrative view of work involving patents and other IPRs through a phase where IPRs are seen as an area requiring specific management to the most recent stage where there is the beginnings of a discussion linking overall IP Strategy to general management strategy. These phases can be identified with the changing names of IP departments referred to earlier. First came the administrative age of Patent Sections, around 1958 the managerial age of Patent Departments arrived and finally around 1988 the strategic age of IP departments began to dawn.

One of the first steps from patent administration to patent management occurs in a book by Saotome. Saotome's[82] book refers to the change from Patent Clerical Work to Patent Management (特許事務から特許管理へ) and then to management with a policy (政策のある管理) (五月女 正三 1982). In his introduction Saotome describes how the most influential book on his thinking about patent management was one published in the USA in 1959 (Berle 1959). It was this that persuaded him to convert the largely clerical nature of patent work in his company (Mitsubishi Kasei) into a management task. This shows again how Japanese thinking about Patent Management, however it may differ from that in the West is often influenced by it.

According to Kikuchi et al. the word patent management 「特許管理」(Tokkyo kanri - "Patent Management") originally came from a "Patent Management Specialist Study Team" of the Japan Productivity Centre (㈶日本生産性本部) which visited the USA and Europe in 1957 shortly before Berle's book was published. In October 1958 the group published a report entitled "Patent Management" (特許管理) and the term Patent Management has been frequently used by large companies in Japan ever since (菊池 秀夫, 西野 卓嗣 et al. 1993). This 1957 study tour is also referred to by Matsushita in his report on a similar tour made by the Japan Patent Association in 1992; saying that the 1958 report had the "greatest influence" on Japanese industry (松下 義治 1993). The 1958 report defined patent management as the "the business of making Patents, Utility Models, Designs, TradeMarks and the like function more usefully in the centre of business activity". The import of these thoughts was that companies needed to protect themselves through strong patents and other

[82]At various times head of the Pacific Intellectual Property Association (PIPA), a director of the JPA, a managing director of AIPPI Japan and chairman of LES[82] Japan all of which are highly influential in the Japanese IP world.

IPRs and that there was also a need to reduce the restrictions imposed by other's IPRs and enable their use on favourable terms. If these aims were not achieved then the activities of the company might be severely limited. In any event the influence of these various factors is seen by Kikuchi as being linked with the success or failure, even the very life and death of the company. (「企業体の盛衰存亡につながる」). The idea that Patent Management has a role at the centre of the management issues facing the company was thus clearly established.

It is also interesting that the 1958 "Patent Management" report is summed up in Saotome's view by the remarks of an ICI manager who used (indeed probably created) the term "Patent War" but who also portrayed Patents as a means of protecting exports for a Britain in the process of losing its empire and secure colonial markets. In some respects at least, the war and the consequent demise of Japan's imperial ambitions meant that Japan was not losing but had already lost any colonies it had. Added to this Japan depended partly on exports to fuel its post war growth (Ito 1992) and therefore protection of export markets was a subject of critical importance. It is thus not too extreme to suggest that the beginnings of Japanese patent management whilst greatly influenced by other factors in Japan, Europe and the USA received an additional boost from Britain and the idea that patents might help a post-imperial power protect exports. The difference in subsequent approach though is that to protect exports requires not just patents protecting past technology but continuous improvement and development of new technology for the future.

That there were the beginnings of a drive to obtain more IPRs in the 1950s can also be seen from a story told by Canon employees about Mr. Yamaji the President who is reputed to have been told when handing in a report on his work as a new employee over 40 years ago that employees should "write patents not reports". (相澤　紘 1993).

Patent Management in Japan thus has foreign origins just as much as the Japanese patent system does. Both have developed though in response to the pressures on and the particular circumstances facing Japanese industry during its development. One consequence of this though, is that in responding to a series of circumstances Japanese Patent Management has tended to lack an overall perspective and to consist instead of a collection of activities and countermeasures, rather than a pro-active consideration of the strategic situation facing a company and consequent development of a particular IP strategy. This is changing but before studying the examples which do consider overall "Patent Strategy" and "IP Strategy" in Japan one must therefore look at what "Patent Management" consists of.

## 7.3. Patent Management

According to Matsubara the four main elements of "Patent Management" are :

i) Patent Contracts (including cross-licenses and import of technology),
ii) Patent Applications,
iii) Countermeasures against other companies' patents
iv) Patent investigations (searches)

(松原　治 1994).

This is characteristic of the "Patent Management" style of Japanese IP management and its development ranges from the basic introduction of the idea that IP needs management as mentioned by Saotome to what now seem characteristic Japanese management methods, such as Patent Maps and Patent Information Management. This stage of the development of IP management in Japan is on the whole limited to tactical management of IP issues and does not consider too much the wider implications they might hold for a company's business.

The actions needed to pursue such tactical objectives though can be characterised by the section headings used in a series of articles entitled「わが社の特許活動」"Our company's Patent Activities" about patent related activities in Japanese companies. These occur in each issue of the JIPA Journal and are :

1) Company Outline
2) Patent Department Outline
    Organization and Staff
    History
3) Our Company's Patent Activities :
    Digging Out Inventions
    Evaluation of Inventions and Applications
    Patent Application business (from application to grant)
    Patent Business Management
    Collection, Use and Management of Patent Information
    Patent Investigations (pre & post application investigation of other IPRs)
    Patent and Technical Information Investigation and Analysis
    Contracts and Licensing Business
    Training and measures to increase patent awareness in the company
4) Future Plans and Wishes.

In general these articles do not dwell much on the overall subject of IP strategy per se nor on the larger picture of overall considerations involved in patent management. They are concerned with the particular measures being adopted by Japanese companies in their day to day management of patents and IPRs. The nature of these initiatives however is mainly concerned with the marshalling of resources not their deployment, with the assembling of patent collections not their use.

## 7.4. From Patent Management towards Patent Strategy

Among the references to elements of Patent Management which exist there are also several occurrences of the term Patent or IP Strategy. These are perhaps the signs of IP strategy emerging from IP management. However, on the whole they do not consider the concept of IP strategy much more than to say it must be used or employed.

For example a few books written by IP department managers describing their companies' "Patent Management" have been published by the JIII (発明協会). The series title is : 「経営戦略と特許」"Management Strategy and Patents" and, in some of the books in the series, references are made either directly or indirectly to IP strategy. Overall though, there is little discussion of IP strategy per se compared to discussion of more specific patent management activities. The book dealing with Toray's patent management exemplifies this, hardly mentioning the word strategy at all (東レ 1987). Whilst there is a chapter sub-heading "Strategy for the effective use of a company's patent rights" the sub section only occupies 2 of the 262 pages in the book.

Another distinction that can be made between the Patent Management era's concept of IP or Patent Strategy and more advanced views is that the former usually resulted in some prescription for the number of patents that were required.

One example of such an approach occurs in an article on Patent Portfolio management by Mr. Hotate, a Japanese Patent Attorney describing a scheme using Product Portfolio Management as introduced to Japan by Abegglen in the late 1970s on behalf of the Boston Consulting Group (Abegglen 1977) to manage patent portfolios (保立 浩一 1995). The end result though is a number of patents which should be held. However, which and how many patents are needed in a patent portfolio depends critically on the field, technology and prior art concerned. Using some calculated number identifies the scheme firmly as part of the numbers style of patent management. IPRs are perhaps not as easily quantified resources as financial resources.

Another example of a numbers approach to Patent Strategy occurs in an early book on Hitachi's Patent Management. Books concerning Hitachi in the above JIII "Patent Management" series have appeared in two editions, in 1983 and 1995, both mentioning strategy in connection with management of patents and other IPRs. In the earlier book (日立 1983) there is a discussion of types of licensing strategy including : licensing strategy, cross-licensing strategy, grant back arrangements, patent pool strategies and standardisation of goods. In respect of grant back arrangements the point is made that one aspect of Business strategy is being able to absorb the technological power of other companies efficiently and that licensing with grant back provisions is one means to using a companies technology to such an end. However, there is also discussion of Hitachi's PAS (PAtent Strategy) which was introduced in 1975 and one of whose key points was the use of patent maps to coordinate and direct patenting and R&D activity[83]. Added to this, in 1981 Hitachi began a "Campaign to increase strategic patents". This aimed to combine business strategy with patenting strategy to acquire patents which would be useful concerning competitors.

However being before the days of the Japanese patent office's "From Quantity to Quality" slogan, the Hitachi objective was expressed in terms of a numerical aim of acquiring at least 5 strategic patents per important product or technology. Despite claiming that Hitachi was already concentrating on quality not quantity, the fact remains that in 1980 it filed around 22000 applications and by 1990 this figure had halved - in line with the JPO's general aim of reducing the number of Japanese applications through its AP80[84] and other programmes started in the late 1980s.

However, Hitachi's "Obtain Strategic Patents" campaign leaving aside the earlier numerical aspect is also an important example of the move towards IP Strategy from IP management. The campaign had several objectives. Integrating business and Patent strategy, Concentrating manpower and financial resources on speedy patenting of basic and surrounding patents and finally providing an incentive to inventors to concentrate on such areas. (日立 1983).

The promotion of quality over quantity has involved many companies and there is some blurring between the concept of a high quality patent and a strategic patent. Toshiba has had a policy of trying to obtain high quality patents in line with the 「量より質へ」(From Quantity to Quality) policy of the Japanese patent office and also of using an application assessment system (日本のう率協会 1990). Omron comment on the persual of "Strategic Patents" and the fact that the company is pursuing a "Strategic Patent Project" (オムロン株式会社 1990). This project may well have been based on the Hitachi campaign. Especially with larger companies who have come up against "Master Patents" being used against them in the US, an ever present aim is to develop Strategic technology which can then be protected by "Strategic Patents".

Another example of the emergence of references to IP strategy often occurs in the final sections of the above mentioned "Our company's Patent Activities" articles where companies express their future plans and wishes. Some of these company wish lists drawn from the articles include mention of IP strategy. One example is that of the Japan Catalyst Chemical Works Co. (日本触媒化学工業株式会社, Nihon shokubai kagaku kougyô KK):

> Future Plans :
> 1) Increasing skills and consciousness concerning patents throughout the whole company as well as the patent department
> 2) Increasing the quality of applications and the strategic use of IPRs obtained
> 3) Strengthening cooperation with patent agents offices
> 4) Establishment of management systems through Office Automation and promotion

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[83]In fact if there were time to analyse the exact timing of the introduction of various patent management techniques the second chapter of the 1995 book contains a very interesting summary of the history of the development of patent management in Hitachi over the past 70+ years (日立, 1995). This is largely based on a history of Hitachi's patent department written in 1984 (日立, 1984).

[84]AP80 - a campaign to increase the % of applications granted to 80% and thus increase quality.

of the shared use of patent information within the company.
(日本触媒化学工業株式会社　1991) (Emphasis added)

It must be admitted that an IP department slogan is not evidence of an overall IP strategy and whilst Japanese companies have a highly developed sense of the individual actions that are now required for IP management there is not such a consensus regarding exactly what IP strategy might mean beyond implementing such actions.

Another idea about what is meant by the word strategy comes from a short series of articles relating to mainly larger companies in 1990 in the JIII (発明協会) journal "Invention" entitled "IP Department Strategy"(知的所有権部の戦略). In one of these Mitsubishi Electric refers to its "SPAC" activity or "Strategic Patent Coverage". Saying that compared to its former patenting activity which was aimed at improvements and commercialisation of products a major aim in the future is to obtain "Basic Patents" (基本特許); an aim is now being promoted by both the IP and the R&D departments (三菱電気株式会 1990).

In the section dealing with Patent information Management the use of patent maps has been described. The mapping of the boundaries of patent claims and technologies must lead to considerations of how the "territory" thus marked out is to be controlled and who it is to be owned by. The Japanese game of "Go" is a two player strategy board game also involving the control of space (in this case by the placing of stones on a grid to control and/or capture opponents stones). The winner is the player at the end of the game with the most grid intersections surrounded and opponents stones captured. There are clear parallels with IP strategy and Patent Maps where patents control intellectual territory. Whilst being a Go master does not make one a IP Strategy master[85] the thoughts and attitudes involved in the game which is common in Japan, might conceivably have influenced thinking about the strategic use of patent maps.

There are thus many reasons to suppose that much of the strategic thinking that exists in Japanese companies regarding IP management is influenced by the use of patent maps. Mitsubishi's use of the term "Strategic Patent Coverage" is a case in point. Hitachi's PAS (PAtent Strategy) use of patent maps (referred to above) to coordinate and direct patenting and R&D activity is another. The development of much Japanese technology as a development of other technology and the consequent need for countermeasures to deal with others IPRs has no doubt also contributed to the keen awareness of the scope of the intellectual territory marked out by patents when considering their strategic value.

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[85]Go and IP strategy are not incompatible pursuits though and I did interview one Japanese IP manager who was a Go expert.

### 7.4.1. Patent Management and Globalisation

A recurring theme throughout this thesis has been the changing international environment facing Japanese companies and their IP management. Before considering the general change from Patent Management to Patent Strategy further this aspect merits some specific attention. Japanese companies are becoming increasingly international and the larger ones now have extensive overseas production and R&D facilities. These can give rise to several IP related problems ranging from a need to obtain IPRs from R&D to problems with leakage of confidential information. For example, a Nissan manager has said :

> "Also, the increase in the number of parts purchased overseas presented another problem, i.e. the outflow of know-how. To produce the same product made at our Japanese plants at the overseas production centres, it became necessary to furnish overseas parts suppliers with technological information required for the designing, experiments and the like. In the past we incorporated as much information as possible in our drawings so that the drawings could be conveniently used in any steps such as design and production. Since we purchased many parts from Japanese suppliers, the information from the suppliers was included from time to time. In such cases the suppliers felt that their know-how was flowing out to overseas competitors. For this reason it became necessary to change our conventional management of technical information including drawings..." (上野　英夫 1993).

Omron for example has identified the question of how to manage IPRs which are developed by and owned by a widely dispersed global group of companies as a growing problem for globalising Japanese companies (オムロン株式会社 1990). As with Omron, globalisation is also posing questions for Canon as to how IP should be managed on a global scale (キヤノン株式会社 1990).

There are several major Japanese companies which despite being of considerable size are very closely connected if not part of US multi-national companies. Two particular examples are Fuji-Xerox and IBM Japan. Whilst such companies may operate in Japan and be managed almost entirely by local staff there are still significant links with or control by central IP departments based in the USA. As a result such companies act as a Japanese window on US IP management practice. The JIPA journal series 「わが社の特許管理」(Our company's patent management) has already been referred to but the article dealing with IBM Japan's patent management practices in 1991 appeared as a separate article and was about 5 times the normal length of such articles (頓宮　孝一 1991). Two aspects emphasised by this article are the need to preserve freedom of action through the use of investigation of patents regarding products, licensing and cross-licensing of patents, and selective filing of patent applications. Preserving freedom of action is something which has been referred to by a senior US staff member in a US company's Tokyo IP department and not just by Japanese patent staff (Interview 93/12/21). However, of particular interest to larger Japanese companies will have been the aspects of that and another article in the JIII journal "Invention" concerning Fuji-Xerox

which also deals with the organisation of the global IP activities of a multi-national (富士ゼロックス株式会社 1990). This is a key question facing the larger Japanese companies especially those which are building overseas R&D facilities. A key product of such R&D facilities apart from information from the watching function they fulfil are IPRs. In 1993 I interviewed one of the two Japanese managers seconded to a Japanese company's recently established R&D facility in the UK. He had previously worked in the company's main patent operation in Japan and was being badgered by the head office in Tokyo to ensure that patents were produced wherever possible (this was a problem in that much of the work concerned was software related inventions which made patents more difficult to obtain in the UK than the US). Another major Japanese company has established a Patent Manager's office in Germany to oversee IPR issues in it's European Operations. How large Japanese companies manage their overseas sourced IP resources is thus an increasingly important issue. This is especially so in the light of the increased investment in overseas R&D where it is hoped that inventors are rather less inhibited than in Japan and rather more inclined to make the ground breaking inventions leading to basic patents that Japanese companies seek. One might even speculate that the next "Japanese" Nobel prize might result from Japanese funded basic research carried out in the USA or Europe[86].

Mr. Nakayama, a patents manager for Toshiba who used to run their Washington Office[87], has said that whilst Japan is well supplied with information it is in general all filtered by the various media it passes through en route to managers who need to know about it. One other advantage of the globalisation of IP business therefore comes from placing IP staff abroad which enables them to access information directly. A further unquantifiable advantage of posting and training IP staff abroad is that the experience of culture shock is seen as a valuable experience in the globalisation of patent management in Japanese companies. (中山喬志 1993).

### 7.4.2. Large Companies and development of the concept of Patent Strategy

To characterise a large company's recent views of what Patent management consists of consider Hitachi. A particularly significant event in Hitachi occurred in 1988 when the company re-introduced a company wide IP Head Office (知的所有権本部). This had two objects the first was to provide IP Strategy Staff for the main company and the second was to provide line support for the various business divisions. The name was chosen on the basis

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[86]Following that the next development might be a new weakening of US patent law if basic Japanese owned patents began to be enforced against US firms using strong US patent laws.

[87]Toshiba in common with one or two other large companies has an IP Office based in Washington in order to keep up to date with developments in the USA which as mentioned forms the major influence on Japanese thinking about IP Issues. In 1993 when Mr. Nakayama gave the speech referred to there were some 50 -60 trainees from various Japanese companies in Washington and New York areas.

that「名は体を表す」 literally "the name expresses the body" and presumably also in line with the general change in departments to using the term IP not just patent. More recently, Mr. Ogawa, the overall head of Hitachi's IP department, identified five key points of present day IP management which relate to general management :

1) IP management closely linked to R&D
   - Participation from early development onwards
   - Separate management of important development themes
   - Strengthening of Patent Patrols (links to R&D centres)
2) Promotion of activities to obtain "Quality Age" rights
   - Establishing Invention assessment systems
   - Obtaining world class IPRs
   - Foreign application strategy suitable for world-wide business
3) Effective use of IPRs
   - Respect for others rights
   - Improvement of the technology balance of payments
4) Timely measures to deal with Problem Rights
   - Thorough patent investigations before commercialisation
   - Implementation of Patent Approval procedures
   - Quick decisions on Countermeasures plans
   - Strengthening ability to deal with litigation
5) Education of IP Specialists and establishment of an organisation closely linked to business management
   - Strengthening links with Top management
   - Bringing up International IP specialists
   - Speeding up rotation
   - Strengthening education of new and transferred staff.

(小川 勝男 1993)

However such a list of activities by a company which must surely be using IPRs strategically begs the question of what exactly IP strategy consists of. Are the Strategic initiatives outlined above, the collecting of "Strategic Patents" the talk of licensing strategy and application strategy sufficient to constitute an overall IP strategy or are they merely IP tactics?

The definition used earlier was "The management of IP, either alone or in combination with other resources of the firm, to achieve the general strategic objectives of the firm" including "the organisation of a firms other resources to achieve objectives regarding its IP / IPR resources". Using this definition the strategic initiatives outlined so far are "strategic" in that they could form part of an overall strategy. Mention has already been made of companies referring to IP and IPRs as a fourth business resource show that IP is at least viewed strategically. The missing link however seems to be the explicit consideration of the overall "IP Strategy" of a company and the integration of the consequent IP strategy and its constituent elements into a company's overall business strategy.

One problem in making such a link is as the Japanese experience has shown Patents and IPRs in general cannot be considered in bulk as a generic resource. As with a business it matters not how many managers a company has but who they are. So with patents it matters not so much how many a company has but what they can be used for. Even if at an industry level

numbers of patents may reveal useful information; the closer one gets to considering individual patents the less numbers are a meaningful measure of an IPR portfolio's effectiveness.

A further problem with most companies with small IP departments (as in the UK) as well as with Japanese companies where staff may not be both IP and Strategy specialists, is that day to day management issues crowd out longer term considerations. It is thus only in the larger companies with the resources to devote to longer term considerations that one is likely to find any detailed consideration of overall IP strategy.

It is thus with such companies as Hitachi, Toshiba, Canon and others like them who have very large IP departments the resources to pay attention to overall policy and technologically based businesses which depend on successful management of IP who are closest to developing integrated approaches to overall IP strategy. Whether the list of activities such as that described by Mr. Ogawa constitutes an overall IP strategy is to a certain extent definitional. At some point from a collection of IP related activities one can say that an overall strategy has emerged. Alternatively one can say that overall consideration of IP strategy from a theoretical viewpoint and the practical strategic situation facing a company could give rise to a set of recommendations for a set of actions constituting an overall IP strategy.

At present almost without exception the former is the case in Japan and Japanese IP Strategy is very much an emergent strategy not one based on underlying theories about IP strategy. As has been pointed out earlier in the main literature review there has been little work on the theory of IP strategy even from an academic perspective. There are some signs though that such thoughts are beginning to be developed.

## 7.5. The emergence of Patent Strategy

Perhaps one of the most revealing articles about Japanese attitudes to IP management and overall IP strategy is one published in the JIPA journal "IP Management" in 1995 concerning the future of Patent Management in Japanese Industry (知的財産管理委員会 1995a; 知的財産管理委員会 1995b). The article which appears in two parts is a report on the conclusions of the IP Management Committee of the JIPA. This committee met in 1994, reported in 1995 and its membership comprised staff from a very wide cross-section of the larger Japanese technology based companies. It can thus be said to fairly represent Japanese IP management experts leading thoughts on IP strategy.

The report's most interesting aspect is that it provides support for the view that whilst Japanese IP management is full of ideas and activities which promote better IP management and which might form elements of an overall IP strategy these activities are derivative and in many cases lacking in an overall strategic level of thought despite any initial impressions use

of the words Patent Strategy might suggest. These ideas within the article stem from comments of the JIPA Chairman Mr. Yamamoto to the effect that :

> "Even if one obtains basic patents on principles of new products and technology, following companies obtain patents on methods of manufacture and surrounding patents relating to commercialisation, and in fact examples where pioneering companies obtain no profits are common". (知的財産管理委員会 1995a).

One might be forgiven for thinking that this was a quote in the mid 80s from the president of an American multi-national rather than from the Chairman of a Japanese industry association in the mid 90s. However Mr. Yamamoto is also quoted as saying :

> "Isn't it that the formula where cross-licensing enables use of all rival patents is promoting the herd-like constitution of Japanese Industry? Something needs to be reformed....."
>
> "This society's members should have a philosophy and this philosophy should be expressed concretely both internally and externally" (知的財産管理委員会 1995a).

These both show that Japanese industry's attitudes towards IP and IPRs is still changing. However further comments by the committee show that the change is more one of a realisation that something needs doing than that something has been done. Where the article does not seem to do Japanese IP departments justice is in admitting that much has been done towards developing the tools with which IP strategy can be manipulated. For example the first step in formulating a strategy is to know what situation one is in and what situation one would like to move to. The development of patent information services and especially more interpretative techniques such as patent mapping provides an excellent basis for providing such knowledge and forming strategies. The objectives of moving towards more high quality patents and IPRs will provide excellent resources with which to form strategies. The situation thus may appear bleak in comparison to where the writers of the article would like to be but not nearly as bleak when one considers what has already been achieved. If one compares that work with the situation in the UK and the conclusions about the largely legal orientation of IP management in the UK one can see that whilst the UK may have an advantage at this stage in possessing a greater degree of legal expertise in industrial patent departments it may not have so much of a strategic management perspective. It is a moot point as to whether it might be easier for the more management oriented Japanese IP departments to recruit or train legal specialists than it will be for the more legal oriented UK patent departments to recruit or train strategic management specialists.

Factors affecting the development of IP management are seen to be the globalisation of the economic environment, the rise of the newly industrialised countries, and expansion of industry overseas and the hollowing of manufacturing industry. Besides this, attention is drawn to the intensification of IPR based competition especially with the USA, the appearance

of new forms of IPR and ways of protecting new technology. However most remarkable are the extremely direct comments about the hitherto lack of respect for IPRs in Japan, the lack of any IP strategy, in particular the imitative and backward style of IP management that exists and the persistence, though gradual demise, of quantity based thinking in Japanese Patent management. Rahn has commented on the concepts of Honne (one's real thoughts) and Tatemae (one's public opinions) in the context of IP management and this article certainly includes a good measure of Honne it would appear. The only expression of approval about the state of affairs portrayed concerns the decline in the number of patent applications being combined with an increase in inventions - indicating a hoped for increase in patent application quality. A further subject criticised though is the age structure of Japanese IP managers about 50% of whom are over 40 and about 40% of whom have under 5 years experience of IP matters according to a JIPA survey quoted in the article. This the article claims shows that many companies are dealing with the increased need for IP managers by transferring middle aged managers to the IP department rather than training up new specialists. The article thus suggests that there is inadequate training and career development and surprisingly, inadequate rotation of managers. The summary of the situation before discussion of IP strategy ends :

> "We have talked of the state of IP Management and problem points however, whilst each company has been thinking of and implementing improvements in connection with these various problems, the actual situation is that one cannot see a lot in the way of the effects of improvement. (知的財産管理委員会 1995a).

An earlier comment about the style of much Japanese IP management is instructive :

> "Originally, top management were thinking about what should become of IP strategy over and above business strategy and the fact that some IP strategy activity should be implemented; however the number of businesses who are really implementing this (IP strategy activity) is particularly low. For example, the reality is that the larger part of industry is using "Me Too" management lacking in independence where they are continually glancing out of the corner of their eyes at the management methods, in short, the IP department organisation, numbers of applications, core staff, of other companies in the same industry." (知的財産管理委員会 1995a).

The concept of "Me Too" patent management parallels much in Japanese society where judgement of behaviour and actions often appears to be being made relative to other's behaviour rather than by comparison to some absolute standard.

The following comment on the activities of the sort described in the series 「わが社の特許管理」 in the same journal already mentioned is indicative of the tenor of the article :

> "(2) The backward state of Patent Management :
> IP Management, depending to the industry sector, and also the industry scale, is increasing in variety, but there are no reference books showing that this is something connected with improvement. Nevertheless, one can look such things up since 「わが社の特許管理」("Our company's patent management") has been described by any number of businesses. Despite this, the number of instances where IP strategy is discussed directly are particularly few. The contents of the core of patent management are the use and acquisition of patent rights, what to do about countermeasures against other companies patents, what to do about evaluating inventions; individual management of inventions and "after" management, these are the main points. (知的財産管理委員会 1995a).

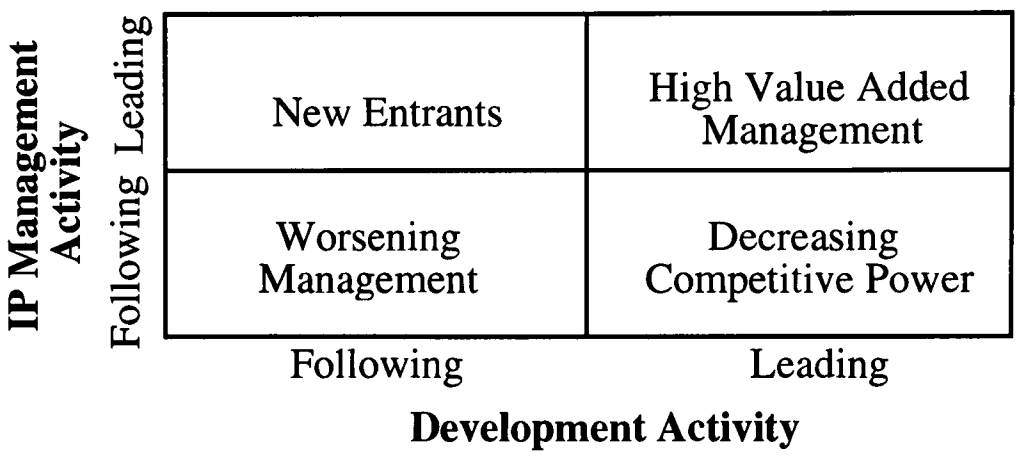
The above comments in the article might be seen as surprising especially when one compares the supposed lack of strategy with the situation in UK firms revealed by the survey. This shows though that the different pressures caused by the different environments have resulted in different pressures on management. In Japan the development of a technological lead from a position of followership, pressure from the USA, high patent density core industry areas, professional and social pressures on qualified experts and the like have resulted in a particular set of activities and practices being developed to cope with the immediate circumstances but which together appear at first sight to be components of an IP strategy even if an emergent one.

With this concentration on immediate problems it is only recently perhaps that the larger companies' IP departments have grown large enough to be able to have the resources to consider the larger picture of IP strategy. The above views are those of large companies but it should be borne in mind that the situation they describe - which is consistent with the other results of this research - is still the norm in Japan, albeit one which perhaps in the light of articles such as the one described will change. What is remarkable though is that the article does not refer to IP Management Practices abroad and make comparisons with them to criticise Japanese management. The origins of patent management as have been described come from studies of practices abroad in Europe and the USA. This article and the thoughts it portrays whilst showing some signs of being derived from US thought (note the similarity noted earlier between mid 80s US statements and mid 90s Japanese statements) is mainly a self-critical approach which is not following but potentially leading in the development of IP strategy as a field. As the article itself points out at one stage and has been pointed out elsewhere in this thesis, followership does not give rise to leadership unless independent means of thought and development are nurtured and imitation only used to speed up the overtaking process. Thus whilst the article shows that much of Japanese IP management comprises imitative responses to particular problems, at the same time it also shows that there are the seeds of a new and original attitude to IP strategy. The second half of the article goes on to describe this.

The first point to be stressed is the need for combined leadership in IP and Business management.

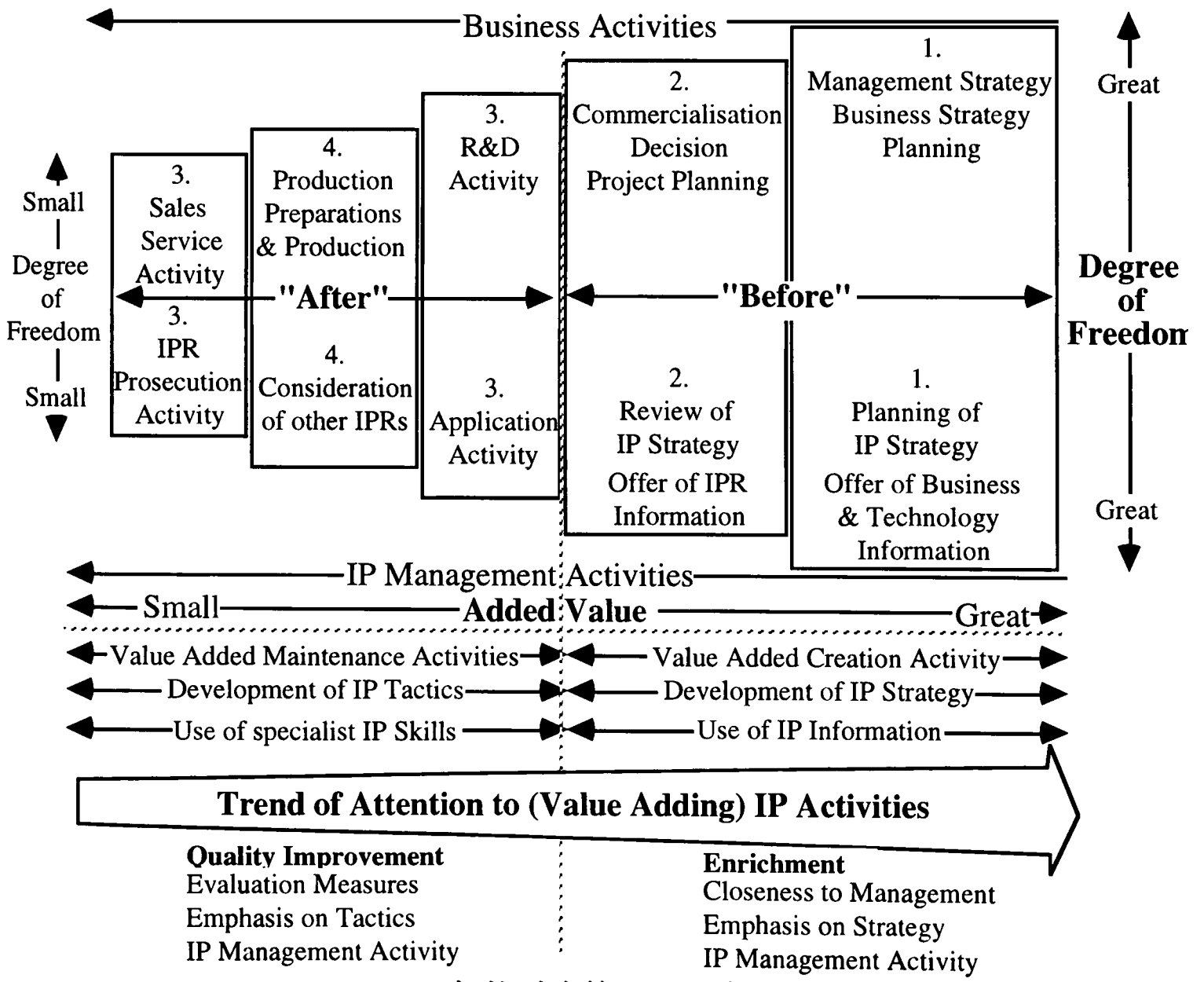
This is shown using a grid where combined leadership results in high value added management.

Figure 40 Development and IP Management Activity
(知的財産管理委員会 1995a).




This view of the need to combine IP and R&D management is expanded on in another diagram which links the freedom of action available to managers with IP Management activities and Added Value.

Figure 41 IP Management Activity and Value Added



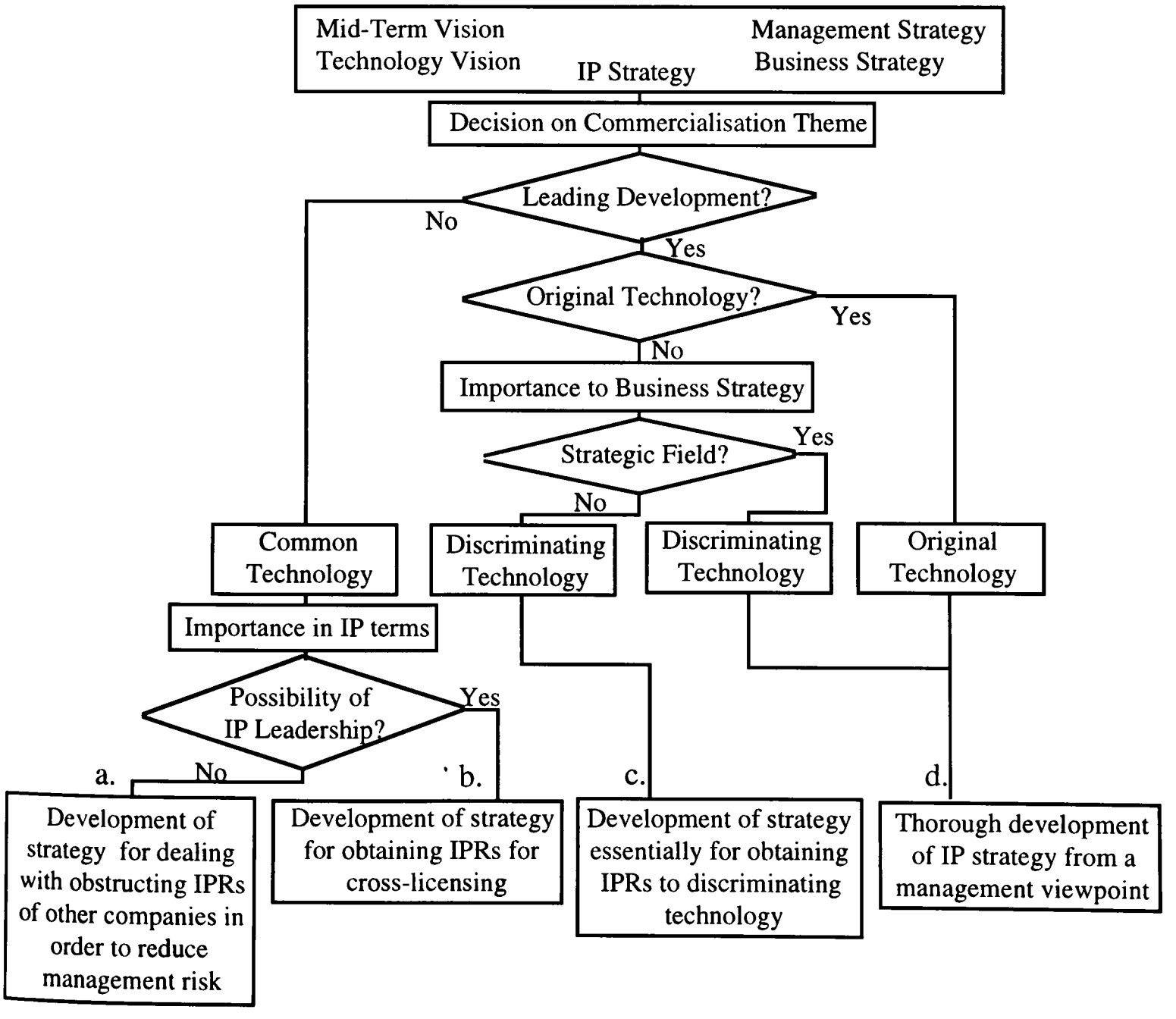

Based on (知的財産管理委員会 1995a).

Here there is also a distinction being drawn between "After" management which has largely

been the case hitherto and "Before" management which is being advocated here indirectly. One might also draw a parallel between "Before" and "After" management and the division of Strategy into the deliberate (Before) and emergent (After) categories of Mintzberg. The shift from after to before also implies that IP management activities will tend to move from mere tactical quality improvement measures to more strategic IP Management measures which have more emphasis on value creation, overall strategy, PIM and links with management.

This shift from what amounts to tactical measures to strategic measures mirrors the same distinction in a similar diagram created by Mifune which has a heavy emphasis on patent information as a major component of Strategy and Tactics (see page 196 (御船　昭 1992; 御船　昭 1993; Mifune 1994)). However the present article also advocates one of the few recommendations in the Japanese literature as to how to conduct IP strategy. This takes the form of a decision tree which concentrates mainly on whether the technology involved is a parallel development with other similar technology (the herd-like technology noted above), discriminated in some way from other technology or unique.

Figure 42　IP Strategic Development of Management Activity related to Added Value Creation Activity




Based on (知的財産管理委員会 1995a).

Whether the field is of strategic importance to the company is also brought into consideration. In the decision tree the solutions a. and b. largely correspond to existing "Patent Management" approaches to IP strategy. This is because they are based on the common technology trends developed by many companies at the same time where cooperation and cross-licensing become essential for all companies to progress. The question is whether in pursuing results c. and d. with their emphasis on original R&D and products Japanese industry will lose the advantages they have enjoyed hitherto in pursuing routes a. and b.

In addition the article makes various recommendations regarding staffing and training particularly regarding training specialists, allowing staff to take the patent attorneys exam as part of staff training and developing career long training programs and IP career paths. If followed these recommendations would result in Japanese IP departments moving towards the specialist nature of UK IP departments whilst arguably retaining the potential managerial skills and advantages of the Japanese system.

## 7.6. Discussion of Survey Results

There are several features of the present survey which can be usefully compared to some of the findings of the above Japanese literature. The emphasis on contact between "top management" and the IP department in Japan is not present to the same extent in the UK if the incidence of number of heads of IP departments who are also company directors is any indication. (Q.3). The incidence of IP committees with Directors/Board members as members of them was also slightly lower for UK companies with IP departments than in Japan (Q.73)[88]. Additionally, the percentage of Directors/ Board members who were involved in IP strategy formulation (Q.21) was lower in the case of large UK companies with over 10000 employees than similarly sized Japanese companies. The involvement of senior management in IP issues in small UK companies is higher but this probably just reflects the need for directors of small companies to be more involved in everything whether they consider it important or not.

The above JIPA article commented on the high proportion of IP department employees who had little experience of IP matters. The data from the present survey is not directly comparable on this point but shows the same information in that over 70% of UK IP department employees had more than 10 years IP experience whilst only 52% of Japanese IP department employees had so much experience. The lack of rotation though was more marked in the case of UK IP departments with 78% of UK staff joining the company via the IP department and only 48% of Japanese IP staff doing so.

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[88]It should be noted that the overall UK sample which included many smaller companies had a higher incidence of Director/Board member membership of IP committees. However this reflects the greater involvement of directors in all company activities in the case of small companies.

Some 40%+ of Japanese companies had IP slogans but as has been stated a slogan does not constitute a strategy. However, the most telling result regarding IP strategy in the survey though was the fact that of UK companies with IP departments only 47% had a written IP strategy whilst some 70% of Japanese companies did with the difference being highly statistically significant (p=0.014) (Q.19). Again what the "strategy" comprised is another matter.

## 7.7. Conclusions

Japanese IP and IPR management as we have seen has developed in the context of several different pressures which have influenced post war IPR management in Japan. These include the following :

Need to develop exports to support economic growth
Need to import and adapt more advanced technology
Need to develop existing technology to gain competitiveness
Competition within Japan in high patent density fields
Social pressures reducing stress on litigation and emphasising cooperation
Curiosity and need to gather and analyse information on what is happening elsewhere
Legislation promoting technology diffusion at the expense of protection
Government policies promoting increased numbers of narrow patents
Pressures reducing ability to employ in-house qualified patent attorneys
Pressures to rotate employees and employ general managers in specialist areas
Competition with companies abroad in high patent density fields
Pressure from abroad regarding enforcement of IPRs against Japanese companies
Pressure from abroad regarding increasing licence fees for use of technology
Pressure from abroad to increase strength of IPR protection within Japan
Increasingly high levels of technology being developed in Japan and needing protection
Increasing demands for access to Japanese technology from SE Asian countries
Increasing profile of IP and IPRs in the public's eye and that of senior management
Increasing financial pressures to increase revenue from IP assets
Need to provide incentives and support for production of leading technology
Need to move from clerical Patent administration to Patent Management.

The result of these and other influences as we have seen are a collection of different activities and actions which can be said to characterise even if not always distinguish IPR Management in Japan. These include :

A concentration on numbers of patents between the 1960s and late 1980s
An approach to patents which assumed negotiation based on trading licenses
Previous lack of concern about infringement

An emphasis on gathering and analysing patent information
An emphasis on increasing the scope of coverage by increasing patent numbers
Expansion of patent departments to cope with increased numbers of applications
Concentration on training to train employees rotated into patents work
IP departments staffed by a low proportion of qualified lawyers
IP department staff with a variety of management experience
Increasing concern to strengthen IPRs obtained abroad especially in SE Asia
Gradually increasing concern to strengthen IPRs obtained in Japan
Emphasis on positive actions to promote licensing out and
Emphasis on positive actions to search for technology to license in
Changing emphasis from patent and IPR quantity to quality
Concern to link IPR management with General management
Increasing respect for IPRs owned by others
Concern with IPRs role with respect to both followers and leaders
Gradual concern that IP Management must evolve IP Strategies.

These can be summed up by saying that Japanese IPR management, irrespective of how strategic one considers it to be, has several distinct characteristics. It is integrated with other business functions. Informed by management and analysis of patent information. Important enough to senior management to merit substantial investment in terms of people and money and necessitate direct links to senior management even in the largest companies. Adaptable and adapted to suit the changing conditions facing Japanese Industry and last but not least, dynamic being concerned with both technology leadership and followership. In essence the six key topics discussed in this chapter can be said to comprise the essential elements of Japanese IP strategy and their discussion has involved all the features of Japanese IP management mentioned.

In the sector summarising the results of the survey a distinction was drawn between the more legal emphasis of UK patent departments and the more management emphasis of Japanese patent departments. From the above discussion it appears that neither UK patent departments, who possess legal experts but few with experience of general management of a broader strategic nature; nor Japanese IP departments, who have greater access to general managers but less legal expertise to hand, are in an ideal position to assemble the range of skills to provide an integrated service for the formulation and implementation of IP strategy. The question is as to whether it is easier to make lawyers strategically aware managers or strategically aware managers lawyers.

# Chapter 10. IP STRATEGY

**Summary**

The aim of this chapter is to draw some general conclusions about IP Strategy using the findings of the present research regarding Japanese and UK IPR management as a source of inspiration.

## 1. IPRs Role in Business Strategy

At the start of this thesis "IP Strategy" was specified as the use of IP either alone or in combination with other resources of the firm to achieve the firm's general strategic objectives. More generally business strategy concerns the:

- Assessment of existing resources, capabilities and opportunities
- Establishment of achievable objectives in terms of :
  - acquiring additional resources
  - creating, sustaining and exploiting competitive advantages
- Organisation of resources to achieve objectives.

Thus "IP Strategy" is comprised of assessment, acquisition and exploitation of IP and the IPRs they are associated with. This is broader than the use of IPRs, as just "isolating mechanisms" to preserve competitive advantage. IPRs are rather, resources that can be used in a wide variety of ways as *control mechanisms* enabling the control of the flow of technology and the exploitation of a company's IP.

### 1.1. IPRs as Business Resources

Earlier, I listed people, financial resources, physical property and IP as the set of resource types from which a firm had to select the resources it was going to use to carry on business (Pitkethly 1987). During the present research one Japanese company also revealed in a survey reply that its IP department slogan was the not dissimilar :

> 「知的財産権をヒト、モノ、カネに次ぐ第四の経営資源 として活用しよう」
> "Let's use IPRs as the 4th business resource along with people, things and money."

Toray in a book describing their patent management also make the point that :

> "This company, is searching for ideas in the market with people as the basis, and thinks it would like go on to establish management which grows with the times and has a "people, things, money, plus industrial property rights" business logic."
> (東レ 1987)

Thus whilst the set of resources a firm possesses are commonly thought of as just :

- Human resources
- Financial resources
- Tangible assets such as buildings and equipment.

IP and the IPRs which define and control that IP, should also be included and considered as company resources needing management just as much as any other resource.

The benefit obtainable from any asset or resource depends on the possession of other resources enabling one to benefit from it. The bare minimum needed to benefit from a resource is the additional resource of access to a means of exchange so that any of the above resources can be exchanged for any of the others. A company's initial task is thus to assess the resources it has, decide what resource mix it needs and obtain that mix starting from what it has (Pitkethly 1987).

However, whilst the resource mix and ability to adjust it are critical, business resources themselves have characteristics which determine how beneficial and helpful they are in achieving sustainable competitive advantage. These have been discussed in the literature review. Grant for example identifies Appropriability, Durability, Transferability, and Replicability as key features (Grant 1991a). Relabelling Durability as Longevity to emphasise an IPR's lifespan, we can study how these affect IPR's value:

- Appropriability — How easy is it to capture returns from the underlying IP?
- Longevity — How long does the IPR last?
- Transferability — How easy is the IP or IPR to acquire or transfer?
- Replicability — How easy is it for others to create the underlying IP?

### 1.1.1. Appropriability

As with any other resource, the benefit derivable from an intellectual asset depends on the marshalling of other resources and how well the owner can use other resources (among them IPRs) to control, and as part of that control appropriate, the returns from the underlying intellectual asset. This is determined firstly by the degree of legal appropriability conferred by any IPRs owned and secondly by the possession of, or degree of control held over any complementary assets (Teece 1986a). Other factors such as lead times may also play a role (Levin, Klevorick et al. 1987). A third critical factor exists though which is the IPR's owner's *ability to exploit the IPR fully.*

Acquisition of the necessary complementary assets and possession of IPRs conferring good

legal appropriability may in theory enable an innovator to appropriate 100% of the benefits of some item of IP. In theory, if an innovator owns the IP or other rights comprising a good project it should at the very least be possible to sell the project on to someone who can exploit it fully or to raise the finance required to acquire the necessary resources. However, in practice, there may be no efficient means of exchange and thus resource mix adjustment may be impossible because of transactions costs (See Page 40), or other market imperfections. In such a case it may be impossible to either sell or license the innovation or to assemble the necessary complementary assets, IPRs or other resources comprising the ideal quantity or mix of resources starting from the innovators existing stock and mix of resources. As a result full appropriation may be impossible.

An example might be a risky innovation where a small company has good legal appropriability and the option of acquiring all the complementary assets needed to exploit the innovation fully. However, a lack of resources or ability to raise the finance needed to exercise the option, or inability to convince others of the viability of the project and licence or sell the IPRs, may leave the innovator unable to exploit the opportunity fully. At best a resource poor innovator will cede some of the benefits to others in order to be able to use their resources to exploit the IP concerned, at worst the resource poor innovator may be unable to exploit the innovation at all.

*Strategic Appropriability*

The combined effects of the legal appropriability and complementary assets described by Teece, other factors such as described by Levin et al. and the extent to which transaction costs limit the assembly of the necessary resources and resource mix will determine the innovators ability to exploit the innovation fully and thus what I shall call the *Strategic Appropriability* of the underlying IP. That is the ability of a party to extract 100% of the theoretical maximum return from a given item of IP.

*Complementary IPRs*

Teece's discussion of Legal Appropriability and Complementary Assets mentions the possibility that separate but complementary technologies might be necessary to enable exploitation of an item of IP. However, if one considers not just individual items of IP at a given time but the development over time of an IP portfolio not only the core IPR but also any surrounding closely related IPRs which cover developments and improvements of the basic IPR and may control access to key features may be critical. It is therefore essential for IPR owners to try and control the underlying IP using not just the IPR concerned and any complementary assets but also as many as possible of the *Complementary IPRs*. This is particularly so in high patent density fields such as occur in Japanese industry where the effects of the encroachment of other IPRs can engulf the original IPR.

This is an area where Japanese IP management might be characterised as comprising the use of patent information management and the subsequent filing of large numbers of patent applications forming Complementary IPRs around a competitors core IPR. The Mitsubishi /Fusion systems case mentioned earlier (Spero 1990) is an example.

Overall or Strategic appropriability is thus determined by both the nature and legal appropriability of the IP or resource to be appropriated, the resources and resource mix of those wishing to appropriate it, transaction costs limiting their ability to adjust that mix, and the critical resource mix required to exploit the IP fully including within that mix any complementary assets or complementary IPRs essential to full exploitation.

### 1.1.2. Longevity

A resource's value depends on how long it lasts which can be affected by several factors. With IPRs the first determinant is the maximum legal life. This varies considerably from IPR to IPR. However, in many cases the key factor affecting the useful life of the IPR will not be the IPR itself but the rate of obsolescence of the underlying intellectual asset. The use of IPRs is thus a never-ending competitive race with companies continually trying to catch up with and ride the crest of the wave of technological progress. The benefits derivable from both IPRs and the underlying IP are thus impermanent and not something which might be relied on unless both are continually maintained and updated. IPR's impermanence and the flow of technology are the two main reasons for involving time in any discussion of IP Strategy.

### 1.1.3. Transferability

In the literature review transaction costs were discussed. If an IP resource is difficult to transfer due to high transaction costs or the nature of the IP itself, it may be advantageous in that other firms will find it difficult to acquire without permission. Easy transferability though is essential if a company wishes to disseminate an invention rapidly to build up market share or use in standardisation strategies. If the IP is difficult to transfer it may be disadvantageous if the company cannot easily exploit the IP itself. In such a case licensing or sale of the IP may not be a practicable way of exploiting it and the company may be forced to commercialise it itself or not at all. If it has inadequate resources to do so it will be unable to exploit the IP fully.

Problems of transferability are usually due to the IP itself not the IPR. An example might be technology whose use requires a high degree of skill. However, in the case of resources licensed in or requiring licenses to others' IPRs, there may also be restrictions on using them or licensing them out to third parties, depending on the license agreements and IPRs concerned.

Transferability is thus an ambiguous quality in resources, being sometimes advantageous, and sometimes disadvantageous. Transferability will be important as much when legal rights are weak and appropriability is critical as when legal appropriability is strong but in-house resources to enable exploitation scarce.

