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Integrated Customer-Focused Knowledge Portals – Conceptual Challenges and Selected Empirical Approaches

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II. Index of Abbreviations

cf.	confer
CoP / CoPs	community of practice / communities of practice
e.g.	exempli gratia
ed. / eds.	editor / editors
etc.	et cetera
i.e.	id est
IS	information system/s
IT	information technology
KI	knowledge integration
KM	knowledge management
KMS	knowledge management system/s
KP	knowledge portal
KPPM	knowledge portal process management
KR	knowledge repository
KT	knowledge transfer
NoP / NoPs	network of practice / networks of practice
OC	organizational culture
OK	organizational knowledge
UoP / UoPs	union of practice / unions of practice

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IV. Abstract

Knowledge portals (KPs) are highly integrative knowledge management systems (KMS), which promise to synthesize widely dispersed knowledge and to interconnect individuals by functioning as a ‘one-stop knowledge shop’. Yet, in practice, KPs face major challenges, which are for the most part due to the intricacies of knowledge exchange, being subjected to multi-faceted individual and social factors. At the same time, growing anecdotal evidence from case studies indicates KPs’ enormous potential. On the other hand, more generalizable empirical research about them is at an infant stage, which is also due to a largely missing common conceptualization of KPs.

This thesis makes an effort to more distinctly conceptualize KPs. It particularly emphasizes a KP’s role to unify networking and repository KMS features and it names implications of this hybrid character. Based on an extensive literature review of KP and associated KMS research, it identifies three major challenges (knowledge dispersion, lacking participation, and unfavorable organizational culture). These are considered to be increasingly incriminating to integrative and comprehensive KPs when compared to other KMS. Subsequently, by means of a review and systemization of findings from 42 conclusive empirical studies, an elaborate illustration of potential approaches to KPs is framed. The presented approaches comprise KP process management, KP-enabled communities and networks of practice, and KP governance.

Based on an assessment of KP effectiveness gaps, the thesis names several enduring issues and tradeoffs that KP design faces. In particular, it carves out the shortcomings of present approaches to integrate tacit knowledge, to address individuals’ intrinsic motivation to use a KP, and to foster management support. The thesis also spotlights the strong interlacements of comprehensive KPs and hints to consequent vicious and virtuous circles. Several implications for practice and research are proposed.

V. Integrated Customer-Focused Knowledge Portals – Conceptual Challenges and Selected Empirical Approaches

1. Introduction

1.1. Background and Relevance

The knowledge-based view of the firm[1] constituted knowledge as a key resource for organizations. However, knowledge solely resides in the minds of individuals, so that organization members' collective knowledge is commonly highly distributed and it can only arduously be leveraged and translated into competitive advantage. In other words, organizations dispose of extensive knowledge, but it is not readily available and suboptimally allocated – organizations are distributed knowledge systems[2]. This state of knowledge dispersion implicates enormous potential for knowledge integration (KI), denoting the combination and systemization of individuals' knowledge into valuable situation-adapted knowledge.[3] Having realized the promises of integrative portal solutions also for knowledge management (KM), information systems (IS) design brought forward knowledge portals (KPs). Originally, the idea is simple: A KP attempts to be a 'one-stop knowledge shop'; that is, a single point of access to all knowledge available in an organization (or even beyond), reprocessed in such a way that it is useful and applicable for any knowledge seeking user. In the end, this endeavor supposedly leads to higher competitiveness, either by means of direct customer integration or of increasing customer focus through more purposeful knowledge reuse.

Yet, knowledge is not only a valuable but also quite an intractable resource. KPs face multiple onerous issues and struggle both to get individuals to contribute their knowledge and to provide knowledge seekers with useful reprocessed knowledge. There are three major challenges that KPs are confronted with: KPs have to integrate knowledge in various facets and from various sources, they need to induce sufficient participation, and they need to be accompanied by a favorable sociocultural environment. While the challenge to enhance KI is most distinctive of KPs when compared to other knowledge management systems (KMS), participation and organizational culture (OC) must not be neglected, as knowledge exchange and integration rely both on individual and social factors. In light of these intricacies of KM and KPs' aspiration for most comprehensive KI, KP deployment necessarily translates into a holistic endeavor.[4]

So far, organizations have been struggling to fully grasp these challenges and frequently had to experience important disappointments over the moderate outcomes that KP deployments yielded despite their intuitional appeal. Similarly, KMS research has seemingly not yet fully accepted KPs as a generic phenomenon, often concentrating on more circumscribed KMS, such as knowledge repositories (KRs) or electronic networks. Major findings for KPs are limited to anecdotal evidence from case studies and few generalizable empirical results are available. Moreover, theoretical conceptualization is scarce and incomplete. Beside numerous works in practitioner literature, little is available in renowned IS journals concerning a stringent KP concept and its implications. On the other hand, authors[5] postulate that integrative approaches to KMS are far more likely to lead to intended outcomes, as knowledge is a somewhat 'restive' resource, which rarely submits to carved-in-stone processes. KPs, as it is in their nature to function as integrators of KMS features, adhere to

[1] Cf. Penrose (1995).
[2] Cf. Alavi, Tiwana (2002), 1029-1030; Gelbuda, Soerensen (2005), 2-6; Tsoukas (1996), 11, 22.
[3] Cf. Alavi, Tiwana (2002), 1030.
[4] Cf. Garud, Kumaraswamy (2005), 15.
[5] Cf. Alavi et al. (2005), 220; Garud, Kumaraswamy (2005), 28-29; Markus et al. (2002), 205.

these calls for flexibility and comprehension. In light of their promises, it is surprising that so little attention in terms of broad comparative empirical analysis has been devoted to them in the past.

In view of this outline, the gaps that this thesis will try to alleviate can be delineated: First, KMS research has not yet established a resilient notion of KPs and does rarely grasp them as a generic concept, distinct from other KMS types. Secondly, KMS research scarcely provides a fundamental and in-depth analysis of the antecedents of KP success or failure. Thirdly, empirical research on KPs is effectuated primarily in the form of case studies, proliferating valuable insights but as yet falling short of viable generalization, classification, and sturdy KP deployment guidelines.

1.2. Objectives

In the face of these gaps of KMS and KP research, this thesis has three major objectives, which it will try to address through an extensive review of established and recent KM literature:

First, it is aimed at a conceptualization of KPs that moves them away from a notion confining them to visualizing web pages. Specifically, the thesis will make an attempt to shed light on the hybrid character of KPs, as they combine features of repositories and of networking KMS. This duality is often indicated when KPs are described as integrative gateways, whereas implications of potential frictions and synergies are rarely accounted for. This work will make an effort to clarify differences between these two spheres that a KP unites and to deduce conceptual implications.

Second, three overarching themes of challenges are to be analyzed in sufficient detail. Knowledge dispersion and extensiveness, but also lacking participation and an unfavorable OC represent major burdens for KP deployment, as practice has shown.[6] These challenges are in large part not unique to KPs, as all KMS must observe and take into account broader organizational dispositions, owing to the special properties of knowledge. However, they appear to be even more incriminating for KPs, as, by definition, they follow an increasingly integrative and comprehensive KM approach. Therefore, the thesis will offer an in-depth review of the named challenges, composed of established viewpoints in KM, which are reoriented towards the specific context of KPs.

Third and most importantly, this thesis will attempt to classify empirical approaches to KPs. Owing to the relative paucity of palpable findings that are directly KP-related, an effort is made to supplement KP research by combining and arranging empirical findings of contiguous KMS research. In other words, based on the hybrid and integrative character of KPs, general results for KMS but also for KRs and networking KMS are to be subsumed into one coherent framework of approaches to KPs. Thus, without actually carrying out empirical validation of the presented deductions, the thesis strives to translate well-reasoned and matching explanatory power of prior studies into the KP context, supposedly resulting in valid insights on how to approach KP design.

1.3. Thesis Structure

In accordance with the objectives outlined above, this thesis is structured as follows: Subsequent to this introduction, section 2 will provide essential definitions, constitute an understanding of integration through KPs, introduce a basic typology for them, and present their usual components. Section 3 will shed light on three major challenges to KPs, namely the extensive and dispersed state in which knowledge is embedded in an organization, the commonly deficient user participation in KPs, and the often inadequate broader socio-cultural context of an organization. Section 4 will systematize and categorize extensive KMS, knowledge repository (KR), networking, and KP research into one framework of approaches to KPs. Reconciling sections 3 and 4, section 5 will analyze the acuteness of the observed challenges and confront them with the approaches found, so that final results will elicit the effectiveness of the introduced approaches. Eventually, concluding remarks and future research perspectives will be sketched in section 6 and 7.

[6] Cf. Brazelton, Gorry (2003), 23; Voelpel (2005), 15-16; Zhang (2006), 20-22.

2. Context and Constitution of Knowledge Portals

This section introduces the basics for forthcoming specifications on challenges and approaches to KPs. It will define and determine the necessary vocabulary and taxonomy (2.1. to 2.3.), supplemented by an outline of the typical architecture of a KP (2.4.).