### 1.1.4. Replicability

Replicability is connected with the appropriability and longevity of the resource. If the IPRs involved are narrow in scope it may be possible for a competitor to "design around" them and whilst not being able to offer exactly the same product, be able to offer one which gives customers a large proportion of what they want.

IP which is not easily appropriated using IPRs may give only short lived advantages. If one can easily design around any IPRs protecting an innovation, the innovator will have a difficult time appropriating returns from the product even though direct copying can be prevented. On the other hand if development and manufacture of such a product is difficult, then even without strong IPRs the innovation will be easy to appropriate by being difficult to replicate. As with transferability, in the case of diffuse intellectual assets, for example where the skills and knowledge of teams of people or complex organisational systems are involved and where the key success factors are unclear to outsiders, replicability will be low and thus appropriability high even if IPRs play a minimal role. Conversely, increasing replicability increases the importance of complementary IPRs.

Replicability is in a sense linked with the scope of IPRs and the breadth of protection offered by them. In the past it was in Japan's interests, whilst catching up technologically and promoting diffusion of inventions more than their protection, to have a patent system which gave narrow protection and enables easier replicability than broad protection. Now Japanese industry is facing a changing situation and there is a need to promote both diffusion and protection. This has resulted in an increased emphasis on broadening the scope of claim interpretation under Japanese law and promoting such a view abroad[89].

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[89]What is particularly interesting is that the situation faced by Japan is not just a straight switch from an IP system allowing anyone to use anything to a draconian system giving patentees powers to stop anyone doing anything, neither of which is the case in Japan. The changes are far more subtle in legal terms but the change in emphasis is nonetheless there. The most recent case on this point involves a Japanese company being held to infringe a Japanese patent belonging to Genentech Inc. a US firm. On appeal a High Court overturned an Osaka District Court ruling that a single, clinically meaningless difference in the amino acid sequence of a tissue plasminogen activator (tPA) placed the defendant's product beyond the scope of the plaintiffs patent (Melson, 1996). This application of the "doctrine of equivalents" by a Japanese High Court against a Japanese Company provides, as the case comment puts it, "a further indication that the Japanese courts are slowly, if reluctantly, moving towards the less restrictive US and European approaches" (See also Appendices).

Low Replicability is thus a desirable resource quality as it will help in appropriation. Replicability is linked to the scope of the IPRs as broad IPRs will reduce the possibility of competitors designing or inventing around them.

### 1.1.5. High Value IPRs

To summarise high value IPRs give the following advantages :

- High appropriability and Low replicability by giving broad protection
- Long life by remaining in force for as long as possible

IPRs with low transferability may be valuable if they nonetheless protect critical resources, making them difficult for others to obtain. IPRs with high transferability will have more exploitation options which may outweigh other considerations. Besides IPRs any other factors increasing or maintaining the value of Intellectual Assets will also be important in particular the use of complementary assets and complementary IPRs. However, in the long run it is the range of inter-related assets at a company's disposal and the use of those assets which will enable it to control IP and appropriate the benefits.

In the case of Japan hitherto the narrowness of patent protection for example has been compensated for to some extent by the large numbers of patent applications being made. However this in turn might be said to have contributed to the more collectivist Japanese approach to IPRs and to their value in some senses being appropriated collectively by all those with access to the area covered by the network of cross-licensed IPRs. However whether the scope of individual Japanese IPRs remains narrow or as appears to be the case gradually broadens it is the combined effectiveness and scope of techno-legal protection that they offer and who has control over and access to the underlying IP and for how long which is important.

IP and IPRs are resources which can be potential sources of competitive advantage. However, no IP or IPR any more than any other strategic resource exists or can be thought of in isolation from other resources.

## 1.2. The Dimensions of IP Strategy

Just as one cannot consider one business resource in isolation from others so few items of IP or their associated IPRs exist in isolation. Any item of IP is linked inextricably to other resources and in particular other items of IP in a relationship positioned in terms of time, the technical / legal scope of the IPRs concerned and the technical advance they represent over preceding IP and IPRs.

Figure 43 IPR Relationships




Relationship

### 1.2.1. Lateral and Longitudinal Relationships between IPRs

Within this space the first type of linkage between IPRs is a lateral linkage. This involves IPRs relating to other items of IP developed in parallel with the IP in question. These may be complementary technically, in the sense that they can be used with the IP in question and optionally complement its competitive advantages. They may on the other hand be competing technically in the sense that they use different means to achieve the same or similar competitive advantages. Complementary technology may fall within the techno-legal scope of an underlying technology as b. does within the scope of a. in the above figure. In the case of a patent for example where a piece of IP falls within the scope of the claims of a valid prior patent, infringement occurs and a license to use the IP is necessary. Thus a license may be needed by the owner of b. from the owner of a. if different. On the other hand a complementary technology might, as most competing technology will, depend on a totally different technology such as c. and fall outside the scope of a.

Nonetheless the technical scope of an IPR and the extent to which this scope becomes crowded with overlapping subsequent IPRs owned by others is a major factor in determining the eventual appropriation of the bulk of the benefits from the underlying IPR. If an initial inventor fails to follow up with subsequent inventions and fails to retain the technical lead,

then subsequent developers may so swamp the initial invention with developments critical to commercial success that the balance of power may shift to the developers not the initiator. This has been referred to earlier as a "patent flooding" strategy, however the relevance to the IP strategy of Japanese corporations is that in certain fields the overlapping nature of myriads of interlocking patents can make cross-licensing all but essential and give an incentive to the filing of large numbers of patent applications. A further incentive is the creation of "patent nets" (Aratama 1971) which can be used to dominate a new field or overcome one already dominated by an existing master patent or patents. In both cases it is the combination of gaining the technical lead and dominating the techno-legal scope of the field which is the key to success.

However, gaining the technical lead and dominating the techno-legal scope of the field is only useful if done continuously over time. The second type of linkage between IPRs therefore is longitudinal, where the variable linking the items of IP concerned is time. This is concerned with how the techno-legal scope and technical advances offered by various items of IP and their associated IPRs evolve over time. How this evolves depends on several critical events in the life of the IP and IPRs concerned.

The critical events for most items of IP on this dimension are the dates of invention, the filing dates of any patents or other IPRs, the date of publication of the underlying IP[90] and if different, the date of commercialisation. The positioning of the items of IP concerning these events will influence not only the legal but the strategic relationship between them. Quite apart from the legal position regarding obtaining and enforcing IPRs[91] the dates of publication and commercialisation of competing technologies will be critical to the relationship between them. Information disclosed in any form before commercialisation by one party may have a significant effect on the development and even success and speed of success of competitors. The disclosure may come about as a result of publication in Patent Applications, by inadvertent disclosure or by other routes legal or illegal[92]. This shows the need for careful management of IP within companies and not just being aware of the published IPRs of competitors and

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[90] If a patent application has been filed the date of filing of the initial application will in most cases determine the latest publication date of the patent application and thus of the underlying IP in the UK and Japan at 18 months from the first filing. The publication date is also important in the UK and most countries with publication at 18 months because it marks the date from which infringement damages may be claimed. In other cases the first marketing of products or services incorporating the IP will generally mark the first publication of the underlying IP.

[91] For example publication of matter falling within the claims of a patent application, even by the same inventor, before filing it will usually invalidate the patent application in the UK or Japan. Secret independent use of IP by others before the publication date of a valid patent can avoid infringement. Use of IP falling within the claims of a published application can be subject to damages for infringement if the application is subsequently granted. At present the US still has a first to file priority system whereby the date of invention and reduction to practical use is important when two conflicting applications exist. In the UK, Europe and Japan the first to file system makes the filing date of conflicting patent applications critical. Dates of invention, publication, filing and first use are thus critical events.

their implications. Japanese companies for example put considerable effort into Patent Information Management and the thorough analysis of competitors' IPRs. Just as important is the publication of information relating to IP and IPRs owned by the company. IPR management needs to encompass not just IPRs but also the underlying IP and anything embodying information about it.

### 1.2.2. IPR positioning

If the items of IP concerned are following parallel but separate technological trajectories the critical aspects are as to when the IP concerned was created, when any patents or other IPRs were filed and when it was made available to the public. One item may be ahead of or behind the other in respect of either or both of its date of conception filing or publication.

If the two items of IP are not only pursuing parallel but collinear technological trajectories and competing to provide similar solutions to the same technical problems then not only will conception, filing and publication be critical events but where one item of IP is based on the other, one will be fundamental IP (e.g. a.) and the other derivative IP (e.g. b.).

Thus besides the litigate/license type decisions which must be taken in respect of every item of IP owned by a company, such decisions and any others related to the IP, must be taken with a knowledge and understanding of the other items or potential items of IP related to the IP in question whether in terms of their scope, technical level or their temporal relationship.

One might ask how this has any connection with IP management in Japan but Japanese use of "patent maps" show that such maps presents precisely the information on temporal derivation and diversity of scope necessary to make informed IP strategy decisions. In short patent mapping is helpful in understanding the territory over which IPR strategies are played out.

Consideration of the diversity of IP surrounding a piece of IP will encompass consideration of both competing and complementary IP, the potential for cross-licensing if a wide variety of complementary IP exists and the potential for pre-empting competing technology by licensing or sales policies designed to build market share if competing IP poses a threat.

Consideration of the derivation of a piece of IP and other items of IP surrounding it will include both derivative and anticipative IP, the potential for cross-licensing to gain access to anticipative IP if need be and the potential strategic consequences of denying access to a particular piece of IP for its future development.

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[92]Outside the 1995 Patent Information Fair in Tokyo there was a stand advertising a conference on trade secrets and their preservation.

IPRs thus have a significant role to play in the creation and preservation of competitive advantage and need to be considered not just from a licensing/litigation perspective but also from a diversity / derivation perspective. This includes the relationship between the technical scope and advance and the temporal relationship between the items of IPR. Japanese "patent mapping" techniques are one way of presenting such information.

## 1.3. Characteristics of IPR values

As mentioned earlier the main value of IPRs depends on the scope and duration of protection. Both these factors depend on the legal right involved but are also affected by the speed with which what is protected becomes obsolete or can be "designed around". In addition in cases where application costs and renewal fees are payable there will be a certain value in options to abandon the IPR and save the fees involved and in any event mere possession of a valid IPR gives one an option on future profits (See Page 47). We can thus say that for most IPRs :

- IPRs value will rise with increased duration of protection
- IPRs value will rise with increased breadth of protection
- IPRs value will fall with exploitation chances as expiry draws near
- IPRs value will fall as the rate of obsolescence rises
- IPR Applications and IPRs early in their life will have a significant amount of their value in options on future profits not actual ones
- IPR Applications and IPRs late in their life will have a small amount of value in options on future profits and most in any actual profits.

The implications of these observations are that whilst one should obviously keep an IPR in force if it generates more income than it costs to maintain, one should also :

- Seek IPRs which are as broad and long lived as possible
- Prefer methods of IPR acquisition which give broader rights
- Not keep IPRs in force in fast moving fields as long as in slow ones
- Not renew IPRs which are old and unexploited
- Keep in force IPRs and applications which are young but as yet unused.

In the case of Japan one can see quite readily the logic behind increasing the breadth of patent protection if the value of IPRs is to be increased. It also fits with the efforts to encourage inventions leading to master patents in their respective fields, all part of the shift in demand for quality as opposed to quantity among Japanese patent applications described earlier. The Japanese deferred examination system[93] also assists the last of the above factors since deferred

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[93]Japanese Patent Law Art 48-2 allows a request for examination to be filed within 7 years of filing.

examination means deferred costs which means it is easier and cheaper to keep a company's options open regarding an applications before spending more money on it or abandoning it.

## 2. Intellectual Property Strategies

So far we have looked at how IPRs fit into general business strategy considerations. We now move on to look at various strategies for acquiring and exploiting IPRs.

### 2.1. Acquisition Strategies

Acquisition of IP is in part a decision as to whether to produce it in-house or buy it in. However, there are several other considerations and a wide range of options including :

- Development In-House
- Development by Subcontracting
- Development through a Joint Venture
- Outright Purchase
- Licensing In using a non-exclusive licence
- Licensing In using an exclusive or sole licence
- Licensing In using a cross-license.

**Tacit Knowledge,**

If something is developed in-house the company will also acquire valuable know-how associated with the development process. Some of this "tacit knowledge" is difficult to record or acquire, in contrast to "explicit knowledge" in a written report and thus may have low transferability. Being able to control this "tacit knowledge" as well as any IPRs will be important. Thus there may be great advantages to in-house development.

**Learning and Catching Up**

In-house development may result in a greater build-up of skills and tacit knowledge and it may put a company ahead of competitors. It may also take a long time and be costly. In contrast, copying, purchase or licensing in can be a considerably quicker and cheaper method of catching up if one is behind competitors. It is rare though to be able to licence in competitor's most advanced technology and in general even if it can be obtained, licensing can only be used to achieve second place. Companies licensing in technology may well be able to catch up with competitors far quicker and with less risk than they otherwise would be able to (the Japanese automobile industry is another case in point (Cusumano 1985)) but it will be difficult for licensees to take the lead without developing some risky originality. The danger in relying on licensing in is that it may stifle originality and any chances of leadership.

It is vital if licensing in or purchase occurs that steps are taken to learn as much as possible and use licensing in merely as a way of speeding up development and learning and building development skills not avoiding them. Buying in IPRs often results in some in-house development work being unavoidable. The aim should go beyond this and be to develop what is licensed to the extent that in the future with the lead reversed, it could even be licensed back to the original licensor[94]. Used badly licensing in can excuse the need to build up a company's own expertise. Used wisely it can serve as a short cut to catch up with and even overtake the competition.

Licensing in must therefore be accompanied by research and understanding if it is to serve as a stepping stone to greater things. It is perhaps in this area that the Japanese approach to licensing has been most successful in that it is rarely divorced from the idea that licensed and otherwise acquired technology is a source of learning and not just a method of avoiding R&D costs. As Nonaka says :

> "To create knowledge, the learning that takes place from others and the skills shared with others need to be internalised - that is reformed, enriched and translated to fit the company's self-image and identity." (Nonaka and Takeuchi 1995).

The problems facing Japanese industry however are similar to those also facing wartime Russia in that there has hitherto been no premium on risky individuality as regards innovation. Kapitza in a letter to Stalin in 1945 asking to resign from the Special Committee on the atomic bomb said :

> "...our industry and armaments have developed only along the line of improving existing techniques. For instance Yakovlev, Tupolev, and Lavochin are our most important designers, but they have not gone beyond perfecting already existing types of aircraft. To develop new types, such as the jet engine, demands a different type of designer - more creative and bolder. Such people find little freedom to develop their talents in the Soviet Union."
> (Letter to Stalin from P.Kapitza 25/12/45 in (Boag, Rubinin et al. 1990)).

One of the top objectives of Japanese IP departments as revealed by IP department slogans in the current survey was that of improving the quality of Patents and Inventions. In part that is due to a perceived need for Japanese companies to produce the master patents of the type associated with US pioneering inventions which have become a problem to Japanese companies of late. Thus there is a similar need in Japan for a creation of the conditions necessary for original innovation, namely the social freedom for creative and bold designers referred to above that appears to be lacking in many Japanese corporate R&D laboratories. In some cases Japanese companies are setting up R&D facilities abroad not just because of a need for listening posts abroad but to do groundbreaking research that companies find difficult to do at

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[94]This was the case in Japan even as far back as 1928 when the Toyoda Automatic Loom Company (a forerunner of Toyota) licensed technology to Platt & Co. in the UK. This had been developed as a result of many years earlier studying machinery from Platt & Co. in the UK.

home (Johnstone 1993). Johnstone has said that it is not that Japanese scientists can't do basic research but that they can if they're only allowed to. A key consideration with licensing therefore is the degree of learning potential for the licensee and the potential loss of technical lead for the licensor.

**Costs of In-House Development**

One reason for purchasing or licensing in is the fact that buying in small amounts of IPRs may be the most efficient way to acquire them, when the costs of developing them are not fully reflected in the price or when high overheads would be involved in doing the work in-house. In such cases the marginal cost of a small piece of in-house development work can be high. It also illustrates the fact that despite recent increases in licensing fees extracted from Japanese companies by US companies there is a great risk of the actual cost and benefits derivable from technology developed by a company not being reflected in the price charged for it in licensing deals. For example Abegglen writing in 1985 said that the cost of the technology transferred to Japan from the West over the previous twenty years was only $17 billion, a fraction of the current annual U.S. research and development budget (Abegglen and Stalk Jr 1985).

**IPR Acquisition Strategies - Conclusion**

In acquiring IPRs consideration should always be given to the effect the method of acquisition will have on the competitive position of both parties and the learning opportunities that licensor may be able to access.

## 2.2. Exploitation Strategies

Exploitation of IPRs might be supposed to simply consist of suing infringers and copiers of the work one has protected with IPRs. However, whilst this is one option others exist. Exploitation strategies may be loosely categorised into the following :

- Protective Strategies
- Exploitative Strategies :
  - of one's own company's IPRs
  - of other's company's IPRs
- Dynamic and Static Strategies

Murakami has characterised Japanese firms patent strategies into i) defensive, ii) monopoly seeking, iii) deterring others and iv) royalty seeking strategies noting a potential future trend away from defensive strategies towards deterring and royalty seeking strategies. Murakami's definitions of these terms must be studied carefully to understand that by defensive he means the concept of broad filing of large numbers of patents to defend a company's freedom to act and not just a wish to monopolise a technology. Firms pursuing "defensive" strategies are thus on his definition :

> "..firms that defend against IP-related attacks from their competitors, and thus secure freedom in their technical and product development activities." (Murakami and Nakata 1994)

This is thus also related to a form of acquisitive strategy since its aim is to preserve freedom of action and freedom to source technology from wherever is best. However, whilst this partly captures the imprecise change from a diffusive to a protective attitude to IP amongst Japanese companies, there is another element which is missing in this categorisation which is the presence of dynamic as opposed to static IP strategies.

The common feature of Murakami's four strategy types is that they are all aimed at two party situations involving the central company and either one or more competitors who are implied to be either leaders or followers relative to the central company. As the present research has shown Japanese companies in particular are simultaneously in both leader and follower positions and whilst being just as keen on licensing out technology are also interested in searching for and licensing in technology where appropriate. Q.22 of the present survey shows that Japanese companies consider the following roles of IPRs to be more important than UK companies do :

a. A source of Revenue through licensing OUT technology
b. A source of Technology through licensing IN technology
c. A source of Technological Information
d. For use in cross licensing to allow your company to act freely

These are all functions where IP is fulfilling a dynamic role. The more protective roles though were nonetheless as important to Japanese companies as to UK companies :

e. To protect your IP assets from free use by others
f. To monopolise your IP assets and make free use by others difficult
h. To gain a lead over competitors by protecting IP assets.

The conclusion one can draw is that Japanese companies are interested in both protective and dynamic IPR roles, seeing no conflict between them. They are also equally interested in licensing out as licensing in. Thus from a Japanese perspective and one might add from any developed country's perspective; IPR strategy is not a two player, leader /follower game but a multi-player game where each is both a leader in some respects and a follower in others with competitors spread out along the dimensions of time and technical advance. Nelson and Winter have discussed models where both imitators and innovators coexist (Nelson 1987). One might in the light of the present discussion extend such thinking to a case where players were each both, but in different areas, leading in some areas and following in others.

In the space defined by the parameters of technical advance, techno-legal scope and time within which IP strategy is formulated one can describe the possibility of all the various

forms of IP strategy which have been mentioned so far including protective, exploitative static and dynamic strategies.

### 2.2.1. Protective Strategies

**Litigation**

Having established an exclusive right it is obviously in an IPRs owner's interest to prevent unauthorised use. However, the expense of litigation means that most cases are settled before they end up in court, as shown by the present research. Moreover this reluctance to enter litigation is common to both UK and Japanese companies and can be considered as one area of IP strategy where the problems faced are common to all. No reasonable company wants to be involved in litigation. Litigation strategy is the province of specialist lawyers and outside the scope of this thesis. However there are certain features of the UK and Japanese legal systems which may favour or disadvantage plaintiffs or defendants in litigation which have been discussed earlier. A distinction thus needs to be drawn between differences in infrastructure and consequent actions and differences in attitudes.

**Licensing Infringers**

The main aim of adopting a protective IPR strategy is to preserve and exploit the monopoly. This presupposes that the IPR owner is in a position to be able to exploit the IPRs fully by supplying all end-users directly. In a situation where there is infringement but the IPR owner is not in a position to exploit the IPR fully there may be pressure brought to settle the issue by granting the infringer a licence.

Such a situation might easily arise in a market such as Japan where a western IPR owner wishes to exploit his IPR but has not yet been able to do so fully. If the company has the resources to and is in a position to exploit the IPR fully itself then such pressure could be strongly resisted. It is likely that in such a case the infringing company will merely use the experience and profit gained in producing the infringing article to improve it and eventually leapfrog the innovating company. The infringement may have been deliberate or not but the answer could be the same. Such an approach was adopted recently by Genentech against Toyobo (Tokuda 1991). Toyobo was held to infringe a tPA patent held by Genentech and despite industry rumours that it might be able to take a license it ended up having to withdraw from its 10 billion yen investment in tPA production when Genentech refused to grant a license following the finding of infringement.

If a company does not have the resources to or is not in a position to exploit the IPR fully itself (which is often the case) then a more conciliatory attitude might be taken. (In some countries such as the UK non-use by a patentee can give rise to competitors being able to acquire compulsory licences, though such situations are rare). The aim though should be to

have a fair division of the profit from the now licensed version whilst ensuring that the licensor is kept several steps behind the IPR owner in terms of learning opportunities. It may be that the infringer is not the person who should be given a license but some other party who is easier to control. However, if exploitation in any country where the company possesses IPRs is something which is done pro-actively not reactively after infringement occurs, choosing a good licensee could be much easier.

**The main failing of protective strategies**

Protective strategies, particularly where successful in stopping infringers, can easily tempt companies to rest on their inventive laurels and not consider the day when the rights they own expire, are rendered obsolete or are designed around by competitors. In other words they may not take account of time. Furthermore a purely protective strategy where all infringers are repelled and would be licensees refused may result in the IPRs concerned not being fully exploited. A more flexible approach which adapts to suit the changing circumstances as the IPR ages will probably produce better returns. Japanese companies do license technology to companies in other Asian countries but it is usually not their latest technology.

### 2.2.2. Exploitative Strategies

Exploitative strategies are those which set out not just to keep everyone else out but to maximise the return from the IPRs available to a company by pursuing whatever methods of exploiting them are most profitable. There are two aspects to this. Firstly exploiting one's own company's internal IPRs and secondly exploiting other company's IP and IPRs (with their permission where needed of course).

**Internal IPR Exploitation**

IPRs can be used to provide cashflows in several ways. Obviously most of these mirror licensing in options

- Protection of Monopoly Rights and 100% market share of the sale or licensing of the goods or services direct to end-users
- Outright Sale of the IPR under a subcontract to other suppliers
- Outright Sale of the IPR
- Licensing Out to other suppliers using a non-exclusive licence
- Licensing Out to other suppliers using an exclusive licence
- Licensing Out to other suppliers using a cross-license

**Defensive Exploitation**

As mentioned above simple protection of the monopoly offered by the IPR is only really an efficient means of exploitation if it is possible for the IPR owner to supply 100% of the

end-user market and maintain such a monopoly. If this is possible it will usually result in higher returns than other methods of exploitation since there are costs in contracting out commercialisation.

**Sale and Licensing - Choice of IPR**

If licensing or outright sale of an IPR to another supplier is contemplated, an important issue is the role it is playing in the development of the company's current business. If it still plays a critical role, disposal in a way which does not allow a sufficient degree of control to be exercised may be detrimental to the innovator, since it could form a stepping stone to a potential competitor trying to catch up with the company.

**Sale and Licensing - Choice of Purchaser or Licensee**

One of the most important decisions after having decided to license or sell IPR to other suppliers is who to sell it to. The licensee or purchaser should not be in a position to overtake the vendor easily and yet must be able to help in fully exploiting the IPR.

In the case of licensing out there is also a choice to be made between exclusive and non-exclusive licenses. If the IPR is connected with the company's current business then granting an exclusive licence to one competing supplier may strengthen it without expanding the market accessed by the IPR to 100%. On the other hand if all competitors are licensed not only is 100% of the market accessed but the feature may cease to be a source of competitive advantage if all suppliers provide it. It may in certain cases where a company is unable to control diffusion of an innovation due to weak IPR protection and lack of strategic control over it, be advantageous to try to diffuse and license it as widely as possible to try to dilute the effect of the competitive advantage to be gained from using it.

The Pilkington Float Glass process was successfully exploited in non-UK markets by use of a mix of in-house exploitation where possible, coupled with licensing elsewhere (Barker 1977). A continuous stream of patents created as the process developed was used to control licensees. In this way the existing market structure was controlled and used to Pilkington's advantage.

With innovations where network or standardisation issues are important the relevant market when considering whether 100% of the potential market can be exploited is not the existing market but the future market allowing for overall market growth. This might actually be higher and profit potential greater if a considerable amount of free licensing occurs to build up both the overall market and the company's share of that market. The Netscape web browser case referred to earlier is a good example of such a strategy. Obviously using such a strategy involves drawing a fine line between building both the market and market share and destroying any profit potential. The key perhaps is that such licensing involves forgoing some revenue to build a source of greater revenue and crucially only foregoing revenue from and

not control of the innovation.

**External IPR Exploitation**

Since other companies may consider exploiting their own IPRs by licensing out innovations, there may be a possibility of exploiting other companies' IPRs using a licence. This is effectively the same situation as was dealt with earlier under the heading of IPR acquisition. A further possibility is to use other companies groundbreaking developments as a basis for development, taking a licence to be able to use them or alternatively using old or unprotected technology as the basis for developments protected by new IPRs.

### 2.2.3. Dynamic vs Static Strategies

In their book on knowledge creation Nonaka and Takeuchi do not deal with the subject of IPRs however they do say that :

> "The process by which new knowledge is created within the organisation - in the form of new products, services or systems - becomes the cornerstone of innovative activities. That process is dynamic." (Nonaka and Takeuchi 1995).

Knowledge creation processes and by implication IP and IPR creation processes are dynamic. However, in addition to this dynamic aspect all IPRs are also valuable but in a sense wasting, assets which will eventually come to an end. IPRs are not impervious to the ravages of time and competition and thus their existence as much as their creation must be considered in a dynamic framework. It is thus essential if a competitive advantage is to be sustained for a company to update and develop it's IPRs continuously. For example, the Word Processing Software this document is written with (Nisus Writer) has copyright notices in respect of every year from 1988 to 1995. Without continuous updating the 1988 copyright would be almost worthless by now.

One might liken competition in developing products and services to a company of people in a sleigh being pursued by wolves. The wolves being more agile than sleighs could stop following, take a short cut and catch the sleigh at a convenient pass further along the route. The occupants however have only to keep ahead of the wolves and keep throwing the remains of their lunch overboard every now and then to keep the wolves out of harms way and safely in second place[95]. In the same way it is sometimes advantageous to license one's old unwanted technology out to competing suppliers to be able to control the seemingly uncontrollable. In cases where there are high switching costs involved (there are perhaps steep hills on either side of the path that the wolves would have to climb) it can be a very effective method of controlling the competition. However, an essential element is that one must always - even if only by a small margin - be in the lead.

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[95]This analogy was prompted by a vague memory of a short story by Lawrence Durrell (Durrell, 1966)

One can thus identify two types of IPR strategy. One is static, relies on existing positions, is defensive and is often unwilling to invest to maintain and develop it's IPR portfolio. Inexorably the IPRs concerned die. The death may be unpredictable as when a new product or service renders the old suddenly obsolete or it may be predictable as when a key patent expires, but it happens and IPRs competitive advantages die with them.

The other form of IPR strategy is more dynamic. Any particular IPR is not relied on just as a position to defend to the bitter end but as one of a series of factors at first delaying the competition for as long as possible and then perhaps controlling their development to a position in line with, but several steps behind, the IPR owner. Furthermore, any particular IPR is also viewed as a means of not just competing with followers but of competing with leaders. If there is one strategy that recent history has shown Japanese industry to be particularly adept at it is the ability to create a wide net of patents covering developments around existing leading patent positions to improve their bargaining position with the holders of the basic patent. The most widely publicised case of this was the Fusion Systems case referred to earlier (Spero 1990). However there are also several references to the use of "Patent Nets" by Japanese writers on Patent Strategy (Rahn 1994) (Aratama 1971) (石井 1982).

When considering such nets though the general attention is to concentrate on the surrounding of one existing invention with a plethora of improvements which all relate to the underlying basic invention. Invariably the longer the timescale being considered the more inventions that need consideration. It is insufficient to concentrate on just one existing invention and in reality one needs to concentrate on thinking not just about present inventions but future ones and the development of a field. Following the development of high temperature superconductors by IBM, Sumitomo Electric filed over 700 patents in the field in 1987 (Tatsuno 1990).

Alternatively, from the point of view of a pursuer the objective becomes to learn and internalise as much as possible from licensing in technology but with the aim of using it as a stepping stone to speed up the process of taking the lead position. The implication of the present study is that it may be easier to adapt to dynamic approach if one has been trained in followership where the objective has been to internalise learning as in the case of Japan.

## 3. PRACTICAL IMPLICATIONS

Having covered a range of basic strategy issues involving IPRs we now need to look at what the implications are regarding IPR management.

## 3.1. Awareness of IPRs

To manage a firm's resources one first needs to know what they are and what resources the firm's major competitors own too. Failure to take note of these, could lead to inadvertent infringement of others rights. The extent to which IPRs possessed by the company or its competitors form key sources of competitive advantage should also be analysed. Once this is known what resources should be allocated to their management will become clearer. These are all research and analysis tasks, which as has been shown earlier, the average Japanese IP department would consider a sine qua non of Patent Information Management.

## 3.2. IPR administration

The administration of IPRs within a company comprises as we have seen two types of work. Firstly reactive work where an IPR department responds to demands from other parts of the business. Secondly there is pro-active work where the IP department acts as a source of education about IP matters and actively seeks out IP issues which need attention and which otherwise might be neglected to the company's detriment. In addition to the distinction between reactive and pro-active work but linked with the latter there is also the issue of liaising with both sources of IP (such as the R&D department) and also those managers responsible for IP related strategic decision making who the IP department can support with advice and information. The IP department should have some form of policy ensuring that none of these essential tasks nor other larger scale objectives are neglected. On this point it is instructive to remember that whilst 47% of UK companies with IP departments had some form of written IP plan or policy around 70% of Japanese respondent's IP departments did.

Inevitably in many organisations there is insufficient justification for an entire IP department. In the present UK sample around 28% of companies had an IP department and whilst almost 100% of the Japanese sample drawn from an IP management society did there is reason to suppose that in general some c35% of Japanese companies may have a specialist IP or Patents department (See Ch.7 and (Murakami and Nakata 1994)). Thus it is not unreasonable to assume that IP departments are more common in Japan than the UK.

## 3.3. IPR Management and Exploitation

### 3.3.1. Relationship to Company's Core Business

With any innovation which occurs in a company the first question once the creation and preservation of the IPRs concerned has been dealt with should be to assess the potential profit impact of the IPR on the company's business. This will help determine the level of resources to be devoted to exploiting it.

It should be stressed that whatever the profit impact of the IPR to merit attention the contribution need not be in the core business of the company. A company which develops something with significant profit potential but outside its core business should nonetheless investigate how, with the resources it has available and in the light of those needed for success, it might best exploit the opportunity. This is an instance where a company not having the skills to make such an evaluation might usefully hire someone who does. If an opportunity is potentially profitable the more sensible question is how, not whether, it should be exploited. For this reason many of the larger Japanese companies are now licensing out unwanted technology to increase revenues (See Figure 5 Page 13 / Figure 6 Page 14 ).

### 3.3.2. Partners / Joint Ventures Licensees Licensors

Ownership of an IPR also raises the question of how widely it should be disseminated. This could be done at several levels :

- Licensing to no one - 100% exclusive in house use
- Licensing to businesses in different product/service sectors
- Licensing to same sector businesses in different markets
- Licensing to same sector same market businesses
- Licensing to anyone

There are a multitude of relevant factors which will govern this key decision among them though are the following key factors :

1) Competitive Advantage offered by the innovation and dependent on :
   - Technical advance offered by the innovation
2) Strategic appropriability determined by :
   - Access to and Control of Critical Complementary Assets
   - Legal Appropriability of the IP concerned
   - Ability to extract 100% of Potential Profit from the innovation
3) Risk of failure of in-house commercialisation of the innovation
4) Learning opportunities available to licensees
5) Standardisation and Network strategy considerations
6) Access to technology in the future as determined by :
   - Techno-legal scope of IPRs owned or controlled
7) The effect of all these factors on the outcome of the next round of innovation
   - involving a consideration of the dimension of Time.

The first of these factors relates to the Competitive Advantage that the innovation represents

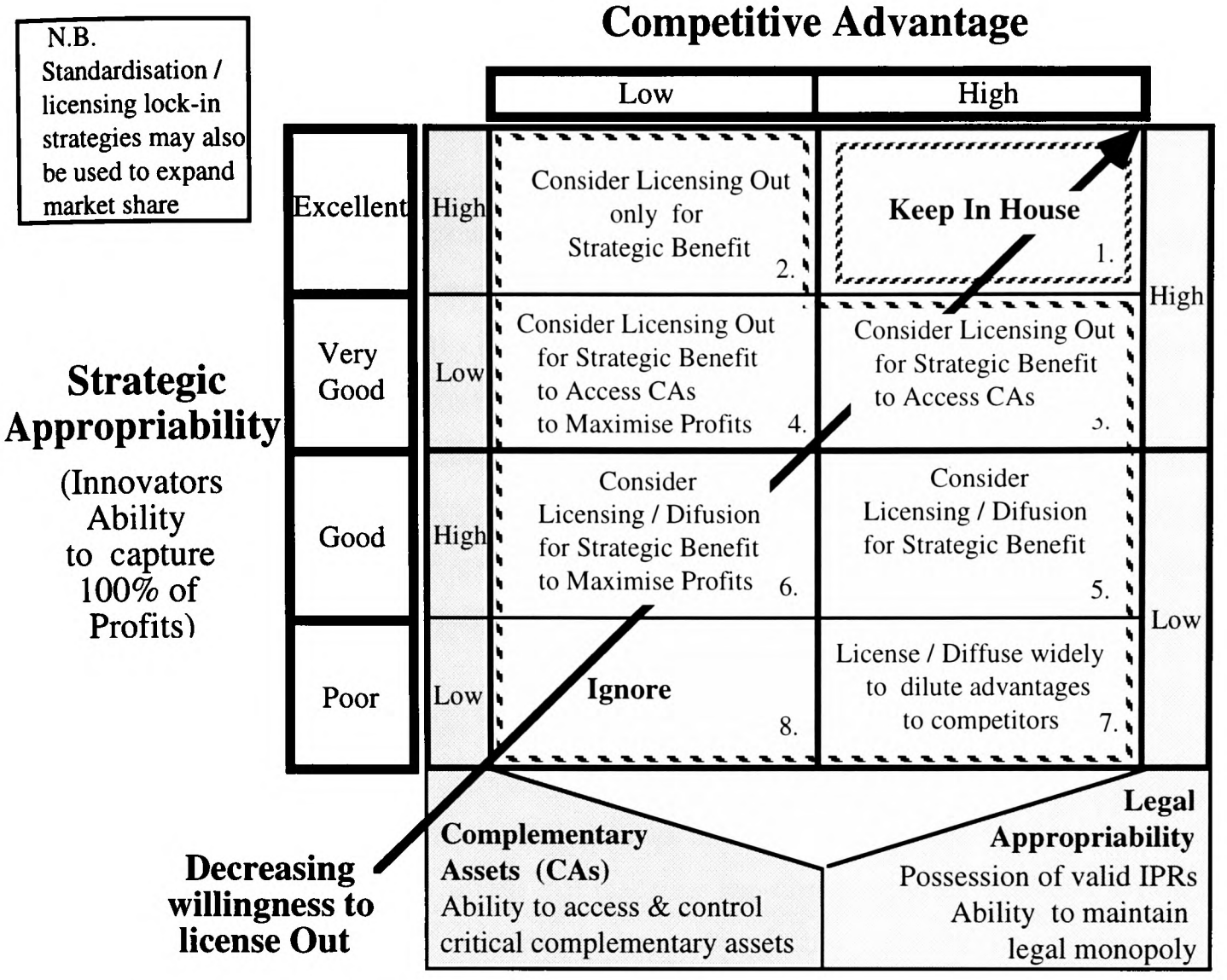
in the IPR owners core business. The greater the competitive advantage conferred the greater the incentive to preserve that Competitive Advantage by in-house exploitation and restricting licensing to parties outside the innovators field of business.

Secondly the expected profit to be gained from the innovation as determined by the access to and control of critical complementary assets and the legal appropriability of the IP concerned will also affect decision making. As the potential profit obtainable from the innovation and importantly the innovators ability to extract 100% of it (also bearing in mind transaction costs See Page 259 and the complication of standardisation / network issues) increases, there will be an increasing incentive to internalise the commercialisation and reduce the costs associated with licensing out the innovation and even of contracting out for critical complementary assets.

Thirdly with any commercialisation of an innovation there are risks involved. Primarily that the commercialisation will fail as a result of the approach adopted. Using multiple approaches to commercialisation obviously diversifies this risk to some extent. In some cases this will result in two in-house projects with similar market aims but totally different implementations. Not every firm however has the resources to fund parallel developments. Consequently as the expected cost of failure of the in-house commercialisation of the innovation rises, the incentive to license out the innovation to multiple licensees (where this is possible) and thus diversify the risk will increase.

These first three factors Competitive Advantage, Strategic Appropriability and Risk all relate to short term considerations regarding licensing. Needless to say licenses may be free-standing or form part of a larger and more comprehensive alliance involving the licensing of joint venture companies for example. In the case of less explicit and more implicit and difficult to transfer IP (See Figure 1 Page 3) there is also an increased need for modes of transfer which involve not just licensing but also the possessors of the implicit knowledge and not just the IPRs. However concentrating on explicit licensing we can predict how the favoured licensing policy will depend on the Competitive Advantage, Strategic Appropriability and Risk involved.

Figure 44 Immediate Licensing Strategies




In the case (1./2.) where the innovators ability to capture 100% of the profits from an innovation is very high there should be no direct reason to license out the innovation to exploit it. Licensing out for strategic reasons might be acceptable if the competitive advantage conferred by the innovation is low (2.). If the innovator's access to and control over the necessary complementary assets is low (3./4.) then licensing out could be used as a bargaining counter to obtain access to them. If the competitive advantage offered by the innovation is low (4.) since little advantage will be lost by licensing out the innovation, licensing out to increase profits is possible. When the legal appropriability of an innovation is low (5.-7.) then as Teece predicts, access to and control of complementary assets will be critical. If the necessary access and control is available (5./6.) then licensing could be considered for strategic purposes. If the competitive advantage offered by the invention is low in the innovator's core business (6.) licensing to increase the profits from the innovation could also be considered. In the case where the Innovators ability to extract any profit from the innovation is poor due to weak or non-existent IPRs and lack of access to or control over the necessary critical complementary assets then if the innovation is of considerable competitive advantage (7.) and especially if some competitors do have an ability to control the necessary complementary assets a form of burnt earth policy could be followed of licensing or diffusing the innovation as widely as possible if necessary by giving free licenses or information away to dilute the advantage to the well-positioned competitors and transfer the focus of competition to an area where the company did possess advantages. Penultimately, if the innovation is a poor source

of profit and of negligible competitive advantage (8.) it might well be ignored and only managed passively. Lastly, increased risk will result in increased willingness to license out This categorisation is of course unlikely to be so rigid in practice and there will be fine gradations of ability to extract profit and degrees of competitive advantage.

In the case of a revolutionary pharmaceutical subject to watertight IPRs and owned by a company with a well developed world-wide marketing operation and many other resources, licensing is obviously redundant (1.). More usual cases will involve some consideration of licensing out the innovation. In considering whether to license out an innovation the immediate factors of the profit potential and competitive advantage conferred by the innovation are key factors. As the competitive advantage conferred by the innovation and the ability of the innovator to extract 100% of the profit potential increases the willingness of the innovator to license out the innovation should decrease.

Teece shows how who obtains the bulk of the profits from innovations depends on the ease of access to complementary assets, relative to competitors and the owners of such complementary assets, and the strength of legal/technical appropriability (Teece 1986a). However, the above scheme shows not what to do about contracting for complementary assets but what to do with the actual innovation itself whether to keep it in house or whether to license it out as a means of exploitation. It may be that licensing out the invention is one means - even through cross-licensing - by which access to critical complementary assets might be obtained. However, in contrast to Teece's approach the above scheme adds the parameter of the competitive advantage conferred by the innovation, distinguishes between strategic and legal appropriability and looks at what the innovator / licensor should do with the invention regarding licensing out to exploit it best, not at who wins and what the innovator might do about obtaining the complementary assets needed. It should be stressed though, that both approaches need to be combined.

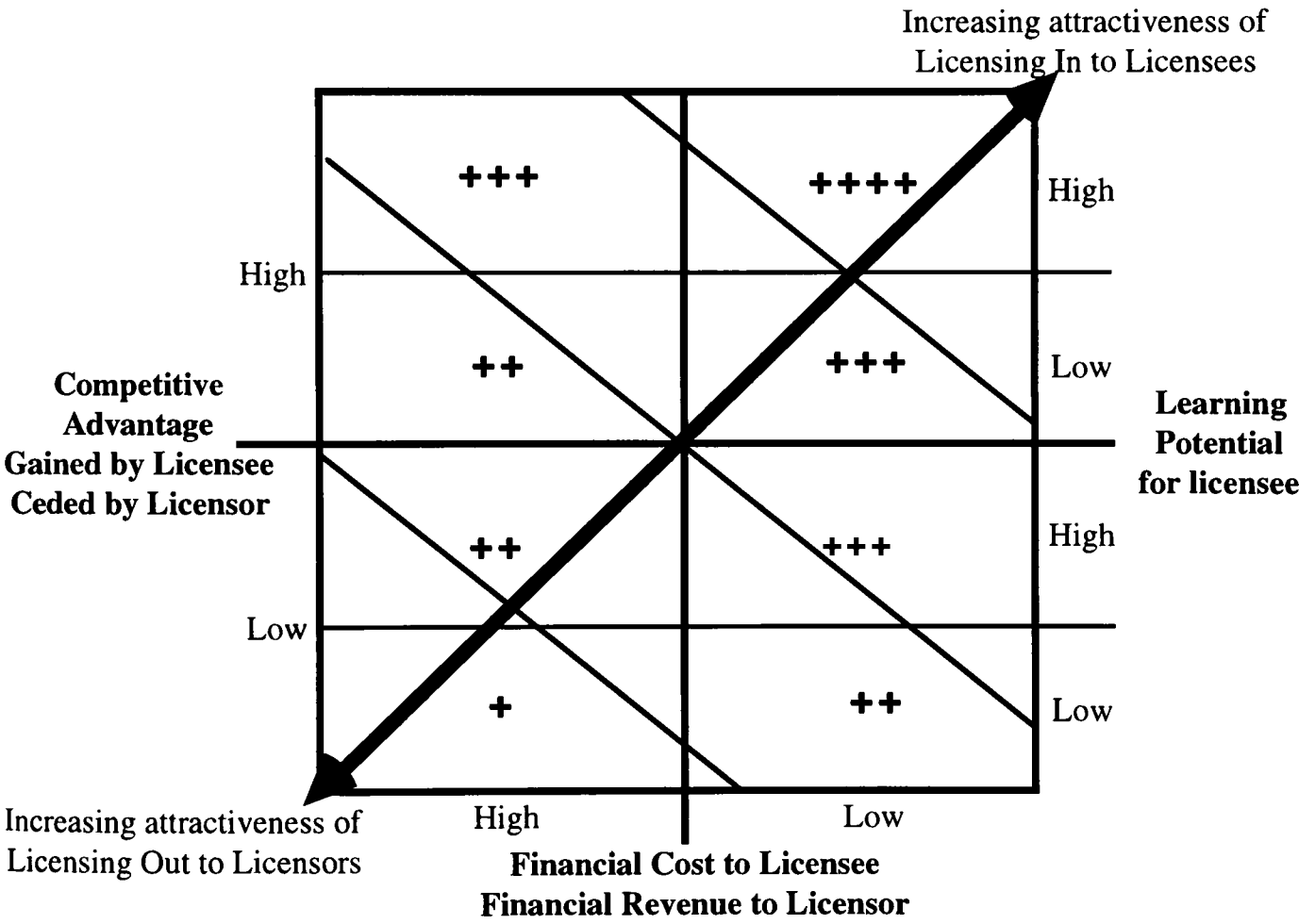
Even if they are they are so combined there is still one further aspect missing. In the above figure there is always the possibility of using standardisation / licensing lock-in strategies in combination with any of the above strategies. By licensing competitors or granting free licenses or even giving away the product to some end-users there may be competitive advantages to be gained usually through either locking competitors into technology under the control of the company or locking customers into a certain technology especially if where high switching costs are involved. Anti-trust and unfair competition laws of course need consideration.

Thus far immediate short term factors have been considered. The remaining factors affecting licensing decisions are concerned with the future and thus necessarily involve a consideration of the dimension of time. Besides time there is also the effect of the innovators ability to

extract 100% of the Potential Profit from the innovation, as studied above. The learning opportunities available to licensees will also be important and finally access in the future to technology conferred by the techno-legal scope of the IPRs owned or controlled by the innovator. These factors thus tie in with the earlier discussion concerning the dimensions of time, techno-legal scope and technical advance which is in many ways related to the competitive advantage offered by the innovation.

By considering the effect on the relative competitive advantage gained by the licensee and ceded by the licensor and the relative financial cost to the licensee or benefit to the licensor as well as the learning potential for the licensee involved in a licensing agreement we can predict its attractiveness to a licensee or licensor. In the case where the licensee is a potential competitor using the licensed innovation in the same field as the innovator there will be an extent to which the situation is a zero-sum game where the licensees gains are the licensors losses.

Figure 45 Licensing Attractiveness

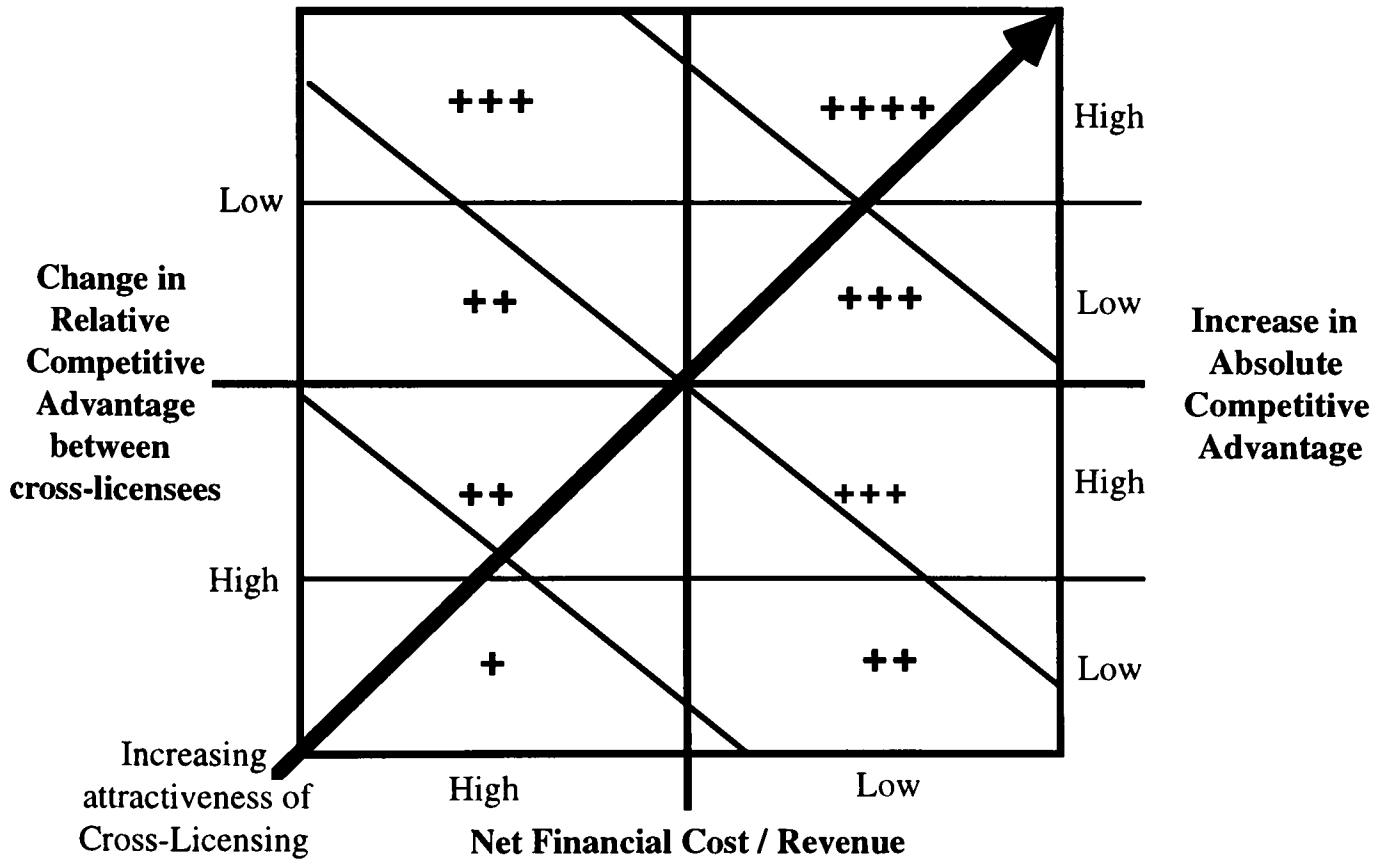



In general as the financial returns from licensing the innovation relative to commercialising it in-house increase (which relate to the innovator's ability to access 100% of the returns by in-house commercialisation) the incentive to license out the innovation will increase. These financial pressures will be opposed by the extent to which the licensing will be seen as ceding competitive advantage and learning opportunities to the licensee. The financial gains from licensing can be reinvested into R&D to preserve the initial technical advance of the innovator. On the other hand the learning opportunities afforded the licensee if taken advantage of may lead to the licensee being able to gain a technical lead on the original innovator in the next round of innovation. The risk is that the immediate financial gains will influence licensors

more than the learning opportunities given away. There are many examples of learning opportunities being gained by licensing out by western companies to Japanese companies (e.g. in the automobile industry (Cusumano 1985) and the semiconductor industry). In itself licensing out and giving away learning opportunities is not itself bad if the revenue derived from it is not used elsewhere but used to create further technical or other leads. The creation of these further technical leads and the establishment of IPRs of broad techno-legal scope is essential if leadership is not to be lost. In fact the counter-view of the surge in US litigation aimed at Japanese companies and mainly heard from large Japanese companies, is that it is a temporary phenomenon which will not last since the successful litigants are not investing their royalties and damages into R&D and manufacturing (Nishioka 1992).

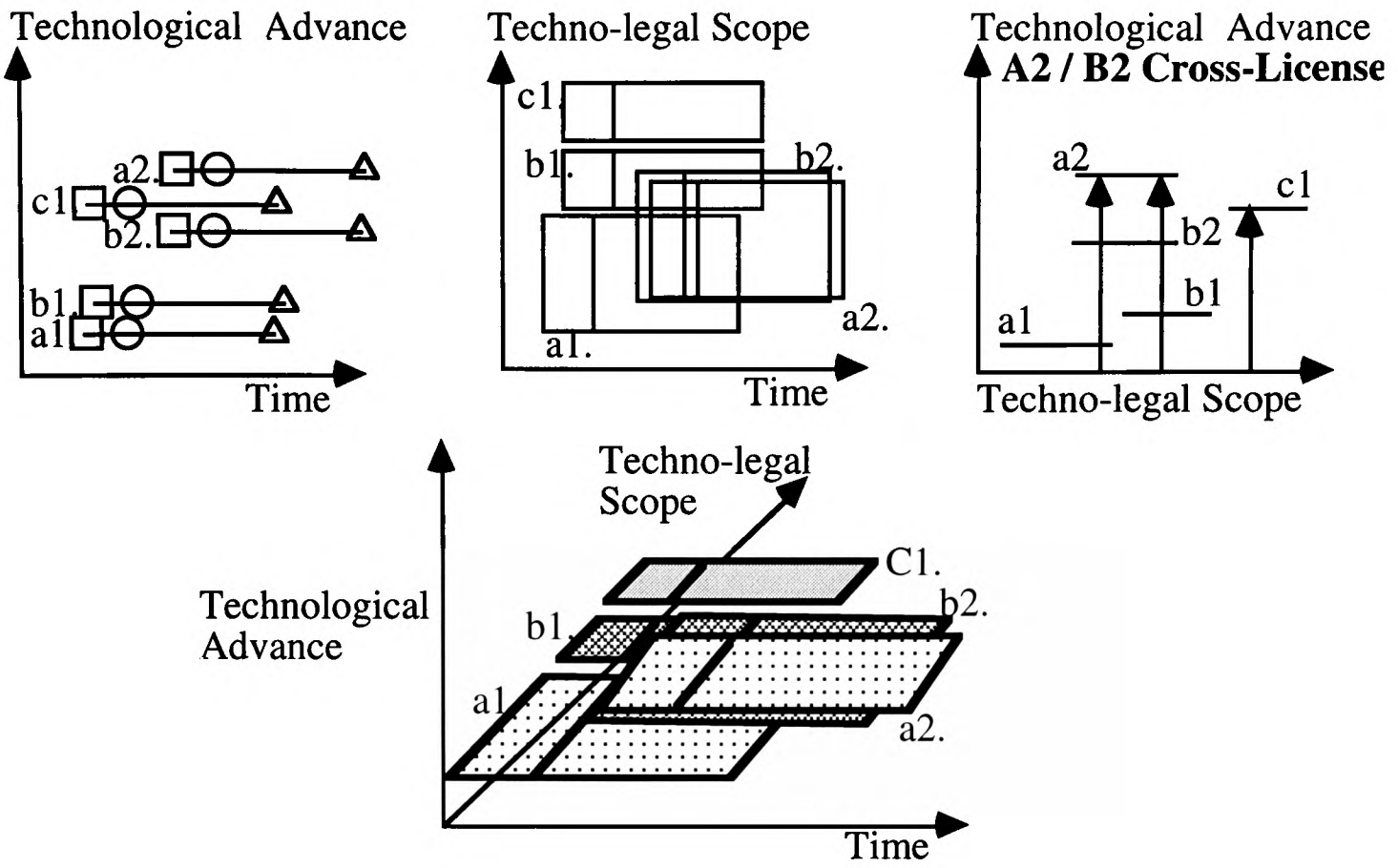
The above figure may portray licensing as a zero-sum game where what the licensee gains the licensor loses. However this is only going to be the case where there is direct competition between the two parties in all respects. At least in the short term where markets, technologies and other factors differ there will not necessarily be a conflict between the two sets of interests and it is quite possible that the competitive advantage to both licensor and licensee will increase. In the case of cross-licensing such needs to be the case for agreement to be reached :

Figure 46 Cross-Licensing Attractiveness




Cross-licensing attractiveness will also be increased by increasing *IPR Density & Ownership Complexity.* Where many IPRs are involved in each product in a market and where those IPRs ownership is diverse (as is the case among Japanese electronics companies) then there will be a great incentive to cross-license. This will be all the greater where the absolute competitive advantage of both cross-licensees is increased relative to their other competitors.

Figure 47 Cross Licensing




In the above diagram A and B produce innovations a1 and b1. Competitor C then produces innovation c1 which is more technically advanced than either a1 or b1. B and A both produce improvements a2. b2. However c1 is still more advanced than b2 and in order for A to produce its preferred product (illustrated by vertical arrows in the technological advance/Techno-legal Scope graph) it requires a licence from B to b2. By obtaining a cross-licence to a2 in return for the license to b2 both A and B can produce products involving a2 which is more technically advanced than competitors Cs innovation c1. By Cross-licensing both A and B are better off relative to C. However in the next round of innovation B may have learnt sufficient from licensing a2 to produce a more advanced improvement than A.

Thus licensing and cross-licensing whilst subject to the various influences outlined above still take place within a space defined by dimensions of time, technological advance and techno-legal scope.

### 3.3.3. Continued Development

It cannot be stressed too often that IPRs are not permanent but wasting assets and they require continual development and maintenance if the advantages they confer are to be maintained. This is a matter for those in charge of projects where significant IPRs have been created. However it is also a matter for those making investment decisions. It is easy when economies have to be made to cut back on development and rely on apparently steady income

streams. If the steady income streams are coming from neglected IPRs eventually they will dry up.

## 4. Conclusions

A company's IPRs whether used on their own or in combination with other factors are valuable resources and need careful management. Awareness of other companies' IPRs is also important to avoid infringing them and make the best strategic decisions about one's own IPRs. In making good strategic decisions consideration of any critical assets involved in exploiting the IPRs and of the competitive advantages they can offer is essential. Finally if the market leadership IPRs can confer is to be preserved the reinforcement and preservation of a companies IPRs by continuous development is essential. The present study of Japanese IP management has emphasised the importance of gathering and analysing patent information, of integrating IP management with other management functions in particular as this discussion has shown the R&D function, of being adaptable to changing conditions and coping with both technological leadership and followership simultaneously and finally of having an awareness of the dimension of time and thus formulating dynamic IP strategies.

# Chapter 11. CONCLUSION

**Summary**

This chapter concludes the thesis with a summary integrating the research's findings, drawing out some implications for IP management practice and outlining some avenues for future research.

## 1. Integration of Findings

When this research commenced there were some facts available. These gave an idea of some of the features the subject involved but no clear overall picture or idea of how important they might be or how they might be interrelated. The findings of the various elements of the research project have given a broader but also more detailed view of the subject and clarified the key topics involved. It only remains to stand back and summarise the overall picture.

First of all the research has aimed to :

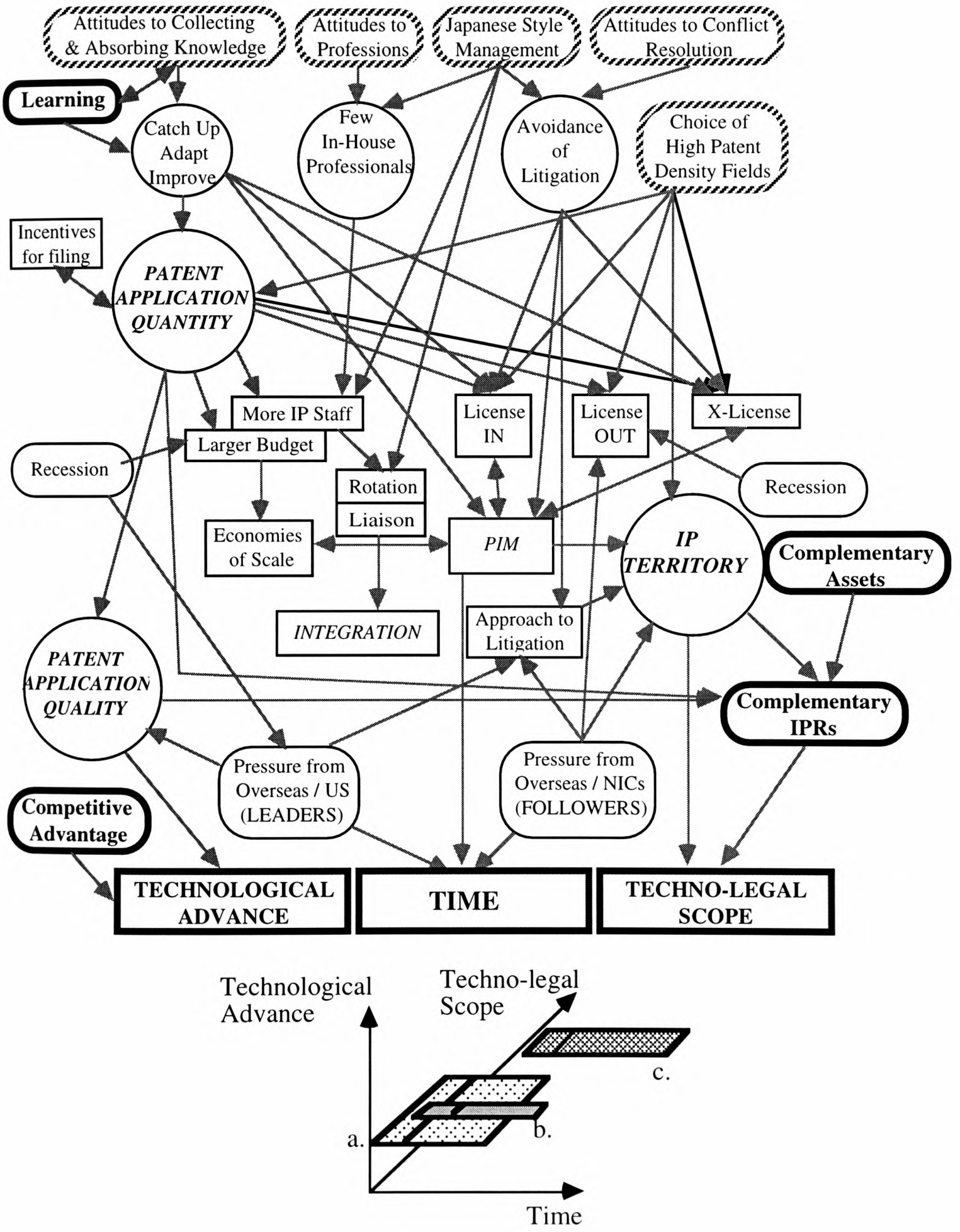
i) describe both Japanese and UK external and internal IP management
ii) compare and contrast Japanese and UK IP management practice, linking the contrasting features to differences in the environment in which they operate
iii) use the research results to help extend existing theoretical frameworks used in thinking about IP Strategy.

It is I believe possible to integrate the results of all three of these steps into an overall picture of IP management practice and strategy.

Among the key environmental features identified as influencing IP management and strategy are both internal and external factors. Internal factors comprise prevailing attitudes towards dispute resolution, management styles, attitudes to professions, attitudes to absorbing and collecting knowledge and the choice of technical field to compete in. In the case of Japan these all have profound influences both direct and indirect on IP management. Firstly Japanese technology management is derived from a followership model aimed at catching up, adapting and improving existing technology. This together with the choice of high patent density fields to compete in led to an initial mode of IP management which emphasised IPR quantity. This has profoundly affected the way in which IP management has developed in Japan. Key consequences have been the larger IP departments required to cope with the work. This in turn has led to economies of scale and has allowed work on PIM and other topics which might not have been so developed were the scale of operations much smaller. It has also affected attitudes to licensing and litigation and patent application filing incentives and ultimately led to calls for a change to an emphasis on quality not quantity. This shift

from quantity to quality has also been prompted by the effects of pressure from overseas, the recession and other factors and has led to a situation where *Technological advance* is seen one of the critical factors underlying IP Strategy.

Figure 48 Integrating IPR Management Issues and Frameworks







Other drivers have been external and include the effects of recession increasing the pressure to enforce IPRs and increase licensing revenues both in Japan and the US. The effects of

increased pressure from US regarding the enforcement of IPRs has also had a profound effect on Japanese IP management. It has in particular contributed to the raising of the profile and perceived importance of IP and reinforced the shift from quantity to quality. However this pressure from the USA has also been combined with the pressures from less advanced nations of Asia. For Japan there are thus combined pressures of catching up with and keeping up with technology leaders and at the same time keeping ahead of technology followers. This has emphasised the dynamic nature of IP strategy and the axis *of Ti*me in the framework in which IP management occurs and which patent information management techniques are also linked to. PIM techniques and particularly Patent Mapping also emphasise the aspect of IP territory and the IP management framework axis of th*e Techno-Legal sco*pe of the IPRs a company owns. This is also linked to the concept of complementary assets discussed by Teece and among which are also any *Complementary IP*Rs required for successful commercialisation of the innovation concerned.

Thus whilst consideration of the internal aspects of IP management in Japan has shown the integrated managerial nature of IP management compared to the more legal nature of UK IP management both internal and external aspects are all shown to be linked directly or indirectly to the three critical axes of an IP framework comprising time, techno-legal scope and technical advance. It is in this framework that IP strategies are played out.

Japan's economic development has progressed through a series of technologies of increasing technical sophistication. Starting for example with silk and textiles it has progressed through basic heavy industries such as steel and shipbuilding to basic consumer electrical goods and cars to electronics goods and the more recent increasing emphasis on high-tech knowledge intensive industries. This development has been in large part one of technology absorption which whilst occurring in a highly competitive environment has also emphasised the need for a collectivist and diffusive approach to IP even if this is now perhaps swinging towards including a more protective approach as well. Nonaka and Takeuchi have for example characterised Japanese knowledge creation as group based and tacit-knowledge oriented and Western knowledge creation as individual-based and Explicit-knowledge oriented whilst suggesting that there may be the possibility of some convergence. Now that Japanese companies are facing transferring their IP to other cultures in licensing out deals, explicit knowledge is perhaps increasing in importance in Japan quite apart from the need to render knowledge explicit in the patenting process. However, the emphasis in the present framework on techno-legal scope is consistent with both the more collectivist and diffusive Japanese patent system of the past which emphasised quantity; as well as the more individual, both protective and diffusive quality driven system it is now tending towards. In both techno-legal scope is important.

The element of time involved is largely driven by consideration of the duration of IPRs.

Since this can range from short to long periods of time the framework is relevant to both short, medium and long range strategy. The variable of time involved is of course a continuous variable even though the IPRs involved have at best finite legal lives and perhaps even shorter useful lives due to the effects of technological progress and competition.

This framework can be combined with the existing concepts of complementary assets, competitive advantage and learning. Bearing in mind the innovators ability to exploit the innovation fully with the resources accessible, licensing in, licensing out and cross-licensing decision frameworks can be devised. This research thus links extensions to Teece's work on the division of returns from innovations with its findings about how IP and IPRs are managed in practice.

## 2. Implications for Management

The implications for management take two main forms. The first comprise specific actions that can be implemented which may be beneficial, these include :

i) Examination of the possibility of using patent mapping techniques for the presentation of information used in IP strategy planning.

ii) Assessment of the potential benefits of rotating a portion of IP staff through other departments and vice versa in order to improve integration and liaison

iii) Assessment of the benefits of giving specialist IP staff a conventional management training aimed at improving appreciation of the strategic nature of IP management.

iv) Exploration of ways of achieving economies of scale in Patent Information operations - for example by the formation of joint venture Patent Information Management subsidiaries.

v) Improvement of financial, legal and strategic IPR evaluation.

The second form of implication comprise new modes of thought or frameworks for thought about IP management and strategy which might usefully be adopted. These include :

i) The use of the 3T framework (Technological Advance, Time and Techno-Legal Scope) described above for considering IP strategy problems

ii) Consideration of Complementary IPRs among Complementary Assets

iii) Consideration of Licensee learning, Competitive advantage and Strategic Appropriability as defined above in considering licensing strategy problems.

iv) The need to achieve balance between legal and managerial expertise in managing IP issues.

A further way of looking at the proposed framework is to consider its implications for firstly short and medium and secondly long term or corporate strategy. In the short/medium term

the financial and tactical implications of controlling techno-legal scope and preserving technological leads are obviously paramount. However in the longer term the implications are linked more to the sources of the IPRs and the sources of the underlying Intellectual Assets and ultimately knowledge. In this respect there are links to the knowledge creation processes described by Nonaka and Takeuchi (Nonaka and Takeuchi 1995). Pavitt points out that one essential element of Technology Strategy is to "take the long view of technological accumulation" (Pavitt 1990). There is a continual need to replenish the knowledge base of any company. As Metcalfe puts it :

> "In understanding levels and rates of change of revealed technological performance, it is to mechanisms by which firms acquire, store and articulate a knowledge base that investigators should look" (Metcalfe and Gibbons 1986).

IPRs have a role to play in the formation, definition and control of that knowledge base. Furthermore the impermanence of IPRs, the need to build up technological skills and an IPR position over time in terms of both technological advance and techno-legal scope, all point to the need for a long term view of IP and IPR strategy.

Whilst IP management concerns the management of both explicit and implicit knowledge, the management of IPRs is largely concerned with explicit knowledge. Japanese knowledge creation has been said to stress tacit knowledge at the expense of the explicit. However the present study shows that however strong that bias in the creation process once created and externalised as explicit knowledge Japanese companies are not slow to manage that explicit knowledge in the form of IPRs. The lessons to be learnt from the present study are thus that explicit knowledge management and knowledge creation and a company's knowledge base are linked through the management of IPRs and the information inputs provided by explicit sources of knowledge that patent information provides. Furthermore when it comes to appropriating knowledge created by a firm, IPRs, however effective, are an essential component of an appropriation strategy whether they are used to appropriate the benefits of implicit trade secrets or explicit patented inventions. Consequently in the long term corporate view IP management issues such as PIM and allocation of resources, staff and training to the management of IPRs are essential features of a knowledge based organisation if that organisation is to maintain and benefit from the knowledge it and others create.

## 3. Avenues for Future Research

The present research has been extremely wide ranging in scope but nonetheless there are a number of topics which have not been pursued which could provide fruitful areas for future research. These comprise :

i) Expansion of the research to include a comparison with the USA.

ii) Further development of the outline IP Strategy framework described, including the collection of case studies illustrating IP strategy problems which can be used to illustrate and test the present frameworks and Teece's earlier work.

iii) Expansion of the research to deal with the special case of Japanese SME companies and how they deal with innovation in the face of large Japanese companies with far greater resources.

iv) Examination of IPR system development in SE Asia and comparison with Japan's Patent and IPR system development.

v) A more detailed study of the history of the Japanese patent system between 1900 and the present day.

vi) A study of the development of the consumer white goods industry in Japan from the 1950s to 1980s from an IPR perspective.

vii) Development of novel patent mapping techniques

viii) Development of patent and IPR valuation techniques especially those based on Option pricing methods together with pragmatic decision rules for commonly encountered IPR decisions (e.g. Patent renewals, Litigation, Applications, Etc.).

ix) The influence of IP department financial management on IPR usage.

x) A study of the assessment of efficiency measures for IP department management.

Of these the most closely linked to the present research and the most beneficial would be the extension of the work to the USA. It might be anticipated that UK practice is intermediate between Japanese and US practice in a number of ways and this could be investigated. For the moment though the present research will have to suffice.

# Appendix A Acronyms

| | |
|---|---|
| **ACCJ** | American Chamber of Commerce in Japan |
| **AIPPI** | International Association for the Protection of Intellectual Property |
| **BoJ** | Bank of Japan. |
| **CAFC** | Court of Appeals of the Federal Circuit (US Patent Appeals Court) |
| **CIPA** | Chartered Institute of Patent Agents (UK) |
| **EPC** | European Patent Convention |
| **EPO** | European Patent Office |
| **FMCG** | Fast Moving Consumer Goods |
| **GAO** | General Accounting Office (US Government) |
| **GATT•TRIPS** | General Agreement on Tariffs and Trade - Trade Related Aspects of Intellectual Property Rights Agreement |
| **HTML** | HyperText Markup Language |
| **IIP** | Institute of Intellectual Property (Japan) |
| **IP** | Intellectual Property |
| **IPC** | International Patent Classification |
| **IPD** | Intellectual Property Department |
| **IPCD** | Intellectual Property and Copyright Department (Policy Section of UK Patent Office) |
| **IPR** | Intellectual Property Right |
| **IPU** | Intellectual Property Unit |
| **ITC** | International Trade Commission (US) |
| **JAPIO** | Japan Patent Information Organisation |
| **JIII** | Japan Institute of Invention and Innovation |
| **JIPA** | Japan Intellectual Property Association |
| **JPA** | Japan Patent Association |
| **JPAA** | Japan Patent Attornies Association |
| **JPO** | Japanese Patent Office |
| **JPS** | Japan Patent Society |
| **JVs** | Joint Ventures |
| **LCD** | Liquid Crystal Display |
| **LES** | Licensing Executives Society |
| **MITI** | Ministry of International Trade and Industry |
| **NISTEP** | National Institute of Science and Technology Policy (STA Japan) |
| **NRI** | Nomura Research Institute |
| **OJT** | On the Job Training |
| **PATOLIS** | Patent On-Line Information Service (Japan) |
| **PCT** | Patent Cooperation Treaty |
| **PIM** | Patent Information Management |
| **PIPA** | Pacific Intellectual Property Association |
| **SPAC** | Strategic Patent Coverage |
| **SRIS** | Science Reference and Information Service |
| **STA** | Science and Technology Agency (Japan) |
| **STDEV** | Standard Deviation |
| **TMPDF** | Trade Marks Patents and Designs Federation |
| **TRIPs** | Trade Related Aspects of Intellectual Property Rights Agreement |
| **USPTO** | US Patent and Trade Mark Office |
| **WIPO** | World Intellectual Property Organisation |

# Appendix B History of the UK Patent System

## 1. History of the UK Patent System

### 1.1. The development of the UK patent system

Several brief histories of the UK patent system exist (Grubb, 1982)(Phillips, 1990). More specialist volumes dealing with the legal or the social aspects of the system are also available (Davenport, 1979) (Dutton, 1984) (MacLeod, 1988) (UK Patent Office, 1993). Here I shall merely draw attention to the bare essentials and those features relevant to the present study.
The word patent, is derived from the Latin "Literae Patentes" or "open letters". In the UK such "Letters Patent" were first used by the monarch to grant rights including monopolies. One use of monopolies was to encourage the introduction of technology into the realm. In the UK, one of the patent system's main origins was the use by Lord Burghley, Elizabeth I's chief minister, of using monopolies to encourage the technology imports (MacLeod, 1988). However, use of such monopolies to raise revenue led to complaints. Subsequent reforms included the 1624 enactment of the "Statute of Monopolies". This was the first "modern" English patent law and though much revised was the basis of UK patent law until 1978.

UK patent law developed slowly but by the late 18th century it had a significant role to play in the industrial revolution as an incentive to invent and develop technology. In 1778 it became established by Lord Mansfield in Liardet v Johnson (Hayward, 1988) and by other case law that applications had to describe the invention in a specification. This was made available for inspection and the instruction of others, rather than just relying on the inventor instructing others during the monopoly period.

The system thus began to emphasise not just the incentives and protection offered but also the spread of information among domestic manufacturers. This balanced the increased strength of protection demanded by inventors by the need for demands for increased disclosure.
The aim of the pre-industrial revolution patent system of encouraging the import of technology eventually gave way to the main aim of developing indigenous technology by a balance of dissemination and protection. This balance is a key feature of patent systems.

Here it is worth distinguishing between state and more direct private benefits. Patent reform or harmonisation measures reducing administrative costs and increasing publicly available information are likely to be promoted by governments, those who bear such costs indirectly and those technological followers in need of such information. Conversely, patent reform or harmonisation measures strengthening the degree of patent protection are more likely to be lobbied for by those private interests, especially patentees, immediately benefiting from such

protection. In late eighteenth century England the process of patent reform was driven not by reform of bureaucratic processes which were highly beneficial sinecures, nor by demands for information from technological followers but by the legislature wanting to ensure dissemination of knowledge and the possessors of monopolies wanting to preserve incentives. The main 18c lobbyists for the improvement of the patent system were thus people like James Watt who had made money from patents and wanted to strengthen the protection afforded inventors.

The patent system thus developed in the UK as both an incentive for innovation and a means of disseminating information. The subsequent reforms of the mid nineteenth century improved both aspects. Printed patent specifications were made officially and cheaply available to other inventors and could be very easily inspected at the Patent Office library opened in London in 1857. By 1880, 469 complete sets of patent specifications had been distributed to public libraries around the country (UK Patent Office, 1993). Patent applications could thus be inspected at many more public libraries in 1880 than they can be inspected at today[1].

The bureaucracy surrounding the grant of patents in the early to mid 1800's was so antiquated and bizarre though that it was parodied by writers such as Charles Dickens[2]. Such criticism and the need for efficient protection for inventions at the Great Exhibition of 1851 and even debates as to the utility of a patent system, led to the main 19c revisions of UK patent law.

It is interesting to note that in this continuing reform process, parliamentary committees took evidence from those with experience of foreign patent systems such as the US patent system which had been revised in 1836 and included one of the first examination systems (UK Parliamentary Select Commission on Letters Patent, 1970). This is interesting because whilst countries may have copied or adapted patent laws from other countries in the past there was no aim of integration or systematic study, merely of suiting laws to a country's own purposes and using useful ideas. It can be argued though that the inclusion of evidence about patent laws abroad in this instance was at least in part the result of improved communications and consequent increasing awareness that with the advent of free trade, patent systems too had to begin to take account of each other. One can obviously draw a parallel with the links between present day patent law harmonisation moves in the USA Europe and Japan and elsewhere and greatly improved means of communication.

[1]According to a Patent Office booklet published in 1989 such a service is now provided in only 13 public libraries around the UK apart from the Science Reference and Information Service (SRIS) of the British Library, now housed in the old Patent Office library. (In contrast Japan now has 106 patent information centres (日本国特許庁, 1994 )). Communications are better than in 1880 but how much better informed the UK public is about the patent system, despite the renewed publicity efforts of the UK patent office in the past few years, is another matter.

[2]Dickens was at least partly responsible for the reform of the UK patent system. His writings including a now little known pamphlet entitled "A poor man's tale of a patent" (Phillips, 1982). Sections of Little Dorritt dealing with the "Circumlocution Office" may in some respects also parody the workings of the patent office before its reform.

One of the first international congresses on patent law, The 1873 Patent Congress in Vienna ended with a resolution that :

> "In consideration of the great inequality of the existing patent legislation, and in consideration of the altered means of international communication of the present time, there is great want of reform, and it is very desirable that the Governments will initiate an international understanding on the patent protection" (Coulter, 1991).

It is interesting to observe that Mr. Paul Hartnack (The UK Patent Office Comptroller General and Chief Executive) said in a recent speech that :

> "Arguably the main driver of the trend towards harmonisation of the world's patent (and trade mark and design) systems over the last 50 years has not been WIPO, or the EPC, or the GATT, massive though their contributions have been. Arguably, it has been the demands of a global market driven by the wonders of modern communications technology." (Hartnack, 1996).

Thus just as much in the past as now, no Patent System and by extension, no system of Patent Management can be an island unto itself.

Despite reforms the first head of the new UK Patent Office was dismissed for embezzlement[3]. This created a scandal but with the important result that he was replaced by Bennet Woodcroft, the mainstay of reform of the system and the cataloguer of all the UK patents prior to 1852, and one might say the Grandfather of patent information management in the UK. In 1857 the Patent Office library opened (now the Science Reference Library and Part of the British library), largely based on Woodcroft's collection (Davenport, 1979).

Further emphasis on increasing protection for patentees resulted in 1883 in increasing certainty as to the scope of a patent by introducing a requirement for claims defining the invention to be protected. In 1902 that certainty was increased further by introducing an examination system to check applications for novelty so as to reduce the number of invalid applications for old ideas (Davenport, 1979). This at first was limited to a search through UK patents but nonetheless increased the value of patents to patentees since it increased their perceived quality in the eyes of potential infringers.

At the same time the shift to preserving the fruits of technical leadership at not just a national but an international level began to result in moves to gain protection abroad for inventions made in the UK either through bilateral treaties or through membership and promotion of international conventions connected with IPRs which enabled applicants for IPRs in different

[3]In contrast Takahashi Korekiyo, the first head of the Japanese Patent Office in 1885, resigned to become manager of what turned out to be a silverless Peruvian silver mine. He subsequently returned to Japan to become Manager of the Bank of Japan and eventually Prime Minister (高橋　是清 (Takahashi Korekiyo), 1936). He was assassinated by right wing extremists in the 26th February incident in 1936.

countries to obtain an agreed level protection in each other's countries. The most relevant of these regarding patents was the Paris Convention for the Protection of industrial Property of which the UK was a founder member in 1883 following the congresses which had started in Vienna in 1873 (Plasseraud, 1983).

In reviewing the development of the UK patent system it must be stressed that the system developed in response to the needs of either the country as a whole or in response to pressure from companies and people affected by the laws concerned. As the UK rose from being a technical pioneer in the industrial revolution to being a technical leader among others on an international stage this lead to a gradual increase in the strengthening of the system in the UK and wherever the UK could exert influence to protect its interests abroad (as we shall see later in the case of Japan). However, that the system was fundamentally responsive to local needs is shown by developments in the UK patent system from the 1880s to the 1920s in the light of the rise of German Organic Chemistry. This is especially noticeable because it even resulted in the UK patent system being deliberately weakened to compensate for Germany's lead.

### 1.1.1. The UK Patent System and the Chemical Industry 1850-1920

In 1856 William Henry Perkin Snr. then aged 18 discovered the purple dyestuff Mauveine. Within a year he had set up a company to manufacture it and the synthetic organic chemical dyestuffs industry was born (Wahl, 1914). However, though the dyestuffs industry began in the UK and was developed in France, Germany became pre-eminent in organic chemistry research in the period between 1860 and the First World War. In fact in that period it was a common part of a British Chemist's education to do a research degree not in the UK but in Germany. Perkin's son, W.H.Perkin Jnr. who became Waynflete Professor of Chemistry at Oxford in 1912, was instrumental in introducing the Part II research year into the Oxford Chemistry course and also the DPhil degree in Chemistry for just this reason.

Against this background two major changes were made to UK patent law. Firstly in the revision of the patent law in 1883, compulsory licensing provisions were introduced which enabled UK companies to obtain licenses to patented inventions which were not being worked in the UK. Chemists in both France and the UK had played a part in starting the dyestuffs industry and then lost their lead to Germany (Wahl, 1914) and so it is not surprising to find that France and the UK but not Germany were founding members of the 1883 Paris Convention which permitted the use of compulsory licence provisions on grounds of non-use. Secondly, the UK continued to try to weaken the rights of foreign patentees in the chemical industry by abolishing the possibility of obtaining patents for chemical products in the UK in 1919. This was intended to enable UK manufacturers to manufacture products discovered by German Chemical companies provided a new synthetic route to the compound could be

found. It is interesting that shortly afterwards and for much the same reasons the new 1921 Japanese patent law allowed patents for chemical processes but not for chemical products in an attempt to prevent domination of Japanese chemical industry by foreign concerns (Neary, 1990) (Grubb, 1982). Pharmaceuticals and Foodstuffs were also subjected to licenses of right whereby any manufacturer could demand a license from a patentee of any pharmaceutical or foodstuff whether the invention was being worked in the UK or not.

It was only in 1949 that the exclusion of chemical product patents was repealed, by which time the German Chemical Industry was presumably no longer seen as such a threat. In 1977 the compulsory license provisions for pharmaceuticals and foodstuffs were also abolished. That they were, was as a result of British research based companies making representations to the Banks Committee formed in 1967 to consider the state of UK patent law whose recommendations formed the basis of the 1977 law. British research based companies were by then very much more concerned about those not conducting research benefiting from their research efforts than about German research efforts being too far in the lead.

These changes had thus occurred as a direct result of pressure for the patent system to be adjusted to suit British Industry. It would be possible to draw other examples of patent law adapting to circumstances of those able to lobby for its change. However this example also shows that the degree of protection afforded by a patent system will usually be in proportion to the state of progress relative to others of the companies in that country. Furthermore it shows that there is continuous interaction between Industry and the IP environment in which IP management occurs.

### 1.1.2. Developments in UK patent law.

Many other revisions to UK patent law have been and continue to be made. One could discuss these as well, however enough has been said to show that changes to the UK's patent law system have followed a course of first encouraging invention by granting monopolies. Expanding the incentives to use the system by increasing publicity and reducing it's cost. Increasing enforceability and the strength of the patent system and finally taking action both at home and abroad to increase the strength of patent protection internationally.

There is a clear progression in this from promoting and diffusing indigenous invention to protecting indigenous invention to promoting protection of invention internationally which nonetheless has been responsive and even reversible if need be to suit the needs of industry. A key point is that generally the UK has been at least among the front runners of scientific development throughout this process, and that the development of its patent system has by and large not had to respond to external pressures for change so much as internal pressures from the needs of UK industry. The case of Japan, as we shall see, is somewhat different.

## Appendix C Major UK Patent legislation 1601-1990

(Main acts only shown -Sources include : (UK Patent Office, 1993), (Davenport, 1979))

1601 Declaration by Queen Elizabeth I - aimed at abolishing abuse of monopolies.

**1623 The Statute of Monopolies. (21 Jac.1 c.3)**
- Monopolies granted "for a term of 14 years" for "any manner of new manufacture".

1778 Lord Mansfield in Liardet v Johnson (Hayward, 1988) established that patent applicants had to describe their inventions in sufficient detail to enable others to implement them.

1829 Parliamentary Committee set up to enquire into Patent Law and Practice

**1835 Lord Brougham's Act (5 & 6 Will. 4. c.83)**
- Allowed amendment and extension of patent term

**1839 (2 & 3 Vict. c.67)**
- Assignee allowed to amend

**1844 The Judicial Committee Act, 1844 (7 & 8 Vict. c.69)**
- Further extension of patent term possible

**1851 The Protection of Invention Act 1851 (14 & 15 Vict.c.8)**
Introduced to protect exhibits at the Great Exhibition of 1851.
Eleven committees investigating patent matters in the UK.

**1852 The Patent Law Amendment Act, 1852 (15 & 16 Vict. c.6)**
- simplified bureaucratic procedure & reduced fees
- printed specifications
- "Great Seal Patent Office" opened on 19th December 1852

**1853 (16 & 17 Vict. c.5) & (16 & 17 Vict. c.115)**
- Revision of fees, purchase of Bennet Woodcroft's library

1857 The Patent Office library opened following Prince Consort's suggestion.
1865 The first head of the UK Patent Office was dismissed for embezzlement.

**1865 Industrial Exhibitions Act 1865 (28 & 29 Vict. c.3)**
- Grace period for filing after exhibitions

**1870 The Protection of Inventions Act 1870 (33 & 34 Vict. c.27)**
- Grace period for filing after international exhibitions

1880 469 sets of patents deposited around the country at £2500 per set

**1883 The Patents, Designs & Trade Marks Act, 1883 (46 & 47 Vict. c.57)**
- Convention Priority : UK a founder member of the Paris Convention.
- Requirement for claims defining the invention.
- Compulsory licensing provisions introduced for non-working of inventions.
- Pre-grant opposition possible

**1885 The Patents, Designs and Trade Marks (Amendment) Act, 1885 (48 & 49 Vict.c.63)**
- Priority date becomes date of application abroad not date of grant

1885 Classification Key to enable subject matter indexing produced

**1886 The Patents Act, 1886 (49 & 50 Vict. c.37)**

**1888 Patents, Designs and Trade Marks Act, 1888 (51 & 52 Vict.c.50)**
- Establishment of register of and examination for patent agents

**1901 The Patents Act, 1901 (1 Ed. 7 c.18)**
- Convention period increased to 12 months (from 7)

**1902 The Patents Act, 1902 (2 Ed. 7 c.34)**
- Introduction of an examination system to check applications for novelty Searches made among UK patents up to 50 years old.
- Revocation if compulsory licence inadequate to satisfy demand

**1907 The Patents and Designs (Amendment) Act, 1907 (7 Ed. 7 c.28)**
**1907 The Patents and Designs Act, 1907 (7 Ed. 7 c.29)**
- Patents of addition introduced

**1908 The Patents and Designs Act, 1908 (8 Ed. 7 c.4)**
**1914 The Patents and Designs Act, 1914 (4 & 5 Geo. 5 c.18)**

**1919 The Patents and Designs Act, 1919 (9 & 10 Geo. 5 c.80)**
- Patents for chemical products excluded
- Compulsory licensing for food and medicine patents
- Maximum patent term extended to 16 years

**1928 The Patents and Designs (Convention) Act, 1928 (18 & 19 Geo. 5 c.3)**
- Compulsory licensing restricted to patents more than 3 years old

**1932 The Patents and Designs Act, 1932 (22 & 23 Geo. 5 c.32)**
- Grounds of revocation specified
- Novelty search extended to Non-UK material
- Belated Opposition

**1938 Patents & c. (International Conventions) Act, 1938 (1 & 2 Geo. 6 c.29)**
- Start of patent term redefined

**1939 Patents, Designs, Copyright and Trade Marks (Emergency) Act, 1939 (2 & 3 Geo.6 c.107)**
**1942 Patents & Designs Act, 1942 (5 & 6 Geo 6. c.6)**

**1946 Patents & Designs Act, 1946 (9 & 10 Geo 6. c.44)**
- Extension of term for war loss

**1949 Patents & Designs Act, 1949 (12,13 & 14 Geo 6. c.62)**
- Exclusion of chemical product patents
- Changes to opposition and revocation provisions
- Infringement provisions introduced

**1957 Patents Act, 1957 (5 & 6 Eliz.2 c.13)**

**1961 Patents & Designs (Renewals, Extensions & Fees) Act, 1961 (9 & 10 Eliz.2 c.25)**
- Extension of time for renewal

1973 European Patent Convention of 1973.

**1977 Patents Act, 1977 (1977 c.37)**
- Compulsory license provisions for pharmaceuticals and foodstuffs abolished.
- Inclusion of examination for obviousness
- Publication of patent applications before grant at 18 months from first application.
- Maximum patent life extended to 20 years
- Various provisions to ensure compliance with European Patent Convention, Strasbourg Convention, Community Patent Convention, Patent Cooperation Treaty.

**1988 Copyright, Designs and Patents Act, 1988**
1989 Patent Office moved to Newport Gwent
1990 Patent Office becomes an Executive Agency of the DTI.

# Appendix D History of the Japanese Patent System

## 1. History of the Japanese Patent System

### 1.1. The development of the Japanese Patent System

In the contract theory of patent law there is a bargain between the inventor and the state whereby the inventor receives a temporary monopoly in return for disclosure of his invention. In such a situation inventors initially have no power and the state is interested in encouraging invention and diffusion of information at minimum social cost. As indigenous invention increases the state becomes subject to lobbying from the now successful inventors for increased monopoly rights whilst the emphasis on disclosure and dissemination of information receives lower emphasis. As the same inventors exhaust home markets and begin to exploit foreign markets, pressure also increases for governments to lobby for increased protection in foreign markets by means of international conventions or bilateral treaties. These in turn may be allied with calls for increased or changed protection for inventions at home in order to justify or enable making such calls abroad. This is broadly the course of development the UK system followed and is true for most countries which have been technological leaders during the development of their IPR systems.

Japan however has very much developed from a state of technological followership. This has been true as much of IPR systems as of Technology in general. Prior to the opening of Japan to the West in 1853 the initial contacts with the West in the Christian Century from c1550 to c1640 and the minimal contacts with the West in the following two hundred years isolation had left no trace at all in Japan of Western ideas about IPR systems (日本国特許庁, 1984). Following 1853 though, both Western technology and laws, including the Patent System, were quickly adopted. Whilst in the UK the adoption and development of a patent system took place over hundreds of years, in Japan the process was considerably quicker. From the first recorded official discussions in 1869 to the implementation of the first workable modern system in 1885 took a mere 16 years.

I have described this rapid development and the early history of the Japanese Patent system in an MSc thesis (Pitkethly, 1993). Here I will therefore just draw attention to some points which are relevant to the present discussion.

The rapidity of Japan's initial introduction of a modern patent law was in great contrast to the gradual introduction of such a system in the UK. Initially though the aims of the Japanese system were similar. In fact in 1868, even before the first unsuccessful attempt to implement a patent system in Japan, Kanda Takahira, a professor at the Kaiseisho (later Tokyo University), published an article in "The Western Magazine" (「西洋雑誌」) entitled

"My view of praiseworthy things" (「褒功私説」) advocating the adoption of a patent system and explaining its basic workings. He listed three main objectives of a patent system:-

i) the invention of things unknown in any country
ii) the teaching of things invented in another country but introduced for the first time to ones own
iii) the adding of improvements to things already long in existence.
(日本国特許庁, 1984).

The first aim, encouragement of indigenous invention, was achieved by the incentives offered by the patent system. Sakichi Toyoda the founder of the Toyoda Loom works and thus of Toyota as a whole is said by the company history to have had a goal of benefiting the nation and contributing to its development. Furthermore, around 1885, "Upon hearing of the main points of the Patent Law, he determined that he would achieve his goal through invention" (Toyota Motor Corporation, 1988).

### 1.1.1. The Introduction of Japanese Patent Law

The first source of information on foreign Patent systems obtained by Japan probably occurred when a party of Bakufu[4] diplomats visited the US patent office as part of a diplomatic mission in 1860. After the Meiji restoration in April 1868 the Meiji Emperor's government adopted a "Free Trade" policy and sought to establish would what now be called a de-regulated, single market environment to promote industrial development. It was at this time and in this state of bureaucratic and political turmoil that the first attempt at instituting a patent law took place. On the 7th April 1871 under Dajôkan proclamation No.170, Japan's first Patent Rules known as the "Summary Monopoly Rules" (専売略規則) came into force. Within a year they were suspended. Takahashi Korekiyo commented that : -

> "there was no adequate Japanese staff who could properly examine the applications. The Government was obliged to hire a large number of foreigners, The financial burden was enormous and yet the technological standard of inventions was not high enough to justify such expenses" (Takahashi,1976) in (Watanabe, 1985)

### 1.1.2. The First Workable Japanese Patent Law

A key feature of the next and very successful attempt to implement a Japanese patent law was the amount of debate and investigation, particularly of foreign patent systems, which went into it's preparation.

The next main source of information after 1872 came from the Iwakura Mission which left

[4]Bakufu : (幕府) The military government headed by the Shogun a post held by members of the Tokugawa clan since the 17th century. The Bakufu was defeated in a civil war resulting in the restoration of power to the Emperor in 1868.

Japan on December 23rd 1871. One way of summarising the mission's aims is to quote article 5 of the Emperors charter oath of 1868 :-

> "5. Knowledge shall be sought for all over the world so as to strengthen the foundations of imperial rule". (Fox, 1969).

If one could point to one sentence which has encapsulated and influenced modern Japanese society's attitude to the world outside Japan this seems to be it. The aim is gathering knowledge not just to imitate others but to use and adapt the knowledge to serve national ends which whilst no longer embodied in the imperial system are still present in the form of Japanese industry.

In America the mission visited the US Patent Office just as it's predecessor did in 1860. On 20th March 1872 two members of the mission visited the Patent Office and the Smithsonian Institute (Miyanaga, 1992). Perhaps more important though was the fact that on its return from touring the USA and Europe the mission returned with details of many of the most advanced patent systems of world useful in helping replace the first failed Japanese system. The Mission may have visited the UK patent office following their arrival in the London on 17th August. They would have had plenty of opportunity to and did indeed visit places nearby such as the City, though Beasley's itinerary does not record such a visit (Beasley, 1981). One might add that the Iwakura mission and the subsequent study tour by Takahashi Korekiyo are among the precursors of the subsequent "study tours" from Japan which are an important feature of the development of IP management in Japan. After a complex and long drawn out process the rules were finally implemented under Dajôkan Proclamation No.7 on 18th April 1885, a day subsequently known even today in Japan as "Invention Day".

### 1.1.3. Takahashi Korekiyo's Patent Offices Tour

Later when a new draft patent law was being discussed, Itô Hirobumi, (subsequently Prime Minister and a key statesman in the formation of modern Japan) who was in charge of the Bureau of Legislation and of revising the bill, said in his "explanation of the revisions" :-

> "one should examine each country's existing law, choosing the most skilled person, who should be suited for the task and moreover take into consideration the state of affairs in the today's world". (Sasaki, 1980).

His words on the studying of foreign systems, again echoing the Emperor's exhortation to study abroad, were what resulted eventually in Takahashi Korekiyo being sent on a study trip of foreign patent offices.

After the promulgation of the new law Takahashi Korekiyo, the first head of the new Japanese Patent Office was ordered to go on a tour of foreign Patent Offices in part at Itô

Hirobumi's instigation and also as part of the government's continuing investigation into Patent and Trademark law aimed at revising the new law. He left Japan in November 1885 and visited Washington and also the Patent Offices in London, Paris and Berlin returning on December 7th 1886.

The end result of his trip, was as he said in a letter to an American friend in 1886 that :-

> "I have in view to reorganise my office entirely on American plan, but of course on much smaller scale.-I am at this moment preparing the plans for jackets various registers such as applications for patents, using the blanks of your office as models" (Sakamoto, 1989).

Takahashi's overall impression of the English patent system was that it reinforced the importance of an examination system, (which was only just being introduced in the UK), and the creation of stable rights. The revised Japanese patent system that Takahashi put into effect in 1889 was thus at least in the administrative details quite literally a direct copy of the US one, something which is amusing to contemplate in view of the more recent US criticism of the Japanese Patent System to be discussed later in this chapter.

Takahashi's role illustrates the increasing role of bureaucracy as opposed to industry lobbying as the driving source for change in IP law at the time. To what extent this affected developments is a moot point but the aims of industry and government in many respects coincide when it comes to IP policy. What is unclear, is to what extent industry at that stage was able to influence the increasingly authoritarian tone of Japanese government which was turning to Berlin and Germany[5] for role models.

### 1.1.4. Early Pressure on the Japanese Patent System from Abroad

One way in which Japan's new patent system differed from other nations' was in the total lack of protection offered to foreigners. It was on this point that foreign pressure was brought to bear and moves began to integrate Japan into the patent law harmonisation movement, again showing that patent systems do not exist in isolation.

There were complaints in the UK in the mid 1870s that Japan had no current patent law which though not entirely true were true so far as foreigners were concerned. An "Association of English patent- holders for the enactment of international patent laws" protested "the want of patent protection in Japan" which was reported in the Journal of the Society of Arts in 1876 (Coulter, 1991). On 1st February 1889 the British Minister enquired on behalf of a British inventor about obtaining a patent and was told by the Ministry of Agriculture and Commerce

[5]One can note that Japanese school and university uniforms are derived from old Prussian army ones and both the name and the shape of the ランドセル ("Randoseru" from the German "Landschell") or universal school satchel, mimic that of the late nineteenth century German Army's haversack.

three days later that patents were unobtainable for inventions by foreigners (日本国特許庁, 1984). Thus at this stage just prior to the end of the nineteenth century there was pressure for Japan to grant patent rights to foreigners. As we shall see it was to be in some sense a card bargained away for diplomatic purposes. One might comment that the basic reason for this is that the underlying short term interests of leading nations and following nations regarding technology are necessarily not at one. With the more recent change in Japan from pure technological followership to a leadership role the environment in which IP policy is formed is changing and this is affecting Japan's IP policy and management at all levels.

**Diplomacy, Patent Law and Harmonisation**

One of the overarching aims of the Meiji government's foreign and domestic policies was the revision of the "Unfair Treaties" which were negotiated from a position of weakness in the 1850s. To this end the government had to create a country which was administratively, industrially and militarily strong enough to earn the respect of western nations. The introduction of a Patent System was seen as being in accord with these aims and thus it was not so much a matter of whether such a system should be implemented (though needless to say there was some dispute about it - both pro and anti) but how and when.

Perhaps the best way of illustrating the pressures connected with treaty revision and their connection to the introduction of a patent system is to quote to the eventual Treaty which revised the original "unfair treaties". Article 25 of the 1894 treaty with the UK which was signed on 16th July said that :-

> "The subjects of each of the High Contracting parties shall enjoy in the dominions and possessions of the other the same protection as native subjects in regard to patents, trademarks, and designs upon fulfilment of the formalities prescribed by law"

and the protocol attached to it said in Article 3 :-

> "The Japanese government undertakes, before cessation of British Consular Jurisdiction in Japan to join the International Conventions for the Protection of Industrial Property and Copyright."

The need to accede to the International conventions thus meant that Japan would have to have a Patent, Trade Mark and Design Law that conformed to the bare essentials of those conventions and the above protocols thus forced Japan to implement a patent system that granted patent rights to foreigners as a condition of revising the treaties. Japan's patent law after a brief period of independent development was, not for the last time subject to foreign pressure from technologically advanced country eager to protect their interests.

### 1.1.5. The Objectives of Early Japanese Patent Law

The embryonic Japanese system thus trod a careful line between the competing demands of importing foreign technology at minimum cost, promoting indigenous technology by granting monopolies and disseminating technology and keeping quiet foreign governments keen on strengthening IPRs internationally. In fact during the deliberations about the 1885 Japanese patent law a paper entitled "The Pros and Cons of Invention Certificate Law" by Inoue Kowashi, a member of the legislation bureau is recorded as including the phrase:

> "In the first place the government does not grant certificates in respect of inventions in order to pay the inventors, rather it is to encourage new contrivances and usually after the expiry of such a certificate the aim is to disperse them quickly throughout the world" (Sasaki, 1981).

Thus just as the initial UK system was weak and very difficult to enforce at first, the Japanese system developed as a weak system which in Japan's case encouraged the dissemination of technology and licensing more than it did litigation - the latter of which has never been very popular in Japan anyway.

The development of the system was thus angled more towards promotion of the government's aim of the disseminating information and invention. This is shown by several factors. Firstly the early laws had compulsory licence provisions. As mentioned earlier these had been promoted by the UK and France in the 1883 Paris Convention. The first 1885 Japanese patent law included a number of articles from US and French patent law and the idea was obviously to pick and choose articles which suited Japan's position. France and the UK had instituted the measures as a compensation for lagging behind German technical progress. Japan however lagged behind almost everyone at the time and so such provisions were particularly appropriate. Most countries' compulsory licence provisions include provision for the granting of licences where patent owners do not work the invention in the country so that others may benefit from it. Japan had similar but more draconian provisions. Article 15 of the first act of 1885 even provided for total revocation of patents where there had been two years non-use or where the invention had been imported from abroad and sold. This last provision had to be toned down when Japan joined the Paris convention in 1899. Thus there was a strong emphasis on promotion and diffusion of invention rather than on the rights of the monopoly holders right from the earliest origins of the Japanese Patent system. This is something which Ordover has also commented on in respect of the modern Japanese system (Ordover, 1991).

### 1.1.6. Further Developments in Japanese Patent Law 1899 - 1921

Following the implementation of the 1899 law there followed a number of revisions to the law over the years. These, as mentioned previously, began to show a decidedly Germanic character. For example in 1905 a "Utility Model" law meant for protecting minor inventions

was copied from German law as a result of a study of European IP Systems carried out by Yamada Saburô at the Governments request whilst he was studying in France in 1901. Unlike the 1885 patent law which gave priority to the first to invent (as in the USA) the new utility model law gave priority to the first to file an application (as in Germany). The 1888 revision of the Patent Law was again subject to minor revisions in 1909 including provisions for licensing basic patents for the benefit of dependent patents (Doi, 1980). Then in 1921 the Patent law was revised again this time as with the Utility model law on a German basis. The system thus changed from a first to invent to a German first to file system. Japan thus picked and chose those laws which suited its circumstances and where unavoidable responded to external pressures to change its laws to mollify other countries.