2.1. Definitions

2.1.1. Knowledge

A distinct definition of knowledge might arguably be neither attainable, nor pertinent.[7] However, given the term's complexity and multifarious implications,[8] this thesis considers eliciting a common understanding to be indispensable. The following definition is adopted:

Knowledge is a justified belief, potentially increasing an entity's ability to take effective action,[9] only possessed and exercised by persons,[10] deriving from flows of information mentally processed relative to existing beliefs and commitments.[11]

Notably, this definition implies a crucial distinction of information and knowledge. As knowledge only exists in an individual's mind, it becomes information once it is communicated.[12] In turn, information becomes knowledge once it is mentally processed, so that knowledge flow denotes a mentally processed information flow. A hierarchical distinction of data, information, and knowledge is not considered conducive.[13] Yet, in the KMS context, it is elementary to be aware of some important properties of knowledge: It is subjective[14], dynamic[15], not self-contained[16], socially constructed[17], and conceivably also affective[18]. Never can knowledge originate from an IS as such.[19]

For the purposes of consistent and intelligible wording throughout this thesis, a few terminological specifications ought to be noted. Speaking of 'knowledge artifacts', it is referred to physically stored information (documents, records, videos, etc.), in which knowledge is embedded and from which it can be derived.[20] 'Knowledge base' describes an individual's given beliefs that influence the mental processing, based on normative expectations, socialization outcomes, and local knowledge.[21] Organizational knowledge (OK) denominates dispersed individuals' knowledge embedded in an organizational context.[22]

2.1.2. Portals

The term 'portal' is used in miscellaneous meanings and contexts. Nonsatisfying notions exist in abundance,[23] but, for the IS context, they can be narrowed down to this working definition:

A portal provides secure, customizable, personalizable, integrated access to dynamic information from a variety of sources, in a variety of source formats, wherever it is needed.[24]

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[7] Cf. Desouza et al. (2008), 560.
[8] Cf. Fahey, Prusak (1998), 265-266.
[9] Cf. Alavi, Leidner (2001), 109.
[10] Cf. Fahey, Prusak (1998), 267.
[11] Cf. Nonaka (1994), 15.
[12] Cf., e.g., Alavi, Leidner (2001), 109-110; Fahey, Prusak (1998), 267.
[13] Cf. Alavi, Leidner (2001), 109.
[14] Cf., e.g., Durcikova, Gray (2009), 85; Okhuysen, Eisenhardt (2002), 383-384.
[15] Cf., e.g., Desouza, Awazu (2005), 766; Gelbuda, Soerensen (2005), 1.
[16] Cf. Tsoukas (1996), 11.
[17] Cf., e.g., Alavi, Leidner (2001), 115; Griffith et al. (2003), 268-269; Wasko, Faraj (2000), 158.
[18] Cf. Hwang, Kim (2007), 234-235; Malhotra (2003), 583; Malhotra, Galletta (2005), 125-127.
[19] Cf. Fahey, Prusak (1998), 267.
[20] Cf. Davenport et al. (1998), 45, Davenport, Prusak (1998), 146.
[21] Cf. Tsoukas (1996), 11.
[22] Cf. Choo (1998), 114; Davenport, Prusak (1998), 5; Wasko, Faraj (2000), 158.
[23] Cf. Benbya et al. (2004), 205-206; Smith (2004), 93.
[24] Cf. Detlor (2004), 9; Smith (2004), 94.

It is rather misleading to call a portal an 'infrastructure'[25] as the term is frequently connoted with a physical element. It is more adequately confined as a gate,[26] in whatever form, interlinking users and facilitating navigation. In this vein, providing unique content is a subordinated function.[27] In the IS context, a portal's gateway character is commonly realized in the form of a web page,[28] which will also be the basic assumption of this thesis. Mostly, organizational portals are embedded in or tantamount to the organization's intranet, so that integration of internet access and functionalities is a supplementary feature but not a necessity.

2.1.3. Knowledge Management

Alavi and Leidner[29] have summarized the essence of KM briefly and comprehensively:

Knowledge management refers to "identifying and leveraging the collective knowledge in an organization to help the organization compete"[30].

In detail, KM addresses four kinds of knowledge processes: knowledge creation, knowledge storage and retrieval, knowledge transfer (KT), and knowledge application.[31] Yet, these processes cannot be seen as strictly separable but are rather immanently intertwined.[32]

Some notional clarifications shall be introduced: In terms of knowledge supply, 'knowledge emission' and 'knowledge contribution' will be used interchangeably. On the demand side, 'knowledge sourcing' will be tantamount to 'knowledge seeking'. While there might be slightly varying connotations in terms of scope and knowledge flow direction, activities phrased as 'knowledge dissemination', 'knowledge diffusion', 'knowledge exchange', or 'knowledge sharing' involve the knowledge processes of KT and possibly of knowledge storage and retrieval. The latter is concerned if, in the course of KT, knowledge is intermittently stored (i.e., physically embedded) and retrieved asynchronously at a later point in time.[33] In particular, there is a twofold connotation to 'knowledge sharing': First, it alludes more strongly to the social relationships that are involved in knowledge exchange;[34] secondly, it is often referred to with emphasis on knowledge contribution.[35]

2.1.4. Knowledge Portals

There have hardly been any attempts in scientific literature to precisely and generally define the term 'knowledge portal'. Different authors[36] have introduced varying and rather specific concepts of KPs. Originally, KPs were considered to be the next level of portal sophistication, subsequent to information portals,[37] often explicitly or implicitly referring to a hierarchical distinction of information and knowledge. Yet, as this distinction is by and large unclear or errant,[38] categorizing KPs according to technical evolution appears arbitrary and falls short of KM's multi-disciplinary nature. Thus, this thesis proposes a pragmatic combination of the already defined terms and the nature of KMS; as portals and KMS form subgroups of IS, KPs constitute the overlap of both:

A knowledge portal is a portal, which purposely supports and stimulates knowledge transfer, knowledge storage and retrieval, knowledge creation, and knowledge application.[39]

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[25] Cf. Smith (2004), 93.
[26] Cf. Detlor (2004), 9.
[27] Cf. Bernstein, Haas (2008), 76.
[28] Cf. Smith (2004), 94.
[29] Cf. Alavi, Leidner (2001), 113.
[30] Alavi, Leidner (2001), 113 [italicized by author of thesis].
[31] Cf. Alavi, Leidner (2001), 115; Pentland (1995), 3.
[32] Cf. Alavi, Leidner (2001), 116; Alavi, Tiwana (2002), 1031.
[33] Cf. Alavi, Leidner (2001), 118-119.
[34] Cf. van Baalen et al. (2005), 302.
[35] Cf., e.g., Alavi et al. (2005), 197.
[36] Cf., e.g., Carlsson (2003), 199-200; Chau et al. (2006), 1216-1217; Desouza, Awazu (2005), 265; Firestone, McElroy (2003), 255-257; Lee et al. (2009), 3663; Staab, Maedche (2001), 63; Tsui (2003), 17.
[37] Cf. Detlor (2004), 14; Firestone (2002), 256-257; Priebe, Pernul (2003), 216-217.
[38] Cf. 2.1.1.
[39] Cf. Alavi, Leidner (2001), 107, 114.

One could argue that virtually any kind of portal has externalities impacting OK, owing to the impalpability of knowledge. Accordingly, a generalized and exact demarcation of KPs and other portals is immensely intricate, so that authors[40] tend to evade this endeavor. Conceivably, the sole truly distinctive feature of KPs is that they *intentionally* tackle inefficiency and ineffectiveness in the use of OK. Hence, they stand opposed to other portals, as they specifically address organizational capabilities derived from OK,[41] thereby helping the organization to compete.[42] Explicitly addressing OK will largely translate into the application of more sophisticated technological functionality and entail a more comprehensive organizational approach, but these implications do not necessarily constitute the nature of KPs.

2.2. Integration through Knowledge Portals

Portals provide 'integrated access' by the definition which was adopted, such that 'integrated KP' is somewhat tautological. In this work, speaking of KPs, it is always meant 'integrated KPs', which only vary in the degree and nature of integration. Nonetheless, a terminological difficulty remains due to a varying understanding of 'integration' effectuated by KPs in scientific and technical literature. Essentially, two types are considered: integration of functionality and of knowledge.

2.2.1. Functionality Integration

Integrated access, first of all, means that KPs operate the seamless interaction with different software or web applications and services, which otherwise would be dispersed, potentially externally.[43] One might sketch four functionality aspects that ought to be considered in KP design: the types of primary media offered to the user, the possibility of communicating synchronously and asynchronously, the bandwidth of communication channels, and the option for knowledge seekers and contributors to act anonymously or not.[44] Hence, a KP can integrate functionality for knowledge storage and retrieval, but also for synchronous communication of participants.