### 1.2. Conclusions

The development of Japanese Patent law shows that remote though Patent law may sometimes seem from central concerns of government it is in fact highly dependent on and influenced by not just commercial interests but also diplomatic and political interests. A further important point to be drawn from the way in which Japanese law developed is the factor of intense study of developments abroad which seems to be a particular characteristic of the development of any Japanese institution.

# Appendix E Major Japanese Patent Legislation 1871-1995

(Main points only shown - *Comments in Italics*)

**Initial Law**

**1871** 明治 4 専売略規則 （せんばいりゃくきそく）
**Monopoly Summary Rules** (SenbaiRyakuKisoku)
- No rights for foreigners
- First to file system

**1872** 明治 5 専売略規則 廃止
**Abolition of Monopoly Summary Rules** (SenbaiRyakuKisoku Haishi)
*Failed due to lack of infrastructure*

**First Workable Law**

**1885** 明治１８ 専売特許条例 （せんばいとっきょじょうれい）
**Monopoly Patent Regulations** (Senbaitokkyojyôrei)
Implemented 18th April (Now known as 発明の日, Invention Day)
- No rights for foreigners
- Priority to first to invent
- Maximum Life of 15 years (5,10 or 15 years)
- No protection for pharmaceuticals

*Mainly derived from French and US law*

**1888** 明治２１ 特許条例 （とっきょじょうれい）
**Patent Regulations** (Tokkyojyôrei)
- Adoption of Formal Examination Procedure (Art 4)
- Food/Drink, Non-Essential Foodstuffs, Medicines excluded (Art 2)
- The issue of granting rights to foreigners was left for the future.

*Revisions to take account of Takahashi Korekiyo's Foreign Trip.*

**1899** 明治３２ 特許法 （とっきょほう）
**Patent Law** (Tokkyohô)
*Revisions made in order to join the Paris Convention*
- Granting of rights to foreigners (Art 6 & 14)
- Revision of non-working forfeiture provisions

**1905** 明治３８ 実用新案法 （じつようしんあんほう）
**Utility Model Law** (Jitsuyôshinanhô)
*First implementation of utility model law based on German law subsequently revised 1909,1921,1954 Latest Revision in 1994 abolishes examination of Utility Model applications making it a registration system now relatively little used by major industry.*

**1909** 明治４２ 特許法 （とっきょほう） **1st Major Revision**
**Patent Law** (Tokkyohô)
*Revisions prompted in part by joining the Paris Convention.*
- Provision of regulations regarding workers inventions (Art 3)
- Making clear the adoption of local novelty (Art 4)
- Provision of rules for granting rights to foreigners (Art 27)

**1921** 大正１０ 特許法 （とっきょほ） （旧法） **2nd Major Revision**
**Patent Law - Old Law** (Tokkyohô) (KyûHô)
*Revision of the law to fit post WWI economic conditions*
1) Priority to First to invent revised to First to File (Art 8)
*Due to change from US to German Influence.*
2) Adoption of Application Publication / Opposition system (Art 73-76)
*(Pre-grant opposition system with publication)*

(Cont'd)

**1959** 昭和３４ 特許法 （とっきょほう） （現行法） **3rd Major Revision**
**Patent Law - Present Law** (Tokkyohô) (GenKôHô)
*Post War revision of the 1921 law to keep up to date with new technology*
- Inclusion of printed matter distributed abroad in matter related to standard of novelty (Art 29 s.1 p.3)
*(local use & knowledge, universal publication novelty standard)*
- New regulation concerned with inventive step (Art 29 s.2)
*(Inventions must also be inventive and not just novel)*
- Revision of Employee invention regulations (Art 35)
- Life of a patent limited to 20 years from date of filing (Art 67)
- Revision of rules regarding infringement of patent rights (Art100/6)

**1970** 昭和４５ 改正 （かいせい） **4th major revision**
**Revision** (Kaisei)
Adoption of Application Early Publication system.
*(Publication at 18m from priority as in Germany and Holland)*
Adoption of Examination on Request system.
*(Examination may be delayed and requested up to 7 years later)*

**1975** 昭和５０ 改正 （かいせい） **5th major revision**
**Revision** (Kaisei)
Product Patents & Pharmaceutical Patents Allowed
Adoption of multiple claim system (only dependent sub-claims)

**1978** 昭和５３ 改正 （かいせい）
**Revision** (Kaisei)
Ratification of patent cooperation treaty

**1985** 昭和６０ 改正 （かいせい） **6th major revision**
**Revision** (Kaisei)
Revision of national law to accord with revision of PCT
Establishment of National Internal Priority right system.

**1987** 昭和６２ 改正 （かいせい） **7th major revision**
**Revision** (Kaisei)
Multiple Independent Claim System adopted
*(Broadened Multiple claim system allowing more in an application)*
Making time limits more flexible to help international harmonisation
Establishment of Patent extension system

**1990** 平成２ 改正 （かいせい）
**Revision** (Kaisei)
Introduction of "Paperless Office" electronic filing system
*(Allows filing of applications on-line or on floppy disks)*

**1995** 平成７ 改正 （かいせい） **8th major revision**
**Revision** (Kaisei)
*Amendment of Patents Act to agree with GATT / TRIPS agreement and agreement between JPO and USPTO.*
- Removal of exclusion of substances manufactured by atomic transformation of atomic nuclei (Art 32)
- Relaxation of disclosure requirements in specification (Art 36)
*(this slightly broadens the scope of patents)*

( Cont'd)

**1995** 平成 7

- Permissibility of filing application in a foreign language
  *(this makes filing in a hurry by foreign applicants slightly easier though there are some disadvantages)*
  *(Arranged under USPTO/JPO24/1/94 agreement)*
- Grant of priority to application from WTO country or one with reciprocal rights
  *(This allows applications from non-Paris Convention WTO GATT signatory countries or those granting reciprocal right to claim priority from an application in their home country)*
- Extension of duration of patent - 20 years from date of filing
  *(was 15 years from publication but not more than 20 from filing)*
  *(This in brings Japan into line with Europe)*
  *(Should extend life of 20-30% of Japanese Patents)*
- Claim interpretation rules revised (Art 70(2))
  (Description and Claims to be taken into account)
  *(this slightly broadens the scope of patents)*
- Abolition of pre-grant opposition system and establishment of post grant-opposition system with joint hearing of multiple oppositions (Art 55 -> Art 113-120) (1st Jan. 1996)
  *(This in brings Japan into line with Europe and abolishes criticism of Japan over multiple oppositions which delay grant of foreign applications ).*
  *(Arranged under USPTO/JPO24/1/94 a greement)*
- Expansion of system for submitting anonymous observations on relevant prior art to examiners
  *(This in brings Japan into line with Europe)*
- Possibility of Accelerated Examination Procedure
  *(This is now also available in the UK arranged in Japan*
  *(Arranged under USPTO/JPO24/1/94 a greement)*

**Sources :**
(吉藤　幸朔, 1992)
(Doi, 1995)
R.H.Pitkethly

# Appendix F UK & Japanese IP Structures and Institutions

## 1. Intellectual Property - Structures and Institutions

### 1.1. UK

#### 1.1.1. UK Patent Office

In the UK the Patent System and other IP registration systems such as Trade Marks, Registered Designs and policy formulation connected with all IPRs including those not involving registration such as Copyright, are all handled by the Patent Office which is at present an executive agency of the Department of Trade and Industry. Recently moves to privatise the office altogether have been shelved at least in part because a number of the functions of a patent office are statutory functions involving for example vetting patent applications in the interests of national security and adjudicating in hearings concerning patents and other IPRs. The Patent Office thus acts as a central government body administering IP in the UK. In the past the Patent Office was located in 25 Southampton Buildings in the centre of the legal area of London. However in the past few years all but a few central functions have been relocated to Newport in Gwent. The library and patent information functions of the Patent Office are now handled by the SRIS or Science Reference and Information Service which is housed in the old Patent Office library and is a part of the British Library.

#### 1.1.2. UK Representative Organisations

The business of drafting, filing, prosecuting and advising on the law of patents and other related forms of IP is usually carried out in the UK by qualified Patent Agents, who are usually also qualified European Patent Attorneys. The European examinations to become a Patent Attorney are organised by the European Patent Office and require some knowledge of technical French and German. The UK examinations are organised by The Chartered Institute of Patent Agents, the main professional body connected with IP in the UK. Whilst resident companies and individuals do not have to use qualified agents to represent them most invariably do either employing their own in-house qualified patent agents or using firms of Patent Agents in private practice in the same manner as firms of solicitors.

In addition to the Chartered Institute of Patent Agents there are a number of other organisations in some cases international which represent either patent agents in Private practice (e.g. FICPI : Federation Internationale des Conseils en Propriete Industrielle) or in Industry (e.g. TMPDF : Trade Marks Patents & Design Federation) or both (e.g. AIPPI : International Association for the Protection of IP). In addition to such organisations there are also organisations for Solicitors specialising in IP issues. Such Solicitors will usually be employed

in private practice but occasionally can be found in company legal or IP departments large enough to have a legally qualified IP expert. A further organisation connected with IP management is the Licensing Executives Society. This is an international organisation including both legally qualified members, licensing managers and consultants without legal qualifications. In larger companies there may well be a separate licensing department usually within the IP or Patents department. In 1994 there were around 1250 qualified UK patent agents of whom around 360 worked in 96 companies in Industry. The remainder worked in private practice.

There are a number of small usually University related research centres or individuals connected with academic IP research who receive funding from Industry however no major government and industry supported research centre for IP exists in the UK along the lines of the Max-Planck research institute in Germany or the Institute of Intellectual Property (IIP) in Japan. Links between Government, Industry and Academia are therefore somewhat ad hoc not having any particular national focus to them. Very recently though an IP Forum to provide a loose informal forum for discussion of IP related legal, economic and business related issues and research was founded and chaired by The Hon. Mr. Justice Jacob. This however lacks the formal government supported structures of the Max-Planck Institute in Germany or the IIP in Japan.

## 1.2. Japan

### 1.2.1. Japanese Patent Office

The Japanese Government Bureaucracy is a highly territorial organisation with each Ministry and Agency jealously guarding it's areas of responsibility and where possible trying to expand them. As a result in contrast to the UK, whilst the definition of Intellectual Property Rights (知的所有権) is the same, there is a distinction between *Industrial* Property Rights and Copyright. This is because Copyright is the responsibility of the Cultural Agency within the Ministry of Education whilst Industrial Property Rights (in effect all other IPRs such as Patents, Utility Models, Trade Marks, Designs, etc.) are the responsibility of the Patent Office within the Ministry of International Trade and Industry (MITI). Occasionally MITI has tried to acquire control over some of the more industrial aspects of copyright law but this has always been strongly resisted.

### 1.2.2. Japanese Representative Organisations

As in the UK Japanese companies are represented by qualified Patent Agents who either work in Industry or in private practice. All are members of the Japan Patent Attorneys' Association (JPAA / 弁理士会). In 1993 there were 3632 members of which only 341 were working in Industrial IP departments in 201 companies. In addition to the JPAA there

are a number of other organisations which play a significant role in IP management in Japan. The main equivalent organisation to the UK TMPDF is the Japan Intellectual Property Association (JIPA). This organisation is open to any organisation which owns IPRs and employs in-house IP specialists (these need not be qualified attorneys). It is the main organisation relating to Industrial IP practice and not only publishes a journal called "IP Management" (知財管理)[6] but also helps run a number of training courses for patent managers in industry. In 1993 there were 654 members including about 80% of the 200 companies employing qualified patent attorneys and over 80% of the top spending companies in Japan. The association also organises numerous study tours to study foreign companies patent management practice. The JIII or Japan Institute for Invention and Innovation (発明協会) is a society open to all and having individual members as well as corporate members. In 1993 there were 12778 members with 6220 Full members and 6508 supporting members. There is no equivalent organisation in the UK. The JIII was founded in 1904 and is charged with organising the Imperial prizes for invention, it also carries out patent information work including much connected with official publications, organises training courses and is the Japan's largest publisher of books connected with IP issues. The JIII also has an active research section and library with extensive holdings of journals relating to IP many unobtainable elsewhere. The JIII also plays a key role through it's 47 branch offices throughout Japan in disseminating Patent Information. These together with patent information centres run by local libraries add up to 106 patent information centres more than matching the 14 information centres distributed around the UK by the SRIS (日本国特許庁, 1994). The JIII is also active in conjunction with the Japan Patent Information Organisation (JAPIO / 日本特許情報機構) in disseminating Patent Information and in organising a bi-annual Patent Information Fair at which patent information hardware and software products and services are displayed by suppliers. Japan also has a branch of AIPPI which with 1000 members from lawyers (弁護士), Patent Attorneys (弁理士) and Industry and Academia which also happens to be the largest National AIPPI branch.

One notable feature of the numerous IP related organisations in Japan is that their staff are continuously changing and in contrast to the UK are far more likely to have come from either Government or industry rather than from industry or the professions alone as is the case in the UK. Furthermore, being larger organisations they can afford to have permanent staff, often staff on full-time secondment[7] from industry or government and in particular the Patent Office. Very often the heads of the various IP related organisations in Japan will be recently retired senior staff from Industry with considerable experience. At lower levels the secondments

[6]The JIPA recently changed its name from the Japan Patent Association (JPA - 特許協会) renaming the journal from "Patent Management" (特許管理).

[7]出向 Shukko or secondment is practised by about 95% of firms with over 5000 employees and can involve 6-7% of the employees of such firms according to a 1990 labour ministry survey (Okazaki-Ward 1993)

are generally for terms of about two years following which the secondee usually returns to his company or the Patent Office thus spreading the skills and knowledge he has acquired from the external IP networks around the internal company networks.

In addition to university IP law specialists there is also a specialist research centre set up with Governmental blessing and industry funding which is intended to fulfil the same role as the Max-Planck Institute in Germany. This is the Institute of Intellectual Property which is headed by a former career head of the Japanese Patent Office, also funded by Japanese Industry and staffed by numerous people, some fully qualified Patent Attorneys, on secondment from Industry or the Patent Office. In formulating policy documents this organisation also involves academics and organises it's own research projects, surveys and study tours.

# Appendix G Comparison of Japanese, UK and US patent law

## 1. Comparison of Japanese, UK and US patent law

The main underlying points to note in the development of Japanese IP law are firstly where the origin of the main influences over the years and secondly the nature of the changes made. At first from 1853-1899 the law was heavily influenced by US and French law and from 1900 to 1945 by German Law. Following 1945 the influences were perhaps more widely spread though Dutch and German law led to adoption of early publication and delayed examination. Latterly there have been changes which tend to make the system more European though the main pressure has come from the US and GATT/TRIPS discussions.

Most of the foreign comment on Japanese patent law tends to be from the USA. This is unfortunate in a way, or at least unbalanced since in many respects the US patent system differs from the Japanese and European systems in some crucial ways. When official investigation of the Japanese Patent system was first raised as a major trade issue in 1988 at the Senate subcommittee hearings Senator Packwood said :

> Senator Packwood : "I am not a patent attorney. I have never handled a patent case in my life, and am relatively unfamiliar with how the system may work in Germany, Japan, or Borneo or any place else. But as I read through the three statements of Commissioner Quigg, Ms. Smith and Mr. Massey, throughout it all, in one way or another, you seem to be saying that *the Japanese system is more akin on balance to the European System and that ours is kind of the odd man out.* (emphasis added). Do I read you correctly?"
> Mr. Quigg (USPTO Commissioner) : "That's correct, sir."
> (Committee on Commerce Science and Transportation, 1988)

There is some pressure from European sources but it is rather muted since perhaps the differences do not seem as great as they do from the USA. One source of comments though is the European Business Council which has published a leaflet on the viewpoints of it's Patents Trademarks and Licences Committee (European Business Council's Patents, 1993). The key points of this document relate to complaints about the following IPR issues:

i) The time taken to obtain a patent in Japan is too great and is caused by
- understaffing at the JPO
- the filing of large numbers of narrow patents despite a multi-claim system
- the existence of collusive pre-grant oppositions delaying grant
- lack of time deadlines for examiners to render decisions

ii) Lack of discovery[8] procedures in litigation
iii) Continued problems with counterfeit goods including lack of damages and high cost of court proceedings
iv) Inadequate arrangements for counterfeiting investigations at customs houses
iv) Inadequate protection of Tradenames in Japan.

[8]"Discovery" is the legal process by which litigants can gain access to relevant documents and evidence in the possession of the other party. In the USA it can be particularly onerous. In Japan it is almost non-existent which means that proving infringement often has to be done using only publicly available evidence. In the case of an invention such as a process this may not easily be available.

Another key lobbying organisation and a somewhat more aggressive one perhaps is the American Chamber of Commerce in Japan (ACCJ). This put forward it's views on IP in Japan in it's 1993 Trade White Paper. In particular it made the following comments (The American Chamber of Commerce in Japan, 1993):

- The average period of patent pendency in Japan remains one of the longest in the developed world
- Due both to the common practice in Japan of filing a large number of applications to cover slight variations in known technology and to the narrow interpretation of patent claims by Japanese Courts, protection is effectively reduced and the system is overburdened with applications
- Multiple oppositions after examination often introduce significant delays in the patenting process since the applicant must respond to each opposition separately. In addition since Japanese law contains no discovery procedure whereby the owner of a process patent may seek evidence of suspected infringement, the protection offered by a process patent is weakened.
- Despite the recent enactment of the Trade Secret Law, there is still a lack of effective protection for trade secret material during procedures in the courts.

Among the recommendations made were :

- That action be taken to keep patent applications confidential prior to publication for opposition until such time as average pendency becomes comparable to that in other developed countries
- The interpretation of claims be broadened sufficiently to protect minor modifications, thus removing any need for redundant applications
- Administrative means be provided by which a patent owner can obtain information about processes suspected of infringement, with appropriate safeguards against frivolous use
- Multiple oppositions be consolidated where appropriate into a single opposition to which the applicant may provide a single response;
- Serious review of court procedures be made with a view to instituting a system similar to the in camera or protective order procedures in U.S. courts for protecting relevant but proprietary information.

The 1995 ACCJ Trade White Paper (The American Chamber of Commerce in Japan, 1995) also made similar points. :

- Excessive time required to obtain patents
- Lengthy patent litigation process
- Lack of strict trade secret enforcement
- Concern over laws relating to software

However, it should be said that the Japanese Patent office is actively addressing the issues raised and changes for example in the opposition procedure (which is now post grant) have occurred. There have also been comments about the difficulties placed on Non-Japanese applicants by having to file initially in Japanese (this has now resulted in filing in English becoming possible). Similar comments have also been heard for some time especially from the USA. These crystallised in 1988 with a Senate subcommittee hearing on "The effect of the Japanese Patent System on American Business". (Committee on Commerce Science and Transportation, 1988). More recently and following on from that initial investigation there has been a US GAO (General Accounting Office) report which describes US companies experiences with the Japanese patent system. In addition to this there have been a number of

articles reviewing the state of US and Japanese Patent law, usually negatively when it comes to Japanese law. (Durney, 1989)(Durney, 1991)(Durney, 1991)(Wineberg, 1988)(Whitener, 1990).

Table 1 US, Japanese & UK Patent Systems

| | **US** | **UK** | **Japan** |
|---|---|---|---|
| Priority | First to Invent | First to File | First to File |
| First Publication | **On Grant (Was to be 18m. from filing from 1/1/96 but change still pending)** | 18 months from filing | 18 months from filing |
| Examination | Automatic | On request | Deferable for up to 7 years |
| Opposition | No but Reexamination is possible | Post Grant | **Post Grant (Was Pre-Grant until 1/1/96)** |
| Term | **20 Years from filing (Before 8/6/95 was 17 Years from grant)** | 20 Years from date of filing | **20 Years from filing (Before 1/7/95 was 15 Years from publication for opposition with Max. 20 Years from filing** |
| 1 Year Grace period for disclosure before filing | Yes | No | No |
| Compulsory Licences | No | Yes but rare | Yes but rare |

US is planning to introduce publication at 18m but currently has no plans to introduce "First to File" priority.

Recent changes in both Japanese and US law have reduced the number of differences. In addition to the above changes several others have been made and it is now possible to file applications in English in the JPO. Efforts are also being made in Japan to reduce the time taken to examine patents (日本国特許庁, 1995). More importantly a number of other changes to statute law (e.g. Art70(2)) have been made to try and broaden the scope of claim interpretation and thus the scope of protection of Japanese patents. In Japan there is relatively little case law, but recent cases have made changes to the breadth of Japanese patents. A recent case involving a Ball spline bearing has laid down some guidelines for broadening the previously very narrow interpretation of Japanese patent claims (Melson, 1995); as has another recent decision involving genetic engineering technology (Melson, 1996). Complaints about multiple oppositions have also been addressed by ensuring consolidation of oppositions on identical grounds and the need for only a single response by the patentee.

The trend of all these changes is to strengthen the Japanese patent system in favour of the patentee and to begin to make litigation easier and oppositions less onerous - in theory. There remain a number of significant barriers to successful litigation which will be reviewed later but at least the trend of amendments to the law is to accede to many of the demands from the USA and elsewhere. If anything it is seen from the Japanese viewpoint that now that Japan has addressed the issues raised by the US it is now the US which appears to be slow in

implementing what it has promised to change.

Over the years as the USA has swung from pro-patent to anti-patent and now since the 1980s back to a pro-patent stance. Thus at present the main purpose of the US system is seen as protecting the patentee. In contrast from the US viewpoint the Japanese system is one which is primarily intended to diffuse innovations not protect them (Foray, 1992)(Ordover, 1991). This view is partly based on the lack of 18 month early publication before grant in the US (Helfgott, 1989). However additionally in Japan there is the tendency towards narrow claim interpretation, the allowance of only narrow claims, the use of few claims[9] and the possibility of deferring examination, which all contribute to an environment where large patent holdings and frequent cross-licensing are common. Litigation is also rare and the pressures to settle and take licenses rather than litigate are substantial.

However, recent changes indicate a change in attitude to the patent system in Japan. Features which in the past have acted to favour the introduction and diffusion of technology are now in some cases being revised and account taken of the need to protect technology as much as diffuse it. It is surely no coincidence that this is occurring at a time when Japanese technology is being sought and infringed by others (as outlined earlier) and when attitudes to IP are being greatly influenced by US companies enforcement of patents against Japanese companies.
In a recent survey of the JIPA reported by the IIP 51% of 295 large Japanese companies replying to a questionnaire survey thought that IP laws should be strengthened whilst 35% of small and medium sized firms also thought the same (知的財産研究所, 1995).

Revisions of Japanese law are usually preceded by intense discussion and assessment of what other countries' practices and in common with other countries no laws would be revised unless it were in the overall best interests of the country and it's industry as a whole. Neary outlines such a process regarding the introduction of per se patent protection for pharmaceuticals and chemicals (Neary, 1990). In 1957 the subject was discussed and Japanese Industry it was thought was "not yet ready". Patent Office surveys found 30.2% in favour in 1955 but 70.6% in 1970 and by 1975 the changes had been made and per se patent protection for pharmaceuticals introduced. The process in many ways parallels the process of change on the same points and with similar considerations which the UK had undergone a few years earlier. It is of course no accident either that whilst considering the change a Japanese study tour group had visited the USA and Western Europe to research such occurrences in 1972 (Neary, 1990), again emphasising that influences on Patent Law are never entirely local.

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[9]This is despite law changes allowing more. The 1994 JPO annual report notes that on average Japanese patents only have 3.8 claims as opposed to an average of 10 in most foreign patents despite the existence of a multiple independent claim system in Japanese Patent Law.

## Appendix H　Japanese Questionnaire & Cover Letter

# 知的所有権に関する産業における活用状況および経営対応についての調査

近年、企業の技術管理分野において、知的所有権をめぐる諸問題は世界的に重要な関心事とされております。この調査の目的は現在の産業における知的所有権の活用と経営対応について、実態と意識を明らかにする事にあります。この調査はオックスフォード大学ロバート・ピットケスリー氏と共同で行い、イギリスでも同様の調査を実施し、日英の比較分析を行うことになっております。この調査の結果は、知的所有権に関する国際的な理解を深めるだけでなく、その経営対応の重要性をも明らかにするものと考えております。よろしくご協力を賜わりますようお願い申し上げます。

1) 調査対象企業は知的所有権に関心を持っていると想定される企業、約500社です。
2)ご回答は、知的所有権、知的財産、特許部門の管理者の方にお願い致します。
3)質問の内容が貴社の業務内容に該当しない場合には、その質問は空欄にして下さい。
4)ご回答頂いた調査票の取扱いについては慎重を期し、個別情報は一切外部に公表致しません。
5)ご回答に際しては、特に断りのない限り、該当する選択肢の番号に○印を付けてお答え下さい。
6)ご記入頂きました調査票は、お手数ですが同封の封筒にて、５月１５日までに返送下さい。
7) ご回答頂いた企業には後日、集計結果の概要をお送り致します。
8)設問の内容に不明な点がございましたら、下記までお問合わせ下さい。

お問合わせ先：(財) 知的財産研究所　〒１０５東京都港区虎ノ門２－７－７、虎ノ門中田ビル
担当：小笠原　　Tel.: 03-3508-2724　　Fax.: 03-3508-2730

まず会社の概要をお知らせください。

| | | | |
|---|---|---|---|
| 会社名 | | | |
| 住所 | 〒 | | |
| 電話　： | | ファックス： | |

年間売上高、研究開発費、について最近の決算時の数値を、また従業員数については平成６年４月１日現在の数値をご記入下さい。

| | | | |
|---|---|---|---|
| 従業員数 | 人 | 年間売上高 | 百万円 |
| 研究開発部門 従業員数 | 人 | 研究開発費 | 百万円 |

貴社の所属業種についておたずねいたします。貴社の主な所属業種を以下の中から４つまで選び、売上高の順に１～４の順位を付けておよその構成比をご記入下さい。

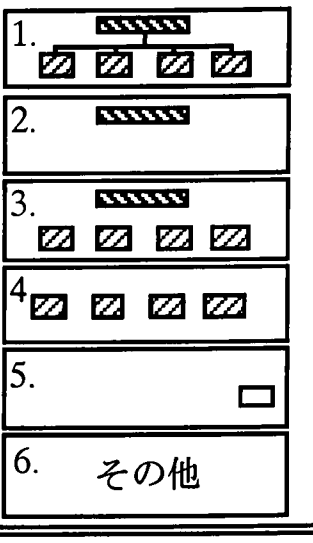
1. 食品　2. 繊維　3. 木・木製品
4. 紙・パルプ　5. 出版・印刷業　6. 化学（除く医薬）
7. 医薬品　8. 石油・石炭製品　9. プラスチック製品
10. ゴム製品　11. 窯業・土石　12. 鉄鋼
13. 非鉄金属　14. 金属製品　15. 電気機械器具
16. 通信・電子・電気計測品　17. 自動車　18. その他輸送用機械
19. 精密機械　20. 一般機械器具　21. その他製造業（具体的に_____）
22. 建設業　23. 放送業　24. ソフトウェア・情報サービス業
25. 通信事業（除く通信機器製造業）　26. その他サービス業（具体的に_____）　27. 試験研究機関

| 第１位 | 第２位 | 第３位 | 第４位 |
|---|---|---|---|
| 業種_____ _____% | 業種_____ _____% | 業種_____ _____% | 業種 _____ _____% |

## 知的所有権／特許部門の組織

問1　貴社の知的所有権／特許部門はどのような組織ですか。（１つを選びO印をご記入下さい）

1. 全社的な知的所有権／特許部門があり、それに所属する知的所有権／特許専任者を関連工場と研究所の部署に配置している
2. 全社的な知的所有権／特許部門があるが、全社的部門所属の知的所有権／特許専任者を関連工場と研究所の部署に配置していない
3. 全社的な知的所有権／特許部門があり、関連工場と研究所には独立の知的所有権／特許部門がある
4. 全社的な知的所有権／特許部門はなく、関連工場と研究所所属の知的所有権／特許部門がある
5. 知的所有権／特許の専任部門はなく、他の部門の業務の一環として扱っている
6. その他




問2　貴社の知的所有権／特許事業を扱っている部門はどの部門に所属していますか。
（１つを選びO印を記入下さい）
1. 研究開発部門　2. 技術計画部門　3. 生産部門　4. 法務部門
5. 総務部門　6. 独立部門　7. その他_____

問3　貴社において知的所有権／特許管理の部門のトップは取締役ですか。1. はい　2. いいえ

問4　貴社の知的所有権／特許部門は取締役に直結した管理組織になっていますか。
1. はい　2. いいえ

## 知的所有権／特許部門の責任

問5　貴社の知的所有権／特許事業を扱っている部門は次の知的所有権を担当していますか。

| | | |
|---|---|---|
| a. 特許 | 1. はい | 2. いいえ、_____に扱われています 3 担当部署はない |
| b. 実用新案 | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| c. 商標 | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| d. 意匠 | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| e. 著作権 (除くソフトウェア) | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| f. コンピュータソフトウェア | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| g. 半導体マスクワーク | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| h. トレードシークレット | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |
| i. ノウハウ | 1. はい | 2. いいえ、_____に扱われています 3.担当部署はない |

問6　貴社の知的所有権／特許部門では以下の項目を各々専門に扱う課／部がありますか。

| | | | |
|---|---|---|---|
| a. コンピュータソフトウェア | 1. はい　2. いいえ | d.ライセンス契約 | 1. はい　2.いいえ |
| b. 訴訟 | 1. はい　2. いいえ | e. 国内ライセンス | 1. はい　2.いいえ |
| c. 特許情報 | 1. はい　2. いいえ | f. 国際 ライセンス | 1. はい　2.いいえ |

## 知的所有権／特許部門の職員

問7　貴社において知的所有権の業務に専従している従業員は何人ですか。_____人

問8　この五年間に知的所有権の業務の従業員数は変わってきましたか。
1. およそ_____% 増加した　2. およそ_____% 減少した　3. 変わらない

問9 貴社の知的所有権の業務の従業員数を、下記の内訳別にご記入下さい

a. 合計　　b. 弁理士資格者　　c. 技術者　　d. 事務員　　e.その他

_____人 = _____人 + _____人 + _____人 + _____人

問10 貴社の知的所有権の業務の従業員数を、勤務部門別にご記入下さい。

| a. 合計 | + - - - - - -国内 - - - - - - - - + b. 知的所有権本部 | c. 工場と研究所 | + - - - - - -海外 - - - - - - - - + d. 外国にある事務所 | e. 外国にある法律事務所や大学で研修中の者 |
|---|---|---|---|---|
| _____人 = | _____人 | + _____人 | + _____人 | + _____人 |

問11 貴社の知的所有権の業務の従業員数を、主な職能別にご記入下さい。

| a. 合計 | b.知的所有権全般 | c.訴訟専門 | d.ライセンス契約 | e.特許情報専門 |
|---|---|---|---|---|
| _____人 = | _____人 | + _____人 | + _____人 | + _____人 |

問12 貴社の知的所有権担当者で海外勤務者、海外研修中の方はいますか。1.はい 2. いいえ
いる場合には勤務地別に内訳をご記入下さい。

| 国 | 従業員数 | 研修　員数 | 国 | 勤務者数 | 研修　員数 |
|---|---|---|---|---|---|
| a. 米国 | _____ | _____ | d. 他の欧州の国 | _____ | _____ |
| b. イギリス | _____ | _____ | e. アジアの諸国 | _____ | _____ |
| c. ドイツ | _____ | _____ | f. その他の国 | _____ | _____ |

問13 貴社の知的所有権部門の従業員数の内、次の外国語で知的所有権について交渉できる方は何人いますか。 a. 英語 _____人　b. フランス語_____人　c. ドイツ語_____人

問14 a.この五年間に知的所有権部門に配属された方の内訳を、それ以前の所属部門別におよその構成比でご記入下さい。

a. 新規採用・中途採用 _____%
b. 研究開発から _____%
c. その他の部門から _____%
集計 100%

b. この五年間に知的所有権部門から転出した方の内訳を、転出先別におよその構成比でご記入下さい。

d. 退職 _____%
e. 研究開発へ _____%
f. その他の部門へ _____%
g. 転職 _____%
集計 100%

問15 知的所有権部の管理職は平均的にみて何年ぐらい知的所有権部に勤務していますか

1. (0-1年)　2. (1-2年)　3. (2-4年)　4. (4-6年)　5. (6-8年)　6. (8-10年)　7. (>10年)

知的所有権／特許部の予算

問16 貴社の最近の知的所有権に関する年間費用（特許等を取得、維持、管理するための費用）はどのぐらいでしたか（除くライセンス契約の支払）

_____百万円

問17 この五年間に知的所有権に関する年間費用は変わってきましたか。

1. およそ_____% 増加した　2. およそ_____% 減少した　3. 変わらない

問18　貴社の知的所有権部が他の部門の為に仕事をする際、
他の部門から予算の振り替えが行われますか。　1．はい　2．いいえ

知的所有権の基本方針

問19　貴社には文書化された知的所有権に関する基本方針がありますか。1．はい　2．いいえ

問20　貴社には知的所有権に関する基本方針スローガンがありますか
1．はい（簡単に記述して下さい）2．いいえ

_____

問21　知的所有権に関する基本方針の策定に参画するのはどの部門の人ですか。
（幾つでもお選び下さい）
1.知的所有権　2.研究開発　3.生産　4.販売／マーケティング　5．取締役　6.その他

知的所有権に対する意識と影響

問22 貴社にとって次のような知的所有権の役割はどの程度の重要性があるとお考えですか

| | 1=全く重要でない ◀▶ 5=極めて重要 | | | | |
|---|---|---|---|---|---|
| a. ライセンス供与による収入源 | 1 | 2 | 3 | 4 | 5 |
| b. ライセンス取得による技術の源 | 1 | 2 | 3 | 4 | 5 |
| c. 技術情報の源 | 1 | 2 | 3 | 4 | 5 |
| d. 貴社の行動を自由にするためのクロスライセンス | 1 | 2 | 3 | 4 | 5 |
| e. 他社が貴社の技術を無断で使う事を防止 | 1 | 2 | 3 | 4 | 5 |
| f. 技術を独占して、他社が使う事を困難にする | 1 | 2 | 3 | 4 | 5 |
| g. 自社技術が技術標準として採用されることに役立つ | 1 | 2 | 3 | 4 | 5 |
| h. 貴社の知的財産を保護して競合他社をリードすること | 1 | 2 | 3 | 4 | 5 |
| i. その他の役割　(具体的に：_____) | 1 | 2 | 3 | 4 | 5 |

問23 下記の事から貴社の知的所有権に関する活動はどの程度の影響を受けると思われますか。

| | 1=全く影響はない ◀▶ 5=強い影響を受ける | | | | |
|---|---|---|---|---|---|
| a. 日本の政府の知的所有権に関する政策 | 1 | 2 | 3 | 4 | 5 |
| b. 国内の競合会社の知的所有権をめぐる活動 | 1 | 2 | 3 | 4 | 5 |
| c. 外国政府の知的所有権に関する政策 | 1 | 2 | 3 | 4 | 5 |
| d. 海外の競合会社の知的所有権をめぐる活動 | 1 | 2 | 3 | 4 | 5 |
| e. 日本特許庁の指導 | 1 | 2 | 3 | 4 | 5 |
| f. 貴社の社員の経験 | 1 | 2 | 3 | 4 | 5 |
| g. その他　(具体的に：_____) | 1 | 2 | 3 | 4 | 5 |

問24 貴社の知的所有権についてどの国の政府および企業から一番強い影響を受けますか。
1. 米国　2. イギリス　3. ドイツ　4.フランス
5. 他の欧州の国　6. アジアの諸国　7. その他の国(具体的に：_____

問25　貴社では積極的に競合会社の知的所有権に関する方針・活動を検討していますか。
1.全くない　2.ごくまれに　3.まれに　4.時々　5.しばしば　6. 度々　7. 継続的に

知的所有権の戦略的な管理

問26　昨年度における他社との技術ライセンスをめぐる支払／収入では
どちらの方が大きかったですか。　1．収入　2．支払

問27　貴社の昨年度の技術ライセンスに関わる収支状況を下にご記入下さい。

| | 総計 | 海外の会社 | 国内の会社 |
|---|---|---|---|
| A) 技術収入 | _____万円 =100%= | _____ % + | _____% |
| B) 技術支払 | _____万円 =100%= | _____ % + | _____% |
| A) / B) の比率（収入 / 支払） | _____ | _____ | _____ |

この5年間に
c. 海外の会社からのライセンス収入　1. 増えた　2.減った　3. 変わらなかった
d. 国内の会社からのライセンス収入　1. 増えた　2.減った　3. 変わらなかった
e. 海外の会社へのライセンス支払　1. 増えた　2.減った　3. 変わらなかった
f. 国内の会社へのライセンス支払　1. 増えた　2.減った　3. 変わらなかった

知的所有権の取得ー研究開発

問28　昨年の知的所有権の出願件数は何件でしたか。また、およそ何%を外国へ出願しましたか

| | a. 出願件数 | b. 外国にも出願 |
|---|---|---|
| a. 特許出願 | _____ | _____% |
| b. 実用新案出願 | _____ | _____% |
| c. 意匠出願 | _____ | _____% |
| d. 半導体マスクワーク | _____ | _____% |

問29　貴社は著作権の対象とする作品数を記録していますか。　1. はい　2. いいえ
記録している場合、昨年中の作品数をご記入下さい。_____

問30　近年の動向として貴社の国内の特許出願の件数は
1. 増えている　2. 減っている　3. 変わっていない

問31　近年の動向として貴社の外国の特許出願の件数は
1. 増えている　2. 減っている　3. 変わっていない

ライセンス

問32　貴社は他の会社等と下記のような技術的な提携関係を結んでいますか。該当する全ての項目に○印を付けて下さい。　また、提携相手先のおよその数をご記入下さい。

| | a. 相手先数 | b. ライセンス供与のみ | c. ライセンス取得のみ | d. クロスライセンス | e. 合弁 | f. 下請け | g. その他 |
|---|---|---|---|---|---|---|---|
| h. 合計 | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| i. 国内の中小企業 (およそ<500社員) | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |
| j. 国内の大手企業 (およそ>500社員) | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |
| k. 国内の他の組織 | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |
| l. 海外の中小企業 (およそ<500社員) | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |
| m. 海外の大手企業 (およそ>500社員) | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |
| n. 海外の他の組織 | _____ | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい | 1. はい |

問33　各々の提携関係について、相手先の最も多い外国の名前をご記入下さい。

| | a. 全体 | b. ライセンス供与のみ | c. ライセンス取得のみ | d. クロスライセンス | e. 合弁 | f. 下請け | g. その他 |
|---|---|---|---|---|---|---|---|
| 最も多い国 | _____ | _____ | _____ | _____ | _____ | _____ | _____ |

ライセンス・イン（取得）

問34　貴社は技術のライセンス・インにどの程度積極的ですか。　1=極めて消極的 ◀▶ 5=極めて積極的　1 2 3 4 5

問35　貴社にとってライセンス・イン／技術を買うことの次の役割はどの程度重要ですか。

| | 1=全く重要でない ◀▶ 5=極めて重要 | | | | |
|---|---|---|---|---|---|
| a. 技術の使用が可能になる | 1 | 2 | 3 | 4 | 5 |
| b. 技術に伴うノウハウの取得 | 1 | 2 | 3 | 4 | 5 |
| c. 研究開発費の節減 | 1 | 2 | 3 | 4 | 5 |
| d. 研究開発時間の節減 | 1 | 2 | 3 | 4 | 5 |
| e. 自社内で開発することができなかった技術の開発 | 1 | 2 | 3 | 4 | 5 |
| f. 先進技術に追い付く | 1 | 2 | 3 | 4 | 5 |
| g. 技術を発展させライセンス・インの必要性を減少させる | 1 | 2 | 3 | 4 | 5 |
| h. クロスライセンスの利用 | 1 | 2 | 3 | 4 | 5 |
| i. 他の目的 (具体的に：_____) | 1 | 2 | 3 | 4 | 5 |

問36　最近の動向として貴社が技術をライセンス・インする件数は
1. 増えている 2. 減っている 3. 変わらない

問37　貴社ではライセンス・イン（取得）の対象となる技術があるか注意してみていますか
1. はい 2. いいえ

ライセンス・アウト（供与）

問38　貴社は技術のライセンス・アウトにどの程度積極的ですか。　1=極めて消極的 ◀▶ 5=極めて積極的　1 2 3 4 5

問39 貴社にとってライセンス・アウト／技術を売ることの次の役割はどの程度重要ですか。

| | 1=全く重要でない ◀▶ 5=極めて重要 | | | | |
|---|---|---|---|---|---|
| a. ライセンス収入を得ること | 1 | 2 | 3 | 4 | 5 |
| b. 使用していない技術資産を活用する | 1 | 2 | 3 | 4 | 5 |
| c. クロスライセンスで他の技術を入手する | 1 | 2 | 3 | 4 | 5 |
| d. 技術的協力関係を構築する | 1 | 2 | 3 | 4 | 5 |
| e. 競争企業を支配する | 1 | 2 | 3 | 4 | 5 |
| f. 貴社の技術への競争企業の依存を増やす | 1 | 2 | 3 | 4 | 5 |
| g. 自社技術が技術標準として採用されること | 1 | 2 | 3 | 4 | 5 |
| h. 単独での技術の利用による財政的負担を軽減する | 1 | 2 | 3 | 4 | 5 |
| i. マーケティング能力の不足を補う | 1 | 2 | 3 | 4 | 5 |
| j. 生産能力の不足を補う | 1 | 2 | 3 | 4 | 5 |
| k. 他の重大な要素の不足を補う | 1 | 2 | 3 | 4 | 5 |
| l. 契約の条件のため | 1 | 2 | 3 | 4 | 5 |
| m. 他の目的 (具体的に：_____) | 1 | 2 | 3 | 4 | 5 |

問40　貴社は基本的に次の技術をライセンス・アウトしますか。

| | 1=全くできない ◀▶ 5=積極的にする | | | | |
|---|---|---|---|---|---|
| a. 貴社の最先端技術 | 1 | 2 | 3 | 4 | 5 |
| b. 競争企業の技術と同じレベルの技術 | 1 | 2 | 3 | 4 | 5 |
| c. 貴社の現在の製品に使用している技術 | 1 | 2 | 3 | 4 | 5 |
| d. 競争企業の技術より高等ではない技術 | 1 | 2 | 3 | 4 | 5 |
| e. 貴社の過去の製品に使用した技術 | 1 | 2 | 3 | 4 | 5 |
| f. 貴社と競争企業に直接使われていない技術 | 1 | 2 | 3 | 4 | 5 |
| g. 標準化を進めるために他社に必要な技術 | 1 | 2 | 3 | 4 | 5 |

問41　貴社では積極的に技術の販売(ライセンス・アウト)をしていますか。 1. はい　2. いいえ

問42　近年貴社が技術をライセンス・アウトする件数は
1. 増えている　2. 減っている　3. 変わっていない

クロスライセンス

問43　貴社は技術を得るためにクロスライセンスを行いますか　1. はい　2. いいえ

問44　貴社は最先端技術を得るために、次のような技術をクロスライセンスでライセンス・アウトできますか

| | 1=全くしない ◀▶ 5=積極的にする | | | | |
|---|---|---|---|---|---|
| a. 貴社の最先端技術 | 1 | 2 | 3 | 4 | 5 |
| b. 競争企業の技術と同じレベルの技術 | 1 | 2 | 3 | 4 | 5 |
| c. 貴社の現在の製品に使用している技術 | 1 | 2 | 3 | 4 | 5 |
| d. 競争企業の技術より高等ではない技術 | 1 | 2 | 3 | 4 | 5 |
| e. 貴社の過去の製品に使用した技術 | 1 | 2 | 3 | 4 | 5 |
| f. 貴社と競争企業に直接使われていない技術 | 1 | 2 | 3 | 4 | 5 |
| g. 標準化を進めるために他社に必要な技術 | 1 | 2 | 3 | 4 | 5 |

問45　貴社では将来ある分野において一定期間に発明される全ての技術についてクロスライセンスを行う合意を含んだ包括的契約を、他社と締結する意思がありますか。又は、ケースバイケースで決めますか。　1.包括的契約　2. ケースバイケース

問46　近年貴社が技術をクロスライセンスする件数は
1. 増えている　2. 減っている　3. 変わっていない

知的所有権の侵害

問47　知的所有権の侵害に関する次の意見についてどう思われますか。
「裁判によって決着をつけるよりも常に交渉で示談にもちこむ方が良い」　1=そうは全く言えない ◀▶ 5=全くその通り　1　2　3　4　5

貴社所有の知的所有権に対する侵害

問48　この五年間に他社が貴社の知的所有権を侵害したために、相手側に対し通告を行った事件はいくつありましたか。下記の相手先別に件数を記入して下さい。

| + ---------- 国内の会社 ---------- + | | | + ---------- 外国の会社 ---------- + | | |
|---|---|---|---|---|---|
| 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 |
| _____ | _____ | _____ | _____ | _____ | _____ |

問49　上記のケースの中で外国のうち件数が最も多かった国の名前をご記入下さい。＿＿＿＿＿

問50　上記の侵害はどのように解決されましたか。下記の相手先ごとに、方法別のおよその割合を記入して下さい。

| | 国内の会社 | | | 外国の会社 | | |
|---|---|---|---|---|---|---|
| | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 |
| 通告のみ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 示談 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 裁判 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| その他 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 総計 | 100% | 100% | 100% | 100% | 100% | 100% |

問51　近年貴社の知的所有権が他社に侵害されるケースは
1. 増えている　　2. 減っている　　3. 変わっていない

問52　他社が貴社の知的所有権を侵害していると考えられ、かつ、専門の弁護士による訴訟で完全勝訴の確率が次の通りと仮定される場合、訴訟と協議による示談のどちらを選びますか。

| | 国内の裁判 | | 外国の裁判 | |
|---|---|---|---|---|
| a. 勝訴の確率＝0% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| b. 勝訴の確率＝25% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| c. 勝訴の確率＝50% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| d. 勝訴の確率＝75% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| e. 勝訴の確率＝90% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| f. 勝訴の確率＝100% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |

問53　この五年間に他社が貴社の知的所有権を侵害した際に、協議による示談より裁判所への訴訟を選んだケースは増える傾向にありますか。
対国内：1. 増えた　2. 減った　3. 変わらない　　対外国：1. 増えた　2. 減った　3. 変わらない

貴社の他社所有の知的所有権に対する侵害

問54　貴社では新しい製品を製造／販売する前に、他社の知的所有権を侵害しないように検討を行いますか。　1. 全く行わない　2. まれに　3. 時々　4. しばしば　5. 必ず行う

問55　この五年間に貴社が他社の知的所有権を侵害したと、相手側からの通告があった事件はいくつありますか。下記の相手先別に件数を記入して下さい。

| 国内の会社 | | | 外国の会社 | | |
|---|---|---|---|---|---|
| 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他の組織 |
| ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |

問56　上記のケースの中での件数が最も多かった外国の名前をご記入下さい。＿＿＿＿＿＿＿

問57　上記の侵害はどのように解決されましたか。およその割合を記入して下さい。

| | 国内の会社 | | | 外国の会社 | | |
|---|---|---|---|---|---|---|
| | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他 の組織 | 中小企業 (<500 社員) | 大手企業 (>500 社員) | その他 の組織 |
| 通告のみ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 示談 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 裁判 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| その他 | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ | ＿＿＿＿ |
| 総計 | 100% | 100% | 100% | 100% | 100% | 100% |

問58　貴社が他社の知的所有権を侵害したとの通告に異議がある場合、専門の弁護士による訴訟で完全勝訴の確率が次の通りと仮定すると訴訟を受けて立つか、協議による示談のどちらを選びますか。

| | 国内の裁判 | | 外国の裁判 | |
|---|---|---|---|---|
| a. 勝訴の確率＝0% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| b. 勝訴の確率＝25% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| c. 勝訴の確率＝50% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| d. 勝訴の確率＝75% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| e. 勝訴の確率＝90% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |
| f. 勝訴の確率＝100% | 1. 示談 | 2. 訴訟 | 1. 示談 | 2. 訴訟 |

問59　この五年間に貴社が他社の知的所有権を侵害したとされた場合に、協議による示談より裁判所での決着を選んだケースは増える傾向にありますか。
対国内：1. 増えた　2. 減った　3. 変わらない　　対外国：1. 増えた　2. 減った　3. 変わらない

問60　近年貴社が他社から知的所有権を侵害したとの通告を受けるケースは
1. 増えている　　2. 減っている　　3. 変わっていない

## 知的所有権についての経営政策

問61　貴社では研究者に特許出願を奨励するため、以下のような間接的な奨励を行っていますか。
a. 研究者のボーナス又は人事評価が特許出願件数に影響される　1. はい　2. いいえ
b. 口頭による奨励　1. はい　2. いいえ
c. 文書による奨励　1. はい　2. いいえ

次のような直接的な奨励金制度をもっていますか。（金額は1件あたり）

| | | | | | |
|---|---|---|---|---|---|
| d. 特許出願のとき | 1. 0円 | 2. 1-5000円 | 3. 5001-10,000円 | 4. >10,000円 | 5. 相応の賞品 |
| e. 特許出願が公開されたとき | 1. 0円 | 2. 1-5000円 | 3. 5001-10,000円 | 4. >10,000円 | 5. 相応の賞品 |
| f. 特許が許可されたとき | 1. 0円 | 2. 1-5000円 | 3. 5001-10,000円 | 4. >10,000円 | 5. 相応の賞品 |
| g. 特許技術が使われた／ライセンスされたとき | 1. 0円 | 2. 1-5000円 | 3. 5001-10,000円 | 4. >10,000円 | 5. 相応の賞品 |

問62　貴社に上記のような奨励金制度がある場合,それが開始された年（西暦）をご記入下さい
＿＿＿＿＿＿＿＿年

問63　貴社の研究所には特許出願の数量的な目標がありますか　1. はい　2. いいえ

問64　貴社は改善提案の制度をもっていますか　1. はい　2. いいえ

教育

問65　貴社では知的所有権の担当者と研究開発部門の研究員のために以下のような知的所有権に関する教育を行っていますか

| | a. 知的所有権の担当者 | b. 研究員 |
|---|---|---|
| OJT | 1. はい　2. いいえ | 1. はい　2. いいえ |
| 社内研修コース | 1. はい　2. いいえ | 1. はい　2. いいえ |
| 社外又は通信研修コース | 1. はい　2. いいえ | 1. はい　2. いいえ |
| 外国の法律事務所／外国の大学／外国の会社での研修 | 1. はい　2. いいえ | 1. はい　2. いいえ |
| 外国の弁理士／弁護士資格取得のため外国での研修 | 1. はい　2. いいえ | 1. はい　2. いいえ |

問66 新任の研究者に対する知的所有権に関する研修は、一人あたり何日かけていますか

1日　2日　3日　4日　5日　6日　7日　>7日

問67　貴社の研究員は：-

| | |
|---|---|
| a. 特許出願の書き方の訓練を受けますか | 1.はい 2. いいえ |
| b. 直接特許庁に出すために特許出願を書きますか | 1.はい 2. いいえ |
| c. 特許部が書き直すためのドラフトとして特許出願を書きますか | 1.はい 2. いいえ |
| d. 特許部に発明を説明するだけですか | 1.はい 2.いいえ |

社外の弁理士／弁護士事務所の使い方

問68　貴社の国内の特許出願のうち、およそ何%を社外の弁理士／弁護士事務所にまかせますか

_____%

問69　貴社は外国の法律に関する問題をどのように扱っていますか。

1.　国内の弁護士／弁理士を通じて扱う　2. 直接外国の弁護士／弁理士にまかせる
3. 貴社の外国にある事務所を通じて扱う

問70　特許出願関連で幾つの弁理士（弁護士）事務所を定常的に使用しますか。

a. 国内出願_____　b. 外国出願_____

問71　最もよく使用する社外の弁理士事務所には貴社の出願業務のうち何%を発注していますか。

a. 国内出願_____%　b. 外国出願_____%

統合

問72　貴社には定期的に知的所有権の問題を検討する委員会はいくつありますか　_____

問73　次の部門の管理職はその委員会に参加していますか。（幾つでも選んで下さい）

1.知的所有権部門　2.研究開発部門　3. 生産部門　4.販売/マーケティング部門　5. 取締役　6.その他 _____

問74　平均的に次の事にはどの程度の時間がかかりますか-

a. 発明から特許出願まで：ー

1. <1週間　2. 1-2 週間　3. 2-4週間　4. 4-6週間　5. 6-8週間　6. 8-10 週間　7. >10週間

b.研究論文の社外公表の許可願いから許可を得るまで

1. <1週間　2. 1-2 週間　3. 2-4週間　4. 4-6週間　5. 6-8週間　6. 8-10 週間　7. >10週間

問75　貴社では特許出願などの業務を行う際に、対象となる技術にランク付けをしていますか。

1. はい　2. いいえ

問76　発明／出願にランクを付けるのはどの部門の管理職ですか。（幾つでも選んで下さい）

1. 知的所有権部門　2. 研究開発部門　3. 生産部門　4. 販売/マーケティング部門　5. 取締役　6.その他 _____

問77　貴社ではどのような部門が次の決定に参加していますか。（幾つでも選んで下さい）

| | | | | | | |
|---|---|---|---|---|---|---|
| a. 国内の特許出願の決定 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| b. 外国の特許出願の決定 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| c. 出願の審査請求 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| d. 特許出願の放棄 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| e. 特許権の更新（特許料の納付） | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| f. 侵害について対策を決める事 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| g. 文書の保存 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| h. 共同研究への参加 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| i. 保護機密のランク付け | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| j. 特許ライセンス購入 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| k. 特許ライセンス供与 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| l. クロスライセンス契約 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |
| l. 研究論文の社外公表の許可 | 1. 知的所有権 | 2. 研究開発 | 3. 生産 | 4. 販売 | 5. 取締役 | 6.その他 |

## 一般情勢に関する事項

問78　国際的にみて知的所有権に関する各国の法律はどの方向に向かっているとお考えですか

1. 急速に 近似しつつある　2.徐々に近似しつつある　3.相違したまま変わらない　4.近似した状態で変化なし　5. 徐々に 相違しつつある　6. 急速に 相違しつつある

問79 日本と西洋の会社の知的所有権に対する考え方はどの方向に向かっているとお考えですか

1. 急速に 近似しつつある　2.徐々に近似しつつある　3.相違したまま変わらない　4.近似した状態で変化なし　5. 徐々に 相違しつつある　6. 急速に 相違しつつある

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その他 この調査票でお聞きした内容について、さらにご意見やお気づきの点があればご自由にお書き下さい

よろしければ下記に連絡先を記入して下さい。

| | |
|---|---|
| 氏名 | |
| 所属部署および役職 | |
| 電話番号および内線 | |

＊＊＊＊＊＊＊＊ご協力誠にありがとうございました＊＊＊＊＊＊＊＊＊

IIP Cover Letter for Japanese Survey

平成６年４月２０日

各　　位

財団法人　知的財産研究所

専務理事　　吉田　豊麿

知的所有権に関する産業における活用状況および経営対応についての調査

国内アンケート調査に関するご協力のお願い

拝啓　時下益々ご清祥のこととお慶び申しあげます。平素は当研究所の研究事業に対し格別のご配慮を賜り、厚く御礼申し上げます。

さて、このたび当研究所におきましては、英国オックスフォード大学ロバート・ピットケスリー氏と共同で、「知的所有権に関する産業における活用状況および経営対応についての調査」を日英両国において同時期に実施し、両国の産業界における知的所有権についての対応および考え方につき、比較分析を行うことにいたしました。

この調査は、わが国産業界の知的所有権についての対応のしかたを国際的な視点から明らかにし、今後の知的所有権国際戦略の策定について、有用な情報を提供すべく計画されたものであります。

つきましては、ご多忙のところ誠に恐縮ではございますが、同封のアンケートにご協力いただきたくお願い申し上げます。

敬具

# Appendix I UK Questionnaires & Cover Letters

## QUESTIONNAIRE CONCERNING INDUSTRY's USE & MANAGEMENT OF INTELLECTUAL PROPERTY

In recent years, Intellectual Property issues have become increasingly important in discussing the management of technology. With this in mind, this survey is being conducted with the aim of clarifying what practices and thinking currently exist in Industry regarding the use and management of Intellectual Property. I have already carried out an identical survey in Japanese with the cooperation of the Institute of Intellectual Property in Tokyo. Over 200 replies were obtained including replies from most major Japanese companies and it is hoped that with your cooperation it will be possible to make a comparative study of the results from Japan and the UK. The results of this survey should not only deepen international understanding of intellectual property issues but also I hope make clear, especially to non-specialists, the importance of intellectual property management. I would therefore be very grateful for your co-operation in completing the questionnaire.