2.2.2. Knowledge Integration

While functionality integration might be included in other portals and KMS, the focus on the integration of knowledge is the key distinctive feature of a KP.[45] Although miscellaneous understandings exist,[46] KI can be defined as "the synthesis of individuals' specialized knowledge into situation-specific systemic knowledge"[47], thereby providing access and connectivity for existing OK[48] and implicating intensified KT[49]. As dispersed knowledge is combined and systemized, KI is distinct from knowledge sharing and can rather be considered tantamount or closely linked to knowledge creation.[50] Moreover, KI is directly conducive to knowledge application,[51] which can be regarded as the most critical knowledge process, through which transferred knowledge translates into competitive advantage.[52] As a result, KI is considered to be crucial for an organization as a whole,[53] as it supposedly leads to higher competitiveness,[54] by transforming specific knowledge into collectively valuable (i.e., purposefully applicable) knowledge.[55]

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[40] Cf. Benbya et al. (2004), 201-213; Collins (2003), 29-32.
[41] Cf. Ryu et al. (2005), 247.
[42] Cf. 2.1.3.
[43] Cf. Benbya et al. (2004), 205; Carlsson (2002), 11; Lee et al. (2009), 3662.
[44] Cf. Goodman, Darr (1998), 423.
[45] Cf. Lee et al. (2009), 3662; Ryu et al. (2005), 247.
[46] Cf. Robert et al. (2008), 315.
[47] Alavi, Tiwana (2002), 1030.
[48] Cf. Kim et al. (2002), 62.
[49] Cf. Davenport et al. (1998), 46.
[50] Cf. Okhuysen, Eisenhardt (2002), 383; Robert et al. (2008), 315-316.
[51] Cf. Alavi, Tiwana (2002), 1030-1031.
[52] Cf. Alavi, Leidner (2001), 122; Alavi, Tiwana (2002), 1030-1031.
[53] Cf. Eisenhardt, Martin (2000), 1109, 1114; Gelbuda, Soerensen (2005); Grant (1996), 377.
[54] Cf., e.g., Alavi, Tiwana (2002), 1030-1031; Grant (1996), 375; Patnayakuni et al. (2006b), 547.
[55] Cf. Okhuysen, Eisenhardt (2002), 370.

For KPs, the variety of sources and of source formats, which any portal addresses, is paralleled by the variety of contributing individuals and of knowledge respectively.[56] Owing to the special properties of knowledge, KPs include validation,[57] structure, and context[58] for information (i.e., meta-information) in the course of systemizing KI. KI and functionality integration are not dichotomous measures; the former mostly rather requires and implicates the latter, owing to KI's broad scope.

2.3. Types of Knowledge Portals

Typologies of KPs are diverse. Subgroups such as 'Web Portals', 'E-Business Portals', or 'Mobile Commerce Portals'[59] will not be highlighted, as systematic, KM-relevant implications of suchlike differentiations appear confined. Hence, explanations will be limited to a fundamental taxonomy.

2.3.1. Internal / External Knowledge Portals

KPs can be distinguished in terms of knowledge flow directions. Here, an internal KP will be defined as only processing knowledge originating from members of the organization, regardless of how the group of knowledge seekers is composed. Consider, for example, customer self service applications like online help services, frequently asked questions sites, and simple information provision about a company. They might be integrated into a portal as a part that external users can access but not contribute to, but this KP would still be of the internal sort. An external KP involves knowledge flows also from external sources towards the internal sphere. Thus, if knowledge flows in a portal are unidirectional towards external players or unintentional but inevitable leakage of knowledge occurs[60], this work will not consider the KP as external. Note that, most of the time, an external KP will also address exclusively internal knowledge flows. In addition, due to more flexible technical solutions, a gradual inclusion of both knowledge flow directions is taking place.[61]

Supposedly, external KPs directly integrate, for example, customers', suppliers', or business partners' knowledge. This will fundamentally be required if knowledge demand implied by the organization's product or service does not directly correlate with the boundaries of the organization's knowledge.[62] A special area of application where crucial user groups are particularly multi-faceted is customer support knowledge. It must be derived from customers, competitors, public sources, and partners, regularly leading to a cross-functional approach.[63] Yet, a whole new world of issues will arise for external KPs. Consider, for example, problematic questions about standards[64], leakage[65], multi-lingual environments[66], and knowledge politics[67] that arise for supply chain and other inter-organizational cooperative KM and KMS. These immense challenges have disposed scholars to engage in a more profound examination of the distinctive features of this subject compared to intra-organizational KM. Accordingly, a major stream of research[68] devotes to the topic.

This thesis, however, strives for a more basic perspective on KPs. It estimates that inter-organizational KM is a rather distinct subject, separable from the internal sphere in many of its facets, for instance, regarding the aforementioned elements of knowledge leakage and politics. Owing to that, it is inferred in this thesis that an extensive treatment of inter-organizational KM would overly widen its scope, so that inter-organizational KPs are not explicitly accounted for.

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[56] Cf. 3.1.3.
[57] Cf. Firestone (2002), 256.
[58] Cf. Collins (2003), 49, 53.
[59] Cf. Collins (2003), 35
[60] Cf. Brown, Duguid (2001), 209.
[61] Cf. Terra, Gordon (2003), 48.
[62] Cf. Grant (1996), 383.
[63] Cf. Davenport, Klahr (1998), 198-200, 206; McKemmish et al. (2009), 1792.
[64] Cf. Kim et al. (2007); King et al. (2002), 94.
[65] Cf. Brown, Duguid (2001), 206.
[66] Cf. Wingyan et al. (2004).
[67] Cf. Davenport, Klahr (1998), 206.
[68] Cf., in particular, Bhandar et al. (2007); Grant, Baden-Fuller (2004); Levy et al. (2003); Lin, Chen (2006); Malhotra et al. (2007); Orman (2007); Patnayakuni et al. (2006a); Schultze, Orlikowski (2004).

Nonetheless, as knowledge cannot be operated firmly, at times, findings will peripherally interfere with them. Moreover, owing to the explicit customer focus of this work, customer integrative KPs will not be excluded but, in turn, will be limited to non-organizational customers.

2.3.2. Corporate / Non-Corporate Knowledge Portals

A second distinction of KPs could be attributed to whether the implementing organization is a corporate body or a public organization. Basically, it should be pointed to potential differences of KP management in public or in private organizations, as the former "may tend to be less efficient, more cautious, risk-averse, and more bureaucratic"[69]. Non-corporate organizations might pursue goals that are different from profit-seeking and they might dispose of differing organizational structures, which, obviously, will impact KMS and KP deployment, too.[70] On the other hand, even if the scope is limited to the corporate sector, understandings of 'business portals'[71], 'enterprise portals'[72], 'enterprise information portals'[73], or 'enterprise knowledge portals'[74] vary. In addition, examples of KPs exist that are not affiliated to a singular corporation or public organization.[75]

Due to this large variety of shapes that KPs can assume, this thesis will not be limited to one of these KP types. Moreover, as long as KPs in the sense of this work are considered, the objective is always facilitation of knowledge processes for greater competitiveness (in whatever form), so that a distinction according to the subsequent fundamental goals of an organization appears in large part superfluous in this context. Accordingly and for practical wording reasons, 'customers' will be referred to as the organization's external target group, to whom services or products are delivered, irrespective if this is done in exchange for money or in a profit-oriented manner.

This also brings up the question of customer focus through KPs. In this thesis, KP effectiveness is attributed to the KP's impact on the organization's competitiveness. Competitiveness, in turn, will be conditioned to the customers' acceptance of the organization's product or service. Hence, in fact, customer focus is somewhat implied in the strive of KPs for effectiveness if they address knowledge processes to help the organization to compete. Evidently, this focus can assume various shapes and intensities, among which customer integration represents the most forceful one. Yet, this thesis considers as customer-focused all KPs of organizations, which serve customers in some way, and it excludes only organizations that do not deliver any product or service.

2.4. Central Components of Knowledge Portals

Naturally, a specific KP design relies on an organization's requirements and given conditions.[76] Yet, some generic components of KPs will briefly be introduced in order to give a basic idea of a typical system architecture. As information technology (IT) design in a strict sense is not the focus of this work, specifications will be limited to what is necessary for a general understanding of upcoming chapters.

2.4.1. Knowledge Organization Systems

Knowledge organization systems constitute the most essential component of a KP, as they address knowledge and information integration by proliferating and structuring meta-information for underlying repositories and networks.[77] Under this broad concept, one can subsume the more specific content management systems, which offer the possibility of classifying and (re-)codifying

[69] Teo (2005), 157.
[70] Cf. Kankanhalli et al. (2005a), 134-135; Teo (2005), 157.
[71] Cf. Eckerson (1999), quoted after Firestone (2002), 6.
[72] Cf. Detlor (2004), 9.
[73] Cf., e.g., Firestone (2002); Ryu et al. (2005); Scheepers (2006).
[74] Cf. Collins (2003), xi; Firestone (2002), 251.
[75] Cf. McKemmish et al. (2009); van Baalen et al. (2005).
[76] Cf. Kearns, Lederer (2003), 1; Teo, Bing (2008), 558-559.
[77] Cf. Collins (2003), 49.

knowledge artifacts from various sources in an integrative manner.[78] Other important subcategories are document and project management systems, as well as knowledge maps.[79]

Simple components of knowledge organization systems can be registers and categorizations.[80] Registers are lists or indexes of information, for instance, comprising glossaries, dictionaries, or authority files.[81] They contribute to a common understanding and language. Categorizations are relevant in particular for facilitation of the knowledge retrieval process, no matter how powerful the search engine is.[82] They comprise, for example, subject headings or content separation schemes.[83]

On a more complex structural level, KPs include taxonomies. First of all, like all portals, a KP regularly contains an organizational information taxonomy[84] (or 'business information directory'[85]), representing a metadata catalog prompted by the different publishing units and ideally comprising all codified information existing in the organization.[86] In addition, a KP integrates an open-ended variety of other taxonomies, such as simple thesauri or more complex ontologies. The latter, by giving information a semantic underlay,[87] might sharpen the search function[88] and other functionalities[89]. The purpose of all this taxonomic meta-information is to provide context and to indicate where knowledge or knowing individuals can be found.[90] Thus, they strongly account for navigation and coordination, thereby enhancing the knowledge retrieval, storage, and transfer processes.

2.4.2. Applications and Services

A KP delivers integrated access to different software tools and a variety of services,[91] so that, supposedly, maximum functionality facilitates knowledge work.[92] Exemplary feature categories are multi-repository support, process, and web service applications.[93] Multi-repository support refers to an application that overlies repositories as such. One can consider the integration of applications and the integration of repositories as complementary parts of a holistic integration of existing IT.[94] The main issue is the visual integration of different interface structures without losing the applications' functionality or giving up on the KP's established logic of use.

2.4.3. Collaboration and Communication Tools

As certain knowledge can only be transferred if persons interact directly,[95] KPs offer media to interlink them, mostly in the form of online collaboration.[96] Work group productivity tools and specialized transactional functions make an effort to foster and facilitate collaboration and communication by providing a convenient platform.[97] Available tools are extremely versatile, among them email, shared document spaces, net meetings, video conferences, wikis,[98] etc. One notable example is semantic blogging, considered especially pertinent for more decentralized KM.[99]

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[78] Cf. Benbya et al. (2004), 204.
[79] Cf. Lee et al. (2009), 3662-3663.
[80] Cf. Collins (2003), 49.
[81] Cf. Collins (2003), 53.
[82] Cf. Garud, Kumaraswamy (2005), 18.
[83] Cf. Collins (2003), 53-54.
[84] Cf. Detlor (2004), 10.
[85] Cf. Dias (2001), 279.
[86] Cf. Dias (2001), 279-280.
[87] Cf. Collins (2003), 53-54; Liming et al. (2007), 283.
[88] Cf. Horrocks (2008), 67.
[89] Cf. Benbya et al. (2004), 206.
[90] Cf. Alavi, Leidner (2001), 121; Liming et al. (2007), 283.
[91] Cf. 2.2.1.
[92] Cf. Goodwin (1987), 229.
[93] Cf. Collins (2003), 69-72.
[94] Cf. Carlsson (2002), 11.
[95] Cf. 3.1.3.1.
[96] Cf. Benbya et al. (2004), 211.
[97] Cf. Detlor (2004), 10.
[98] Cf. Lee et al. (2009), 3662-3664.
[99] Cf. Cayzer (2004), 51-52.

2.4.4. Repository Access

Integrating the access to an organization's repositories is a key task for KPs[100] in the context of KI. Knowledge that is located in them in codified form is the principal groundwork on which the knowledge organization system adds meta-information. Types of repositories can be sophisticated KRs but also plain databases.[101] KR refers to a repository that stores, indexes, and synthesizes knowledge artifacts (e.g., codified best practices), so as to promote knowledge reuse.[102]

2.4.5. Search

For all KMS, search represents an essential part of the knowledge retrieval process. Basic categories are standard, concept-based, and metadata search.[103] The integration of varying sources and evolving insights into search is a particularly important issue for KPs.[104] Search is intertwined with the KP interface, as it is mostly implemented as a static feature,[105] requiring adapted and contextualized displaying.[106]

2.4.6. Personalization and Roles

By definition, portals offer customization and personalization[107], being important means to reach a higher degree of structure and usefulness of retrieved information and distinguishing it from common web services.[108] Generally, a user and role management, which recognizes and administrates user and access,[109] is thus required.[110] Roles will be defined according to tasks,[111] with the purpose to pre-determine knowledge flows towards user groups[112] as specifically as possible. Role management can be considered the groundwork of 'tailored' personalization.

There are two possibilities for supplementary personalization. On the one hand, the KP will allow the user to organize knowledge flows,[113] providing them with means to avert an overflow of information and save browsing time.[114] This is referred to as explicit personalization or (user) customization. Otherwise, the KP can personalize the web page itself, based on rules or user behavior.[115] Henceforth, this latter form will be called implicit personalization.

2.4.7. Interface

A KP's interface is the point of visual contact with the user. It must offer direct manual access to relevant features. Explicit personalization, for example, must be provided for shown content, but also for visual representation itself.[116] The interface's key function is visual integration, having to be geared to the user experience in order to present all functionalities: For example, enabled by knowledge organization systems, it complements content pages by content relevant pages, thereby helping the user to interpret the main body.[117]

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[100] Cf. Collins (2003), 66-67; Terra, Gordon (2003), 98-99.
[101] Cf. Carlsson (2002), 11.
[102] Cf. Gray, Durcikova (2005), 164.
[103] Cf. Collins (2003), 56-63.
[104] Cf. Terra, Gordon (2003), 103, 106.
[105] Cf. Collins (2003), 55.
[106] Cf. Detlor (2004), 129.
[107] This thesis does not adopt the wording of Hansen et al., who introduced 'personalization' as a KM strategy; cf. Hansen et al. (1999), 107.
[108] Cf. Benbya et al. (2004), 205.
[109] Cf. Carlsson (2002), 11.
[110] Cf. Collins (2003), 63-66.
[111] Cf. Patnayakuni et al. (2006b), 551-552.
[112] Cf. Carlsson (2002), 11.
[113] Cf. Collins (2003), 66.
[114] Cf. Terra, Gordon (2003), 50, 109.
[115] Cf. Benbya et al. (2004), 211; Forsati, Meybodi (2010), 1316-1317.
[116] Cf. Smith (2004), 94.
[117] Cf. Collins (2003), 43-44, 48.

3. Conceptual Challenges to Knowledge Portals

Having gathered the necessary basics of KPs and the KM context, the third section highlights and examines major challenges in the conception of KPs. It presents a rather selective but thorough analysis of three challenges that are overall considered to be most distinctive and crucial for them.

Moreover, a multitude of subordinated challenges are categorized and schematized into a coherent framework. Albeit, at times, there are far-reaching overlaps as all three challenges are in large part interwoven with each other, a subsumption under the themes of 'Extensive and Dispersed Knowledge' (3.1.), 'Insufficient Participation' (3.2.), and 'Unfavorable Organizational Culture' (3.3.) will be attempted. The elaboration of generic challenges implies that many of the specified issues can be attested to other KM or KMS initiatives, too. Yet, distinctive features of KPs will particularly be focused upon.

3.1. Extensive and Dispersed Knowledge

Seemingly the most fundamental and arduous challenge is the extended and distributed state in which knowledge resides in an organization. It is the most salient obstacle to KI, which is in turn the central task of a KP. Hence, it will be contemplated rather thoroughly. Below, the utopian ideal of knowledge supply through a KP will be depicted (3.1.1.), before it is confronted with the general terms of the challenging reality in organizations (3.1.2.). Once this outline of the setting is completed, the challenge will be looked at in more detail, regarding its different facets (3.1.3.).

3.1.1. Ideal of a One-Stop Knowledge Shop

It is a portal's primary purpose to be a gate to varying underlying sources; it is a single point of access to information that would mostly be available anyway but only in a fragmented manner. As mere detection of information might be the least of problems,[118] a KP, in its function as KMS, additionally systemizes this information, so as to make it meaningful to the recipient,[119] and it interconnects individuals to foster direct exchange if the required knowledge cannot be stored. A KP, hence, is a sort of synthesizer and 'canalizer' of information from and about other participants; it preselects, contextualizes, bundles, regroups, and (hopefully) structures this information. As knowledge resides in individuals' minds and the KP does not primarily generate unique content, the question of comprehensive and implicitly personalized knowledge supply is directly connected to the question of knowledge contribution: In order to enhance KT and KI, the KP also needs to induce users' extensive input.

Several authors[120] have utilized the term 'One-Stop Shop' to describe this purpose: The knowledge seeker can retrieve any information necessary at one (virtual) space. Any knowledge, no matter how, where, and when it is contributed, is reprocessed and concentrated towards one single point, at which knowledge supply comprises a maximum of specialized, useful knowledge for the recipient.[121] This is achieved through sound meta-information; ideal knowledge sourcing through a KP does not require any supplementary source to make sense of a given information output.

Hence, the ideal KP is an all-in-one knowledge supply solution – a one-stop knowledge shop. It is a unique gate for all information, which integrates a maximum of existing knowledge and specifically personalizes it for any user, making all relevant knowledge accessible at one point.