Please note the following points -

1) This survey is being sent to c800 UK companies judged likely to be interested in Intellectual Property.
2) The questionnaire is designed to be answered by Intellectual Property, Industrial Property and Patent Dept. Managers
3) If particular questions do not apply to your company please leave them blank.
4) All individual replies received from companies will be treated in strictest confidence.
4) In the absence of special instructions please indicate your preferred answer by ringing○ the number of your answer.
5) To speed processing the results I would be very grateful to receive your questionnaire by 1st January 1995.
**6) Those companies who reply will be sent a summary of the collected results of both Japanese & UK surveys.**
7) If you have any questions regarding the questionnaire please do not hesitate to contact me at the following address:

Robert Pitkethly : Templeton College , Oxford OX1 5NY
Tel. 0865-735422 Fax. 0865-736374 E-Mail : RHP@vax.ox.ac.uk

Please first of all give the following general details about your company :

| | | | |
|---|---|---|---|
| Company Name | | | |
| Address | | | Post Code: |
| Telephone No. | | Fax No. | |

For the last full financial year please give the following-

| | | | |
|---|---|---|---|
| No of Employees ( as at April '94) | | Annual Sales | £ '000 |
| No. of R&D Employees ( as at April '94) | | R&D Annual Budget | £ '000 |

What is your company's main field of operations (please choose up to 4 and indicate the order of importance and the approximate % of your total sales due to each area: -

| | | |
|---|---|---|
| 1. Foods Manufacturing | 2. Fibre Industry | 3. Lumber & Wooden products |
| 4. Paper & Pulp Industry | 5. Publishing & Printing | 6. Chemicals (excl.. Pharmaceuticals) |
| 7. Pharmaceuticals | 8. Oil & Coal Products | 9. Plastics Products |
| 10. Rubber products | 11. Misc. Ceramics | 12. Iron & Steel |
| 13. Non Ferrous Metals | 14. Metal Products | 15. Electric machinery & Appliances |
| 16. Communications Electronic & Electric Measuring Instruments | | 17. Automobiles |
| 18. Other Transport, Machinery | 19. Precision Machinery | 20. General Machines & Appliances |
| 21. Other Industry_____ | 22. Construction | 23. Broadcasting |
| 24. Software & Information Services | 25. Communications (excl. Mfrs) | 26. Other Services _____ |
| 27. Test & Research institute | | |

| 1st | 2nd | 3rd | 4th |
|---|---|---|---|
| Code_____ %_____ | Code _____ %_____ | Code_____ %_____ | Code_____ %_____ |

## COMPANY IP / PATENT DEPT. ORGANISATION

Q1 What type of organisation is your company's Intellectual Property / Patent Department ?
(Please choose one by ringing the appropriate number)

**1.** COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT, WITH full time managers responsible for patents / IP belonging to it based in Factories / R&D centres.

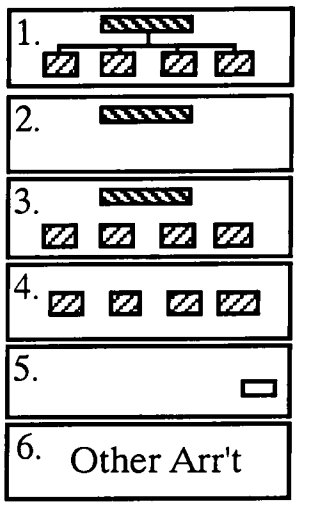
**2.** COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT, WITHOUT full time managers responsible for patents / IP belonging to it based in Factories / R&D centres.

**3.** COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT *AND* INDEPENDENT IP / PATENT DEPARTMENTS belonging to Factories / R&D centres.

**4.** INDEPENDENT IP / PATENT DEPARTMENTS belonging to Factories / R&D centres & NO COMPANY-WIDE CENTRAL IP / PATENT DEPT.

**5.** NO full time IP / PATENT dept. such matters dealt with by other dept(s).

**6.** Some other arrangement




Q2 Which part of your company does the Dept. dealing with IP/Patents belong to? (Choose one)
**1.** R&D Dept. **2.** Technology Planning Dept. **3.** Production Dept. **4.** The Legal Dept.
**5.** The General Affairs Dept. **6.** Independent Dept. **7.** Other (please specify)_____

Q3 Is the head of the Dept. managing IP / Patent matters in your company a Director? **1.** YES **2.** NO

Q4 Does your company's IP/Patent department report directly to a Company Director? **1.** YES **2.** NO

## COMPANY IP DEPT. RESPONSIBILITIES

Q5 Does the part of your company responsible for IP / Patents deal with the following IPRs?

| | | | |
|---|---|---|---|
| a. Patents | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| b. Utility Models | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| c. Trade Marks | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| d. Designs | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| e. Copyright (non software) | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| f. Computer Software | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| g. Semiconductor Mask Works | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| h. Trade Secrets | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |
| i. Know How | **1.** YES | **2.** NO dealt with by _____ | **3.** No Specific Dept. |

Q6 In the IP / Patents dept. of your company are there parts exclusively responsible for any of the following?

| | | | | | |
|---|---|---|---|---|---|
| a. Computer Software | **1.** YES | **2.** NO | d. Licence Contracts | **1.** YES | **2.** NO |
| b. Litigation | **1.** YES | **2.** NO | e. National Licences | **1.** YES | **2.** NO |
| c. Patent Information | **1.** YES | **2.** NO | f. International Licences | **1.** YES | **2.** NO |

## COMPANY IP DEPT. PERSONNEL

Q7 How many employees are involved exclusively in IP work in your company? _____ Employees

Q8 Has the number of people involved exclusively in IP work in your company changed in the past 5 years?

**1.** Increased by approx. _____% **2.** Decreased by approx. _____% **3.** Remained the same

Q9How many people in your company dealing exclusively with IP matters have the following roles?

| a. TOTAL Number | | b. Qualified Patent Agents? | | c. Engineers / (Technical Assistants)? | | d. Office /Clerical Staff? | | e. Others ? |
|---|---|---|---|---|---|---|---|---|
| _____ | = | _____ | + | _____ | + | _____ | + | _____ |

Q10 Please fill in the number of people dealing exclusively with IP matters who work in the following places.

| | | +- - - - - -NATIONAL - - - - - - - -+ | | | +- - - - - - - OVERSEAS- - - - - - - - -+ | |
|---|---|---|---|---|---|---|
| a. TOTAL No. | | b. Main IP/ Patent Dept. | | c. R&D Depts. | d. Co. Offices Abroad | e. Training in Law Offices or University abroad |
| _____ | = | _____ | + | _____ | + _____ | + _____ |

Q11 Please fill in the number of people dealing with IP matters who specialise in work in the following areas.

| a. TOTALNo. | | b.General IPR | | c.Litigation | | d.License Contracts | | e.Patent Information |
|---|---|---|---|---|---|---|---|---|
| _____ | = | _____ | + | _____ | + | _____ | + | _____ |

Q12 Does your company have specialist IP staff based overseas **1.** YES **2.** NO -> Q.13

If Yes - which countries are they in ?

| Country | No. Working | No, Training | Country | No. Working | No, Training |
|---|---|---|---|---|---|
| a. USA | _____ | _____ | d. Other European countries | _____ | _____ |
| b. Japan | _____ | _____ | e. Other Asian countries | _____ | _____ |
| c. Germany | _____ | _____ | f. Other countries | _____ | _____ |

Q13 How many of your company's IP department staff can discuss IP issues in these foreign languages?

a. Japanese _____ b French _____ c. German _____

Q14

| a. Of your present IP dept. staff what % have come from the following areas:- | | b. Of staff who left your IP department in the past five years what % went to the following : - | |
|---|---|---|---|
| a. JOINED Co. via IP Dept. (as 1st job or mid-career) | _____% | d. RETIRED from IP Dept. | _____% |
| b. Transfer from R&D Dept. | _____% | e. Transfer to R&D Dept. | _____% |
| c. Transfer from Other Dept. | _____% | f. Transfer to Other Dept. | _____% |
| | | g. LEFT for other employment | _____% |
| TOTAL | 100% | TOTAL | 100% |

Q15 Approximately how many years on average do managers in the IP dept. spend working in the IP dept.?

**1.** (0-1) **2.** (1-2) **3.** (2-4) **4.** (4-6) **5.** (6-8) **6.** (8-10) **7.** (>10)

**COMPANY IP DEPT. BUDGET**

Q16 What is current approximate total spent yearly on IP activities by your company _____
(NB excluding receipts and payments for licensing )

Q17 Has this amount changed over the past 5 years? 1. Increased by_____% 2. Decreased by_____% 3. No

Q18 Does your IP department transfer charge other Company departments for work carried out for them?

1. YES 2. NO

**OVERALL COMPANY IP POLICY**

Q19 Does your company have a written basic plan /policy relating to Intellectual Property ? **1.** YES **2.** NO

Q20 Does your company have any slogan summarising its basic plan /policy concerning Intellectual Property ?
**1.** YES (Please Describe it briefly) **2.** NO

_____

Q21 Which department do those who contribute to making overall IP policy belong to? (Choose 1 or more)

**1.** IP **2.** R&D **3.** Production **4.** Sales/Marketing **5.** Directors/Board Members **6.** Others

**MANAGEMENT ATTITUDES TO IP & INFLUENCES**

Q22 How important to your company are the following roles of IPRs?

| | 1=IRRELEVANT ◄——► 5=ESSENTIAL | | | | |
|---|---|---|---|---|---|
| a. A source of Revenue through licensing OUT technology | 1 | 2 | 3 | 4 | 5 |
| b. A source of Technology through licensing IN technology | 1 | 2 | 3 | 4 | 5 |
| c. A source of Technological Information | 1 | 2 | 3 | 4 | 5 |
| d. For use in cross licensing to allow your company to act freely | 1 | 2 | 3 | 4 | 5 |
| e. To protect your IP assets from free use by others | 1 | 2 | 3 | 4 | 5 |
| f. To monopolise your IP assets and make free use by others difficult | 1 | 2 | 3 | 4 | 5 |
| g. To help have your technology adopted as a technical standard | 1 | 2 | 3 | 4 | 5 |
| h. To gain a lead over competitors by protecting IP assets | 1 | 2 | 3 | 4 | 5 |
| i. Some other role (please specify) _____ | 1 | 2 | 3 | 4 | 5 |

Q23 To what extent are your company's thoughts and actions about IP influenced by any of the following?

| | 1=NOT AT ALL ◄——► 5=VERY GREATLY | | | | |
|---|---|---|---|---|---|
| a. UK Government IP policy | 1 | 2 | 3 | 4 | 5 |
| b. UK Competitor's IP practices | 1 | 2 | 3 | 4 | 5 |
| c. Foreign Government's IP policy | 1 | 2 | 3 | 4 | 5 |
| d. Overseas Competitor's IP practices | 1 | 2 | 3 | 4 | 5 |
| e. UK Patent Office Guidance | 1 | 2 | 3 | 4 | 5 |
| f. Employees Experience | 1 | 2 | 3 | 4 | 5 |
| g. Other (please specify_____) | 1 | 2 | 3 | 4 | 5 |

Q24 Which countries' government and companies exert the most influence over your company thinking about IP.
**1.** USA **2.** Japan **3.** Germany **4.** France **5.** Other European Country **6.** Other Asian Country
**7.** Other (please specify _____

Q25 Do you actively study your competitor's IP policy & actions?

**1.** Never **2.** Very Rarely **3.** Rarely **4.** Occasionally **5.** Often **6.** Very Often **7.** Continually

**COMPANY STRATEGIC MANAGEMENT OF IP**

Q26 In terms of overall financial payments to/from other companies last financial year which was greater?:

1. INCOME from Technology Sales was greater 2. PAYMENTS to Buy Technology were greater

Q27 If possible please give approximate details of your companies' income and payments for technology in the last financial year

| | TOTAL | %With companies Overseas | % With companies in UK |
|---|---|---|---|
| A) Total INCOME from selling/licensing out technology | £_____ | =100%=_____ % + | _____% |
| B) Total PAYMENTS for buying/licensing in technology | £_____ | =100%=_____ % + | _____% |
| RATIO of A) / B) i.e. INCOME / PAYMENTS | _____ | _____ | _____ |

In the past five years : -

| | | | |
|---|---|---|---|
| c. Has INCOME from licensing in technology to OVERSEAS | 1. Increased | 2. Decreased | 3. Not changed |
| d. Has INCOME from licensing in technology to UK | 1. Increased | 2. Decreased | 3. Not changed |
| e. Have PAYMENTS for licensing in technology from OVERSEAS | 1. Increased | 2. Decreased | 3. Not changed |
| f. Have PAYMENTS for licensing in technology from UK | 1. Increased | 2. Decreased | 3. Not changed |

**IPR ACQUISITION - RESEARCH**

Q28 For the past year please give the approximate number of the following IPR applications your company filed : -

| | a. No. of Applications | b. % also filed abroad |
|---|---|---|
| a. Patent applications | _____ | _____% |
| b. Utility model applications | _____ | _____% |
| c. Design applications | _____ | _____% |
| d. Semiconductor Mask works | _____ | _____% |

Q29 Does your company record Copyright works created ? 1. YES 2. NO
If YES how many Copyright works were recorded in the past year ? _____

Q30 In recent years has the number of UK Patent Applications you file been : -
1. Increasing 2. Decreasing 3. Staying the same

Q31 In recent years has the number of Foreign patent applications you file been : -
1. Increasing 2. Decreasing 3. Staying the same

**LICENSING - GENERAL**

Q32 What types of alliance does you r company use with different types of company? If your company currently uses the following types of alliance with the following type of company please ring (1.Yes) in the table below. How many such alliances does your company currently have?

Please indicate the approximate totals for each type of alliance and each type of company

| | a. TOTAL No. of Alliances | b. One way Licensing OUT only | c. One way Licensing IN only | d. Cross Licensing | e. Joint Venture | f. Contract Subcontract | g. Other |
|---|---|---|---|---|---|---|---|
| h. TOTAL No. of Alliances | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| i. Small Co. (<500 emps) in UK | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |
| j. Large Co. (>500 emps) in UK | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |
| k. Other Organisations in UK | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |
| l. Small Co. (<500 emps) OVERSEAS | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |
| m. Large Co. (>500 emps) OVERSEAS | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |
| n. Other Organisations OVERSEAS | _____ | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes | 1. Yes |

Q33 Which is the most frequently involved country in such alliances?

| | a.Overall | b.One way Licensing OUT | c.One way Licensing IN | d.Cross Licensing | e.Joint Venture | f.Contract Subcontract | g.Other |
|---|---|---|---|---|---|---|---|
| Most frequently involved Foreign Country | _____ | _____ | _____ | _____ | _____ | _____ | _____ |

**LICENSING - LICENSING IN**

Q34 What is your company's attitude to licensing IN technology ? 1. Negative ◄—— 3. Neutral ——► 7. Positive

1 2 3 4 5

Q35 How important to your company are the following roles of licensing IN /buying technology ?

| | 1=IRRELEVANT ◄—— ——► 5=ESSENTIAL | | | | |
|---|---|---|---|---|---|
| a. Being able to use the technology | 1 | 2 | 3 | 4 | 5 |
| b. Acquiring associated know-how | 1 | 2 | 3 | 4 | 5 |
| c. Saving R&D costs | 1 | 2 | 3 | 4 | 5 |
| d. Saving R&D development time | 1 | 2 | 3 | 4 | 5 |
| e. Developing what cannot be developed in-house | 1 | 2 | 3 | 4 | 5 |
| f. Catching up with advanced technology | 1 | 2 | 3 | 4 | 5 |
| g. Reducing the need to license by developing one own technology | 1 | 2 | 3 | 4 | 5 |
| h. Using Cross Licenses | 1 | 2 | 3 | 4 | 5 |
| j. Other objectives (please specify) _____ | 1 | 2 | 3 | 4 | 5 |

Q36 Recently have the number of cases of LICENSING IN of technology by your company been :-

1. Increasing 2. Decreasing 3. Staying the same

Q37 Does your Company actively search for technology to buy / LICENSE IN 1. YES 2. NO

**LICENSING OUT**

Q38 What is your company's attitude to licensing OUT technology ? 1. Negative ◄—— 3. Neutral ——► 5. Positive

1 2 3 4 5

Q39 How important to your company are the following roles of licensing OUT / selling technology ?

| | 1=IRRELEVANT ◄—— ——► 5=ESSENTIAL | | | | |
|---|---|---|---|---|---|
| a. receiving money as licensing fees | 1 | 2 | 3 | 4 | 5 |
| b. exploiting unused technological assets | 1 | 2 | 3 | 4 | 5 |
| c. acquiring access to technology via cross-licences | 1 | 2 | 3 | 4 | 5 |
| d. building co-operative technical relationships | 1 | 2 | 3 | 4 | 5 |
| e. controlling competitors | 1 | 2 | 3 | 4 | 5 |
| f. increasing competitors dependence on your technology | 1 | 2 | 3 | 4 | 5 |
| g. having your technology adopted as a technical standard | 1 | 2 | 3 | 4 | 5 |
| h. reducing the financial burden of exploiting technology alone | 1 | 2 | 3 | 4 | 5 |
| i. compensating for lack of marketing ability | 1 | 2 | 3 | 4 | 5 |
| j. compensating for lack of manufacturing ability | 1 | 2 | 3 | 4 | 5 |
| k compensating for lack of other critical resources or factors | 1 | 2 | 3 | 4 | 5 |
| l. contractual requirement | 1 | 2 | 3 | 4 | 5 |
| m. Other objectives (please specify)_____ | 1 | 2 | 3 | 4 | 5 |

Q40 Is your company in principle prepared to license OUT technology which is : -

| | | 1=NOT AT ALL ◄——► 5=VERY WILLING TO | | | | |
|---|---|---|---|---|---|---|
| a. | Your most advanced technology | 1 | 2 | 3 | 4 | 5 |
| b. | Technology at the same level as competitors technology | 1 | 2 | 3 | 4 | 5 |
| c. | Technology used in your current products | 1 | 2 | 3 | 4 | 5 |
| d. | Less advanced than competitors technology | 1 | 2 | 3 | 4 | 5 |
| e. | Technology used in your past products | 1 | 2 | 3 | 4 | 5 |
| f. | Technology not used directly by your company or competitors | 1 | 2 | 3 | 4 | 5 |
| g. | Any technology needed by others to promote standardisation | 1 | 2 | 3 | 4 | 5 |

Q41 Does your Company actively market it's technology for Sale / LICENSING OUT ? 1. YES 2. NO

Q42 Recently have the number of cases of LICENSING OUT of technology by your company been :-
1. Increasing 2. Decreasing 3. Staying the same

**CROSS LICENSING**

Q43 Would your company enter into cross licensing agreements in order to acquire technology? 1. YES 2. NO

Q44 In order to acquire the most advanced technology would your company enter into cross licensing agreements which involved licensing OUT any technology your company owns which is -

| | | 1=NOT AT ALL | | | | 5=VERY WILLINGLY |
|---|---|---|---|---|---|---|
| a. | Your most advanced technology | 1 | 2 | 3 | 4 | 5 |
| b. | Technology at the same level as competitors technology | 1 | 2 | 3 | 4 | 5 |
| c. | Technology used in your current products | 1 | 2 | 3 | 4 | 5 |
| d. | Less advanced than competitors technology | 1 | 2 | 3 | 4 | 5 |
| e. | Technology used in your past products | 1 | 2 | 3 | 4 | 5 |
| f. | Technology not used directly by your company or competitors | 1 | 2 | 3 | 4 | 5 |
| g. | Any technology needed by others to promote standardisation | 1 | 2 | 3 | 4 | 5 |

Q45 In order to acquire technology would your company enter into cross licensing agreements, which covered any technology in a particular field developed in the future by either party in a given time period, provided balancing payments are made or would you only cross- license on a case by case basis?
1. YES Blanket cross licences possible 2. NO Case by case licensing only

Q46 Recently have the number of cases of CROSS-LICENSING of technology by your company been :-
1. Increasing 2. Decreasing 3. Staying the same

**INFRINGEMENT OF IPRS**

Q47 To what extent do you agree with this statement :
"Whether one is right or not - it is always better to negotiate a settlement than to go to court"
1=Strongly Disagree ◄——► 5=Strongly Agree
1 2 3 4 5

**INFRINGEMENT OF YOUR COMPANY'S IPRs**

Q48 For the last five years, please give the total number of initial complaints of infringement made by your company against the following types of organisation infringing your IPRs

| +------ Nationally based companies- -----+ | | | +-------- Companies based overseas- -- ----+ | | |
|---|---|---|---|---|---|
| Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgn |
| _____ | _____ | _____ | _____ | _____ | _____ |

Q49 Which has been the most frequently involved foreign country in such cases? _____

Q50 How have the above complaints of infringement against your company usually been resolved? - Please give numbers of cases for each type of resolution for each category of opponent.
(If numbers unavailable please use approximate percentages for each category).

| | + - - Nationally based companies - - - + | | | +- - -Companies based overseas - - - + | | |
|---|---|---|---|---|---|---|
| Numbers of cases : | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns |
| Simple Notification | _____ | _____ | _____ | _____ | _____ | _____ |
| Out of Court Settlement | _____ | _____ | _____ | _____ | _____ | _____ |
| Court Litigation | _____ | _____ | _____ | _____ | _____ | _____ |
| Other | _____ | _____ | _____ | _____ | _____ | _____ |
| TOTAL No. (or 100%) | | | | | | |

Q51 In recent years has the number of infringements of your IPRs by others been :
**1.** Increasing **2.** Decreasing **3.** Staying the same

Q52 IF YOU THOUGHT ANOTHER COMPANY WAS INFRINGING YOUR COMPANY'S IPRS and an expert lawyer gave you the following chance of success in a court action , would you choose to negotiate, accept a compromise and settle out of court OR would you go to court to try to obtain an outright victory?

| | IN A NATIONAL COURT | | IN A FOREIGN COURT | |
|---|---|---|---|---|
| a. 0% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| b. 25% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| c. 50% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| d. 75% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| e. 90% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| f. 100% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |

Q53 In the past five years - On occasions when other companies have infringed your IPRs has the number of cases where you have chosen to go to court rather than accept a negotiated settlement tended to : -
**Nationally**: **1.** Increase **2.** Decrease **3.** Not change **Internationally** : **1.** Increase **2.** Decrease **3.** Not change

## ALLEGATIONS OF INFRINGEMENT BY YOUR COMPANY OF OTHER COMPANIES' IPRs

Q54 Does your Company conduct infringement clearance searches before producing / selling new products to ensure that your company is not infringing other companies' IPRs?
**1.** Never **2.** Rarely **3.** Sometimes **4.** Frequently **5.** Always

Q55 For the last five years please give the total number of initial complaints of infringement against your company made by the following types of organisation

| + - - - - - - Nationally based companies- - - - - - + | | | + - - - - - - - -Companies based overseas- - - - - - - + | | |
|---|---|---|---|---|---|
| Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgn |
| _____ | _____ | _____ | _____ | _____ | _____ |

Q56 Which has been the most frequently involved foreign country in such cases? _____

Q57 How have the above complaints of infringement against your company usually been resolved - (If numbers unavailable please use approximate percentages for each category).

| Number of Cases. | + - - Nationally based companies - - - + Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | +- - - -Companies based overseas - - - + Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns |
|---|---|---|---|---|---|---|
| Simple Notification | | | | | | |
| Out of Court Negotiation | | | | | | |
| Court Litigation | | | | | | |
| Other | | | | | | |
| TOTAL No. (or 100%) | | | | | | |

Q58 IF YOUR COMPANY WAS ACCUSED OF INFRINGING ANOTHER COMPANY'S IPRS and an expert lawyer gave you the following chance of success in a court action , would you choose to negotiate, accept a compromise and settle out of court - or would you go to court to try to obtain an outright victory?

| | IN A NATIONAL COURT | | IN A FOREIGN COURT | |
|---|---|---|---|---|
| a. 0% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| b. 25% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| c. 50% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| d. 75% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| e. 90% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |
| f. 100% chance of victory in court | **1.** Settle | **2.** Court | **1.** Settle | **2.** Court |

Q59 In the past five years - On occasions when other companies claim you have infringed their IPRs - has the number of cases where you have chosen to go to court rather than accept a negotiated settlement tended to : -
**Nationally**: **1.** Increase **2.** Decrease **3.** Not change **Internationally**: **1.** Increase **2.** Decrease **3.** Not change

Q60 Are allegations that you are infringing other's IPRs **1.** Increasing **2.** Decreasing **3.** Staying the same

## OPERATIONAL MANAGEMENT OF IP - ADMINISTRATION AND INTEGRATION

Q61 Are there any of the following Indirect Incentives to researchers to file patent applications?

| | | |
|---|---|---|
| a. Bonus and/or Assessment is influenced by number of patent applications filed | 1. YES | 2. NO |
| b. Verbal encouragement is given to file applications | 1. YES | 2. NO |
| c. Written encouragement is given to file applications | 1. YES | 2. NO |

Are there any of the following Direct Financial Incentives? (Choose one each)

| | | | | | |
|---|---|---|---|---|---|
| d. Filing a Patent Application | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
| e. On Publication of a Patent Application | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
| f. On Grant of a Patent | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
| g. On use/licensing of an invention | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |

Q62 If any such financial award schemes exist what year did they start in your company? _____

Q63 Do your research departments have numerical targets for filing patent applications? **1.** YES **2.** NO

Q64 Does your company have an improvement suggestion scheme ? **1.** YES **2.** NO

## EDUCATION

Q65 How are your Specialist IP staff & R&D staff educated about IP matters?

| | a. Specialist IP Staff | | b. R&D Staff | |
|---|---|---|---|---|
| On the job training (OJT) | **1.** YES | **2.** NO | **1.** YES | **2.** NO |
| Special in-house courses | **1.** YES | **2.** NO | **1.** YES | **2.** NO |
| Correspondence/External courses | **1.** YES | **2.** NO | **1.** YES | **2.** NO |
| Secondment to Lawyers, Companies, Offices, Colleges abroad | **1.** YES | **2.** NO | **1.** YES | **2.** NO |
| Training abroad for qualification as a lawyer in foreign countries | **1.** YES | **2.** NO | **1.** YES | **2.** NO |

Q66 How many days training per year are R&D staff given in their 1st year of IP training? **1** **2** **3** **4** **5** **6** **7** **>7**

Q67 Are R&D researchers : -

a. trained to draft patent applications? **1.** YES **2.** NO
b. expected to Draft patent applications ready for filing **1.** YES **2.** NO
c. expected to Draft applications for revision by the IP dept. **1.** YES **2.** NO
d. expected to just describe inventions to the patent dept.. **1.** YES **2.** NO

**USE OF OUTSIDE ATTORNEYS**

Q68 What % of your total UK Patent Application work is sent to outside patent agents?_____%

Q69 How does your company deal with issues involving FOREIGN law?
**1.** Through National Attorneys **2.** Directly with Foreign Attorneys **3.** Via own Co. office abroad

Q70 How many firms of outside Patent Attorneys do you regularly employ for Patent Application work?
a. NATIONAL Applications? _____ b. OVERSEAS Applications?_____

Q71 What % of your application work is sent to the firm of outside patent agents you use most?
a. In the case of NATIONAL Agents? _____% b. In the case of OVERSEAS agents?_____%

**INTEGRATION**

Q72 How many committees in your company, discuss IP related issues on a regular basis? _____

Q73 Are managers from any of the following departments members of such committees? (Choose 1 or more) :
**1.** IP Dept. **2.** R&D Dept. **3.** Production Dept. **4.** Sales/Marketing Dept. **5.** Director/Board Members **6.** Others _____

Q74 How many weeks does it take on average for the following -
a. From notification of an invention to the patent dept. to filing a patent application -
**1.** <1Week **2.** 1-2 Weeks **3.** 2-4Weeks **4.** 4-6Weeks **5.** 6-8Weeks **6.** 8-10 Week s **7.** >10 Weeks

b. From requesting permission to publish a journal article or conference paper to receiving a decision
**1.** <1Week **2.** 1-2 Weeks **3.** 2-4Weeks **4.** 4-6Weeks **5.** 6-8Weeks **6.** 8-10 Week s **7.** >10 Weeks

Q75 Does your company use ranking of inventions / applications to help make decisions? 1.YES 2. NO

Q76 Which department's managers decide the ranking of inventions / applications? (Choose one or more)
**1.** IP Dept. **2.** R&D Dept. **3.** Production Dept. **4.** Sales/Marketing Dept. **5.** Director/Board Members **6.** Others _____

Q77 In your company which departments are involved in the following decisions? (Please indicate one or more)

| | | | | | |
|---|---|---|---|---|---|
| a. Filing National Patent Applications | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| b. Filing Foreign Patent Applications | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| c. Requesting Examination | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| d..Abandoning Applications | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| e. Paying Patent Renewal Fees | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| f. Taking action against Infringers | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| g. Preservation of Documentation | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| h. Inclusion in Collaborative Research | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| i. Ranking of Confidential Information | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| j. Seeking a patent licence | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| k. Granting a patent licence | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| l. Arranging Cross licensing | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |
| m. Allowing Pub'n in Jnls/Conferences | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales/Mktg | **5.** Director/Bd Member **6.** Other |

**ENVIRONMENTAL FACTORS**

Q78 Do you think that IP law is converging or diverging internationally?

| 1. Rapidly Converging | 2. Slowly Converging | 3. Remaining almost the same | 4. Slowly Diverging | 5. Rapidly Diverging |
|---|---|---|---|---|

Q79 Do you think that Japanese companies and Western companies attitudes to IP are converging or diverging ?

| 1. Rapidly Converging | 2. Slowly Converging | 3. Remaining almost the same | 4. Slowly Diverging | 5. Rapidly Diverging |
|---|---|---|---|---|

Should you have any further comments relating to any of the above questions or issues please note them below :

So that if necessary I can contact you to resolve any further questions about the survey and so that I can send you the summary of the results of the two surveys, I would be very grateful if you would complete the following details :-

| | |
|---|---|
| Your Name | |
| Job Title & Dept. | |
| Telephone No. | |

* * * * * * * * * * * * **Thank you very much for your co-operation.** * * * * * * * * * * * *

**Templeton College**
**Oxford OX1 5NY**
Tel : (0865) 735422
Fax : (0865) 736374

Doctoral Research Project

Dear

I am a UK Patent Agent currently conducting doctoral research into the use and management of Intellectual Property by Japanese and UK companies. If you are not the person responsible for Patents or Intellectual Property matters in your company, I apologise for any inconvenience caused but would be very grateful if you would forward this letter to the appropriate individual.

I have recently returned from a year in Japan. Whilst there, I surveyed about 500 Japanese companies, asking in detail about their use and management of Patents. The survey was very successful with a 45% response rate and I have just completed the analysis of the results.

I intend to write a comprehensive analysis of Japanese companies' IP management practices. However, for comparison, I need to collect parallel data on UK based companies. I am therefore enclosing a questionnaire identical, save for the use of English, to that I wrote and used in Japan. I would be very grateful if you would complete this and return it to me by 1st January 1995.

I realise that the enclosed questionnaire may seem long. However, for the UK results to be comparable with those from Japan it must be identical. In any event, I would be very grateful if you would complete any questions you are able to, and return the questionnaire.

I am sending the questionnaire to around 800 UK technology based companies. These I have identified as being potentially interested in IP management, either because they own patent applications or employ staff who, like myself, are members of the Chartered Institute of Patent Agents or the Licensing Executives Society.

Finally, three important points :

- My research is not supported by any technology based company. I have had the cooperation of the Institute of Intellectual Property in Tokyo and in Oxford of both Templeton College and St.Peter's College Intellectual Property Centre, where I am a research associate. The research funding has come from Citibank, the Japan German Centre Berlin and myself.

- All replies will be kept in confidence. They will only ever be seen by myself and only aggregate statistical analyses will be made publicly available.

- **In return for your completed questionnaire I will send you a summary of the results of not only this UK survey but also of the corresponding Japanese survey.**

If you have any questions or would like to discuss this research further, please do not hesitate to contact me at the above address. Thank you in advance for your cooperation.

Yours sincerely,

Robert Pitkethly

**Templeton College**
**Oxford OX1 5NY**
Tel : (0865) 735422
Fax : (0865) 736374

Doctoral Research Project

12/9/95

«ADD1»
«ADD2»
«ADD3»
«ADD4»
«ADD5»
«ADD6»

Dear Sir / Madam

I recently sent a questionnaire to your company concerning Intellectual Property & Patents Management. It forms part of a comparative study with some identical research I have already carried out in Japan. I am still receiving replies from other companies in the UK and I can therefore, still make use of any reply you send. If you now have time to complete even some of the questions and return the questionnaire to me it would still be a considerable help to my research.

You may no longer have the original questionnaire or may have been unable to complete it, or your company may have no interest in Intellectual Property or Patents. However, even so, I would still be extremely grateful if you could let me know by answering some of the key questions from the original questionnaire which are shown overleaf and fax or otherwise return the enclosed page to me.

I will be sending a summary of the results of the parallel Japanese survey I have done together with the results of this UK survey to everyone who I receive a reply from, no matter how brief.

If you have any questions or would like to discuss this research further, please do not hesitate to contact me at the above address. Thank you in advance for your cooperation.

Yours sincerely,

Robert Pitkethly

**Templeton College**
**Oxford OX1 5NY**
Tel : (0865) 735422
Fax : (0865) 736374

Doctoral Research Project

To : Robert Pitkethly **Fax. 0865 736374** No. of Pages : 1

To : **Robert Pitkethly**
**Templeton College**
**Oxford OX1 5NY**

From:
«ADD2»
«ADD3»
«ADD4»
«ADD5»
«ADD6»

If you would like a free summary of the results of this survey and the corresponding Japanese one, please give :
Your Name :
Dept. :
Tel.No. :

**A. Is there anyone in your company specifically responsible for Patents / Intellectual Property 1.Yes 2.No**

**B. Does your company have a separate Patents / Intellectual Property (IP) Dept(s) ? 1.Yes 2.No**

**C. Which dept. does whoever would deal with Patents / Intellectual Property belong to?**
1. R&D 2. Technology Planning 3. Production 4. Legal 5. Gen'l Affairs 6. Independent Dept. 7. Other

**D. About how many Employees are involved in just** a) IP / Patents work ? _____ b) R&D work : _____

**PLEASE ALSO ANSWER ANY OF THE FOLLOWING QUESTIONS YOU CAN AND RETURN THIS FORM TO THE ABOVE ADDRESS**

Q1 About how many initial patent applications did your company file last year? _____ . What % were filed abroad ___%

Q2 How important to your company are the following roles of IPRs? 1=IRRELEVANT ◄——► 5=ESSENTIAL

| | | | | | |
|---|---|---|---|---|---|
| a. A source of Revenue through licensing OUT technology | 1 | 2 | 3 | 4 | 5 |
| b. A source of Technology through licensing IN technology | 1 | 2 | 3 | 4 | 5 |
| c. A source of Technological Information | 1 | 2 | 3 | 4 | 5 |
| d. For use in cross licensing to allow your company to act freely | 1 | 2 | 3 | 4 | 5 |
| e. To protect your IP assets from free use by others | 1 | 2 | 3 | 4 | 5 |
| f. To monopolise your IP assets and make free use by others difficult | 1 | 2 | 3 | 4 | 5 |
| g. To help have your technology adopted as a technical standard | 1 | 2 | 3 | 4 | 5 |
| h. To gain a lead over competitors by protecting IP assets | 1 | 2 | 3 | 4 | 5 |

Q3 Last financial year which was greater?: 1.INCOME from Technology Sales 2.PAYMENTS to Buy Technology

Q4
a. Does your Company actively search for technology to Buy / LICENSE IN 1. YES 2. NO
b. Does your Company actively market it's technology for Sale / LICENSING OUT ? 1. YES 2. NO

Q5 What is your company's attitude 1. Negative ◄—— 3. Neutral ——► 5. Positive

| | | | | | |
|---|---|---|---|---|---|
| a. to licensing IN technology from others ? | 1 | 2 | 3 | 4 | 5 |
| b. to licensing OUT your technology to others? | 1 | 2 | 3 | 4 | 5 |

Q6 To what extent do you agree with this statement :
"Whether one is right or not - it is always better to negotiate a settlement than to go to court"
1=Strongly Agree ◄——► 5=Strongly Disagree
1 2 3 4 5

Q7
a. Are researchers given Written encouragement to file patent applications? 1. YES 2. NO
Are researchers given any of the following Direct Financial Incentives? (Choose one each)

| | | | | | |
|---|---|---|---|---|---|
| b. Filing a Patent Application | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
| c. On Grant of a Patent | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
| d. On use/licensing of an invention | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |

IF YOU HAVE ANY FURTHER COMMENTS PLEASE USE THE FOLLOWING SPACE OR AN ADDITIONAL SHEET IF NECESSARY

**-- Thank you very much for your help. --**

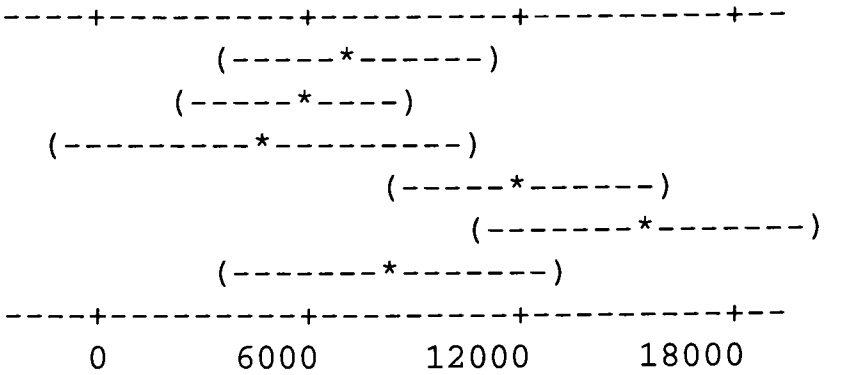
# Appendix J Analysis for Sectoral Bias in Japanese Replies

ANALYSIS OF VARIANCE IN Numbers of Employees p = 0.007

| | N | MEAN | STDEV |
|---|---|---|---|
| 1.Misc | 38 | 6798 | 7738 |
| 2.Chem | 63 | 5113 | 7718 |
| 3.Pharm | 17 | 4063 | 2298 |
| 4.Elec. | 40 | 11552 | 20312 |
| 5.Tspt | 24 | 15037 | 17641 |
| 6.Mach. | 26 | 7632 | 9474 |

POOLED STDEV = 12484

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV

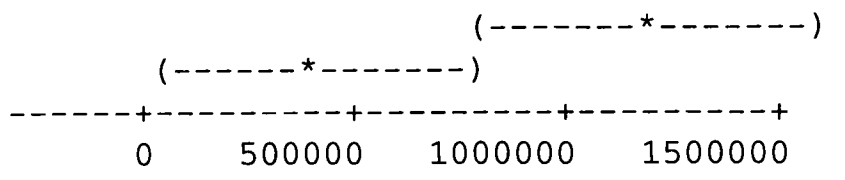



ANALYSIS OF VARIANCE IN Sales figures p = 0.009

| | N | MEAN | STDEV |
|---|---|---|---|
| 1.Misc | 37 | 676405 | 911019 |
| 2.Chem | 64 | 360798 | 484233 |
| 3.Pharm | 17 | 183789 | 122554 |
| 4.Elec. | 39 | 597229 | 1123761 |
| 5.Tspt | 24 | 1151515 | 1952919 |
| 6.Mach. | 26 | 371763 | 517653 |

POOLED STDEV = 965313

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV

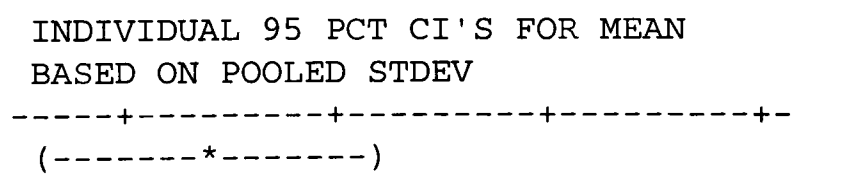



ANALYSIS OF VARIANCE IN R&D Expenditures p = 0.001

| | N | MEAN | STDEV |
|---|---|---|---|
| 1.Misc | 33 | 9421 | 13776 |
| 2.Chem | 62 | 11436 | 16471 |
| 3.Pharm | 16 | 20107 | 12864 |
| 4.Elec. | 34 | 57952 | 114586 |
| 5.Tspt | 23 | 48921 | 77279 |
| 6.Mach. | 23 | 18518 | 33222 |

POOLED STDEV = 57613

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV



# Appendix K Analysis for Sectoral Bias in UK Replies

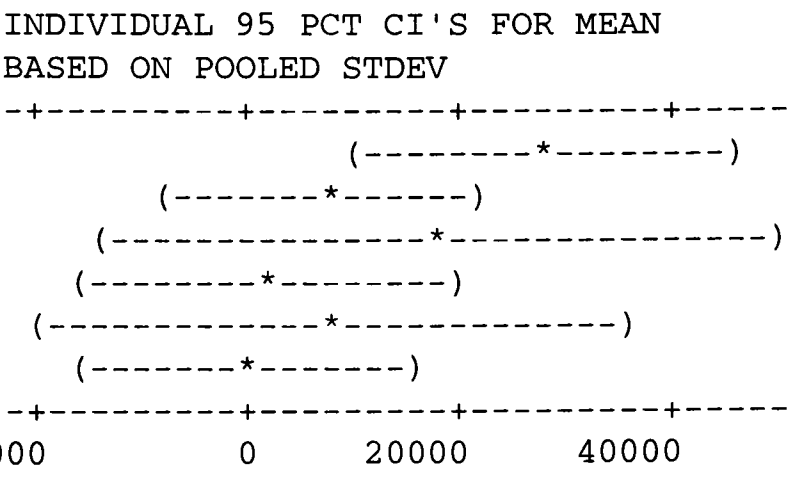
## Complete Questionnaires

ANALYSIS OF VARIANCE in Numbers of Employees p = 0.267

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 16 | 28131 | 74115 |
| 2 | 23 | 7438 | 18804 |
| 3 | 5 | 18158 | 38546 |
| 4 | 15 | 2662 | 4306 |
| 5 | 6 | 7843 | 13561 |
| 6 | 19 | 744 | 556 |

POOLED STDEV = 35320

INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV

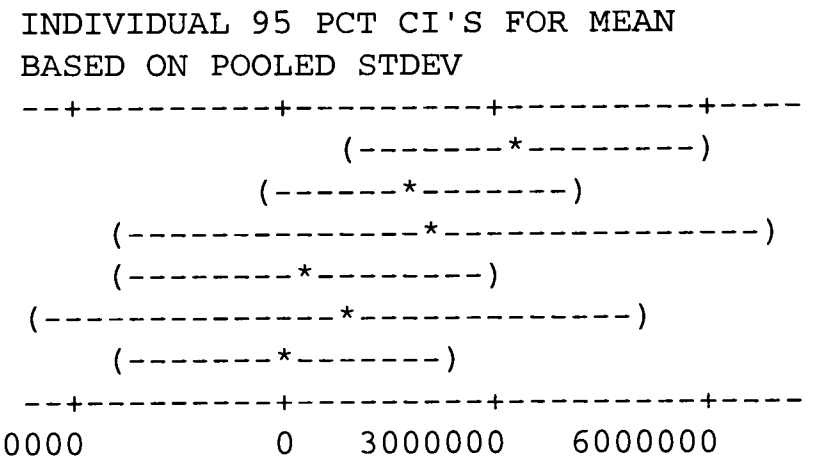



ANALYSIS OF VARIANCE in Sales Figures p = 0.480

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 16 | 3431301 | 7849712 |
| 2 | 23 | 1887145 | 7259665 |
| 3 | 5 | 2194235 | 4717496 |
| 4 | 15 | 340144 | 889856 |
| 5 | 6 | 753697 | 1434058 |
| 6 | 19 | 63390 | 102065 |

POOLED STDEV = 5303971

INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV



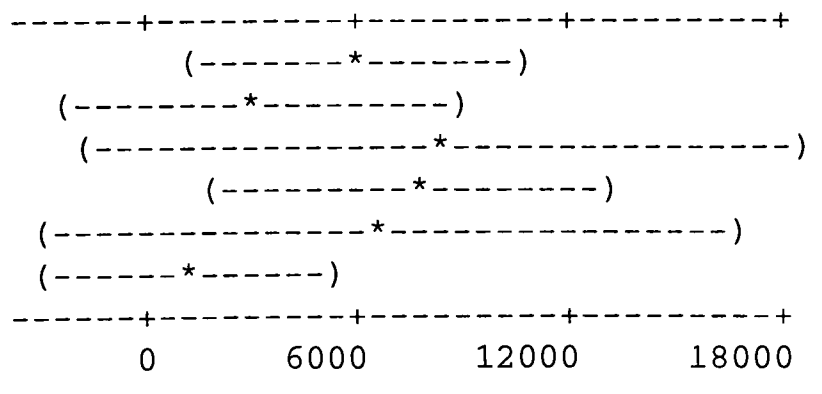

## Reduced Questionnaires

ANALYSIS OF VARIANCE in Numbers of Employees p = 0.452

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 43 | 5921 | 15097 |
| 2 | 30 | 3005 | 8155 |
| 3 | 9 | 8400 | 17102 |
| 4 | 29 | 7598 | 30487 |
| 5 | 10 | 6782 | 15101 |
| 6 | 54 | 1275 | 2236 |

POOLED STDEV = 15799

INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV

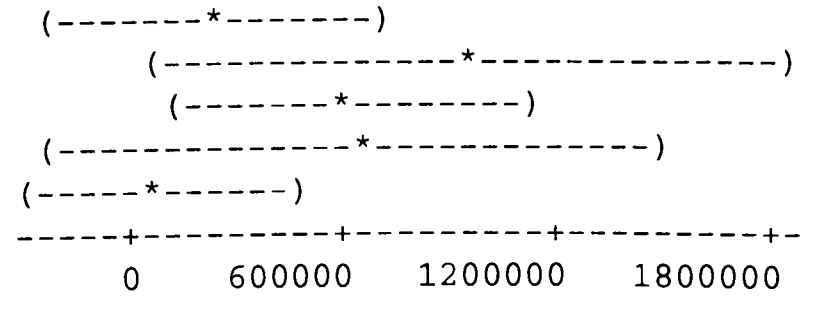



ANALYSIS OF VARIANCE in Sales Figures p = 0.246

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 43 | 613866 | 1429468 |
| 2 | 30 | 235065 | 605719 |
| 3 | 9 | 970768 | 1991531 |
| 4 | 29 | 608696 | 2518651 |
| 5 | 10 | 638762 | 1141629 |
| 6 | 54 | 89793 | 171221 |