3.1.2. Constituents of the Challenge

Still, KP designers must bear in mind that complete KI and access are a utopian image. As a natural tendency, in certain situations, human beings seek to retrieve knowledge through direct contact to others, while the exegesis of reasons for volitional information source selection is a field yet to be

[118] Cf. Jacobson, Prusak (2006).
[119] Cf. Poston, Speier (2005), 221-222.
[120] Cf., e.g., Chau et al. (2006), 1216; Davenport et al. (2008), R11; Teo (2005), 150.
[121] Cf. Ryu et al. (2005), 247; Voelpel et al. (2005), 10.

researched in detail.[122] Due to the multifarious intricacies of operating knowledge, moreover, addressing the distributedness of knowledge is a tremendously complex challenge, in particular in modern and partially virtualized organizations.[123] In accordance with that, KI relies on social capital[124] and on inalienable complementarities of other KT systems[125] and methods[126]. Thus, the perfect one-stop knowledge shop can only serve as an idealized paradigm for KPs.

For these reasons, in reality, the setting is a different one: Knowledge is insufficiently available for knowledge seekers, as it is overly dispersed in organizations in an extended and fragmented manner.[127] In essence, this lack of an "overseeing mind"[128] can be considered as predetermined, so that one might define the organization as a distributed knowledge system[129] or as a complex information-processing entity[130]. This is certainly due to knowledge being 'sticky'[131] and subjected to self-enforcing boundaries[132]. Immoderate knowledge distributedness exacerbates other challenges[133] and dispersed individuals not participating in a KP are comparable to dormant, ineffective information[134]. The acuteness of tackling knowledge dispersion is also contingent on the nature of the organization's field of application. If IS-enabled work involves creative 'deliberations', high unpredictability of users or work context, and a portfolio of specific, general, and action-related knowledge, this will significantly catalyze the urge of knowledge and functionality integration.[135]

On the other hand, a "key success factor is to achieve the right balance between centralization and decentralization in KM initiatives"[136]. Knowledge distributedness need not be a burden for an organization in all of its facets. Specialized knowledge is a requirement for efficiency,[137] whereas the attenuation of division of labor will negatively influence a person's depth of knowledge.[138] Thus, the right degree of decentralization is contingent on task interdependency.[139] Structural diversity within groups, implying distributedness of members, might catalyze rather than inhibit knowledge sharing.[140] Over-ambitious KI, for example, in the form of standardized knowledge retrieval, might above all be counterproductive if knowledge workers' creativity and idiosyncratic methods are thwarted.[141] All in all, consequently, blanket KI might cause more harm than achievement. Thus, KI must not be misconstrued as a synchronization of users and their knowledge bases, but rather ought to be conceived as a delicate and systemized transfer of knowledge, harmonizing knowledge work without vitiating it.

Yet, altogether, it is assumed that tackling knowledge dispersion in a constructive manner can translate into exploitation of considerable potential and an increased performance,[142] as, at the outset, organizations tend to rather lack sufficient KI.[143] So it appears worthwhile to examine purpose-

[122] Cf. Malhotra, Galletta (2005), 137, 140-141; Massey, Montoya-Weiss (2006); Zimmer et al. (2007), 299, 301, 303.
[123] Cf. Desouza et al. (2008).
[124] Cf. Robert et al. (2008), 318-322.
[125] Cf. Goodman, Darr (1998), 426.
[126] Cf. Zimmer et al. (2007), 299.
[127] Cf. Alavi, Leidner (2001), 119.
[128] Tsoukas (1996), 11.
[129] Cf. Alavi, Tiwana (2002), 1029-1030; Gelbuda, Soerensen (2005), 2-6; Tsoukas (1996), 11, 22.
[130] Cf. Zimmer et al. (2007), 300.
[131] Cf. Von Hippel (1994), 429.
[132] Cf. Carlile (2002); Carlile (2004); Patnayakuni et al. (2007), 289-290.
[133] Cf. Davenport et al. (2008), 559.
[134] Cf. Tiwana, Bush (2005), 86.
[135] Cf. Markus et al. (2002), 182-184, 205.
[136] Garud, Kumaraswamy (2005), 17.
[137] Cf., e.g., Davenport, Prusak (1998), 86; Grant (1996), 377.
[138] Cf. Ryu et al. (2005), 249.
[139] Cf. Robert et al. (2008), 318-319.
[140] Cf. Cummings (2004), 353-354.
[141] Cf. Morris (2001), 832.
[142] Cf., e.g., Patnayakuni et al. (2007), 289-290; Zack (1999), 47, 55-57; Zimmer et al. (2007), 298.
[143] Cf. Robert et al. (2008), 316.

ful ways to reduce the dispersion of existing but scattered knowledge,[144] by striving to install an overseeing mind and introducing a "brain of the organization"[145]. In addition, positive effects of knowledge dissemination might be even greater if units are dispersed but generally faced with similar tasks and problems,[146] as participants generally prefer to reuse available established knowledge and not to reproduce it.[147] Overall, promises and downturn are conceived to be proportionate to organization size and geographical dispersion.[148]

Integrating fragmented knowledge for an enhanced knowledge supply brings up a formidable line of reasoning to KP design: To start off with, accessibility is considered the most important factor for retrieval from, choice of, and opinions about information sources.[149] Thus, in the context of KI, KPs must first of all provide the mere possibility of accessing knowledge sources which otherwise would not be considered by knowledge workers: Only if stored knowledge is made available, the underlying KMS can be useful.[150] Secondly, the factual access to abundant knowledge must be coordinated and guided, as perceived accessibility also refers to dependability and convenience, to the point of users tending to pick the first source that on principle satisfies their needs.[151] If access costs to a source (composed of effort and time) cannot be alleviated sufficiently or time and opportunities granted for access are not adequate, participants will not seek knowledge from it.[152] Thirdly, mere perceived accessibility still is not sufficient for completion of a beneficial KT or knowledge storage and retrieval process, as progress in the individual's cognitive structure is required.[153] During this procedure, dispositions of individuality (learning orientation) and workload (intellectual demand) might mitigate purposeful knowledge sourcing[154] and they must thus be accounted for. Hence, personalized meta-information and pertinent guidance to integrated sources are indispensable in the design of a KP in order to guarantee supply of perceptually accessible and useful knowledge.[155] In other words, KI and comprehensive knowledge supply do not only involve pooling of knowledge but also emitting it in a coordinated form that is meaningful to the user and adapted to their knowledge demand.[156] All in all, this task proves to be just as challenging and complex as it is pivotal.[157]

3.1.3. Common Issues

3.1.3.1. Knowledge Diversity

The intricate operability of knowledge is certainly the most salient facet of the challenge of knowledge dispersion. Hence, KP design needs to conceptualize knowledge and its particularities.

Knowledge can essentially be classified in two dimensions: tacit and explicit.[158] This pair of words conveniently denotes the ends of a continuum from knowledge that is per se non-declarative to knowledge that can easily be articulated.[159] Although the taxonomy is not without ambiguity,[160] it is essential to consider the implications of varying degrees of tacitness insofar as they require different approaches in the design of KMS.[161] Therefore, in the course of comprehensive KI, a KP too

[144] Cf. Alavi, Tiwana (2002), 1030-1031; Tiwana, Bush (2005), 86.
[145] Benbya et al. (2004), 211.
[146] Cf. Goodman, Darr (1998), 418.
[147] Cf. Carlile (2004), 565; Wasko, Faraj (2000), 170.
[148] Cf. Alavi et al. (2005), 198; Ryu et al. (2005), 268; Sarker et al. (2005), 201-202.
[149] Cf. Zimmer et al. (2007), 301.
[150] Cf. Goodman, Darr (1998), 423.
[151] Cf. Jasperson et al. (2005), 525-533; Zimmer et al. (2007), 302, 304.
[152] Cf. Kankanhalli et al. (2005b), 1158-1159, 1163-1164; Zimmer et al. (2007), 302, 315.
[153] Cf. Gray, Meister (2004), 823.
[154] Cf. Gray, Meister (2004), 829-831.
[155] Cf. Priebe, Pernul (2003), 219-220.
[156] Cf. Lee et al. (2009), 3662-3663.
[157] Cf. Desouza et al. (2008); Grant (1996), 381-383, 377-378.
[158] Cf. Alavi, Leidner (2001), 110; Nonaka (1991), 13-14.
[159] Cf. Griffith et al. (2003), 270; Nonaka, von Krogh (2009), 640-642.
[160] Cf. Alavi, Leidner (2001), 111-112; Tsoukas (1996), 14.
[161] Cf. Alavi, Leidner (2001), 112; Griffith et al. (2003), 275-277; Kulkarni et al. (2006), 322-322.

has to utilize different mechanisms in order to manage different knowledge types. In order to lower complexity, three distinctive archetypes of knowledge will be referred to in the following: explicit knowledge, codifiable tacit knowledge, and non-codifiable tacit knowledge.

It is in the nature of IS that they are able to deal best with codified knowledge,[162] which derives from the contribution of explicit knowledge or of tacit knowledge that has been explicated. It is implied that the acquisition of interpretative explicit knowledge builds the crucial groundwork upon which tacit knowledge can be developed.[163] In line with this reasoning, Desouza and Awazu[164] contend that KPs are supposed to enable only the storage and exchange of explicit knowledge. However, this view can justifiably be regarded as rather simplistic. Namely, the repository model[165] that they refer to is complemented by a conception of KMS denoted as interactive[166], network[167], community[168], or expertise-sharing network[169] model. Whereas repository-focused KMS decidedly refer to asynchronous explicit KT (e.g., through KRs), network-related KMS focus on tacit knowledge. They provide individuals either with ample opportunity to codify their knowledge or with means for direct electronic communication or contact.[170] Therefore, these KMS are predicted to be a more adequate means to tackle knowledge dispersion.[171] A KP, functioning as a single point of access both to repository and networking features, is a hybrid form of both models,[172] based on the assumption that their integration is not categorically precluded.[173] In other words, a KP unites two usually separate KMS spheres, henceforth denoted as repository and networking sphere.

Thus, due to the delineated comprehension of KI addressing both knowledge types, KI is not one-dimensional but threefold:[174] First, KPs must integrate explicit knowledge, directly derived from contributors and KRs. Secondly, a KP should also address codification of tacit knowledge and integrate it,[175] as this endeavor is considered highly rewarding and critical for success.[176] As these two measures result in a high degree of explicitness of integrated knowledge, they are referred to as explicit KI.[177] Finally, the KP will have to find ways to systemize tacit KT (i.e., achieve tacit KI) if knowledge is by no means codifiable or if its codification would be of no use[178].

It must be kept in mind that explication and codification of knowledge are complex processes.[179] They are bound to cause codification costs[180] and to yield knowledge losses[181], "divorc[ing] the codified knowledge from its context"[182]. The severity of codification rising with the degree of tacitness,[183] it can generally be tough or impossible for individuals to communicate tacit knowledge[184] and it is hardly generalizable[185]. This is why more laborious and time-consuming efforts are neces-

[162] Cf. Desouza et al. (2008), 561; Grant (1996), 379.
[163] Cf. McCall et al. (2008), 78-79; Patnayakuni et al. (2006b), 548.
[164] Cf. Desouza, Awazu (2005), 765.
[165] Cf. Alavi (2000); quoted after Kankanhalli et al. (2005a), 114.
[166] Cf. Zack (1999), 51.
[167] Cf. Alavi (2000); quoted after Kankanhalli et al. (2005a), 114.
[168] Cf. Alavi et al. (2005), 219.
[169] Cf. Tiwana, Bush (2005), 85.
[170] Cf. Zack (1999), 50-51.
[171] Cf. Delen, Al-Hawamdeh (2009), 144-145; Tiwana, Bush (2005), 85.
[172] Cf. Bernstein, Haas (2008), 76; Braganza et al. (2009), 503, 519; Carlsson (2002), 11; Chau et al. (2006), 1216; Ryu et al. (2005), 269.
[173] Cf. Alavi et al. (2005), 220; Garud, Kumaraswamy (2005), 28-29; Markus et al. (2002), 205.
[174] Cf. Voelpel et al. (2005), 10.
[175] Cf., e.g., Patnayakuni et al. (2006b), 551; Voelpel et al. (2005), Zimmer et al. (2007), 299.
[176] Cf., e.g., Grant (1996), 382; Gupta, Govindarajan (2000), 79; Morris (2001), 833.
[177] Cf. Patnayakuni et al. (2006b), 551-552.
[178] Cf. Alavi, Tiwana (2002), 1036; Davenport, Prusak (1998), 71-72; Zack (1999), 47.
[179] Cf. Davenport, Prusak (1998), 68-72.
[180] Cf. 3.2.1.
[181] Cf. Alavi, Leidner (2001), 112; Grant (1996), 379; Von Hippel (1994), 430; Zack (1999), 47.
[182] Garud, Kumaraswamy (2005), 29.
[183] Cf. Alavi, Tiwana (2002), 1030.
[184] Cf. Alavi, Leidner (2001), 112; Morris (2001), 822, 833; Zhang (2006), 21.
[185] Cf. van Baalen et al. (2005), 311-313.

sary to integrate it,[186] among them the noted storytelling approach[187] or other best practice sharing[188]. Mostly, practical experience will be sequentially recorded and recommended,[189] but, as it is subjective and rooted in action, deriving finite insights can be intricate. This will be especially significant if participants are only loosely tied together and have rather specific (e.g., project-oriented) tasks, overlapping only in general terms.[190] Consequently, KPs that address tacit KT ought to enrich knowledge channels.[191] Yet, in general terms, the more tacit knowledge is related to context, process, and relationship, the less likely is its successful codification.[192]

As it was reasoned, some knowledge will remain to which only tacit KI is applicable. Logically, in terms of display, KPs can only address codified knowledge artifacts, so that it is another key task for them to establish the basis on which holders of tacit knowledge can interact directly,[193] letting interaction and the virtual "meeting of minds"[194] take centre stage. This reasoning relates to the necessity of direct interpersonal contact for the retrieval of complex information, denoted as relational knowledge sourcing[195]. Although exact means of social-interactive KT are nebulous,[196] basically, KPs can integrate communication channels or inter-link people through online knowledge communities or expertise localization mechanisms.[197] Networks of people should thereby be visualized and contacts be rendered more efficient.[198] However, when purely relying on virtuality, the KP might generally evoke constraints hampering knowledge application and tacit KI.[199]

Even these concentrated remarks hint to the complexity of efficient integration of knowledge, scattered along the continuum of endless graduations from tacit to explicit knowledge, not to mention other unintended effects inherent in KM.[200] It should also be pointed to the increasing intricacy of purposeful feature design and composition. KPs struggle to offer just the right blend of means for participants to reproduce purely explicit knowledge, to codify tacit knowledge if possible, or to identify the knowledge worker disposing of valuable but not codifiable tacit knowledge.

3.1.3.2. Information Diversity

Even if knowledge can be embedded in knowledge artifacts and thus becomes physically stored information, integration is not straightforward, as these artifacts can assume various shapes and structures. A KP should make an effort to integrate any information from the simply structured sort (e.g., standardized data kept in databases) to the unstructured extremes, which mostly originate from interactive communication (e.g., e-mail, short messages, text documents, web pages, or recordings).[201] Integration of information interchange between people is more intricate, as it is rarely documented;[202] a problem which is exacerbated by the growing number of communication tools and channels,[203] which imply diverse conditions and timeliness for flowing information and KT.[204]

Similarly, the internet comprehends a vast pool of information in which knowledge is embedded. Generally, technological solutions like web aggregators can mine it and create adapted information

[186] Cf. Desouza et al. (2008), 562-563.
[187] Cf. Davenport, Prusak (1998), 81-83; Morris, Oldroyd (2009).
[188] Cf. Garud, Kumaraswamy (2005), 16; Voelpel et al. (2005), 10.
[189] Cf. Morris (2001), 831-832.
[190] Cf. Alavi, Leidner (2001), 112; van Baalen et al. (2005), 310-311.
[191] Cf. Griffith et al. (2003), 275-277; Gupta, Govindarajan (2000), 79-80.
[192] Cf. Grant (1996), 382; Morris (2001), 822, 833.
[193] Cf. Desouza et al. (2008), 559.
[194] Wasko, Faraj (2000), 167-168.
[195] Cf. Zimmer (2007), 301.
[196] Cf. Patnayakuni et al. (2007), 296.
[197] Cf. Tsui (2004), 17.
[198] Cf. Braganza et al. (2009), 503; Morris (2001), 834.
[199] Cf. Alavi, Tiwana (2002); Griffith et al. (2003).
[200] Cf. Garud, Kumaraswamy (2005); Schultze, Leidner (2002), 213.
[201] Cf. Kim et al. (2002), 58; Ryu et al. (2005), 268.
[202] Cf. Evanschitzky et al. (2007), 278-279.
[203] Cf. Chou, Lin (2002), 158; Desouza, Awazu (2005), 766-767.
[204] Cf. Massey, Montoya-Weiss (2006).

configurations.[205] Simple but loosely 'swirling' external knowledge artifacts (e.g., exchange rates, price developments, etc.) might frequently be of great use if displayed as pertinent context when interpreting internal data;[206] yet, they are increasingly difficult to integrate.[207] More importantly though, internet users are less likely to share knowledge out of an economic calculus;[208] thus, a KP should mine this information, representing a vast and neutral information source. Unbiased and large-scale internet user groups often collaboratively create in-depth knowledge,[209] but they might not care to let the organization know. This is increasingly important for the disclosure of negative information and opinions about the organization.[210] However, the downturn of reach is the serious lack of stability, quality, and structure, frequently leading to information overload.[211] Therefore, web search mechanisms face a tradeoff between precision (vertical search) and comprehension (general-purpose search), such that they are strongly reliant on the utilized algorithm.[212] Although many technological solutions exist, they are mostly not prudentially integrated and adapted.[213]

Yet, structure is also an issue for information residing in circumscribed repositories, as they adhere to various information formats.[214] Especially KRs, due to their diversity and divulgence,[215] might dispose of manifold specific and unique structures.[216] Information flows will be severely hindered if categorizations or representation standards are inconsistent throughout the organization.[217] Whereas, therefore, centralization is estimated vital,[218] categorizations and taxonomies usually are deemed to be optimal only if they are sufficiently detailed,[219] as, for alternating fields of application, knowledge must feature different degrees of breadth and depth.[220] Therefore, various technologies that attempt to counterbalance this tension must be weighed and implemented.[221]

Next to varying inherent structures of information, there is frequently a need for an imposed overall information structure,[222] a sort of "shared language"[223]. This is due once more to KPs being supposed not only to produce information but also meta-information. Knowledge seekers' call for more transparency will result in the need of imposing a global structure, which contextualizes, arrays, and harmonizes networks and subgroups of people and knowledge.