POOLED STDEV = 1374097

INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV



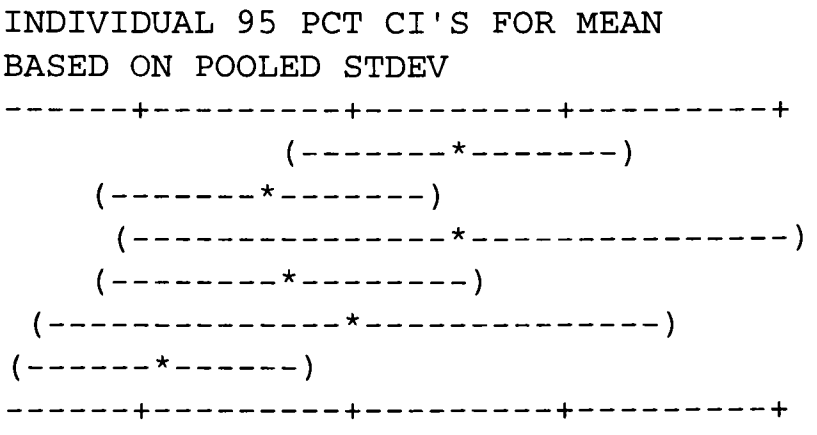
## Combined Questionnaires

ANALYSIS OF VARIANCE in Numbers of Employees  p = 0.172

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 59 | 11944 | 41047 |
| 2 | 53 | 4928 | 13842 |
| 3 | 14 | 11885 | 25704 |
| 4 | 44 | 5915 | 24837 |
| 5 | 16 | 7783 | 14041 |
| 6 | 73 | 1005 | 1536 |

POOLED STDEV = 24016

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV

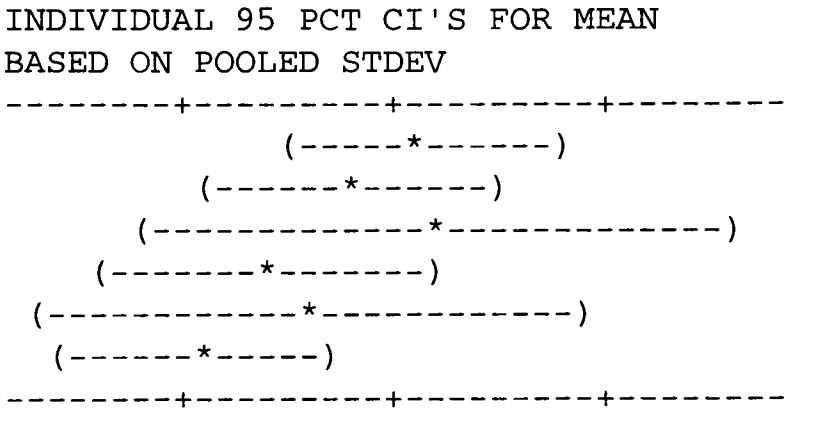



ANALYSIS OF VARIANCE in Sales Figures  p = 0.269

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 59 | 1377916 | 4360196 |
| 2 | 53 | 952005 | 4815108 |
| 3 | 14 | 1407721 | 3107807 |
| 4 | 44 | 517144 | 2098835 |
| 5 | 16 | 731806 | 1203931 |
| 6 | 73 | 71975 | 121647 |

POOLED STDEV = 3234007

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV

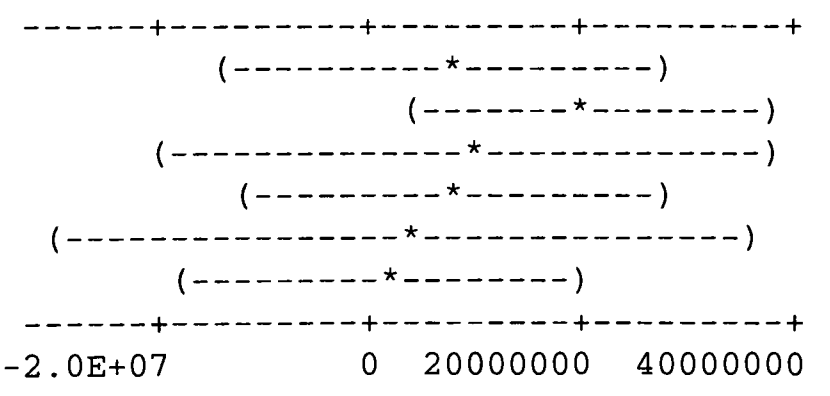



ANALYSIS OF VARIANCE ON R&D Expenditure  p = 0.754

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 10 | 7370600 | 15739856 |
| 2 | 15 | 20711240 | 60635492 |
| 3 | 5 | 9135400 | 8029379 |
| 4 | 11 | 8080073 | 13594771 |
| 5 | 4 | 3100251 | 5071284 |
| 6 | 12 | 1428041 | 1851763 |

POOLED STDEV = 33114152

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV

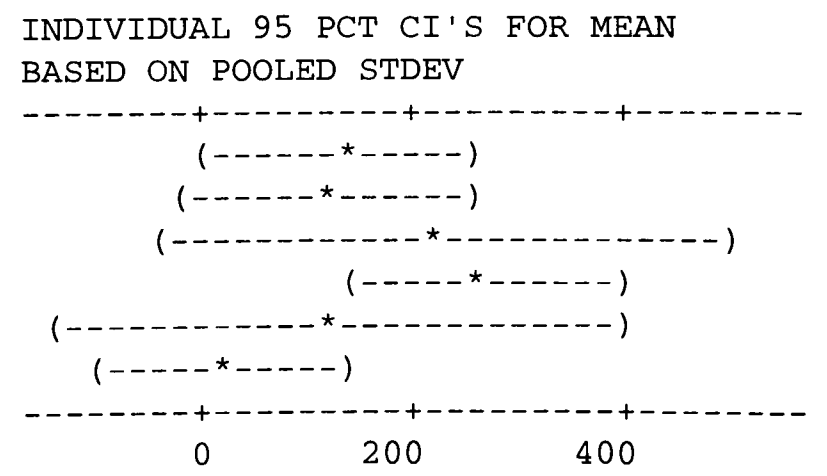



ANALYSIS OF VARIANCE ON R&D Employees  p = 0.158

| LEVEL | N | MEAN | STDEV |
|---|---|---|---|
| 1 | 47 | 131.3 | 603.2 |
| 2 | 38 | 121.5 | 283.9 |
| 3 | 11 | 223.4 | 284.8 |
| 4 | 42 | 269.9 | 739.2 |
| 5 | 11 | 123.3 | 246.0 |
| 6 | 64 | 19.8 | 25.2 |

POOLED STDEV = 458.8

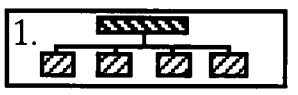
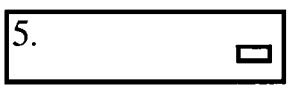
INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV



# Appendix L COMPARATIVE ANALYSIS OF SURVEY DATA

## 1. IP Department Organisation

Data Table 1 : Type of IP/Patent Department Organisation

| Q.1 | | Japan | UK Original | |
|---|---|---|---|---|
| 1. COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT WITH full time managers responsible for patents / IP belonging to it based in Factories / R&D centres. |   | 34<br>16.3% | 19<br>23.5% | |
| 2. COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT WITHOUT full time managers responsible for patents / IP belonging to it based in Factories / R&D centres. | | 134<br>64.1% | 11<br>13.6% | |
| 3. COMPANY-WIDE CENTRAL IP / PATENT DEPARTMENT *AND* INDEPENDENT IP / PATENT DEPARTMENTS belonging to Factories / R&D centres. | | 22<br>10.5% | 4<br>4.9% | |
| 4. INDEPENDENT IP / PATENT DEPARTMENTS belonging to Factories / R&D centres & NO COMPANY-WIDE CENTRAL IP / PATENT DEPT. | | 10<br>4.8% | 1<br>1.2% | |
| | | | | UK Total |
| 5. NO full time IP / PATENT dept. such matters dealt with by other dept(s). |   | 3<br>1.4% | 40<br>49.4% | 180<br>71.4% |
| 6. Some other arrangement | | 6<br>2.9% | 6<br>7.4% | |
| (N) | | (209) | (81) | (257) |

**UK**

| IP Dept.Type | 1 | 2 | 3 | 4 | 5 | 6 | ALL | N |
|---|---|---|---|---|---|---|---|---|
| No.ofEmployees | | | | | | | | |
| 1.(0-500) | 13.04 | 21.74 | -- | 4.35 | 56.52 | 4.35 | 100.00 | (23) |
| 2.(500-1000) | 15.00 | 10.00 | 5.00 | -- | 70.00 | -- | 100.00 | (20) |
| 3.(1000-5000) | 31.82 | 13.64 | 4.55 | -- | 40.91 | 9.09 | 100.00 | (22) |
| 4.(5000-10000) | -- | -- | 16.67 | -- | 50.00 | 33.33 | 100.00 | ( 6) |
| 5.(10000+) | 60.00 | 10.00 | 10.00 | -- | 10.00 | 10.00 | 100.00 | (10) |
| ALL | 23.46 | 13.58 | 4.94 | 1.23 | 49.38 | 7.41 | 100.00 | (81) |
| N | (19) | (11) | ( 4) | ( 1) | (40) | ( 6) | (81) | |

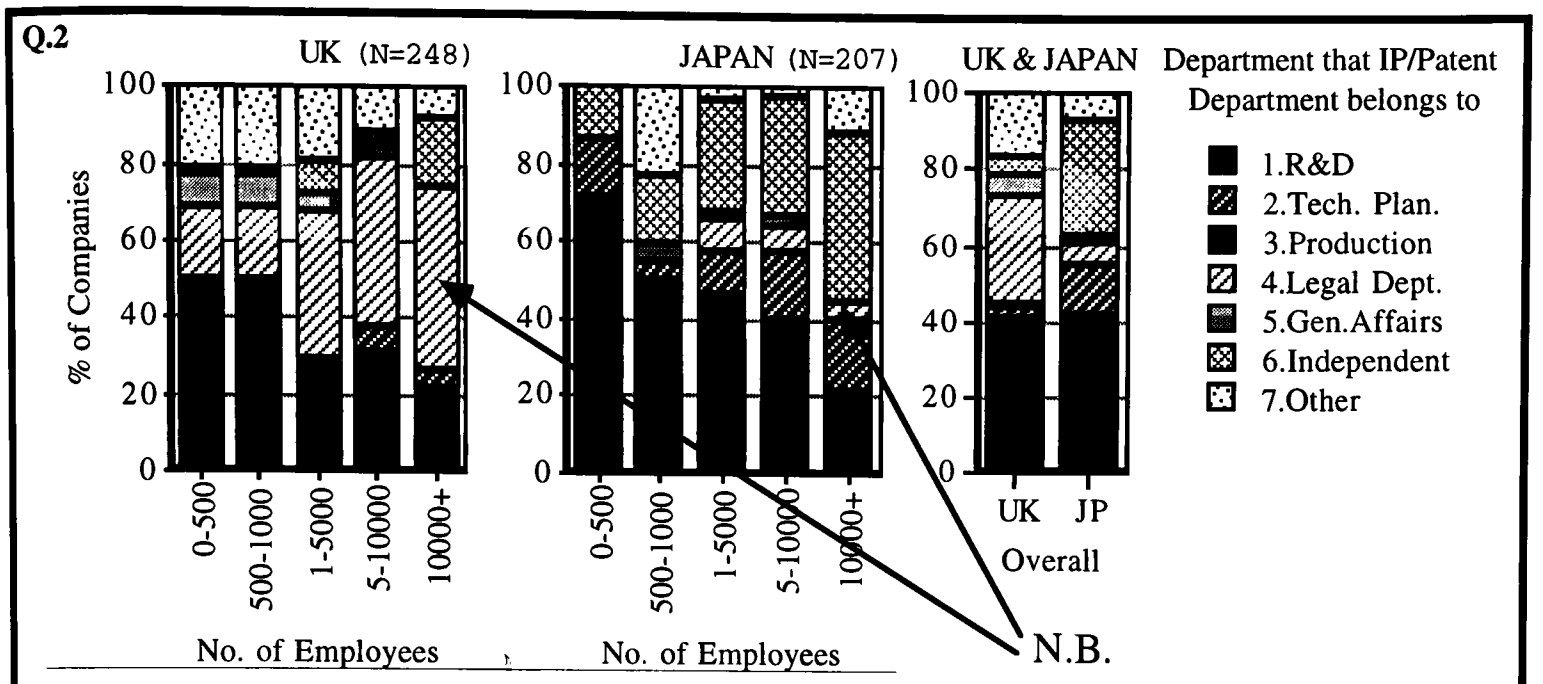
CHI-SQUARE = 30.321 WITH D.F. = 20 p = 0.0648 Can reject Ho.
Conclusion: Company Size and Organisation Type are dependent at 10% level

**JAPAN**

| IP Dept.Type | 1 | 2 | 3 | 4 | 5 | 6 | ALL | N |
|---|---|---|---|---|---|---|---|---|
| No.ofEmployees | | | | | | | | |
| 1.(0-500) | 14.29 | 42.86 | -- | 28.57 | -- | 14.29 | 100.00 | ( 7) |
| 2.(500-1000) | 4.55 | 68.18 | 4.55 | 13.64 | 4.55 | 4.55 | 100.00 | ( 22) |
| 3.(1000-5000) | 11.88 | 76.24 | 3.96 | 4.95 | 0.99 | 1.98 | 100.00 | (101) |
| 4.(5000-10000) | 18.18 | 69.70 | 9.09 | -- | -- | 3.03 | 100.00 | ( 33) |
| 5.(10000+) | 30.23 | 32.56 | 32.56 | -- | 2.33 | 2.33 | 100.00 | ( 43) |
| ALL | 16.02 | 64.08 | 10.68 | 4.85 | 1.46 | 2.91 | 100.00 | (206) |
| N | (33) | (132) | (22) | (10) | (3) | (6) | (206) | |

CHI-SQUARE = 64.633 WITH D.F. = 20 p = 0.0000 Can reject Ho.
Conclusion: Size and Organisation Type are dependent.

## Data Table 2 : Company Department owning the IP/Patent Department




UK % of Companies (No. of Employees / Company Dept. - Chi-Square : P = 0.0023)

| No. Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL (N) |
|---|---|---|---|---|---|---|
| 1.R&D | 44.83% | 59.65% | 27.69% | 31.25% | 21.74% | 40.73%(101) |
| 2.Tech. Plan. | 2.30% | 3.51% | 1.54% | 6.25% | 4.35% | 2.82%( 7) |
| 3.Production | 2.30% | -- | -- | -- | -- | 0.81%( 2) |
| 4.Legal Dept. | 18.39% | 19.30% | 38.46% | 43.75% | 47.83% | 28.23%( 70) |
| 5.Gen.Affairs | 9.20% | 3.51% | 4.62% | 6.25% | -- | 5.65%( 14) |
| 6.Independent | 1.15% | 1.75% | 7.69% | -- | 17.39% | 4.44%( 11) |
| 7.Other | 21.84% | 12.28% | 20.00% | 12.50% | 8.70% | 17.34% ( 43) |
| ALL | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% (248) |
| | (87) | (57) | (66) | (15) | (23) | (248) |

JAPAN % of Companies (No. of Employees / Company Dept. - Chi-Square : P = 0.0692)

| No. Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL (N) |
|---|---|---|---|---|---|---|
| 1.R&D | 71.43% | 50.00% | 46.08% | 39.39% | 20.93% | 41.06%( 85) |
| 2.Tech. Plan. | 14.29% | 4.55% | 11.76% | 18.18% | 18.60% | 13.53%( 28) |
| 3.Production | -- | -- | -- | -- | -- | 0.00%( 0) |
| 4.Legal Dept. | -- | -- | 7.84% | 6.06% | 4.65% | 5.80%( 12) |
| 5.Gen.Affairs | -- | 4.55 % | 1.96% | 3.03% | -- | 1.93%( 4) |
| 6.Independent | 14.29% | 18.18% | 28.43% | 30.30% | 44.19% | 30.43%( 63) |
| 7.Other | -- | 22.73% | 3.92% | 3.03% | 11.63% | 7.25%( 15) |
| ALL | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00%(207) |
| (N) | (7) | (22) | (102) | (33) | (43) | (207) |

## Data Table 3 : Is the Head of the Dept. Managing IP/Patent matters a Director

| Q.3 | No.of Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL |
|---|---|---|---|---|---|---|---|
| | JAPAN % Yes | 28.57% | 31.82% | 34.95% | 21.21% | 51.16% | 35.58% ($Chi^2$ p=0.0979) |
| | (N) | (7) | (22) | (103) | (33) | (43) | (208) |
| | UK % Yes | 47.83% | 45.00% | 22.73% | 16.67% | 10.00% | 33.33% ($Chi^2$ p=0.1027) |
| | (N) | (23) | (20) | (22) | (6) | (10) | (81) |

## Data Table 4 : Does the IP Department report directly to a Company Director

| Q.4 | No.Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL |
|---|---|---|---|---|---|---|---|
| | JAPAN % Yes | 100.00 | 72.73 | 86.27 | 90.63 | 88.37 | 86.41 ($Chi^2$ p=0.2641) |
| | (N) | (7) | (22) | (102) | (32) | (43) | (206) |
| | UK % Yes | 75.00 | 77.78 | 86.36 | 50.00 | 40.00 | 72.22 ($Chi^2$ p=0.0566) |
| | (N) | (16) | (18) | (22) | ( 6) | (10) | (72) |

## 2. IP Department Responsibilities

### Data Table 5 : IP / Patent Department Responsibilities

| Q.5 | JAPAN | | /Ind'l Sector | No. Employees | UK | | /Ind'l Sector | No. Employees |
|---|---|---|---|---|---|---|---|---|
| | %YES | N | $Chi^2$ P | $Chi^2$ P | %YES | N | $Chi^2$ P | $Chi^2$ P |
| a. Patents | 100.0% | 211 | - | - | 96.20% | 79 | 0.4669 | 0.3376 |
| b. Utility Models | 99.5% | 211 | 0.4697 | 0.0000 | 64.81% | 54 | 0.5150 | 0.1063 |
| c. Trade Marks | 91.5% | 211 | 0.4066 | 0.0465 | 76.32% | 76 | 0.3439 | 0.0595 |
| d. Designs | 97.2% | 211 | 0.6692 | 0.0000 | 80.60% | 67 | 0.7404 | 0.2959 |
| e. Copyright (non software) | 47.8% | 203 | 0.2295 | 0.0004 | 76.12% | 67 | 0.6883 | 0.8131 |
| f. Computer Software | 52.8% | 199 | 0.0367 | 0.0000 | 35.71% | 56 | 0.6742 | 0.6027 |
| g. Semiconductor Mask Works | 32.5% | 191 | 0.0051 | 0.0000 | 12.77% | 47 | 0.8008 | 0.1231 |
| h. Trade Secrets | 45.1% | 206 | 0.4021 | 0.0007 | 60.94% | 64 | 0.9260 | 0.1530 |
| i. Know How | 57.8% | 204 | 0.8092 | 0.1747 | 74.24% | 66 | 0.6712 | 0.8778 |

### Data Table 6 : Specialist IP/Patent department sections

| Q.6 | a)JAPAN | | b)UK | | t test a:b | c)UK-IPD | | t test a:c |
|---|---|---|---|---|---|---|---|---|
| | %YES | N | %YES | N | p value | %YES | N | p value |
| a. Computer Software | 12.7% | 205 | 3.03% | 66 | 0.0025 | 3.00% | 33 | 0.014 |
| b. Litigation | 28.4% | 208 | 19.12% | 68 | 0.11 | 29.4% | 34 | 0.90 |
| c. Patent Information | 49.3% | 209 | 38.03% | 71 | 0.098 | 50.0% | 36 | 0.94 |
| d. Licence Contracts | 42.8% | 208 | 26.47% | 68 | 0.012 | 35.3% | 34 | 0.41 |
| e. National Licences | 35.7% | 207 | 20.90% | 67 | 0.015 | 30.3% | 33 | 0.54 |
| f. International Licences | 35.7% | 207 | 22.39% | 67 | 0.031 | 33.3% | 33 | 0.79 |

## 3. IP Department Personnel

### Data Table 7 : Number of Staff involved exclusively in IP work

| Q.7 | N | Mean | Median | Std.Dev'n | Minimum | Maximum |
|---|---|---|---|---|---|---|
| JAPAN | 211 | 30.24 | 11.00 | 55.470 | 1.00 | 380.00 |
| UK | 245 | 3.446 | 0.50 | 12.898 | 0.00 | 150.00 |
| UK-IPD | 71 | 10.29 | 3.00 | 22.560 | 0.00 | 150.00 |
| UKNoIPD | 169 | 0.618 | 0.00 | 1.226 | 0.00 | 11.00 |

### Data Table 8 : Number of IP Staff by Industry Sector

| Q.7 | JAPAN | Mean | UK | Mean | UK-IPD | |
|---|---|---|---|---|---|---|
| Industry Sector | N | IP Staff | N | IP Staff | N | Mean |
| 1.Misc | 38 | 12.39 | 53 | 3.65 | 5 | 31.40 |
| 2.Chem | 65 | 22.07 | 49 | 2.58 | 19 | 5.98 |
| 3.Pharm | 18 | 18.50 | 13 | 16.81 | 10 | 21.75 |
| 4.Elec. | 40 | 54.50 | 44 | 4.50 | 14 | 13.21 |
| 5.Tspt | 24 | 34.58 | 15 | 2.73 | 8 | 3.50 |
| 6.Mach. | 26 | 43.50 | 71 | 0.94 | 15 | 1.97 |
| | ANOVA p=0.008 | | ANOVA p=0.004 | | ANOVA p=0.052 | |

## Data Table 9 : Number of IP Staff by No. of Employees

Q.7

| No. of Employees | JAPAN N | Mean IP Staff | UK N | Mean IP Staff | UK-IPD N | Mean IP Staff |
|---|---|---|---|---|---|---|
| 1.(0-500) | 7 | 3.29 | 89 | 0.838 | 15 | 1.81 |
| 2.(500-1000) | 22 | 5.36 | 55 | 0.80 | 12 | 1.75 |
| 3.(1000-5000) | 103 | 12.12 | 63 | 2.61 | 23 | 6.48 |
| 4.(5000-10000) | 33 | 27.06 | 17 | 5.47 | 5 | 17.00 |
| 5.(10000+) | 43 | 93.90 | 21 | 22.29 | 16 | 28.03 |
| | ANOVA p=0.000 | | ANOVA p=0.000 | | ANOVA p=0.003 | |

## Data Table 10 : IP Staff per 1000 Total Employees

Q.7

| No.Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | |
|---|---|---|---|---|---|---|---|
| JAPAN | 8.363 | 6.552 | 4.508 | 3.890 | 3.696 | 4.588 | (ANOVA p=0.000) |
| (N) | (7) | (22) | (102) | (32) | (43) | (206) | |
| UK | 2.514 | 1.133 | 1.714 | 0.272 | 0.445 | 1.670 | (ANOVA p=0.056) |
| (N) | (89) | (55) | (64) | (16) | (21) | (245) | |
| | (t test of overall figure vs Japan p=0.0000) | | | | | | |
| UKIPD | 5.789 | 2.400 | 4.143 | 0.758 | 0.542 | 3.19 | (ANOVA p=0.155) |
| (N) | (15) | (12) | (24) | ( 4) | (16) | ( 71) | |
| | (t test of overall figure vs Japan p=0.079) | | | | | | |

## Data Table 11 : % of companies reporting changes in IP Staff levels

Q.8

| | UK | UKIPD | JP |
|---|---|---|---|
| Increased in past 5 years | 8.33% | 10.8% | 51.2% |
| Decreased in past 5 years | 18.06% | 29.4% | 14.2% |
| Stay Same | 73.61% | 62.1% | 34.6% |
| (N) | 72 | 37 | 211 |

## Data Table 12 : Growth Rates in Numbers of IP Staff over the past 5 years

Q.8

| | Mean IP Staff 5 years ago | Mean IP Staff at present | 5 year Growth | Annual Growth Rate | (UK Total Figures = Original + Reminder) |
|---|---|---|---|---|---|
| Japan | 26.87 (211) | 30.24 (211) | +12.54% | +2.39% pa | |
| UK | 6.58 (77) | 4.99 (81) | -24.16% | -5.38% pa | 3.446 (245) |
| UK-IPD | 12.63 (39) | 9.99 (39) | -20.90% | -4.58% pa | 10.290 ( 71) |

(UK Figures are from Original Questionnaires Only - Present Total UK Figures given for comparison)

## Data Table 13 : Average Numbers of IP Staff with given roles

Q.9

| | a.TOTAL(N) | b.Qualified Patent Agents | c.Engineers/ (Tech.Assts) | d.Office Staff | e.Others |
|---|---|---|---|---|---|
| JAPAN | 30.45 (211) | 1.000 (211) | 17.90 (208) | 6.690 (207) | 2.347 (206) |
| % of total | | 3.28% | 58.78% | 21.97% | 7.71% |
| UK | 4.62 ( 79) | 1.738 ( 78) | 0.731 ( 78) | 1.962 ( 78) | 0.178 (78) |
| % of total | | 37.62% | 15.82% | 42.47% | 3.85% |
| UK-IPD | 8.70 ( 39) | 3.360 ( 38) | 1.276 ( 38) | 3.820 ( 38) | 0.321 (38) |
| % of total | | 38.62% | 14.67% | 43.91% | 3.69% |
| UKNoIPD | 0.34 ( 37) | 0.054 ( 37) | 0.176 ( 37) | 0.081 ( 37) | 0.046 (37) |
| % of total | | 15.74% | 51.31% | 23.62% | 13.41% |

## Data Table 14 : Average Numbers of IP Staff in given locations

**Q.10**

| (N) | a.TOTAL | b.Main IP/ Pat.Dept | c.R&D Dept | d.Co.Office Abroad | e.Training in Law Office or Univ'y abroad |
|---|---|---|---|---|---|
| JAPAN | 30.43(211) | 19.76(208) | 9.43(207) | 0.139(209) | 0.135(208) |
| UK | 3.94( 79) | 2.72( 77) | 0.283(77) | *0.87* ( 79) | 0.000 (79) |
| UKIPD | 7.57( 39) | 5.15 (37) | 0.346(37) | *1.81* ( 37) | 0.000 (37) |
| UKNoIPD | 0.37( 37) | 0.235(37) | 0.1622(37) | 0.000(37) | 0.000 (37) |

( * figures in italics greatly influenced by figures from one large UK based multinational)

## Data Table 15 : Average Numbers of IP Staff in given specialisations

**Q.11**

| Average No. of Staff | | a.TOTAL | b.General IPR | c.Litigation | d.License Contracts | e.Patent Information |
|---|---|---|---|---|---|---|
| JAPAN | (N) | 28.730 (206) | 23.700 (205) | 0.599 (204) | 2.158 (204) | 2.154 (205) |
| UK | (N) | 2.878 ( 79) | 3.010 ( 77) | 0.269 ( 77) | 0.373 ( 77) | 0.503 ( 77) |
| UKIPD | (N) | 5.250( 39) | 5.940( 37) | 0.392 ( 37) | 0.554 ( 37) | 0.945 ( 37) |
| UKNoIPD | (N) | 0.439 (38) | 0.156( 38) | 0.112 ( 38) | 0.138 ( 38) | 0.098 ( 38) |

## Data Table 16 : Specialist IP Staff based overseas

**Q.12** Does your company have specialist IP staff based overseas **1.** YES **2.** NO -> Q.13
If Yes - which countries are they in ?

**JAPAN**

| | Count | % | N = 210 |
|---|---|---|---|
| | 1.Yes | 33 | 15.71 |
| | 2.No | 177 | 84.29 |

| Total Numbers | USA | UK | Germany | Other European | Other Asian | Other | TOTAL |
|---|---|---|---|---|---|---|---|
| Working | 29.00 | 1.00 | 4.00 | 0.00 | 0.00 | 0.00 | 34 |
| Training | 27.00 | 2.00 | 5.00 | 0.00 | 0.00 | 0.00 | 34 |

Number of the above working for companies with 10000+ employees = 31
Number of the above training for companies with 10000+ employees = 24

**UK**

| | Count | % | N = 73 |
|---|---|---|---|
| | 1. Yes | 9 | 12.33 |
| | 2. No | 64 | 87.67 |

| Total Numbers | USA | Japan | Germany | Other European | Other Asian | Other | TOTAL |
|---|---|---|---|---|---|---|---|
| Working | 232 | 19 | 20 | 54 | 3 | 10 | 338 |
| Training | 1 | 0 | 1 | 10 | 2 | 1 | 15 |

## Data Table 17 : IP Staff language skills

**Q.13** How many of your company's IP department staff can discuss IP issues in these foreign languages?

| **JAPAN IP Employees** | N | Mean | Median | STDev | MIN | MAX | TOTAL | %of All |
|---|---|---|---|---|---|---|---|---|
| English | 181 | 4.017 | 2.000 | 7.387 | 0.00 | 50.00 | 727 | 14.59% |
| French | 182 | 0.0330 | 0.0000 | 0.2327 | 0.00 | 2.00 | 6 | 0.12% |
| German | 182 | 0.0824 | 0.0000 | 0.3773 | 0.00 | 3.00 | 15 | 0.30% |

Total IP staff in sample of 181 = 4983.5 (4989.5 for182 Sample)

| **UK IP Employees** | N | Mean | Median | STDev | MIN | MAX | TOTAL | %of All |
|---|---|---|---|---|---|---|---|---|
| Japanese | 73 | 0.0137 | 0.0000 | 0.1170 | 0.0000 | 1.0000 | 1 | 0.2% |
| French | 73 | 1.034 | 0.000 | 5.873 | 0.000 | 50.000 | 75.5 | 19.9% |
| German | 73 | 0.877 | 0.000 | 5.855 | 0.000 | 50.000 | 64 | 16.9% |

Total IP staff in sample of 73 = 378.90

Data Table 18 : Staff origins and destinations

**Q.14**

| % of present IP dept. staff from the following areas: - | a)JAPAN (N) | t test a:b p= | b)UK | t test a:c p= | c)UK-IPD | d)UKNoIPD |
|---|---|---|---|---|---|---|
| **a.** JOINED Co. via IP Dept. (as 1st job or mid-career) | 36.77% (198) | 0.48 | 41.49%(52) | 0.0011 | 63.5%(31) | 5.3%(19) |
| **b.** Transfer from R&D Dept. | 35.74% (198) | 0.033 | 23.33%(53) | 0.0011 | 16.4%(53) | 36.8%(19) |
| **c.** Transfer from Other Dept. | 23.4%3 (198) | 0.13 | 15.85%(53) | 0.27 | 16.9%(53) | 15.8%(19) |
| % of staff leaving the IP department in the past five years who left to : - | a)JAPAN (N) | t test a:b p= | b)UK | t test a: c p= | c)UK-IPD | d)UKNoIPD |
| **d.** RETIRE from IP Dept. | 43.71%(180) | 0.0000 | 15.01%(47) | 0.0014 | 20.4%(29) | 20.4%(29) |
| **e.** Transfer to R&D Dept. | 7.35%(179) | 0.041 | 2.13%(47) | - | - | - |
| **f.** Transfer to Other Dept. | 30.51%(180) | 0.0000 | 3.29%(48) | 0.0000 | 5.3%(30) | - |
| **g.** Leave for other employment | 9.45%(178) | 0.0035 | 28.22%(47) | 0.0022 | 35.8%(29) | 6.7%(15) |

Combining Q.7 and Q14a-Q14c gives the following totals:

| Calculated Overall Gross %'s | UK | JP |
|---|---|---|
| a. JOINED Co. via IP Dept. | 77.95% | 48.38% |
| b. Transfer from R&D Dept. | 17.05% | 34.05% |
| c. Transfer from Other Dept. | 5.15% | 17.56% |
| Total IPDept Employees (Replies) | 372.86(52) | 5268.21(198) |

Data Table 19 : Length of stay in IP/Patents department of IP Staff

**Q.15**

| (N) | UK (44) | UK-IPD (29) | Japan (208) |
|---|---|---|---|
| 1-2Years | 2.27% | 3.44% | 0.96% |
| 2-4Years | 4.54% | 6.89% | 6.73% |
| 4-6Years | 6.81% | 3.44% | 12.98% |
| 6-8Years | 6.81% | 10.34% | 13.94% |
| 8-10Years | 9.09% | 6.89% | 12.98% |
| >10Years | 70.45% | 68.96% | 52.40% |

## 4. IP Dept. Budget

Data Table 20 : IP Expenditure to Sales & R&D Expenditure Ratios

**Q.16**

| | a.---Japan---- N | MEAN | t test a: b p value | b.-----UK------ N | MEAN | c.---UK-IPD-- N | MEAN | d.--UKNoIPD-- N | MEAN |
|---|---|---|---|---|---|---|---|---|---|
| IP Expenditure/Sales | (184) | 0.00209 | 0.078 | ( 62) | 0.00376 | (29) | 0.00583 | ( 30) | 0.00115 |
| IP Expenditure/R&D Expenditure | (173) | 0.07146 | 0.80 | ( 43) | 0.0678 | (20) | 0.0815 | ( 21) | 0.0479 |
| R&D Expenditure/Sales | (191) | 0.04754 | 0.025 | (229) | 0.02384 | (57) | 0.0415 | (168) | 0.0164 |

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL |
|---|---|---|---|---|---|---|---|
| Japan ¥m | 227 | 529 | 395 | 786 | 584 | 682 | 528 |
| Japan £(140¥=£) | 1621428 | 3778571 | 2821428 | 5614285 | 4171428 | 4871428 | 3771428 |
| (N) | (35) | (60) | (16) | (30) | (21) | (24) | (186) |
| UK £ | 154091 | 623750 | 1207500 | 595083 | 440000 | 101689 | 434466 |
| (N) | (11) | (16) | ( 4) | (12) | ( 5) | (15) | (63) |

Data Table 21 : Changes in IP Budgets

**Q.17**

| Years | UK | UK-IPD | JP |
|---|---|---|---|
| Increase | 54.29% | 56.25% | 66.66% |
| Decrease | 11.43% | 6.25% | 12.56% |
| No Change | 34.29% | 37.50% | 20.77% |
| (N) | 70 | 32 | 207 |

## Data Table 22 : IP Budget Growth Rates

| Q.17 | | Five Years ago | Now | Growth | Growth/Year | Inflation Adjusted Growth | Growth /Year |
|---|---|---|---|---|---|---|---|
| Japan | (¥M) | 454.3 (186) | 528(186) | 16.20% | 3.05% | 5.03% | 0.99% |
| UK | (£) | 371770( 63) | 434466( 63) | 16.86% | 3.17% | -6.97% | -1.43% |
| UK-IPD | (£) | 674427( 30) | 746722( 30) | 10.72% | 2.06% | -11.86% | -2.49% |
| UK-NO IPD | (£) | 46568( 30) | 53989( 30) | 15.94% | 3.00% | -13.29% | -2.81% |

(Adjustment for Inflation using Consumer Price Index data in OECDMain Economic Indicators 1991-1994)

## Data Table 23 : Incidence of Transfer Charging

| Q.18 | **Industry Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|---|---|
| | Japan %Yes | 10.53 | 28.12 | 17.65 | 45.00 | 21.74 | 38.46 | **27.88** | 0.0138 |
| | (N) | (38) | (64) | (17) | (40) | (23) | (26) | (208) | |
| | t test JP : UK p = | | | | | | | | 0.26 |
| | UK %Yes | 35.71 | 50.00 | 80.00 | 25.00 | 16.67 | 13.33 | **35.14** | 0.0489 |
| | (N) | (14) | (22) | ( 5) | (12) | ( 6) | (15) | (74) | |

## 5. Overall IP Policy

## Data Table 24 : Presence of written IP plan/policy

| Q.19 | **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|---|---|
| | Japan %Yes | 68.42 | 70.31 | 44.44 | 63.16 | 83.33 | 84.62 | 69.71 | 0.0492 |
| | (N) | (38) | (64) | (18) | (38) | (24) | (26) | (208) | |
| | UK %Yes | 42.86 | 40.91 | 100.00 | 46.67 | 16.67 | 16.67 | 38.75 | 0.0200 |
| | (N) | (14) | (22) | ( 5) | (15) | ( 6) | (18) | (80) | |

| **No. of Employees** | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|
| Japan %Yes | 66.67 | 54.55 | 63.73 | 81.82 | 85.71 | 70.24 | 0.0203 |
| (N) | (6) | (22) | (102) | (33) | (42) | (205) | |
| UK %Yes | 29.17 | 25.00 | 47.62 | 40.00 | 70.00 | 38.75 | 0.1191 |
| (N) | (24) | (20) | (21) | ( 5) | (10) | (80) | |

UK %Yes 38.75% t test vs Japan p = 0.000

UK-IPD %Yes 47.40% t test vs Japan p = 0.014

## Data Table 25 : Japanese Company IP Slogans

| | No. of Slogans |
|---|---|
| Utilisation of IP / Patents | 17 |
| Strategic Use of IP / Combining Business & IPStrategy | 16 |
| Quality of Patents or Inventions | 13 |
| Respect for others' IPRs and avoidance of Infringement | 11 |
| Promoting links between IP and R&D Departments | 6 |
| Protecting Inventions / Patents | 6 |
| Effective/Valid IPRs or Action | 6 |
| Strong /Strength(ening) of IPRs | 5 |
| IPRs Contributing to Profit / Value Added | 3 |
| Cross licensing | 2 |
| Fighting Patents / From Defensive to Offensive use | 2 |
| Raise awareness of Patents / Creating IP type company | 2 |
| Re-engineering & Rationalisation | 1 |
| Protecting Freedom of action | 1 |

(N.B.Some slogans fall in to one or more categories)

## Data Table 26 : Presence of Japanese Company IP Slogans

| Q.20 | No. of Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|---|
| | % with Slogan | -- | 23.81 | 35.29 | 40.62 | 69.23 | 40.30 | p=0.0002 |
| | (N) | (7) | (21) | (102) | (32) | (39) | (201) | |

## Data Table 27 : Involvement in IP Policy Creation

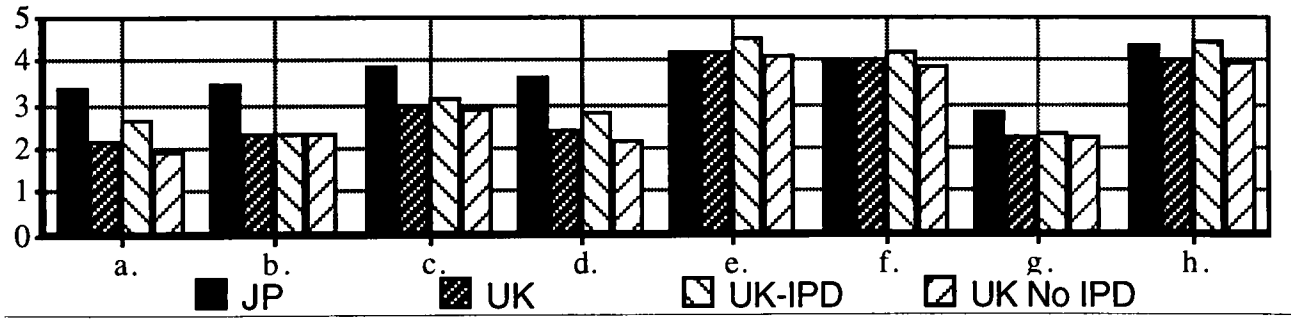
| Q.21 | 1. IP | 2. R&D | 3. Production | 4. Sales/Marketing | 5. Directors/Board Members | 6. Others |
|---|---|---|---|---|---|---|
| a.Japan %Yes | 95.63 | 35.05 | 5.15 | 5.15 | 46.91 | 5.15 |
| (N) | (194) | (194) | (194) | (194) | (194) | (194) |
| {>10000 empl. | 100.0 | 24.39 | 7.32 | 4.88 | 56.10 | 2.44} |
| b.UK %Yes | 37.50 | 66.25 | 6.25 | 30.00 | 67.50 | 7.50 |
| (N) | (80) | (80) | (80) | (80) | (80) | (80) |
| t test a:b p = | 0.0000 | 0.0000 | 0.73 | 0.013 | 0.0015 | 0.49 |
| c.UKIPD | 60.53 | 63.16 | 5.26 | 23.68 | 63.16 | 5.26 |
| (N) | (38) | (38) | (38) | (38) | (38) | (38) |
| t test a:c p = | 0.0001 | 0.0020 | 0.98 | 0.013 | 0.067 | 0.98 |
| d.UKNoIPD | 15.79* | 68.42 | 5.26 | 36.84 | 68.42 | 10.53 |
| (N) | (38) | (38) | (38) | (38) | (38) | (38) |
| {>10000 Emp | 80.00 | 60.00 | 20.00 | 30.00 | 20.00 | 10.00} |

(*6 companies who also said they had no IP department said their (non-existent) IP dept was involved by mistake)

# 6. Management Attitudes to IP & Influences

## Data Table 28 : Management Attitudes to IP

Q.22 (1=Irrelevant <-> 5=Essential )




a. A source of Revenue through licensing OUT technology
b. A source of Technology through licensing IN technology
c. A source of Technological Information
d. For use in cross licensing to allow your company to act freely
e. To protect your IP assets from free use by others
f. To monopolise your IP assets and make free use by others difficult
g. To help have your technology adopted as a technical standard
h. To gain a lead over competitors by protecting IP assets

| | a. | b. | c. | d. | e. | f. | g. | h. |
|---|---|---|---|---|---|---|---|---|
| a.Japan | 3.3900 | 3.4402 | 3.8486 | 3.5952 | 4.1619 | 3.9336 | 2.8502 | 4.3493 |
| b.UK | 2.1598 | 2.3506 | 2.9625 | 2.3966 | 4.2276 | 4.0000 | 2.2490 | 4.0697 |
| t test a:b p = | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.46 | 0.50 | 0.0000 | 0.0025 |
| c.UK IPD | 2.6600 | 2.3600 | 3.1600 | 2.8400 | 4.5430 | 4.1700 | 2.3200 | 4.4200 |
| d.UK No IPD | 1.9600 | 2.3300 | 2.8800 | 2.2100 | 4.0800 | 3.9000 | 2.2400 | 3.9300 |

## Data Table 29 : Extent of influences on thinking and actions relating to IP

**Q.23**

(1=Not at all <-> 5=Very Greatly)

a. Home Government IP policy

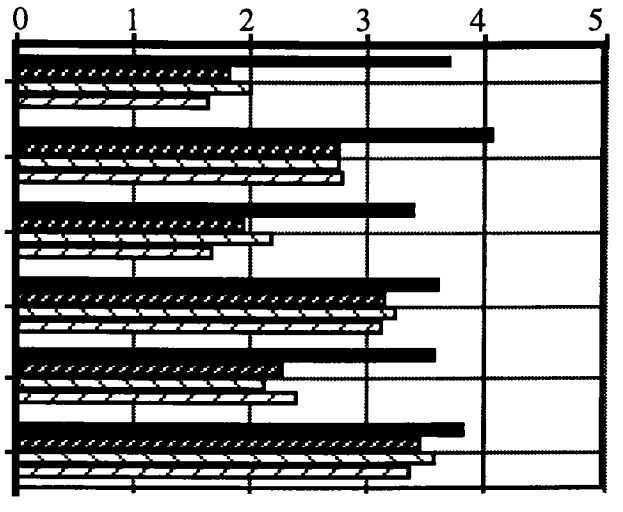
b. Home Competitor's IP practices

c. Foreign Government's IP policy

d. Overseas Competitor's IP practices

e. Home Patent Office Guidance

f. Employees Experience




JP UK UK-IPD UK No IPD

| | a. | b. | c. | d. | e. | f. |
|---|---|---|---|---|---|---|
| a.Japan | 3.719 | 4.090 | 3.433 | 3.617 | 3.576 | 3.841 |
| b UK | 1.830 | 2.790 | 1.970 | 3.170 | 2.280 | 3.490 |
| t test a:b p = | 0.000 | 0.000 | 0.000 | 0.007 | 0.000 | 0.011 |
| | | | | | | |
| c.UK IPD2.03 | 2.78 | 2.22 | 3.26 | 2.14 | 3.59 | |
| d.UK No IPD | 1.65 | 2.81 | 1.69 | 3.14 | 2.41 | 3.39 |

## Data Table 30 : Most Influential Countries

(Which countries' government and companies exert the most influence over your company thinking about IP.)

**Q.24**

| UK Companies (71 Replies) | No. | % of replies | Japanese Companies (198 Replies) | No. | % of replies |
|---|---|---|---|---|---|
| 1.USA | 49 | 69.0 | 1.USA | 176 | 88.88 |
| 2.Japan | 32 | 45.0 | 2.UK | 1 | 0.05 |
| 3.Germany | 37 | 52.1 | 3.Germany | 1 | 0.05 |
| 4.France | 16 | 22.5 | 4.France | 0 | 0.00 |
| 5.Other European | 21 | 29.6 | 5.Other European | 1 | 0.05 |
| 6.Other Asian | 5 | 7.0 | 6.Other Asian | 2 | 0.10 |
| 7.Other | 2 | 2.8 | 7.Other | 17 | 8.60 |

## Data Table 31 : Active study of competitors IP policy and actions

**Q.25**

| | Japan (N = 210) % | UK (N = 81) % |
|---|---|---|
| 1.Never | 2.86 | 6.17 |
| 2.Very Rarely | 4.76 | 8.64 |
| 3.Rarely | 10.00 | 16.05 |
| 4.Occasionally | 34.29 | 18.52 |
| 5.Often | 16.19 | 19.75 |
| 6.Very Often | 13.33 | 12.35 |
| 7.Continually | 18.57 | 18.52 |

## 7. Strategic Management of IP

### Data Table 32 : Payments for Technology

**Q.26**

| | UK | UKIPD | UK NoIPD | Japan |
|---|---|---|---|---|
| INCOME greater | 55.43% | 69.80% | 50.40% | 45.64% |
| PAYMENTS greater | 44.57% | 30.20% | 49.60% | 54.35% |
| (N) | 175 | 53 | 119 | 195 |
| t test vs Japan | 0.060 | 0.0014 | | |

**JAPAN**

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|---|
| INCOME greater | 62.86 | 44.07 | 29.41 | 35.29 | 50.00 | 46.15 | 45.64 | 0.1733 |
| PAYMENTS greater | 37.14 | 55.93 | 70.59 | 64.71 | 50.00 | 53.85 | 54.36 | |
| (N) | (35) | (59) | (17) | (34) | (24) | (26) | (195) | |

| **No. of Employees** | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|
| INCOME greater | 33.33 | 40.00 | 40.21 | 54.84 | 55.81 | 45.83( 88) | 0.3357 |
| PAYMENTS greater | 66.67 | 60.00 | 59.79 | 45.16 | 44.19 | 54.17(104) | |
| (N) | (6) | (15) | (97) | (31) | (43) | (192) | |

### Data Table 33 : Income and Payments for Technology

**Q.27**

| | N | Mean (¥M) | Min | Max |
|---|---|---|---|---|
| Total Income | 112 | 555.49 | 0 | 13000 |
| Total Payments | 109 | 421.59 | 0 | 19029 |

104 Replies gave both Income and Payment details :

| | Average Income (¥M) | Average Payment (¥M) |
|---|---|---|
| 58 had a positive balance | 710.93 | 157.28 |
| 41 had a negative balance | 173.11 | 893.46 |
| 5 had a zero balance | | |

The overall balance of income to payments was 1.056. However, 107 replies had one or both Income and Payment details missing and :

31 reported a positive balance in Q.26
63 reported a negative balance in Q.26
13 gave no answer to Q.26

If the average balances for the 104 replies which gave both Income and Expenditure details are applied to all replies to Q.26, in 89 of which Technology Sales Income was greater and in 106 of which Payments to Buy Technology were greater then the average balance of trade in technology ((A) / (B)) would be not 1.056 but :

((89 * 710.93)+(106 * 173.12))/((89 * 157.28)+(106 * 893.46))= 0.751

## 8. IPR Acquisition - Research

### Data Table 34 : Patent Applications

**Q.28**

| | Mean No. | (N) | Max No. | Mean % Filed Abroad | (N) |
|---|---|---|---|---|---|
| a.Japan | 772 | (206) | 12039 | 13.24% | (194) |
| b.UK | 19.28 | (196) | 700 | 57.45% | (184) |
| t test a:b p= | 0.0000 | | | 0.0000 | |
| c.UKIPD | 58 | ( 55) | | 73.70% | ( 53) |
| t test a:c p= | 0.0000 | | | 0.0000 | |
| d.UKNoIPD | 4 | (137) | | 50.20% | (127) |

## Data Table 35 : Patent Applications by Company Size and Industry

| Q.28 | | | | | |
|---|---|---|---|---|---|
| | Patent Applications by Industrial Sector | UK Mean No. | UK %.filed abroad N | Japan Mean No. | Japan %.filed abroad N |
| | 1.Miscellaneous | 11.5 | 63.80% (42) | 284 | 5.17% (37) |
| | 2.Chemical | 20.0 | 59.63% (38) | 535 | 11.52% (63) |
| | 3.Pharmaceutical | 61.1 | 67.77% (12) | 102 | 26.15% (18) |
| | 4.Elect/Comms | 37.8 | 57.77% (39) | 1732 | 12.27% (39) |
| | 5.Transport | 25.1 | 79.48% (12) | 721 | 14.60% (23) |
| | 6.Machinery | 4.9 | 81.32% (60) | 1109 | 6.83% (26) |
| | | | | | |
| | Patent Applications by No. of Employees | UK Mean No. | UK %.filed abroad N | Japan Mean No. | Japan %.filed abroad N |
| | 1.(0-500) | 3.77 | 79.24% (71) | 40.7 | 19.03% ( 6) |
| | 2.(500-1000) | 20.7 | 56.91% (43) | 55.2 | 11.38% ( 22) |
| | 3.(1000-5000) | 14.5 | 74.69% (54) | 215.6 | 10.20% (100) |
| | 4.(5000-10000) | 48.2 | 46.02% (11) | 497.3 | 15.44% ( 32) |
| | 5.(10000+) | 77.0 | 67.59% (17) | 2772 | 10.62% ( 43) |
| | OVERALL | | 64.44%(196) | | 11.06% (206) |

(N.B. %'s filed abroad derived from total application figures)

## Data Table 36 : Recordal of Copyright Works

**Q29** Does your company record Copyright works created ? 1. YES 2. NO

If YES how many Copyright works were recorded in the past year ? _____

| **JAPAN** N = 197 | Count | % | **UK** N = 71 | Count | % |
|---|---|---|---|---|---|
| 1.Yes | 12 | 6.09 | 1.Yes | 7 | 9.86 |
| 2.No | 185 | 93.90 | 2.No | 64 | 90.14 |

## Data Table 37 : Changes in Domestic and Foreign Patent Applications

**Q.30 /31**

| | Japanese Companies | | UK Companies | |
|---|---|---|---|---|
| | Domestic | Foreign | Domestic | Foreign |
| Increase | 30.95% | 27.05% | 37.18% | 41.56% |
| Decrease | 36.67% | 29.47% | 28.21% | 27.27% |
| No Change | 32.38% | 43.48% | 34.62% | 31.17% |
| (N) | 210 | 207 | 78 | 77 |

Japanese Company Domestic Applications ($Chi^2$ p=0.0035) :

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL |
|---|---|---|---|---|---|---|---|
| Increase | 42.11% | 34.37% | 27.78% | 22.50% | 29.17% | 23.08% | 30.95% |
| Decrease | 15.79% | 34.37% | 11.11% | 55.00% | 54.17% | 46.15% | 36.67% |
| No Change | 42.11% | 31.25% | 61.11% | 22.50% | 16.67% | 30.77% | 32.38% |
| | (38) | (64) | (18) | (40) | (24) | (26) | (210) |

Japanese Company Foreign Applications ($Chi^2$ p=0.0678) :

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach. | ALL |
|---|---|---|---|---|---|---|---|
| Increase | 16.22% | 28.57% | 38.89% | 32.50% | 20.83% | 28.00% | 27.05% |
| Decrease | 24.32% | 38.10% | 5.56% | 25.00% | 25.00% | 44.00% | 29.47% |
| NoChange | 59.46% | 33.33% | 55.56% | 42.50% | 54.17% | 28.00% | 43.48% |
| | (37) | (63) | (18) | (40) | (24) | (25) | (207) |

## 9. Licensing - General

### Data Table 38 : Licensing Alliances with Overseas Companies

**Q.32** Licensing alliances with Overseas Companies (% of respondent companies with alliances)

| | | | t test a:b | |
|---|---|---|---|---|
| UK Respondent | | a.Licensing OUT | p value | b.Licensing IN |
| Other Party : | c.Small Co. (<500 emps) | 23.9% (46) | 0.51 | 18.1% (44) |
| (t test c: d - p values) | | 0.26 | | 0.34 |
| | d.Large Co. (>500 emps) | 34.7% (46) | 0.47 | 27.2% (44) |
| Japanese Respondent | | | | |
| Other Party : | e.Small Co. (<500 emps) | 37.3% (161) | 0.51 | 28.6% (161) |
| (t test e : f - p values) | | 0.68 | | 0.0000 |
| | f.Large Co. (>500 emps) | 42.8% (161) | 0.0017 | 60.0%(161) |

The results from Question 32 are complex. First of all it should be noticed that response rates were very low and it was not possible to make reliable statements about the national licensing by UK companies. However, the remaining replies dealing with overseas organisations were still meaningful.

**Q.32 JAPANESE SURVEY** **Rows i - n & Col. b- g = 1=Yes 0 = No**

| **Row h. = Mean No. (n)** **Col. a = Mean No. (n)** | a. TOTAL No. of Alliances | b. One way Licensing OUT only | c. One way Licensing IN only | d. Cross Licensing | e. Joint Venture | f. Contract Subcontract | g. Other |
|---|---|---|---|---|---|---|---|
| h. TOTAL No. of Alliances | 50.7(131) | 21.30 (96) | 15.78 (93) | 1.853 (116) | 2.102 (127) | 3.86 (134) | 3.33(144) |
| i. Small Co. (<500 emps) in JAPAN | 15.45(131) | 0.646 (161) | 0.298 (161) | 0.043 (161) | 0.074 (161) | 0.174 (161) | 0.080(162) |
| j. Large Co. (>500 emps) in JAPAN | 15.23(131) | 0.671 (161) | 0.671 (161) | 0.447 (161) | 0.099 (161) | 0.050(161) | 0.105(162) |
| k. Other Organisations in JAPAN | 2.61(137) | 0.081 (161) | 0.211 (161) | 0.000 (160) | 0.006 (161) | 0.025 (161) | 0.049(161) |
| l. Small Co. (<500 emps) OVERSEAS | 6.36(135) | 0.373 (161) | 0.286 (161) | 0.031 (161) | 0.198 (161) | 0.062 (161) | 0.043(162) |
| m. Large Co. (>500 emps) OVERSEAS | 9.61(132) | 0.428 (161) | 0.600 (161) | 0.304 (161) | 0.255 (161) | 0.037(161) | 0.098(162) |
| n. Other Organisations OVERSEAS | 0.64(138) | 0.025 (161) | 0.150 (160) | 0.00 (160) | 0.018 (161) | 0.006(161) | 0.025(161) |

1= Yes, 0 = No

**Q.32 UK SURVEY** **Rows i - n & Col. b- g = 1=Yes 0 = No**

| **Row h. = Mean No. (n)** **Col. a = Mean No. (n)** | No. of Alliances | a. TOTAL Licensing OUT only | b. One way Licensing IN only | c. One way Licensing | d. Cross Venture | e. Joint Subcontract | f. Contract | g. Other |
|---|---|---|---|---|---|---|---|---|
| l. Small Co. (<500 emps) OVERSEAS | 2.67 (27) | 0.239(46) | 0.181(44) | 0.063(47) | 0.244(45) | 0.116(43) | 0.116(43) | 0.000(43) |
| m. Large Co. (>500 emps) OVERSEAS | 2.20 (25) | 0.347(46) | 0.272(44) | 0.288(45) | 0.222(45) | 0.069(43) | 0.069(43) | 0.023(43) |
| n. Other Organisations OVERSEAS | 0.030(33) | 0.022(44) | 0.000(43) | 0.000(45) | 0.000(44) | 0.023(43) | 0.023(43) | 0.023(43) |

1= Yes, 0 = No

Data Table 39 : Incidence of Licensing Alliances

| Q.33 | UK Licensing OUT (N=18) | UK Licensing IN (N=15) | Japan Licensing OUT (N=133) | Japan Licensing IN (N=133) |
|---|---|---|---|---|
| USA | 9 | 7 | 42 | 72 |
| Japan | 13 | 1 | 6 | 5 |
| Korea | | | 14 | 3 |
| UK | 2 | 3 | 5 | 1 |
| Germany | 2 | 2 | 4 | 11 |
| China | | | 4 | |
| Thailand | | | 3 | |
| France | 2 | | 2 | 4 |
| Switzerland | | | 2 | 1 |
| Indonesia | | | 3 | |
| Taiwan | | | 3 | |
| Sweden | | | 1 | 1 |
| Belgium | | | | 1 |
| India | 1 | | | |
| Finland | | 1 | | |
| Italy | | | | 1 |
| Holland | | 1 | | |

## 10. Licensing in

Data Table 40 : Attitudes to Licensing In Technology

| Q.34 | Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL | $Chi^2$ p |
|---|---|---|---|---|---|---|---|---|---|
| | JAPAN | 2.903 | 3.163 | 4.417 | 3.091 | 2.950 | 3.217 | 3.173 | 0.000 |
| | (N) | (31) | (49) | (12) | (33) | (20) | (23) | (168) | |
| | UK | 3.167 | 3.326 | 4.538 | 3.452 | 2.733 | 3.182 | 3.304 | 0.000 |
| | (N) | (48) | (46) | (13) | (42) | (15) | (66) | (230) | |
| | | (Average Responses : 1 = Negative 3 = Neutral 5 = Positive) | | | | | | | |

Data Table 41 : Attitudes to Roles of Licensing In Technology

Q.35

(1=Irrelevant <-> 5=Essential )

a. Being able to use the technology

b. Acquiring associated know-how

c. Saving R&D costs

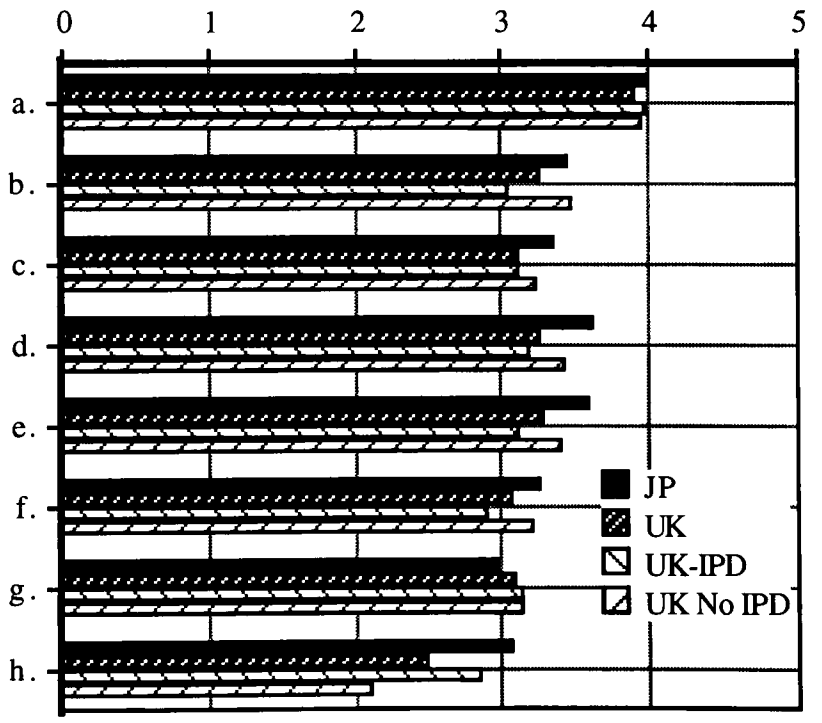
d. Saving R&D development time

e. Developing what cannot be developed in-house

f. Catching up with advanced technology

g. Reducing the need to license by developing one own technology

h. Using Cross Licenses




| | a. | b. | c. | d. | e. | f. | g. | h. |
|---|---|---|---|---|---|---|---|---|
| a.Japan | 4.0206 | 3.4635 | 3.3763 | 3.6269 | 3.6166 | 3.2796 | 2.9945 | 3.0944 |
| (N) | (194) | (192) | (194) | (193) | (193) | (186) | (182) | (180) |
| t test a:b Pvalue= | 0.52 | 0.29 | 0.15 | 0.037 | 0.062 | 0.21 | 0.47 | 0.0006 |
| b.UK (All) | 3.919 | 3.279 | 3.143 | 3.286 | 3.290 | 3.082 | 3.121 | 2.508 |
| (N) | (62) | (61) | (63) | (63) | (62) | (61) | (58) | (59) |
| | | | | | | | | |
| c.UK IPD4.000 | 3.07 | 3.14 | 3.21 | 3.14 | 2.93 | 3.15 | 2.86 | |
| (N) | (28) | (28) | (29) | (29) | (29) | (28) | (27) | (28) |
| t test a:c Pvalue | 0.92 | 0.15 | 0.35 | 0.10 | 0.071 | 0.12 | 0.52 | 0.29 |
| e.UK No IPD | 3.97 | 3.50 | 3.26 | 3.45 | 3.42 | 3.23 | 3.15 | 2.14 |
| (N) | (31) | (30) | (31) | (31) | (30) | (30) | (27) | (28) |

## Data Table 42 : Changes in Licensing In

**Q.36**

| | Japan | UK | UKIPD | UK-No IPD |
|---|---|---|---|---|
| Increase | 27.77% | 28.33% | 20.68% | 37.93% |
| Decrease | 15.66% | 8.33% | 13.79% | 3.44% |
| No Change | 56.56% | 63.33% | 65.51% | 58.62% |
| (N) | (198) | (60) | (29) | (29) |

Japanese Companies: % reporting changes ($Chi^2$ p=0.0002) :

| Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec. | 5.Tspt | 6.Mach. | ALL |
|---|---|---|---|---|---|---|---|
| Increase | 11.11% | 28.81% | 75.00% | 31.58% | 26.09% | 15.38% | 27.78% |
| Decrease | 11.11% | 23.73% | 0.00% | 10.53% | 26.09% | 11.54% | 15.66% |
| NoChange | 77.78% | 47.46% | 25.00% | 57.89% | 47.83% | 73.08% | 56.57% |
| | (36) | (59) | (16) | (38) | (23) | (26) | (198) |

## Data Table 43 : Active Search for Technology to license in.

**Q.37**

| | Japan | UK | UKIPD | UK-NoIPD |
|---|---|---|---|---|
| % of Companies | 75.4% | 34.6% | 26.2% | 38.3% |
| t test (vs Japan) p value | - | 0.0000 | 0.0000 | |

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach | ALL | $Chi^2$Pvalue |
|---|---|---|---|---|---|---|---|---|
| Japan % Yes | 65.71% | 85.00% | 93.33% | 66.67% | 73.91% | 69.23% | 75.38% | 0.0943 |
| (N) | (35) | (60) | (15) | (36) | (23) | (26) | (147) | |
| UK % Yes | 37.25% | 38.64% | 90.91% | 26.19% | 0.00% | 33.85% | 34.65% | 0.0001 |
| (N) | (51) | (44) | (11) | (42) | (15) | (65) | (228) | |

## 11. Licensing out

## Data Table 44 : Attitudes to Licensing Out Technology

**Q.38**

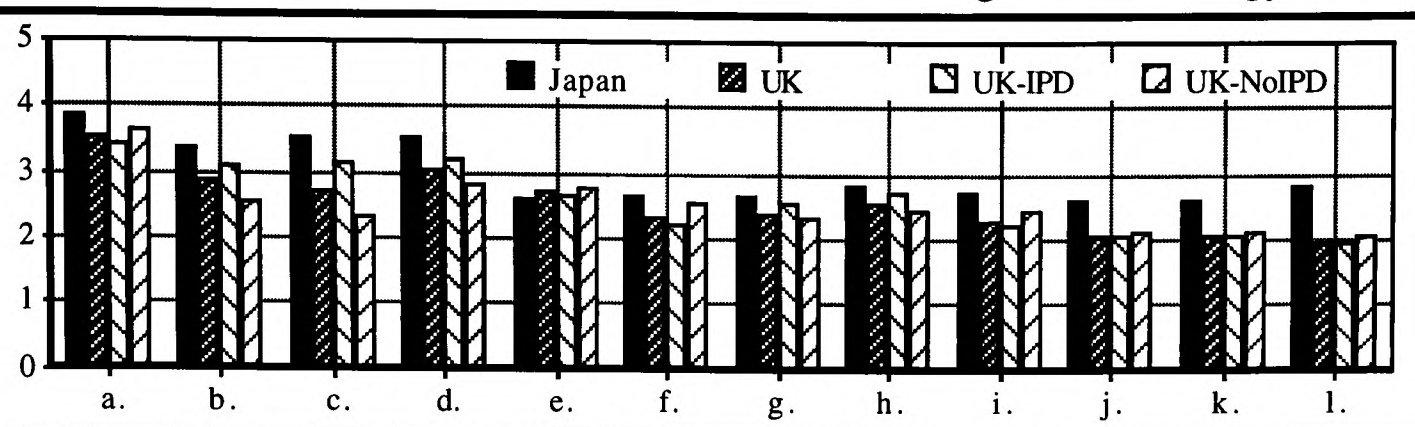
| | Japan | UK | UKIPD | UK-NoIPD |
|---|---|---|---|---|
| Average Response | 3.323 | 3.22 | 3.44 | 3.15 |
| t test (vs Japan) p value | - | 0.33 | 0.47 | |

| **Sector** | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach | ALL | ANOVA p |
|---|---|---|---|---|---|---|---|---|
| JAPAN | 3.290 | 3.114 | 3.786 | 3.290 | 3.500 | 3.381 | 3.3230 | 0.185 |
| (N) | (31) | (44) | (14) | (31) | (20) | (21) | (161) | |
| UK | 3.021 | 3.228 | 3.750 | 3.619 | 3.000 | 3.074 | 3.222 | 0.075 |
| (N) | (48) | (46) | (12) | (42) | (16) | (68) | (232) | |

(Average Responses : 1 = Negative 3 = Neutral 5 = Positive)

| **No. of Employees** | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | ANOVA p |
|---|---|---|---|---|---|---|---|
| JAPAN | 3.500 | 2.938 | 3.247 | 3.222 | 3.692 | 3.323 | 0.023 |
| (N) | (4) | (16) | (73) | (27) | (39) | (161) | |
| UK | 3.133 | 3.189 | 3.139 | 3.875 | 3.421 | 3.222 | 0.191 |
| (N) | (83) | (53) | (61) | (16) | (19) | (232) | |

## Data Table 45 : Attitudes to Roles of Licensing Out Technology

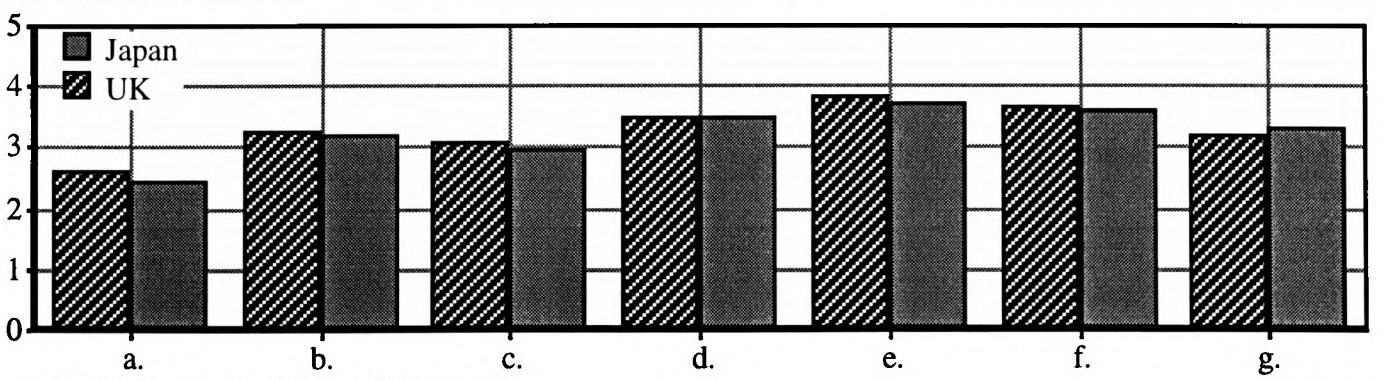



**Q.39** (Average Responses : 1 = Irrelevant 5 = Essential)

| (N) | a.Japan | t test a:b p= | b.UK | c.UK-IPD | t test a: c p= | d.UKNoIPD |
|---|---|---|---|---|---|---|
| a. receiving money as licensing fees | 3.832 (196) | 0.056 | 3.515 (68) | 3.45 (33) | 0.140 | 3.66 (32) |
| b. exploiting unused technological assets | 3.370 (193) | 0.002 | 2.866 (67) | 3.12 (33) | 0.220 | 2.58 (31) |
| c. acquiring access to technology via cross-licences | 3.529 (189) | 0.000 | 2.738 (65) | 3.13 (31) | **0.076** | 2.35 (31) |
| d. building co-operative technical relationships | 3.521 (192) | 0.001 | 3.045 (66) | 3.22 (32) | 0.130 | 2.84 (31) |
| e. controlling competitors | 2.625 (184) | 0.620 | 2.712 (66) | 2.69 (32) | 0.800 | 2.77 (31) |
| f. increasing competitors dependence on your technology | 2.667 (183) | 0.050 | 2.338 (65) | 2.25 (32) | **0.055** | 2.53 (30) |
| g. having your technology adopted as a technical standard | 2.672 (186) | 0.094 | 2.394 (66) | 2.53 (32) | 0.540 | 2.35 (31) |
| h. reducing the financial burden of exploiting technology alone | 2.813 (187) | 0.074 | 2.545 (66) | 2.72 (32) | 0.650 | 2.42 (31) |
| i. compensating for lack of marketing ability | 2.728 (184) | 0.009 | 2.308 (65) | 2.25 (32) | 0.820 | 2.43 (30) |
| j. compensating for lack of manufacturing ability | 2.611 (185) | 0.000 | 2.078 (64) | 2.06 (32) | **0.005** | 2.14 (29) |
| k compensating for lack of other critical resources or factors | 2.606 (180) | 0.000 | 2.066 (61) | 2.07 (29) | **0.018** | 2.14 (29) |
| l. contractual requirement | 2.804 (179) | 0.000 | 1.952 (62) | 1.94 (32) | **0.000** | 2.07 (27) |

## Data Table 46 : Technology which Companies will License Out

**Q.40**




(1=Not at all <-> 5=Very Willing to)

| | a.Japan | (N) | b.UK | (N) | t test a:b p = |
|---|---|---|---|---|---|
| a. Your most advanced technology | 2.431 | (190) | 2.594 | (69) | 0.40 |
| b. Technology at the same level as competitors technology | 3.219 | (187) | 3.261 | (69) | 0.80 |
| c. Technology used in your current products | 2.984 | (188) | 3.074 | (68) | 0.59 |
| d. Less advanced than competitors technology | 3.494 | (184) | 3.515 | (66) | 0.89 |
| e. Technology used in your past products | 3.692 | (182) | 3.866 | (66) | 0.27 |
| f. Technology not used directly by your company or competitors | 3.629 | (181) | 3.646 | (65) | 0.93 |
| g. Any technology needed by others to promote standardisation | 3.296 | (179) | 3.185 | (65) | 0.54 |

## Data Table 47 : Active marketing of technology for licensing out

| Q.41 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach | ALL | Chi²Pvalue |
| Japan %Yes | 32.43 | 22.41 | 58.82 | 35.14 | 33.33 | 19.23 | 30.65 | 0.0675 |
| | (37) | (58) | (17) | (37) | (24) | (26) | (199) | |
| UK %Yes | 26.92 | 21.28 | 50.00 | 20.93 | -- | 27.69 | 24.36 | 0.0694 |
| | (52) | (47) | (12) | (43) | (15) | (65) | (234) | |

## Data Table 48 : Changes in Licensing Out Activity

| Q.42 | Japan | UK | UKIPD | UK-No IPD |
|---|---|---|---|---|
| Increase | 33.67% | 32.35% | 29.41% | 35.48% |
| Decrease | 3.06% | 8.82% | 14.70% | 3.22% |
| No Change | 63.26% | 58.82% | 55.88% | 61.29% |
| (N) | (196) | (60) | (34) | (31) |

**UK**

| **No. of Employees** | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL (n) |
|---|---|---|---|---|---|---|
| 1.Inc | 35.29 | 25.00 | 25.00 | 33.33 | **55.56** | 32.35(22) |
| 2.Dec | -- | 12.50 | 20.00 | -- | -- | 8.82( 6) |
| 3.N/C | 64.71 | 62.50 | 55.00 | 66.67 | 44.44 | 58.82(40) |
| ALL | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00(68) |
| | (17) | (16) | (20) | ( 6) | ( 9) | (68) |

CHI-SQUARE = 8.612 WITH D.F. = 8 P = 0.3759 Cannot reject Ho.
Conclusion : Two variables are independent at 10% level

| **No. of Employees** | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL (n) |
|---|---|---|---|---|---|---|
| 1.Inc | 16.67 | 38.89 | 28.42 | 25.00 | **46.51** | 32.99( 63) |
| 2.Dec | 16.67 | -- | 4.21 | -- | 2.33 | 3.09( 6) |
| 3.N/C | 66.67 | 61.11 | 67.37 | 75.00 | 51.16 | 63.92(125) |
| ALL | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00(194) |
| | (6) | (18) | (95) | (32) | (43) | (194) |

CHI-SQUARE = 11.809 WITH D.F. = 8 P = 0.1598 Cannot reject Ho.
Conclusion : Two variables are independent at 10% level

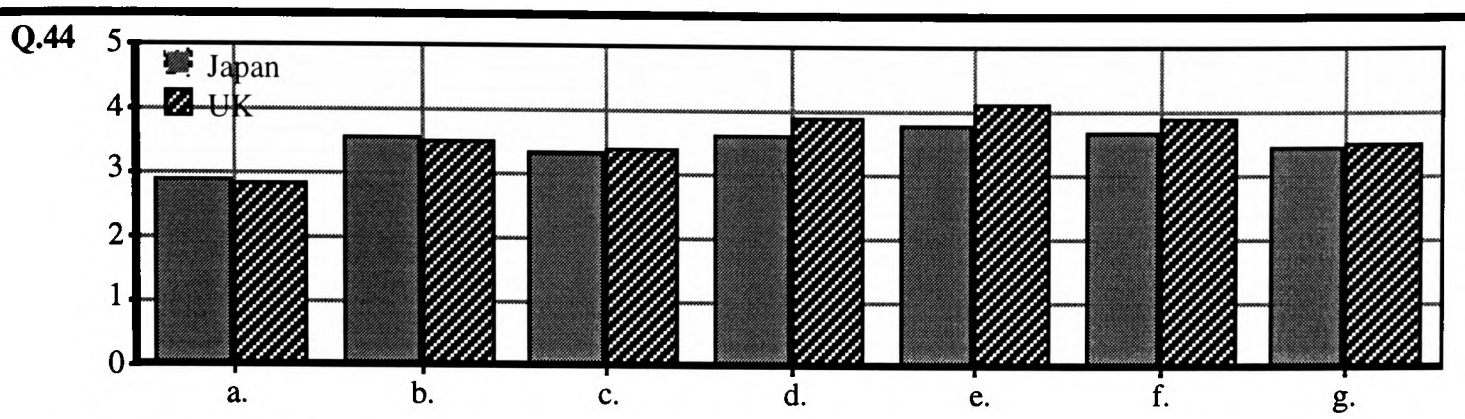
## 12. Cross licensing

## Data Table 49 : Willingness to enter cross-licensing agreements

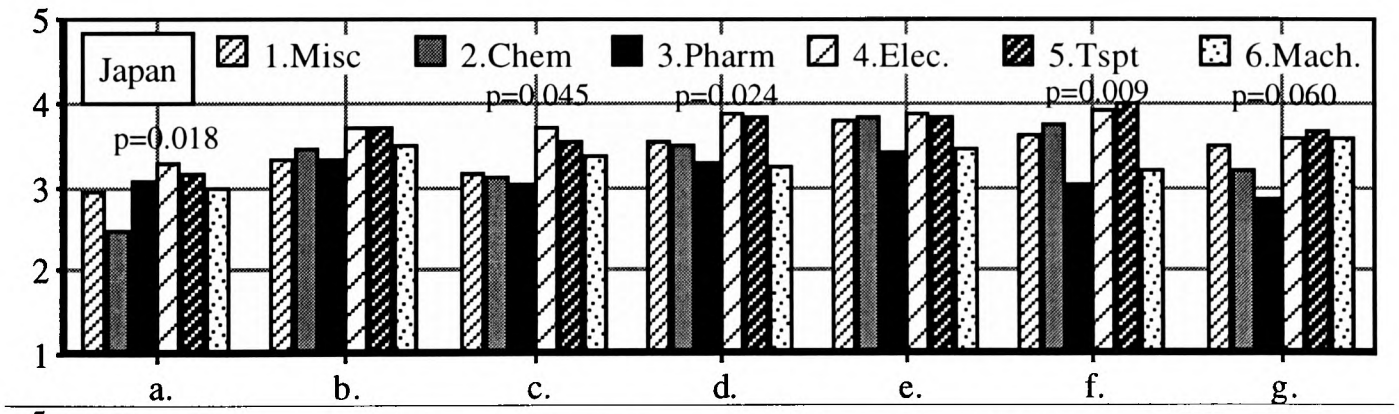
| Q.43 | Japan | UK | UKIPD | UK-No IPD |
|---|---|---|---|---|
| Yes % | 86.02% | 88.06% | 93.90% | 83.30% |
| (N) | (186) | (67) | (33) | (30) |

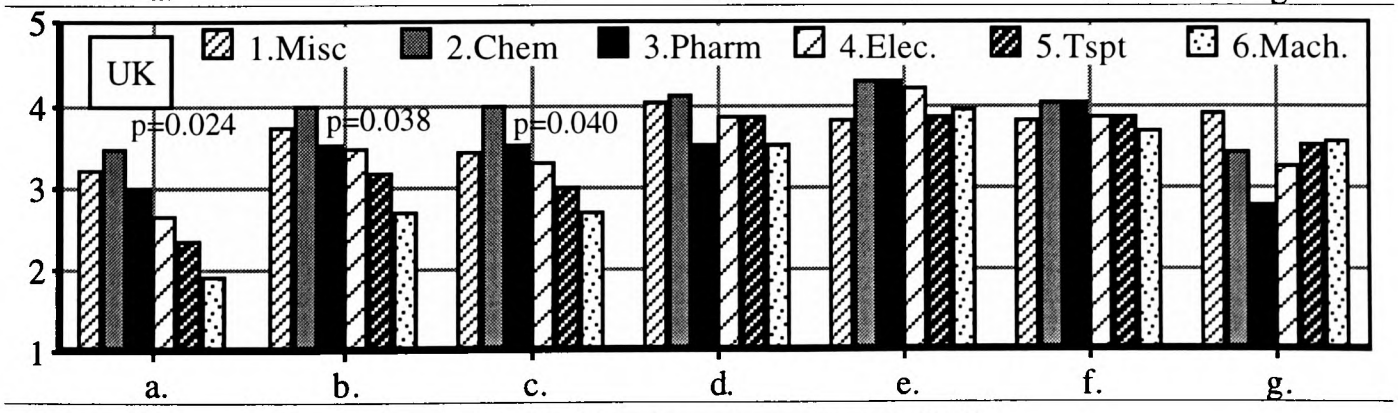
| Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach | ALL | Chi²Pvalue |
|---|---|---|---|---|---|---|---|---|
| Japan %Yes | 65.63 | 88.68 | 94.12 | 91.43 | 87.50 | 92.00 | 86.02 | 0.016 |
| | (32) | (53) | (17) | (35) | (24) | (25) | (186) | |
| UK %Yes | 91.67 | 100.00 | 100.00 | 71.43 | 66.67 | 90.91 | 88.06 | 0.0814 |
| | (12) | (20) | ( 4) | (14) | ( 6) | (11) | (67) | |

# Data Table 50 : Technology which Companies will Cross-License Out




| (1=Not at all <-> 5=Very Willing to) (N) | a.JAPAN | t test a:b p= | b.UK | c.UKIPD | t test a:c p= |
|---|---|---|---|---|---|
| a. Your most advanced technology | 2.9061 (181) | 0.73 | 2.841 (63) | 2.88 (32) | 0.89 |
| b. Technology at the same level as competitors technology | 3.5140 (179) | 0.81 | 3.476 (63) | 3.37 (32) | 0.52 |
| c. Technology used in your current products | 3.3146 (178) | 0.72 | 3.371 (62) | 3.26 (31) | 0.80 |
| d. Less advanced than competitors technology | 3.5600 (175) | 0.037 | 3.852 (61) | 3.68 (31) | 0.55 |
| e. Technology used in your past products | 3.7314 (175) | 0.017 | 4.066 (61) | 3.81 (31) | 0.71 |
| f. Technology not used directly by your company or competitors | 3.6497 (177) | 0.20 | 3.864 (59) | 3.73 (30) | 0.72 |
| g. Any technology needed by others to promote standardisation | 3.3882 (170) | 0.75 | 3.446 (56) | 3.63 (30) | 0.31 |

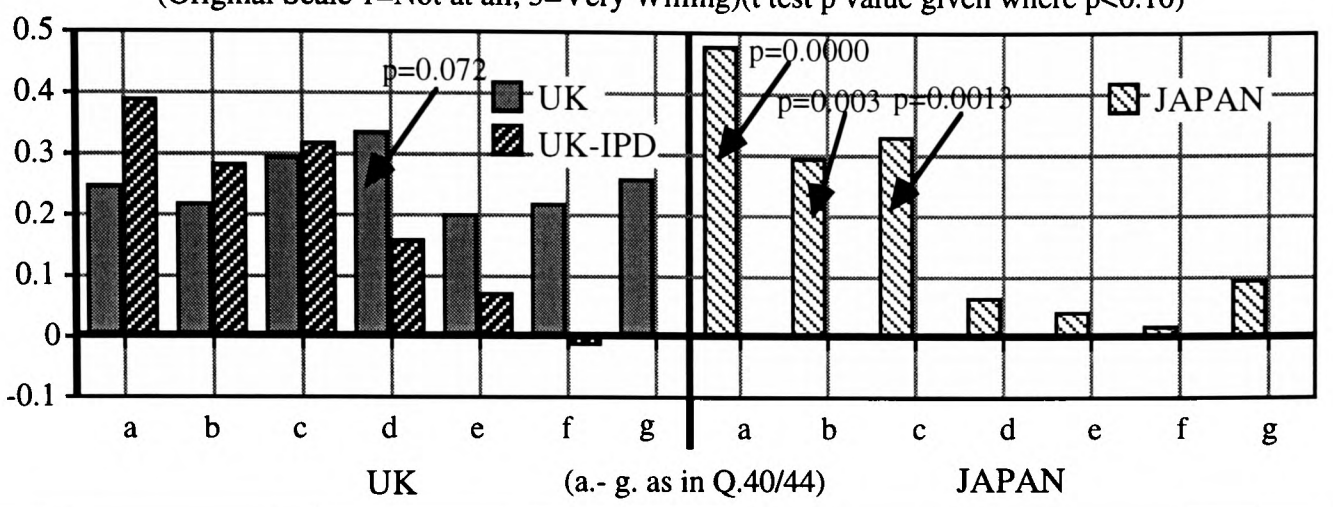



(ANOVA P values given where P<0.10)

## Data Table 51 : Differences between willingness to license and cross-license

**Q.40 & 44** Difference between willingness to license out in a cross licence and plain licence
(Original Scale 1=Not at all, 5=Very Willing)(t test p value given where p<0.10)




## Data Table 52 : Blanket Cross-licences

**Q45** In order to acquire technology would your company enter into cross licensing agreements which covered any technology in a particular field developed in the future by either party in a given time period provided balancing payments are made or would you only cross- license on a case by case basis?

| | | **JAPAN** N=192 | | **UK** | N = 62 | |
|---|---|---|---|---|---|---|
| | | Count | % | | Count | % |
| 1. YES | Blanket cross licences possible | 10 | 5.20 | | 11 | 17.74 |
| 2. NO | Case by case licensing only | 182 | 94.79 | | 51 | 82.26 |

## Data Table 53 : Changes in Cross-Licensing Activity

**Q.46**

| | Japan | UK | UKIPD | UK-No IPD |
|---|---|---|---|---|
| Increase | 20.94% | 16.07% | 16.66% | 13.04% |
| Decrease | 1.05% | 5.36% | 3.33% | 8.69% |
| No Change | 78.01% | 78.57% | 80.00% | 78.26% |
| (N) | (149) | (56) | (30) | (23) |

# 13. Infringement of IPRs

## Data Table 54 : Attitudes to Negotiating or Litigating Disputes

**Q.47** To what extent do you agree with the statement : ( 1=Strongly Disagree, 5=Strongly Agree)
"Whether one is right or not - it is always better to negotiate a settlement than to go to court"

| | | | t test | | t test | | |
|---|---|---|---|---|---|---|---|
| | | a.Japan | a: b p= | b.UK | a: c p= | c.UK-IPD | d.UK-No IPD |
| | | 3.7024 | 0.71 | 3.7364 | 0.94 | 3.691 | 3.7758 |
| | (N) | (205) | | (239) | | (68) | (165) |

## 14. Infringement of Respondent Company's IPRs

Data Table 55 : Complaints of Infringement made by Respondents

**Q.48** Average number of initial complaints of infringement made by respondent company against the following types of organisation infringing respondent company IPRs.

| | + - - - - - - Nationally based companies- - - - + | | | + - - - - - - - -Companies based overseas- - - - - + | | |
|---|---|---|---|---|---|---|
| | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns |
| a.JAPAN | 2.703 (158) | 3.867 (158) | 0.000 (159) | 1.000 (159) | 0.503 (159) | 0.038 (159) |
| b.UK | 1.238 ( 63) | 0.613 ( 62) | 0.230 ( 61) | 2.081 ( 62) | 1.476 ( 63) | 0.016 ( 61) |
| t test a:b p = | 0.015 | 0.0000 | 0.16 | 0.13 | 0.032 | 0.46 |

| t test p values for pairs of above data : | Small Co.s National (JP) | Large Co.s Overseas (JP) | Small Co.s National (UK) | Large Co.s Overseas(UK) |
|---|---|---|---|---|
| Small Co.s Overseas | 0.26 | 0.45 | 0.003 | 0.071 |
| Large Co.s National | 0.12 | 0.089 | 0.14 | 0.0000 |

Data Table 56 : Infringer's Country

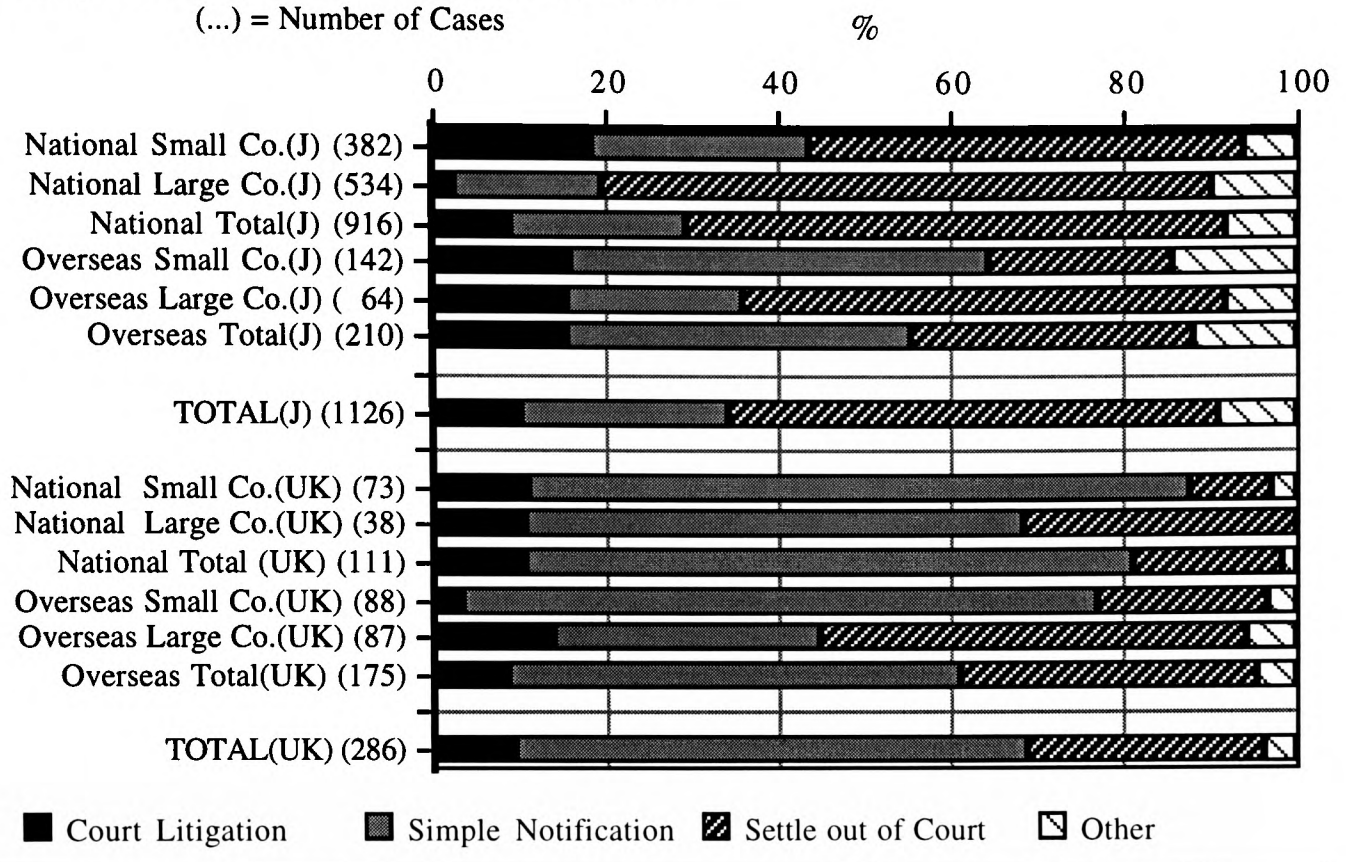
**Q49** Which has been the most frequently involved foreign country in such cases?

| **UK** | N = 41 Count |
|---|---|
| USA | 16 |
| Germany | 4 |
| Italy | 4 |
| Taiwan | 3 |
| Holland | 2 |
| China | 1 |
| France | 1 |
| Sweden | 1 |
| Japan | 1 |
| Belgium | 1 |
| UK | 1 |
| India | 1 |
| Ireland | 1 |
| None | 4 |

| **JAPAN** | N = 46 Count |
|---|---|
| Taiwan | 14 |
| USA | 10 |
| Korea | 6 |
| Germany | 3 |
| Japan | 3 |
| UK | 2 |
| China | 1 |
| Italy | 1 |
| Spain | 1 |
| Holland | 1 |
| None | 4 |

## Data Table 57 : Resolution of disputes involving respondent's IPRs

**Q.50** Sample Size : Japan : N=119-121, UK : N=46-47
(...) = Number of Cases




JAPAN (Respondents N = 119-121)

| % of Cases | + - - Nationally based companies - - - - + | | | | +- - - -Companies based overseas - - - - + | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | TOTAL |
| Simple Notification | 25.18% | 17.10% | | 20.41% | 48.74% | 20.31% | | 39.76% | 24.02% |
| Settle out of Court | 50.31% | 70.52% | | 62.11% | 20.98% | 55.78% | | 32.62% | 56.61% |
| Court Litigation | 18.36% | 2.58% | | 9.17% | 15.92% | 15.63% | | 15.71% | 10.39% |
| Other | 6.16% | 9.79% | | 8.29% | 14.37% | 8.28% | | 11.90% | 8.97% |
| TOTAL | 100.00% | 100.00% | | 100.00% | 100.00% | 100.00% | | 100.00% | 100.00% |
| TOTAL CASES | 382 | 534 | 0 | 916 | 142 | 64 | 4 | 210 | 1126 |

UK (Respondents N = 46-47)

| % of Cases | + - - Nationally based companies - - - - + | | | | +- - - -Companies based overseas - - - - + | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | TOTAL |
| Simple Notification | 76.71% | 57.89% | | 70.27% | 73.86% | 31.03% | | 52.57% | 59.44% |
| Settle out of Court | 9.59% | 31.58% | | 17.12% | 19.32% | 49.43% | | 34.29% | 27.62% |
| Court Litigation | 10.96% | 10.53% | | 10.81% | 3.41% | 13.79% | | 8.57% | 9.44% |
| Other | 2.74% | 0.00% | | 1.80% | 3.41% | 5.75% | | 4.57% | 3.50% |
| TOTAL | 100.00% | 100.00% | | 100.00% | 100.00% | 100.00% | | 100.00% | 100.00% |
| TOTAL CASES | 73 | 38 | 0 | 111 | 88 | 87 | 0 | 175 | 286 |

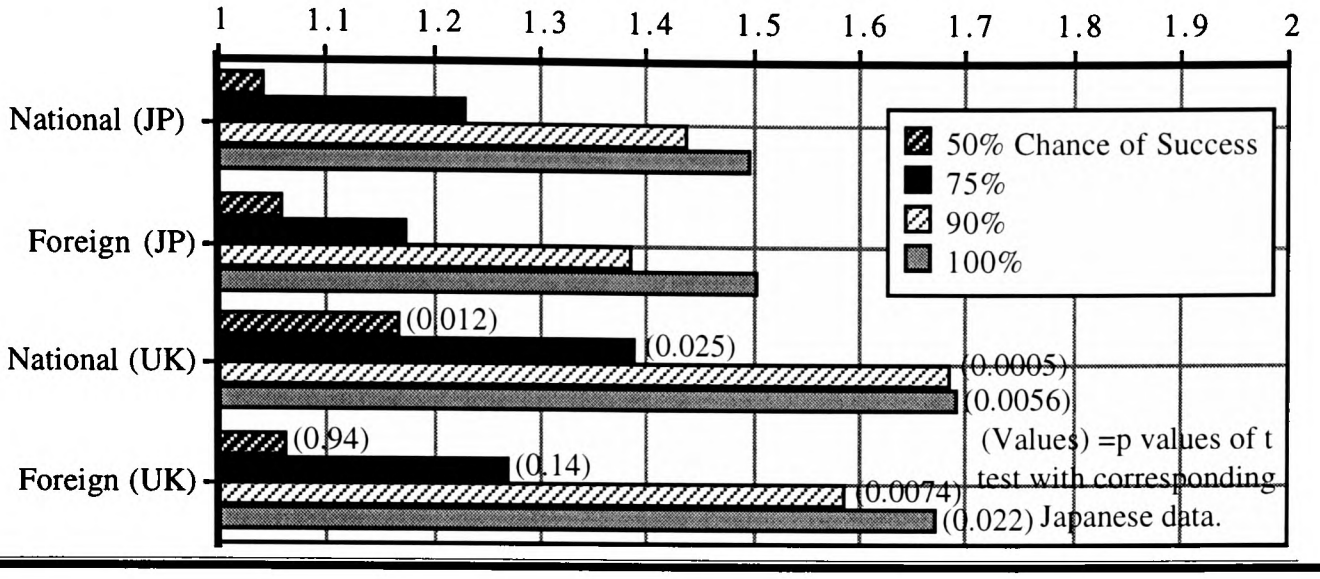
## Data Table 58 : Changes in Cases of Infringement of Respondent's IPRs

| **Q.51** | Japan | UK | UKIPD | UK-No IPD |
|---|---|---|---|---|
| Increase | 37.64% | 33.33% | 40.00% | 23.07% |
| Decrease | 3.53% | 6.67% | 6.66% | 7.69% |
| No Change | 58.82% | 60.00% | 53.33% | 69.23% |
| (N) | (170) | (60) | (30) | (26) |

## Data Table 59 : Propensity to litigate when respondent's IPRs are infringed

**Q.52**

Average propensity to go to National or Foreign court on infringement of respondent's IPRs
(Scale :1=Settle, 2=Go to court)




## Data Table 60 : Changes in Resolution of Infringement of Respondent's IPRs

**Q.53**

| | Japan Nationally | Japan Internationally | UK Nationally | UK Internationally |
|---|---|---|---|---|
| Increased use of Court | 5.92% | 5.42% | 7.55% | 12.50% |
| Decreased use of Court | 3.94% | 2.32% | 3.77% | 3.57% |
| No Change in use of Court | 90.13% | 92.24% | 88.68% | 83.93% |
| (N) | (152) | (129) | (53) | (53) |

## Data Table 61 : Frequency of Infringement Clearance Searches

| **Q.54** | 1. Never | 2. Rarely | 3. Sometimes | 4. Frequently | 5. Always | Average (N) | |
|---|---|---|---|---|---|---|---|
| a.Japan | 0.0% | 1.00% | 3.4% | 22.8% | 72.80% | 4.680 (206) | |
| b.UK | 1.3% | 12.99% | 25.97% | 29.87% | 29.87% | 3.740 (77) | |
| c.UK-IPD | 0.0% | 8.11% | 21.62% | 37.84% | 32.43% | 3.946 (37) | |
| d.UK-NoIPD | 2.70% | 18.92% | 29.73% | 21.62% | 24.32% | 3.472 (36) | |
| ( t test a.Japan average vs b.UK average : p = 0.0000 ) | | | | | | | |
| Means by Sector | 1.Misc | 2.Chem | 3.Pharm | 4.Elec | 5.Tspt | 6.Mach | ANOVA p |
| Japan | 4.3889 | 4.6825 | 4.9412 | 4.5500 | 4.9167 | 4.8846 | 0.001 |
| UK | 4.308 | 3.550 | 4.60 | 3.533 | 3.167 | 3.667 | 0.072 |

## 15. Allegations of Infringement

## Data Table 62 : Complaints of Infringement made against Respondents

**Q.55**

Average number of initial complaints of infringement against respondents made in the past five years by the following types of organisation

| | + - - - - - - Nationally based companies- - - - + | | | + - - - - - - - -Companies based overseas- - - - + | | |
|---|---|---|---|---|---|---|
| | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns | Small Co.s <500 employees | Large Co.s >500 employees | Other Orgns |
| JAPAN | 1.164 (165) | 3.163 (166) | 0.164 (165) | 0.808 (167) | 1.616 (164) | 0.463 (164) |
| UK | 0.219 ( 64) | 0.312 ( 64) | 0.032 ( 64) | 0.344 ( 64) | 0.812 ( 64) | 0.032 ( 64) |
| t test p value | 0.0002 | 0.0000 | 0.026 | 0.096 | 0.0081 | 0.0011 |

| t test p values | Small Co.s National (JP) | Large Co.s Overseas (JP) | Small Co.s National (UK) | Large Co.s Overseas(UK) |
|---|---|---|---|---|
| Small Co.s Overseas | 0.300 | 0.022 | 0.41 | 0.029 |
| Large Co.s National | 0.0004 | 0.0059 | 0.47 | 0.012 |

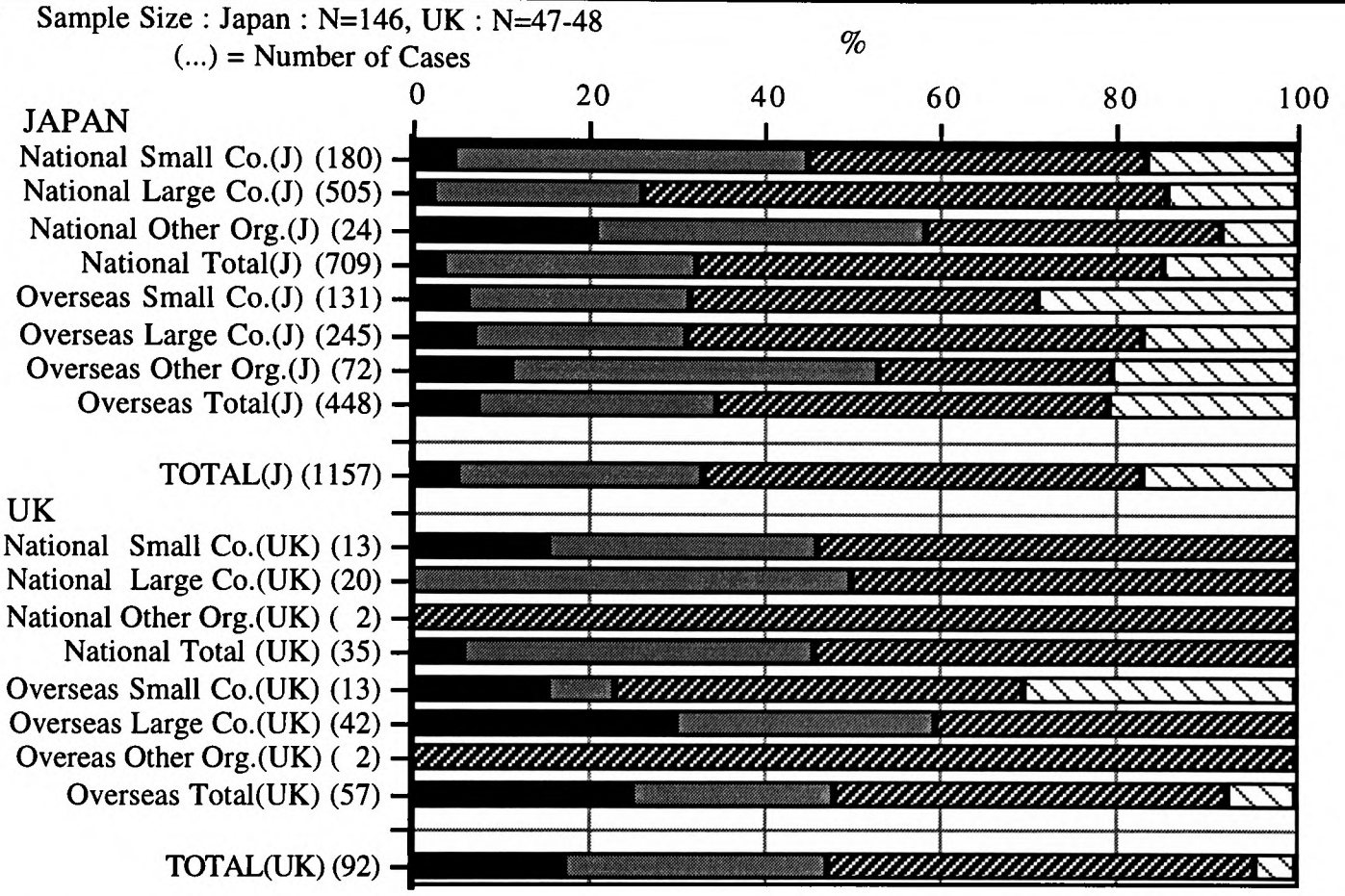
## Data Table 63 : Overseas sources of allegations of IPR Infringement