3.1.3.3. Repository Dispersion

Due to low hardware prices and the increasing number of KM tools, the accumulation of digitalized information is seemingly cheap.[224] Thus, it is common for organization members, teams, and departments to generate a myriad of scattered "silos"[225] of information.[226] In addition to these informal procedures, it can also be the organizational pattern and therefore the intentional structure of an organization that implicates a dispersion of repositories. Consider, for example, the case of project-

[205] Cf. Madnick, Siegel (2002).
[206] Cf. Davenport et al. (2008), R11.
[207] Cf. Delen, Al-Hawamdeh (2009), 142.
[208] Cf. Davenport, Jarvenpaa (2003), 53; Wasko, Faraj (2000), 171.
[209] Cf. Chiu et al. (2006), 1883-1886; Kudaravalli, Faraj (2008), 720-722.
[210] Cf. Davenport, Jarvenpaa (2003), 58.
[211] Cf. Chau et al. (2006), 1216-1217; McKemmish (2009).
[212] Cf. Chau et al. (2006), 1218.
[213] Cf. Chau et al. (2006), 1219.
[214] Cf. Bernstein, Haas (2008); Patnayakuni et al. (2006b), 552; Terra, Gordon (2003), 100-101.
[215] Cf. Gray, Durcikova (2005), 164.
[216] Cf. Yao, Etzkorn (2006), 404.
[217] Cf. Desouza, Awazu (2005), 768; King et al. (2002), 94; Yao, Etzkorn (2006), 404-405..
[218] Cf. Teo (2005), 150.
[219] Cf. Delen, Al-Hawamdeh (2009), 142; Goodman, Darr (1998), 424.
[220] Cf. Davenport, Klahr (1998), 200; Ryu et al. (2005), 249.
[221] Cf. Bernstein, Haas (2008), 76-78.
[222] Cf. Kulkarni et al. (2006), 324.
[223] Patnayakuni et al. (2006b), 552.
[224] Cf. Desouza, Awazu (2005), 766.
[225] Benbya (2006), U4.
[226] Cf. Zhang (2006), 8-9.

oriented work where any project team will tend to establish its own repository.[227] Moreover, integration of KRs also involves integration of meta-information that logically connects formerly dispersed stocks.[228] This is referred to as the activation of formerly 'dormant' information.[229] If repositories cannot be integrated in the KP, this will cause a lack of perceived knowledge accessibility. This is critical insofar as accessibility is considered the most important and basic factor for knowledge seeking,[230] this coherence being even more germane to IS than to non-relational sources.[231]

Dispersion of repositories, however, need not necessarily be detrimental. If project teams actually function very much independently from one another to the extent that mutual knowledge transfer would be feckless, loosely coordinated repositories might be the structure of choice,[232] resulting in a more federated system.[233] Furthermore, any kind of personal information might per se be irrelevant to other participants and its centralized storage will regularly lead to inefficiency.[234] Repository integration, thus, must weigh if information dissemination will lead to potential synergies or inefficient reprocessing of highly specific knowledge, only useful to a confined group of users.

3.1.3.4. Participant Dispersion

In order to maximize knowledge synergies through transfer, it appears logical to integrate different participants inside and outside the organization into KMS.[235] Next to internal KT, knowledge flows coming from the exterior can be highly rewarding if they are sufficiently accurate.[236] However, the more individuals or groups are to be integrated, the more adaptive the KP will have to be if it is meant to successfully deal with the increased complexity and variety of knowledge flows. Consider, for example, personalization that becomes more difficult if participants are more heterogeneous.[237] Moreover, the KP might unintentionally worsen relations between participants.[238] In this context, the concept of cognitive distance[239] is important: If the knowledge bases of two persons are either identical or do not have any overlapping sphere, there will be no impetus for knowledge sharing.[240] At any rate, KT requires a certain common knowledge of emitter and recipient.[241] A KP has to deal with a multiplicity of different cognitive distances between pairs of participating peers. Thus, on the contrary to more circumscribed KMS, a KP can hardly typecast its users.[242]

Having left aside inter-organizational KPs, two major groups of participants remain: The organization members (3.1.3.4.1.) and non-organizational customers (3.1.3.4.2.).

3.1.3.4.1. Organization Members

For most organizations, its members will be the most important KP participants. Yet, a priori, an organization will mostly dispose of an unbalanced knowledge structure,[243] as organization members are split into various sub-groups with differing knowledge needs and specialized knowledge bases.[244] Moreover, it will usually not be an organizational unit's priority to share knowledge but

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[227] Cf. Desouza, Evaristo (2004), 88-90.
[228] Cf. Desouza, Awazu (2005), 768.
[229] Cf. Kim et al. (2002), 57.
[230] Cf. 3.1.2.
[231] Cf. Zimmer et al. (2007), 303, 316.
[232] Cf. Desouza, Evaristo (2004), 89-90.
[233] Cf. Delen, Al-Hawamdeh (2009), 142.
[234] Cf. Desouza, Evaristo (2004), 89.
[235] Cf. Alavi et al. (2005), 193.
[236] Cf. Malhotra (2003), 590, 595.
[237] Cf. Chou, Lin (2002), 158.
[238] Cf. King et al. (2002), 94.
[239] Cf. Noteboom et al. (2005), L1-L2. The concept originally refers to inter-organizational relations but can be devolved to smaller entities; cf. van Baalen et al. (2005), 303.
[240] Cf. Alavi, Leidner (2001), 112.
[241] Cf. Brown, Duguid (2001), 205; Carlile (2004), 564-565.
[242] Cf. Scheepers (2006); Teo, Bing (2008), 558; Voelpel et al. (2005).
[243] Cf. Ryu et al. (2005), 268.
[244] Cf. Grant (1996), 378; Morris (2001), 835.

rather to solve its local problems.[245] KPs might harmonize individuals' knowledge bases.[246] However, specific knowledge is necessary for an efficient division of labor.[247] The challenge can be exacerbated by organizational progress: As organizations grow, their members are bound to become more dispersed,[248] to the extent that co-workers might not even be aware of each other's existence.[249] An important pattern in this context is the virtual team, whose goal is to connect geographically dispersed workers with varying expertise.[250]

Participant dispersion, however, does not only relate to dispersed individuals but also to dispersed groups, as they are presumed to comprise highly valuable tacit knowledge.[251] In this context, the notion of communities of practice (CoPs) and networks of practice (NoPs) should be noted,[252] as they both account for knowledge collaboration irrespective of organizational allocation of resources and responsibilities. A CoP is a small group of strongly interrelated members with solid reciprocal norms.[253] In a NoP, usually numerous participants gather, who have only weak links with each other, who can stem from inside and outside the organization, and who conduct similar practices.[254] Frequently, loosely tied NoPs will be pertinent to direct knowledge flows from the external sphere inwards,[255] making them a salient means for external KPs. These heterogeneous unions of practice (UoPs)[256] mostly evolve in a self-emergent manner[257] as more or less secluded modules throughout an organization[258]. KP design ought to handle the delicate challenge of apprehending this and, at the same time, clarifying, constituting, and ultimately facilitating KT between groups. Sound coordination promises to be of huge benefit for the organization.[259] However, it is argued that a certain tension between integral and particularistic practices will always persist.[260]

Different knowledge demands are largely dependent on the nature of tasks being attributed to subgroups. Agents with direct customer contact, for example, might need more flexible information input in order to be able to adapt solutions to the customers' wishes.[261] Generally, knowledge seeking behavior is reliant on an individual's perception of the intellectual exigency of their work, which, in turn, depends on how complex, interdependent, and routine the task is.[262] Also, the usefulness of information is more or less subjective: A continuum from standardized (e.g., product facts) to personal information (e.g., an individual's workload in a project[263]) is required.[264]

Fragmented UoPs or departments will furthermore adhere to fragmented workflows and processes, making it more difficult to establish holistic participation. Routines will evolve informally over time and they relate to the individual's closer social environment[265] rather than to the organization as a whole. The challenge is enforced for self-organized and autonomous work patterns.[266]

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[245] Cf. Goodman, Darr (1998), 418.
[246] Cf. Grant (1996), 380.
[247] Cf. Brown, Duguid (2001), 207; Grant (1996), 377; Gelbuda, Soerensen (2005), 23.
[248] Cf. Gelbuda, Soerensen (2005), 2-3; Ryu et al. (2005), 268.
[249] Cf. O'Dell, Grayson (1998), 157; Voelpel et al. (2005), 17.
[250] Cf. Sarker et al. (2005), 201.
[251] Cf. Erden et al. (2008).
[252] At this point, the concepts only need brief introduction, whereas they are specified later on; cf. 4.3.2.
[253] Cf. Brown, Duguid (1991), 49; Brown, Duguid (2001), 203; van Baalen et al. (2005), 303; Wasko, Faraj (2005), 37.
[254] Cf. Brown, Duguid (2001), 205; van Baalen et al. (2005), 302-303; Wasko, Faraj (2005), 37.
[255] Cf. Wasko, Faraj (2005), 52.
[256] UoP is used as the superordinate term for CoPs and NoPs.
[257] Cf. Brown, Duguid (2001), 204-206.
[258] Cf. Grant (1996), 381.
[259] Cf. Brown, Duguid (2001), 209.
[260] Cf. Tsoukas (1996), 22.
[261] Cf. Morris (2001), 833.
[262] Cf. Gray, Meister (2004), 824.
[263] Cf. Desouza, Evaristo (2004), 89.
[264] Cf. Grant (1996), 377.
[265] Cf. Morris (2001), 822.
[266] Cf. Morris (2001), 823.