**Q.56**

| | UK (N=30) | Japan (N=99) |
|---|---|---|
| USA | 50.00% | 82.65% |
| Germany | 23.33% | 7.14% |
| France | 10.00% | 2.04% |
| UK | 10.00% | 2.04% |
| Japan | 3.33% | 4.08% |
| Holland | 3.33% | 0.00% |
| Korea | - | 1.02% |
| Switzerland | - | 1.02% |
| Sweden | - | 1.02% |

## Data Table 64 : Resolution of disputes involving alleged infringement by respondent's of others IPRs.

**Q.57** Sample Size : Japan : N=146, UK : N=47-48
(...) = Number of Cases




**UK** (N = 47-48 ) + - - Nationally based companies - - - - + +- - - -Companies based overseas - - - - - +

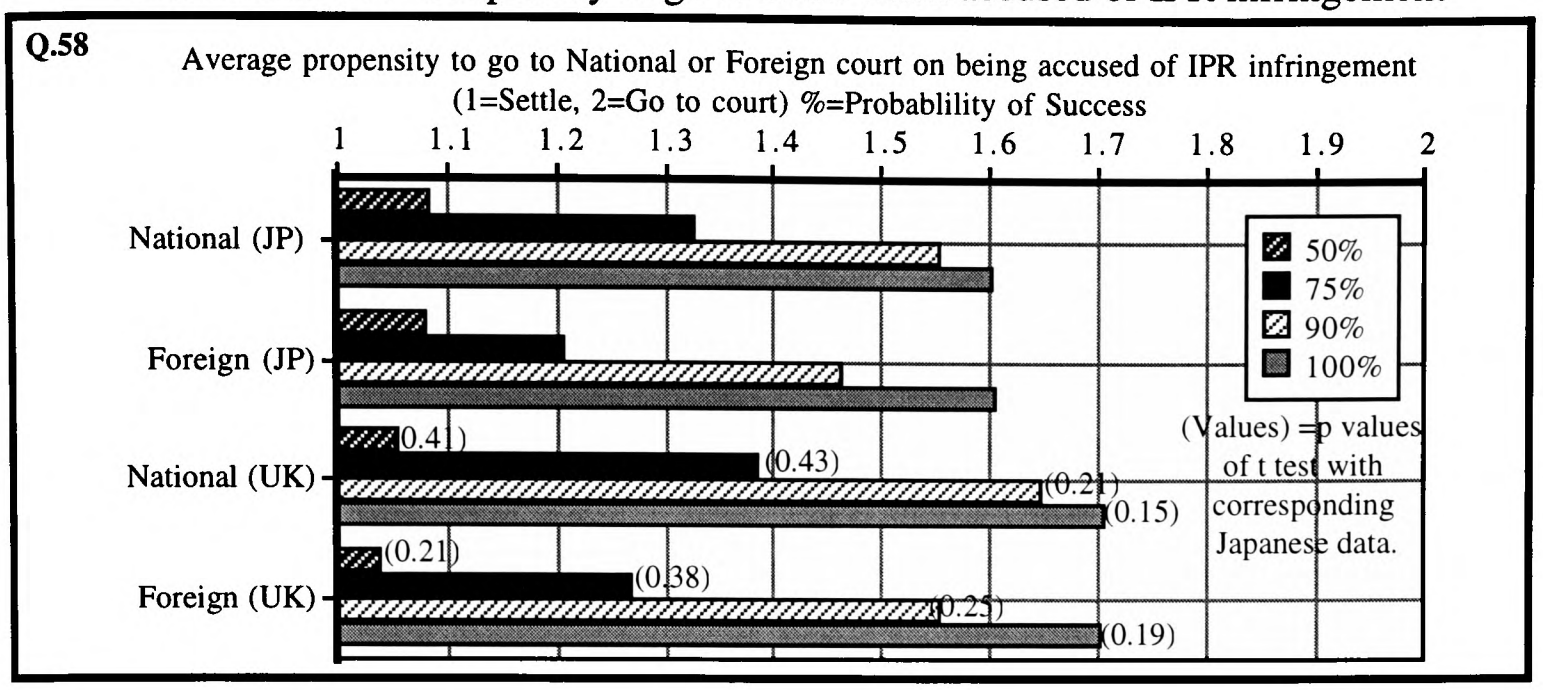
| % of Cases | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Simple Notification | 30.77% | 50.00% | 0.0% | 40.00% | 7.69% | 29.73% | 0.00% | 23.08% | 29.89% |
| Settle out of Court | 53.85% | 50.00% | 100.0% | 54.29% | 46.15% | 40.54% | 100.00% | 44.23% | 48.28% |
| Court Litigation | 15.38% | 0.00% | 0.0% | 5.71% | 15.38% | 29.73% | 0.00% | 25.00% | 17.24% |
| Other | 0.00% | 0.00% | 0.0% | 0.00% | 30.77% | 0.00% | 0.00% | 7.69% | 4.60% |
| TOTAL | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| TOTAL CASES | 13 | 20 | 2 | 35 | 13 | 42 | 2 | 57 | 92 |

**JAPAN** (N=146) + - - Nationally based companies - - - - - + +- - - -Companies based overseas - - - - - +

| % of Cases | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | Small Co.s <500 emps | Large Co.s >500 emps | Other Orgns | Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Simple Notification | 40.55% | 23.76% | 37.50% | 28.49% | 25.19% | 24.08% | 41.66% | 27.23% | 28.00% |
| Settle out of Court | 38.33% | 59.40% | 33.33% | 53.17% | 39.69% | 51.83% | 26.38% | 44.19% | 49.69% |
| Court Litigation | 4.44% | 2.37% | 20.80% | 3.52% | 6.10% | 6.94% | 11.11% | 7.36% | 5.01% |
| Other | 16.66% | 14.45% | 8.33% | 14.80% | 29.00% | 17.14% | 20.83% | 21.20% | 17.28% |
| TOTAL | 100.00% | 100.00% | 100.00 | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| TOTAL CASES | 180 | 505 | 24 | 709 | 131 | 245 | 72 | 448 | 1157 |

## Data Table 65 : Propensity to go to court when accused of IPR infringement

**Q.58**




## Data Table 66 : Changes in Resolution of Alleged Infringement by Respondent

**Q.59**

| | Japan Nationally | Japan Internationally | UK Nationally | UK Internationally |
|---|---|---|---|---|
| Increased use of Court | 2.00% | 4.00% | 4.35% | 10.87% |
| Decreased use of Court | 4.80% | 3.20% | 4.35% | 2.17% |
| No Change in use of Court | 93.10% | 92.80% | 91.30% | 86.96% |
| (N) | (145) | (126) | (46) | (46) |

## Data Table 67 : Changes in level of allegations of Infringement

**Q.60**

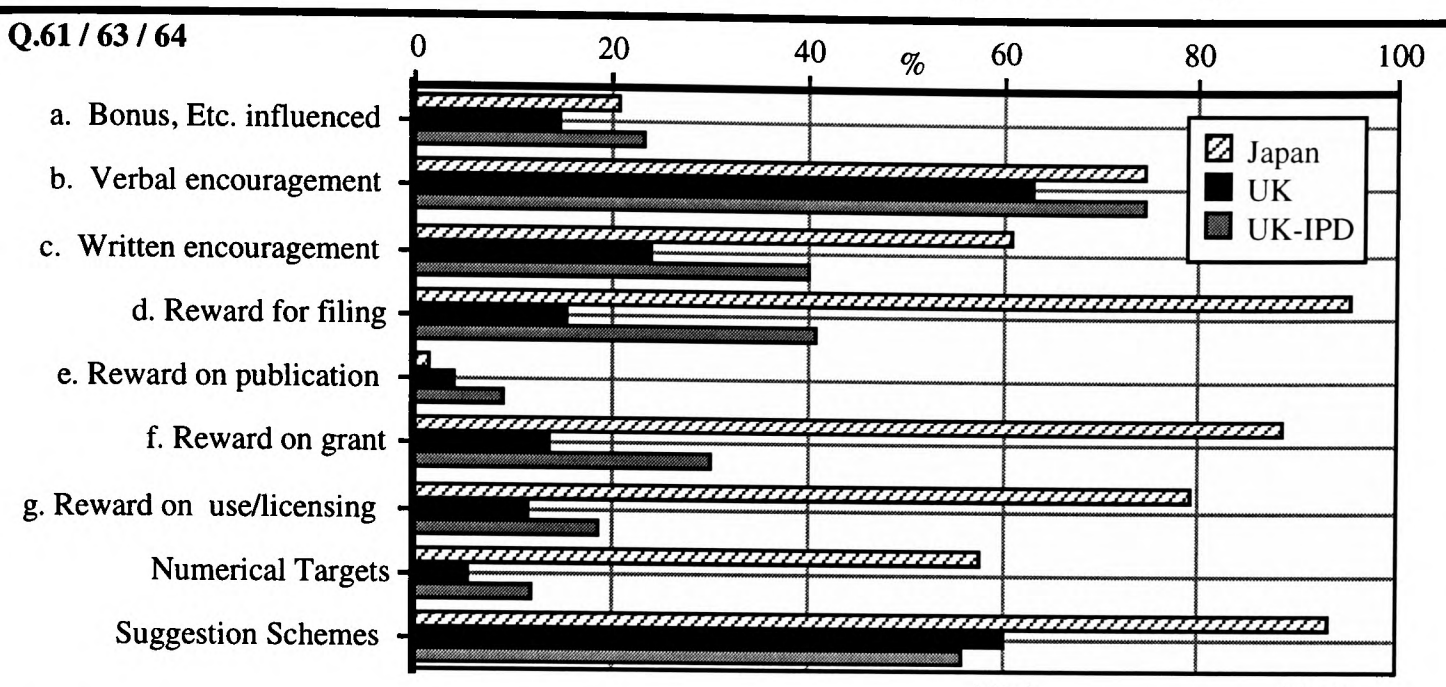
| | Japan | UK | UK-IPD | UK-NoIPD |
|---|---|---|---|---|
| Increased | 39.30% (74) | 12.28%( 7) | 17.24% | 4.00% |
| Decreased | 7.4% (14) | 5.26% ( 3) | 6.90% | 4.00% |
| No Change | 53.10%(100) | 82.46%(47) | 75.86% | 92.00% |
| (N) | (188) | (57) | (29) | (25) |

| JAPAN Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL ( N) |
|---|---|---|---|---|---|---|
| Increase | 16.67% | 31.58% | 30.34% | 54.84% | 53.66% | 39.25%( 73) |
| Decrease | 16.67% | 10.53% | 10.11% | 6.45% | -- | 7.53%( 14) |
| No Change | 66.67% | 57.89% | 59.55% | 38.71% | 46.34% | 53.23%( 99) |
| (N) | ( 6) | (19) | (89) | (31) | (41) | (186) |

Chi-Squared P = 0.0739

## 16. Operational Management of IP

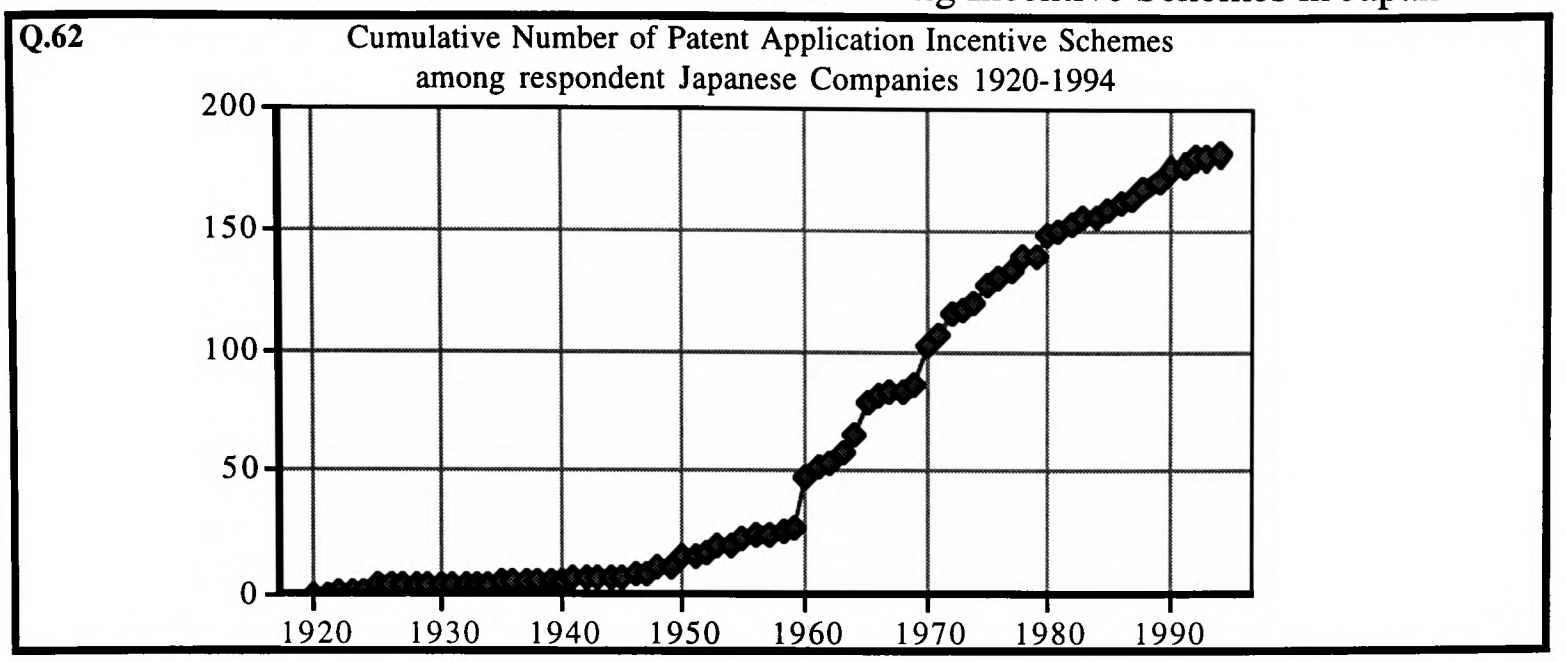
Data Table 68 : Incentives for Patent Application Filing



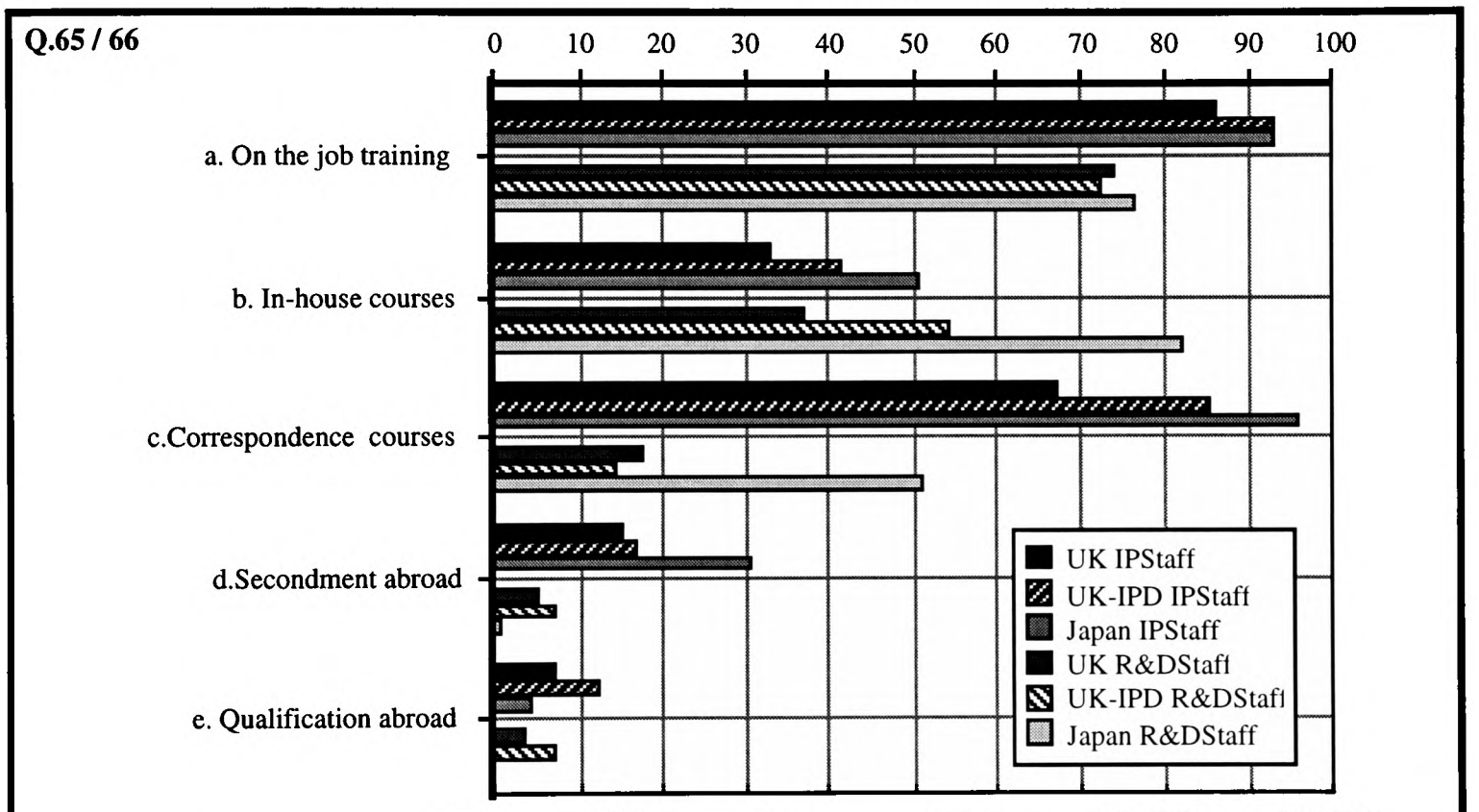

| Indirect | a.Japan | b.UK | t test a:b p= | c.UK-IPD | t test a:c p= |
|---|---|---|---|---|---|
| a. Bonus and/or Assessment is influenced by number of patent applications filed | 21.11% (199) | 15.10 (73) | 0.240 | 23.50 (34) | 0.76 |
| b. Verbal encouragement is given to file applications | 75.00% (196) | 63.40 (71) | 0.078 | 75.00 (32) | 1.00 |
| c. Written encouragement is given to file applications | 61.46% (192) | 24.40 (225) | 0.000 | 40.60 (64) | 0.0042 |
| Direct Financial Incentives on : | | | | | |
| d. Filing a Patent Application | 95.59% (204) | 15.80% (209) | 0.000 | 41.30% (63) | 0.0000 |
| e. On Publication of a Patent Application | 1.80% (164) | 4.48% ( 67) | 0.33 | 9.40% (32) | 0.16 |
| f. On Grant of a Patent | 88.83% (197) | 13.90% (208) | 0.000 | 30.60% (62) | 0.0000 |
| g. On use/licensing of an invention | 79.44% (180) | 11.80% (204) | 0.000 | 19.00% (58) | 0.0000 |
| Numerical Targets for Applications | 57.97% (207) | 5.60% ( 72) | 0.000 | 12.10% (28) | 0.0000 |
| Suggestion Schemes | 93.70%(208) | 60.60% ( 71) | 0.000 | 56.20% (32) | 0.0002 |

| Scale of Financial Rewards | | (N) | 1. £ nil | 2. £1-£33 | 3. £33-£66 | 4. >£66 | 5. Calculated Award |
|---|---|---|---|---|---|---|---|
| d. Filing a Patent Application | Japan | (204) | 4.41% | 44.61% | 39.22% | 11.27% | 0.49% |
| | UK | (209) | 84.21% | 3.83% | 1.91% | 6.22% | 3.83% |
| e. On Publication of an Application | Japan | (167) | 98.20% | 0.00% | 0.00% | 1.80% | 0.00% |
| | UK | ( 67) | 95.52% | 1.49% | 1.49% | 0.00% | 1.49% |
| f. On Grant of a Patent | Japan | (197) | 11.17% | 6.60% | 39.59% | 42.13% | 0.51% |
| | UK | (208) | 86.06% | 1.44% | 1.44% | 8.17% | 2.88% |
| g. On use/licensing of an invention | Japan | (180) | 20.56% | 0.00% | 1.11% | 65.00% | 13.33% |
| | UK | (204) | 88.24% | 0.49% | 0.00% | 1.47% | 9.80% |

## Data Table 69 : Introduction of Financial Filing Incentive Schemes in Japan




## Data Table 70 : IP Training of IP and R&D Staff




| | UK IP Staff | | UK R&D Staff | | Japan IP Staff | | Japan R&D Staff | | UK-IPD IP Staff | | UK-IPD R&DStaff | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % | N | % |
| a. On the job training | 52 | 86.54 | 66 | 74.24 | 202 | 93.56 | 194 | 76.80 | 31 | 93.5 | 33 | 72.7 |
| b. In-house courses | 39 | 33.33 | 59 | 37.29 | 197 | 50.76 | 200 | 82.50 | 24 | 41.7 | 31 | 54.8 |
| c.Correspondence courses | 46 | 67.39 | 55 | 18.18 | 202 | 96.04 | 189 | 51.32 | 28 | 85.7 | 27 | 14.8 |
| d.Secondment abroad | 39 | 15.38 | 54 | 5.56 | 195 | 30.77 | 189 | 1.06 | 23 | 17.4 | 27 | 7.4 |
| e. Qualification abroad | 39 | 7.69 | 54 | 3.70 | 192 | 4.69 | 191 | 0.00 | 23 | 13 | 27 | 7.41 |

Number of days IP training for R&D Staff in 1st year of IP training

| | (N) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | >7 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 191 | 0.52% | 53.40% | 23.04% | 10.47% | 1.57% | 3.14% | 1.05% | 1.05% | 5.76% |
| UK | 46 | 23.91% | 50.00% | 15.22% | - | - | 2.17% | - | 4.35% | 4.35% |
| UK-IPD | 22 | 13.64% | 54.55% | 13.64% | 0.00% | 0.00% | 4.55% | 0.00% | 9.09% | 4.55% |

Average (assuming >7 = 7 i.e. lower limit of average) Japan : 2.07 UK : 1.52 UK-IPD: 2.00

## 17. Education

Data Table 71 : Drafting of patent applications by R&D Staff

| Q.67 | % Yes | % Yes | t test | % Yes |
|---|---|---|---|---|
| Are R&D researchers : - | a.Japan | b.UK | a:b p= | c.UK-IPD |
| a. trained to draft patent applications? | 64.11% | 7.14% | 0.0000 | 8.60 |
| b. expected to Draft patent applications ready for filing | 9.66% | 1.52% | 0.0016 | 3.00 |
| c. expected to Draft applications for revision by the IP dept. | 73.91% | 15.38% | 0.0000 | 9.40 |
| d. expected to just describe inventions to the patent dept.. | 32.84% | 80.60% | 0.0000 | 88.20 |

## 17.1. Use of external patent attorneys

Data Table 72 : Utilisation of Outside Patent Attorneys

| Q.68 | a.Japan | t test | b.UK | t test | c.UK-IPD | d.UK-No IPD | |
|---|---|---|---|---|---|---|---|
| % of work sent to | | a:b p= | | a:c p= | | | |
| outside Attorneys | 73.05% | 0.76 | 71.36% | 0.0005 | 42.32% | 99.86% | |
| (N) | (207) | | (78) | | (37) | (37) | |
| Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | ANOVA p |
| JAPAN | 78.00% | 71.27% | 70.55% | 71.33% | 80.12% | 73.05% | 0.585 |
| (N) | (5) | (22) | (102) | (32) | (43) | (207) | |
| UK | 83.33% | 83.33% | 56.00% | 83.30% | 32.60% | 71.36% | 0.002 |
| (N) | (24) | (18) | (20) | ( 6) | (10) | (78) | |

Data Table 73 : Method of Dealing with Foreign Laws

**Q.69** How does your company deal with issues involving FOREIGN law?
**1.** Through National Attorneys **2.** Directly with Foreign Attorneys **3.** Via own Co. office abroad

**JAPAN**

| | | | | | | |
|---|---|---|---|---|---|---|
| **1.** | Through National Attorneys | | | | : | 116 |
| **2.** | | Directly with Foreign Attorneys | | | : | 43 |
| **3.** | | | Via own Co. office abroad | | : | 6 |
| **4.** | Through National Attorneys & | Directly with Foreign Attorneys | | | : | 31 |
| **5.** | Through National Attorneys & | Directly with Foreign Attorneys | & Via own Co. office abroad | | : | 2 |
| **6.** | Through National Attorneys & | | Via own Co. office abroad | | : | 5 |
| **7.** | | Directly with Foreign Attorneys | & Via own Co. office abroad | | : | 3 |
| | 154 | 79 | 16 | | N = 206 | |

**UK**

| | | | | | | |
|---|---|---|---|---|---|---|
| **1.** | Through National Attorneys | | | | : | 36 |
| **2.** | | Directly with Foreign Attorneys | | | : | 21 |
| **3.** | | | Via own Co. office abroad | | : | 2 |
| **4.** | Through National Attorneys & | Directly with Foreign Attorneys | | | : | 6 |
| **5.** | Through National Attorneys & | Directly with Foreign Attorneys | & Via own Co. office abroad | | : | 3 |
| **6.** | Through National Attorneys & | | Via own Co. office abroad | | : | 1 |
| **7.** | | Directly with Foreign Attorneys | & Via own Co. office abroad | | : | 3 |
| | 46 | 34 | 7 | | N = 72 | |

## Data Table 74 : Numbers of external firms of Patent Attornies

**Q.70** How many firms of outside Patent Attorneys do you regularly employ for Patent Application work?
a. NATIONAL Applications? _____ b. OVERSEAS Applications?_____

| **JAPAN** | N | N* | Mean | Median | TRMean | STDev | SEMean | MIN | MAX | Q1 | Q3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70a | 203 | 8 | 7.680 | 5.000 | 6.902 | 7.076 | 0.497 | 0.000 | 54.000 | 3.000 | 10.000 |
| 70b | 178 | 33 | 5.497 | 3.000 | 4.497 | 7.383 | 0.553 | 0.000 | 70.000 | 2.000 | 7.000 |

| **UK** | N | N* | Mean | Median | TRMean | STDev | SEMean | MIN | MAX | Q1 | Q3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70a | 73 | 186 | 1.219 | 1.000 | 1.138 | 0.901 | 0.105 | 0.00 | 5.00 | 1.00 | 2.00 |
| 70b | 63 | 196 | 15.87 | 2.00 | 9.65 | 36.73 | 4.63 | 0.00 | 200.00 | 1.00 | 12.00 |

## Data Table 75 : % of work sent to external firms of Patent Attornies

**Q.71** What % of your application work is sent to the firm of outside patent agents you use most?
a. In the case of NATIONAL Agents? _____% b. In the case of OVERSEAS agents?_____%

| **JAPAN** | N | N* | Mean | Median | TRMean | STDev | SEMean | MIN | MAX | Q1 | Q3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 71a | 199 | 12 | 35.67 | 30.00 | 34.02 | 26.36 | 1.87 | 0.00 | 100.00 | 15.00 | 50.00 |
| 71b | 166 | 45 | 55.09 | 50.00 | 55.55 | 30.84 | 2.39 | 0.00 | 100.00 | 30.00 | 82.50 |

TWOSAMPLE T FOR 71a VS 71b : T= -6.40 P=0.0000 DF= 326

| **UK** | N | N* | Mean | Median | TRMean | STDev | SEMean | MIN | MAX | Q1 | Q3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 71a | 69 | 190 | 67.70 | 100.00 | 69.38 | 42.53 | 5.12 | 0.00 | 100.00 | 7.50 | 100.00 |
| 71b | 56 | 203 | 66.11 | 100.00 | 68.04 | 44.09 | 5.89 | 0.00 | 100.00 | 6.25 | 100.00 |

TWOSAMPLE T FOR 71a VS 71b : T= 0.20 P=0.84 DF= 115

## 18. Integration

## Data Table 76 : IP Committees

**Q.72**

| | a.Japan | t test a:b p= | b.UK | t test a: c p= | c.UK-IPD | d.UK-No IPD |
|---|---|---|---|---|---|---|
| Average number of IP committees | 1.773 | 0.13 | 1.145 | 0.82 | 1.91 | 0.25 |
| (N) | (176) | | (69) | | (33) | (37) |

| Employees | 0-500 | 500-1000 | 1-5000 | 5-10000 | 10000+ | ALL | ANOVA p |
|---|---|---|---|---|---|---|---|
| JAPAN | 0.500 | 0.737 | 1.329 | 1.808 | 3.368 | 1.773 | 0.094 |
| (N) | (6) | (19) | (85) | (26) | (38) | (174) | |
| UK | 0.522 | 0.389 | 1.875 | 1.250 | 3.125 | 1.145 | 0.012 |
| (N) | (23) | (18) | (16) | ( 4) | ( 8) | (69) | |

## Data Table 77 : IP Committee Members

**Q.73** % of Companies with IP Committee members from stated functions

| | 1..IP Dept. | 2. R&D Dept. | 3. Production Dept. | 4. Sales/Marketing Dept. | 5. Director/Board Members | 6. Others _____ |
|---|---|---|---|---|---|---|
| a.JAPAN | 97.81% (137) | 91.97% (137) | 52.55% (137) | 24.82% (137) | 55.47% (137) | 12.41% (137) |
| t test a:b p = | 0.0005 | 0.23 | 0.0012 | 0.0001 | 0.89 | 0.58 |
| b.UK | 68.42% (38) | 84.21% (38) | 24.325 (37) | 62.16% (37) | 56.76% (37) | 16.22% (37) |
| t test a:c p = | 0.31 | 0.54 | 0.048 | 0.0087 | 0.30 | 0.57 |
| c.UK-IPD | 91.67% (24) | 87.50% (24) | 30.43% (23) | 56.50% (23) | 43.50% (23) | 17.39% (23) |
| d.UK-NoIPD | - | 75.00% (12) | 16.70% (12) | 66.70% (12) | 83.30% (12) | 8.33 (12) |

## Data Table 78 : Waiting times for application filing and publication clearance

| Q.74 | UK Filing | Japan Filing | UK Clearance | Japan Clearance |
|---|---|---|---|---|
| 1.<1 Week | 3.03% | 0.50% | 30.61% | 21.39% |
| 2.1-2 Weeks | 12.12% | 2.48% | 32.65% | 43.93% |
| 3.2-4 Weeks | 27.27% | 28.71% | 16.33% | 28.32% |
| 4.4-6 Weeks | 18.18% | 27.72% | 8.16% | 4.05% |
| 5.6-8 Weeks | 13.64% | 17.33% | 0.00% | 1.16% |
| 6.8-10Weeks | 7.58% | 8.42% | 2.04% | 0.00% |
| 7.>10 Weeks | 18.18% | 14.85% | 10.20% | 1.16% |
| All | (N)=66 | (N)=202 | (N)=49 | (N)=173 |
| Estimated Average | 5.75 Weeks | 5.54 Weeks | 2.94 Weeks | 5.74 Weeks |

## Data Table 79 : Ranking of Inventions / Applications

| Q.75 | a.Japan | b.UK | c.UK-IPD | d.UK-NoIPD |
|---|---|---|---|---|
| % of Respondents using Ranking | 67.14% | 22.06% | 32.30% | 9.10% |
| (N) | (210) | (68) | (31) | (33) |
| t test (- : a) p value | | 0.0000 | 0.0000 | |

## Data Table 80 : Departments involved in ranking inventions/applications

| Q.76 | % of Companies with members from stated functions involved in ranking. | | | | | |
|---|---|---|---|---|---|---|
| (N) | **1..**IP Dept. | **2.** R&D Dept. | **3.** Production Dept. | **4.** Sales/Marketing Dept. | **5.** Director/Board Members | **6.** Others |
| Japan+Ranking | 84.89%(139) | 79.86%(139) | 17.27%(139) | 5.04%(139) | 2.88%(139) | 2.88%(139) |
| UKIPD+Ranking | 80.00%( 10) | 80.00%( 10) | 30.00%( 10) | 70.00%( 10) | 30.00%( 10) | 0.00%( 10) |

## Data Table 81 : Involvement of Personnel in IP related decisions

**Q.77** % of Companies with members from stated functions involved in decisions.
(Average % in respect of all questions listed here)

a. Filing National Patent Applications
b. Filing Foreign Patent Applications
c. Requesting Examination
d. Abandoning Applications
e. Paying Patent Renewal Fees
f. Taking action against Infringers
g. Preservation of Documentation
h. Inclusion in Collaborative Research
i. Ranking of Confidential Information
j. Seeking a patent licence
k. Granting a patent licence
l. Arranging Cross licensing
m. Allowing Publication in Journals/Conferences

| (N) | **1.**IP Dept. | **2.** R&D Dept. | **3.** Production Dept. | **4.** Sales/Marketing Dept. | **5.** Director/Board Members | **6.** Others |
|---|---|---|---|---|---|---|
| Japan (197-210) | 83.50% | 74.95% | 25.21% | 16.47% | 34.65% | 11.63% |
| UK (60-72) | 45.38% | 55.12% | 7.88% | 30.18% | 52.32% | 8.06% |
| UKIPD (30-33) | 71.67% | 50.28% | 7.78% | 26.79% | 43.07% | 5.44% |
| UKNoIPD(28-35) | 20.31% | 61.37% | 7.46% | 3.24% | 62.50% | 9.70% |

**Q.77**

| **JAPAN** MeanValues 1=Yes 0=No | (N) | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales | **5.** Director | **6.** Other |
|---|---|---|---|---|---|---|---|
| a. Filing National Patent Appl'ns | (210) | 0.966 | 0.685 | 0.195 | 0.042 | 0.100 | 0.028 |
| b. Filing Foreign Patent Appl'ns | (208) | 0.942 | 0.788 | 0.245 | 0.158 | 0.394 | 0.076 |
| c. Requesting Examination | (210) | 0.938 | 0.814 | 0.238 | 0.076 | 0.076 | 0.047 |
| d..Abandoning Applications | (207) | 0.932 | 0.830 | 0.236 | 0.111 | 0.173 | 0.053 |
| e. Paying Patent Renewal Fees | (209) | 0.923 | 0.741 | 0.239 | 0.134 | 0.095 | 0.038 |
| f. Taking action against Infringers | (209) | 0.971 | 0.775 | 0.358 | 0.325 | 0.602 | 0.138 |
| g. Preservation of Documentation | (199) | 0.909 | 0.286 | 0.110 | 0.045 | 0.040 | 0.150 |
| h. Inclusion in Collaborative Rsch | (207) | 0.497 | 0.951 | 0.241 | 0.154 | 0.420 | 0.120 |
| i. Ranking of Confidential Info | (165) | 0.593 | 0.630 | 0.278 | 0.139 | 0.206 | 0.248 |
| j. Seeking a patent licence | (204) | 0.843 | 0.823 | 0.352 | 0.303 | 0.696 | 0.156 |
| k. Granting a patent licence | (206) | 0.893 | 0.787 | 0.333 | 0.304 | 0.705 | 0.154 |
| l. Arranging Cross licensing | (200) | 0.875 | 0.770 | 0.310 | 0.285 | 0.665 | 0.135 |
| m. Allowing Pub'n in Jnls/Conf. | (197) | 0.568 | 0.858 | 0.136 | 0.060 | 0.328 | 0.161 |

| **P Values for t test JAPAN:UK-IPD** | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales | **5.** Director | **6.** Other |
|---|---|---|---|---|---|---|
| a. Filing National Patent Appl'ns | **0.039** | **0.0050** | 0.29 | **0.0041** | - | - |
| b. Filing Foreign Patent Appl'ns | **0.085** | 0.47 | **0.077** | **0.0011** | 0.28 | |
| c. Requesting Examination | **0.026** | **0.0000** | **0.0000** | 0.26 | **0.071** | - |
| d..Abandoning Applications | **0.060** | 0.11 | **0.099** | **0.0006** | **0.0074** | - |
| e. Paying Patent Renewal Fees | **0.041** | **0.032** | **0.019** | **0.0012** | **0.0008** | 0.84 |
| f. Taking action against Infringers | **0.0087** | **0.0000** | **0.0000** | 0.80 | **0.069** | **0.0079** |
| g. Preservation of Documentation | 0.19 | 0.25 | - | | 0.32 | 0.10 |
| h. Inclusion in Collaborative Rsch | 0.34 | **0.0084** | **0.0012** | **0.061** | 0.34 | **0.023** |
| i. Ranking of Confidential Info | 0.65 | **0.025** | **0.0000** | 0.18 | 0.31 | **0.027** |
| j. Seeking a patent licence | **0.082** | **0.0014** | **0.014** | 0.45 | **0.091** | 0.68 |
| k. Granting a patent licence | **0.085** | **0.0004** | **0.0000** | 0.84 | 0.39 | 0.70 |
| l. Arranging Cross licensing | **0.037** | **0.0000** | **0.0014** | 0.95 | 0.67 | 0.93 |
| m. Allowing Pub'n in Jnls/Conf. | **0.072** | **0.0036** | **0.0098** | 0.16 | 0.62 | **0.056** |

| **UK-IPD** Mean Values 1= Yes 0 = No (N) | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales | **5.** Director | **6.** Other |
|---|---|---|---|---|---|---|
| a. Filing National Patent Applications | 0.818(33) | 0.878(33) | 0.125(32) | 0.363(33) | 0.375(32) | 0.000(32) |
| b. Filing Foreign Patent Applications | 0.818(33) | 0.727(33) | 0.125(32) | 0.484(33) | 0.500(32) | 0.000(32) |
| c. Requesting Examination | 0.757(33) | 0.312(32) | 0.031(32) | 0.151(33) | 0.218(32) | 0.000(32) |
| d..Abandoning Applications | 0.787(33) | 0.687(32) | 0.125(32) | 0.454(33) | 0.437(32) | 0.000(32) |
| e. Paying Patent Renewal Fees | 0.757(33) | 0.531(32) | 0.093(32) | 0.454(33) | 0.424(33) | 0.031(32) |
| f. Taking action against Infringers | 0.757(33) | 0.250(32) | 0.062(32) | 0.303(33) | 0.757(33) | 0.031(32) |
| g. Preservation of Documentation | 0.812(32) | 0.193(31) | 0.000(31) | 0.000(31) | 0.096(31) | 0.064(31) |
| h. Inclusion in Collaborative Research | 0.406(32) | 0.727(33) | 0.062(32) | 0.060(33) | 0.333(33) | 0.031(32) |
| i. Ranking of Confidential Information | 0.548(31) | 0.400(30) | 0.033(30) | 0.066(30) | 0.300(30) | 0.100(30) |
| j. Seeking a patent licence | 0.687(32) | 0.500(32) | 0.161(31) | 0.375(32) | 0.531(32) | 0.129(31) |
| k. Granting a patent licence | 0.750(32) | 0.419(31) | 0.064(31) | 0.322(31) | 0.625(32) | 0.129(31) |
| l. Arranging Cross licensing | 0.687(32) | 0.333(30) | 0.096(31) | 0.290(31) | 0.625(32) | 0.129(31) |
| m. Allowing Pub'n in Jnls/Conferences | 0.727(33) | 0.575(33) | 0.031(32) | 0.156(32) | 0.375(32) | 0.062(32) |

| **UK** Mean Values 1= Yes 0 = No | **1.** IP | **2.** R&D | **3.** Prod'n | **4.** Sales | **5.** Director | **6.** Other |
|---|---|---|---|---|---|---|
| a. Filing National Patent Applications | 0.500(72) | 0.833(72) | 0.114(70) | 0.394(71) | 0.557(70) | 0.028(70) |
| b. Filing Foreign Patent Applications | 0.500(72) | 0.750(72) | 0.128(70) | 0.464(71) | 0.600(70) | 0.028(70) |
| c. Requesting Examination | 0.507(71) | 0.500(70) | 0.043(69) | 0.157(70) | 0.289(69) | 0.043(69) |
| d..Abandoning Applications | 0.486(72) | 0.690(71) | 0.100(70) | 0.464(71) | 0.542(70) | 0.042(70) |
| e. Paying Patent Renewal Fees | 0.500(72) | 0.563(71) | 0.071(70) | 0.366(71) | 0.436(71) | 0.042(70) |
| f. Taking action against Infringers | 0.478(69) | 0.338(68) | 0.073(68) | 0.333(69) | 0.811(69) | 0.058(68) |
| g. Preservation of Documentation | 0.485(70) | 0.405(69) | 0.058(69) | 0.072(69) | 0.246(69) | 0.101(69) |
| h. Inclusion in Collaborative Research | 0.272(66) | 0.701(67) | 0.045(66) | 0.104(67) | 0.462(67) | 0.075(66) |
| i. Ranking of Confidential Information | 0.349(63) | 0.451(62) | 0.032(62) | 0.112(62) | 0.354(62) | 0.129(62) |
| j. Seeking a patent licence | 0.432(67) | 0.537(67) | 0.123(65) | 0.424(66) | 0.636(66) | 0.138(65) |
| k. Granting a patent licence | 0.484(66) | 0.446(65) | 0.078(64) | 0.390(64) | 0.692(65) | 0.140(64) |
| l. Arranging Cross licensing | 0.467(62) | 0.383(60) | 0.098(61) | 0.393(61) | 0.677(62) | 0.131(61) |
| m. Allowing Pub'n in Jnls/Conferences | 0.439(66) | 0.569(65) | 0.062(64) | 0.250(64) | 0.500(64) | 0.093(64) |

## 19. Environmental factors

Data Table 82 : Opinions on Changes in IP law and Attitudes to IP

| Q.78 / 79 | IP Law | | Japanese & Western Attitudes to IP | |
|---|---|---|---|---|
| | UK % | Japan% | UK % | Japan% |
| 1. Rapidly Converging | 14.29% | 8.60% | 3.12% | 8.20% |
| 2. Slowly Converging | 72.86% | 84.10% | 53.12% | 85.00% |
| 3. Remaining almost the same | 7.14% | 6.20% | 37.50% | 5.80% |
| 4. Slowly Diverging | 5.71% | 1.00% | 6.25% | 0.50% |
| 5. Rapidly Diverging | 0.00% | 0.00% | 0.00% | 0.50% |
| (N) | 70 | 208 | 64 | 207 |
| Average (1-5) | 2.043 | 1.995 | 2.469 | 2.000 |
| t test P value (vs Japan) | 0.58 | | 0.0000 | |

## 20. Respondent Details

Data Table 83 : Respondent Details

Respondent Details - Japanese Survey (N)=106

| 部長 | 課長 | 室長 | メンバー | スタッフ |
|---|---|---|---|---|
| **Bucho** | **Kacho** | **Shitsucho** | **Member** | **Staff** |
| Head of Division | Head of Section | Head of Room | Department Member | Member of Staff |
| 53 | 32 | 17 | 2 | 2 |
| 50% | 30% | 16% | 2% | 2% |

## 21. Ratio Analyses

Data Table 84 : Ratio Analysis Tables a. - l.

| a. | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept.Expenditure / Tot.Sales | 184 | 0.0021 | 0.168 | 0.852 |
| UK : IP Dept.Expenditure / Tot.Sales | 62 | 0.00376 | 0.451 | 0.312 |

| b. | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept.Expenditure / R&D Exp. | 173 | 0.0715 | 0.046 | 0.054 |
| UK : IP Dept.Expenditure / R&D Exp. | 43 | 2.28 | 0.633 | 0.821 |

| c. | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept.Expenditure / Pat.Appl'n (Million Yen/Application) | 182 | 1.544 | 0.000 | 0.356 |
| UK : IP Dept.Expenditure / Pat.Appl'n (£/Application) | 53 | 25400 | 0.231 | 0.972 |

| d. | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept.Expenditure / IPDept.Emp (Million Yen/Employee) | 186 | 20.10 | 0.530 | 0.646 |
| UK : IP Dept.Expenditure / IPDept.Emp.32 (£/Employee) | 141348 | | 0.828 | 0.012 |

| **e.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept.Employee / Co. Employee | 208 | 0.0046 | 0.000 | 0.000 |
| UK : IP Dept.Employee / Co. Employee | 245 | 0.00167 | 0.229 | 0.056 |

| **f.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : IP Dept. Employee / R&D Employee | 197 | 0.0441 | 0.194 | 0.073 |
| UK : IP Dept. Employee / R&D Employee | 187 | 0.0748 | 0.222 | 0.420 |

| **g. =(e./f.)** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : R&D Employee / Co. Employee | | 0.1043 | | |
| UK : R&D Employee / Co. Employee | | 0.0223 | | |

| **h.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : Patent Appl'ns / IPDept.Employee | 206 | 19.96 | 0.002 | 0.000 |
| UK : Patent Appl'ns / IPDept.Employee | 103 | 7.61 | 0.436 | 0.581 |

| **i.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : Patent Appl'n / R&D Employee | 194 | 0.799 | 0.101 | 0.355 |
| UK : Patent Appl'n / R&D Employee | 152 | 0.3757 | 0.476 | 0.826 |

| **j.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : R&D Expenditure / Patent Appl'n (Million Yen/Patent Application) | 187 | 56.70 | 0.000 | 0.915 |
| UK : R&D Expenditure / Patent Appl'n (£/Patent Application) | 132 | 189085 | 0.066 | 0.763 |

| **k.** | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
|---|---|---|---|---|
| JAPAN : R&D Expenditure / R&D Employee | 185 | 19.96 | 0.136 | 0.004 |
| UK : R&D Expenditure / R&D Employee | 180 | 15028 | 0.320 | 0.643 |
| | N | MEAN | Anova p Ind.Sect. | Anova p No.Emp. |
| JAPAN : R&D Exp. / Sales | 191 | 0.0475 | 0.000 | 0.949 |
| UK : R&D Exp. / Sales | 229 | 0.02384 | 0.191 | 0.559 |

# Appendix M Japanese Company Patent Information Management Services

## Japanese Companies' Patent Information Management

| | |
|---|---|
| 王子製紙 Oko Paper | Technology Information Centre within Patent Dept. |
| 花王 Kao Corp. | Patent/Information Division. |
| クボタ Kubota | Patent Information Management by R&D Depts and Patent Specialists. |
| 神戸製鋼所<br>Kobe Steel | Technology Information Planning Division<br>Patent Information Management System . |
| 三洋化成<br>SanyoChemical | Technology Information Management by Research Affairs Division<br>Patent Searching and Watching services by Patent Division. |
| 積水建設<br>Sekisui | Research Results Data Management System for internal information<br>Patent Centre conducts patent searching using various databases. |
| 島津製作所<br>Shimadzu | Patent Information Management by Intellectual Property Department in cooperation with R&D management staff. |
| シャープ Sharp | Intellectual Property Rights Centre. |
| 住友電気工業<br>SumitomoElectric | Techno-Research Centre for Patent Information Searches<br>Patent Division Patent search service with terminals in R&D Centres. |
| 東京ガス<br>Tokyo Gas | Planning & Patent Information Group supports Patent related activities<br>Public patent searching systems accessible from each R&D Centre. |
| 豊田工機<br>Toyota Machinery | Intellectual Property division specialist patent searching staff provide Information and Patent Review services . |
| 東芝 Toshiba | Toshiba Group Information Network allows searching by all staff.<br>A separate company: Toshiba Techno-Centre Inc. also provides services. |
| 日本鉱業<br>Nippon Mining | Online searching by R&D centres & Patent Dept. Information service.<br>Preparation of Patent Investigation Reports for R&D planning. |
| 日本鋼管<br>JapanSteelPipe | Electronic Patent Management system including on-line searching.<br>Joint production of patent maps by R&D and Patent Departments. |
| 日本合成ゴム<br>Japan Synthetic Rubber | Internal and External technology information databases. Computerised patent management system. Patent Investigations by Patent Dept. |
| 日本電気<br>NEC | Internal Information search service run by Patent Department using terminals linked to external Patent Information Organisations. |
| 日産自動車<br>NissanMotors | Online searching of databases with access provided to researchers.<br>Computerised patent management system used by patent department who also provide analysis of technological trends using patent data. |
| 日立金属<br>HitachiMetals | Collection of Patent information carriedout by main company main development division's patent department. |
| 日立製作所<br>HitachiWorks | Company wide on-line patent information database located in main Intellectual Property divisions offices and accessible by other offices. |
| 松下電器産業<br>MatsushitaElectric | Intellectual Property Rights Centre exists but patent searching carried out by separate company: Matsushita Techno-Research. |
| 三菱電気MitsubishiElectric | On-line database searching facilities provided. |
| 三菱重工業<br>MitsubishiHeavyIndustry | Patents and Contracts division provides patent searching and analysis services and support including patent mapping. |
| 雪印乳業<br>SnowBrandDairies | On-line patent searching by Patent Department. Searching of technical information by Research Information Group. |
| リョービ Ryobi | Technology and Patent Information service provided by Patent Dept. |

Derived from (日本能率協会, 1990)

Other companies mentioning patent information activities or departments in their IP or Patent departments include :

Kanebo (鐘紡株式会社, 1990)
Suzuki Motors (鈴木自動車株式会社, 1990)
Toshiba Ceramics (東芝セラミックス株式会社, 1990)
Nifco[10] (ニフコ株式会社, 1990)
Sanyo Kokusaku Pulp (山陽国策株式会社, 1990)
HOYA (HOYA株式会社, 1990)
Mitsubishi Paper (三菱製紙株式会社, 1990)
Hamamatsu Hotonics[11] (浜松ホトニクス株式会社, 1992)
Tokai Rubber[12] (東海ゴム工業株式会社, 1992)
Hitachi Maxell (日立マクセル株式会社, 1992)
Minolta Camera (ミノルタカメラ株式会社, 1992)
Shiseido (株式会社資生堂, 1992)
Tokimec[13] (株式会社トキメック, 1992) who use a subsidiary.
Ikegami[14] Communications (池上通信株式会社, 1992)
Tomoegawa Paper Works[15] (株式会社　巴川製紙所, 1992)
Japan Catalytic Chemical Works[16] (日本触媒化学工業株式会社　, 1991)
Murata Works (村田製作所　, 1991)
Eizai (エーザイ株式会社, 1991)
Kenwood (株式会社ケンウッド, 1991)
Osaka Gas (大阪ガス株式会社, 1991)
Kumagaigumi (株式会社熊谷組, 1991)
Toshiba Machine (東芝機械株式会社, 1993)
Kyourin Pharmaceutical (杏林製薬株式会社, 1993)
Japan Oxygen (日本酸素株式会社, 1993)
Yamaha (ヤマハ株式会社, 1993)
Daiwa Spinning (大和紡績株式会社, 1993)
Futaba Denko (双葉電子工業株式会社, 1993)
Seiko (セイコー電子工業株式会社, 1993)
Nintendo (任天堂株式会社, 1993)
Fuji Xerox (富士ゼロックス株式会社, 1993).

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[10]A 1000 employee industrial fastener company.

[11]A 2000 employee electrical parts manufacturer

[12]A 3100 employee Industrial rubber and chemicals manufacturer

[13]A 2300 employee precision engineering company

[14]A 1937 employee electronics company

[15]A 1327 employee paper company

[16]A 2000 employee chemical company

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# あとがき

『...書物はいくら記してもきりがない。
学びすぎれば体が疲れる。

すべてに耳を傾けて得た結論。
「神を畏れ、その戒めを守れ。」
これこそ、人間のすべて。』

聖書：コヘレトの言葉　12. 12ー13