3.1.3.4.2. Customers

Especially for service-oriented organizations, it can be valuable to integrate the customer's knowledge,[267] by letting them participate in the KP. Different mechanisms and incentives must be applied, as customers' knowledge will be even more dispersed than the OK.[268] For this reason, issues of missing structure, relevance, reliability and quality might become even more virulent.[269] In other words, IS can efficiently identify and collect (primitive) information about usage, preferences, feedback and the like,[270] but this information is not yet useful knowledge. Further, even if it is reprocessed and made available, customer support agents still might not primarily source knowledge from the IS, as they possibly prefer interpersonal contact.[271] KPs are thus faced with the demanding task not only to collect customer knowledge, but also to reprocess it into a valuable condition.[272] In the process, information quality is often neglected and not conceptualized as a distinct issue.[273]

Customer KI is primarily effectuated by the organization's services, products, and marketing sectors,[274] where customer needs should be translated into action as directly as possible. A prominent applicative field is technical support in call centers. Inexpensive personnel can be employed, who possess only basic technical skills and are then supplied with the narrow relevant knowledge via an IS.[275] Particularly customer feedback management will attempt to gather customer knowledge.[276] Most of the time, it will be rather simple to gather knowledge about customers' opinions,[277] but it is quite the opposite for acquisition of customer knowledge about suggestions for improvement or even solutions. Possibilities allowing the customer to express their wishes must be offered; channels of communication, for example, should be enriched.[278] At any rate, in the equation of knowledge processes, the customer must be considered and their varying preferences for certain procedures be factored.[279] Furthermore, regulatory boundaries constrain full exploitation of all collected information.[280] Timeliness aggravates the challenge. Often, reaction to complaints and suggestions is insufficient, while customer KM must rather anticipate customers' future behavior.[281]

A KP might additionally emit useful knowledge to customers for efficient customer self service. Mostly, this translates into a question of coherent support channel management, as the KP has to seamlessly integrate other channels or at least be synchronized with them, while considering internal KRs, too.[282] This boils down to the issue of leakage: Knowledge that is easily available for customers will also be available for competitors.[283] Other, more general issues of conflict might arise if the KP replaces or interferes with other communication or marketing channels instead of only cultivating knowledge-intensive relationships with customers that is supportive of all channels.[284]

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[267] Cf. Davenport, Jarvenpaa (2003), 42; Patnayakuni et al. (2006b), 551.
[268] Cf. Davenport, Klahr (1998), 199-200.
[269] Cf. Davenport, Klahr (1998), 200; McKemmish et al. (2009).
[270] Cf. Davenport, Jarvenpaa (2003), 41-42, 57, 59.
[271] Cf. Gray, Durcikova (2005), 161-162.
[272] Cf. Davenport, Jarvenpaa (2003), 43-44, 54-55, 57; McKemmish et al. (2009), 1793-1794.
[273] Cf. Diemers (2003), 160.
[274] Cf. Davenport, Jarvenpaa (2003), 41; Gray, Durcikova (2005), 160-166.
[275] Cf. Gray, Durcikova (2005), 162-164, 178-180.
[276] Cf. Gray, Durcikova (2005), 186.
[277] Cf. Davenport, Klahr (1998), 206.
[278] Cf. Davenport, Jarvenpaa (2003), 43.
[279] Cf. Chou, Lin (2002), 158.
[280] Cf. Davenport, Jarvenpaa (2003), 47.
[281] Cf. Schotte (2003), 27.
[282] Cf. Davenport, Klahr (1998), 205.
[283] Cf. Davenport, Jarvenpaa (2003), 54.
[284] Cf. Davenport, Jarvenpaa (2003), 49-50, 54-55.

3.2. Insufficient Participation

Beyond the issue of knowledge dispersion, a sufficient degree of KP usage is indispensable. Any KMS is only of so much use as information is contributed and absorbed by participants.[285] In the following, the argument will be built upon a conception of participation referring to the technology acceptance model[286], which needs to be adapted to a KMS continuance view[287] and is thus significantly supplemented by social exchange[288] and social influence theory[289], further explaining intrinsic and extrinsic participation conditions. As for now, effects of social capital shall be left aside as they rather refer to the broader organizational context, depicted in the next section. First, the challenge will be outlined more thoroughly (3.2.1.), before specific issues will be elicited (3.2.2.).

3.2.1. Participation as a Knowledge Portal's 'Currency'

If KT is to be enabled by KMS, economic or attitudinal outcomes and benefits of KT, that is, the 'currencies' of knowledge sharing, will categorically only result from participation in it.[290] As essential as this necessity might appear, KP practice regularly struggles to achieve sufficient levels of usage.[291] Often, system success is reduced to technical success of IS design, although the system would rather require alignment to factual user needs,[292] especially, as participation is voluntary in most modern KMS.[293] In this vein, it is noted that KP technology and features have to fit the knowledge worker and their tasks in order to be successful.[294] The intricacy of addressing this challenge is in large part due to the multilayered impacts on knowledge sharing.[295] Falsely, participation might be considered an automatism, although, in fact, knowledge flows rarely spread easily in a sufficient manner across an organization.[296] Therefore participation should rather be realized as a distinct challenge;[297] it must be explicitly accounted for in the design of a KP.[298] The mere setup of a KP will regularly not lead to the intended increase in KT and KI.

If knowledge is supposed to be shared through IS participation, it will have to be contributed and sourced.[299] Yet, any contribution is bound to costs, which consist of time, effort, and expected follow-up requests[300] (i.e., the codification effort[301]), but also of a loss of knowledge power[302]. In this vein, regularly, parties need to anticipate greater benefits than costs when disclosing their knowledge.[303] Note that it is the mere expectancy of a benefit that counts in the moment of contribution,[304] as it is common that there is no immediate return for the contributor.[305] The same is true

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[285] Cf. Durcikova, Gray (2009), 83; Kankanhalli et al. (2005a), 114-115; Kulkarni et al. (2006), 311; Malhotra, Galletta (2004), 89; Zimmer et al. (2008), 298.
[286] Cf. Davis (1989); Davis et al. (1989); Venkatesh et al. (2003).
[287] Cf. He, Wei (2009), 827-828; Tiwana, Bush (2005), 86-88.
[288] Cf. Blau (1964); Thibaut, Kelley (1986).
[289] Cf. Kelman (1958); O'Reilly, Chatman (1986).
[290] Cf. Kulkarni et al. (2006), 320.
[291] Cf. Brazelton, Gorry (2003), 23; Garud, Kumaraswamy (2005), 21; Voelpel (2005), 15-16; Zhang (2006), 20-22.
[292] Cf. Malhotra, Galletta (2004); Voelpel et al. (2005), 9.
[293] Cf. Malhotra, Galletta (2005); Voelpel et al. (2005), 15.
[294] Cf. Lee et al. (2009); Teo, Bing (2008), 559-560.
[295] Cf. Quigley et al. (2007), 72, 83.
[296] Cf. Bock et al. (2005), 87; Davenport et al. (1998), 53-54; Kankanhalli et al. (2005a), 113-115; Kulkarni et al. (2006), 333.
[297] Cf. Tiwana, Bush (2005), 85; Zimmer et al. (2007), 298.
[298] Cf. Voelpel et al. (2005), 16.
[299] Cf. Bock et al. (2006), 357; He, Wei (2009), 826-827.
[300] Cf. Goodman, Darr (1998), 421-422.
[301] Cf. Kankanhalli et al. (2005a), 120.
[302] Cf. 3.3.2.1.
[303] Cf., e.g., Davenport, Jarvenpaa (2003), 52; Kankanhalli et al. (2005a), 115.
[304] Cf. Kankanhalli et al. (2005a), 115-116.
[305] Cf. Voelpel et al. (2005), 17.

for knowledge seeking,[306] as opportunity costs for search, adaption of solution to problem, and solution quality evaluation arise.[307] There are initial and ongoing learning costs for IS usage independently of a single activity.[308] Moreover, knowledge seeking and contributing are directly interrelated and enhance each other dialectically,[309] such that 'sharing' frequently is treated as a generic type of action.[310] As transfer of OK is contingent also on the number of participants, mostly, network effects will occur and critical mass mechanisms be relevant.[311] Hence, a KP has to limit the named costs of contributing and seeking knowledge[312] or outweigh them by providing substantial benefits of knowledge sharing[313], be they tangible or intangible.[314] This is why it must be a KP's fundamental principle to offer (the expectation of) some net value of knowledge sharing to any participant.

These reflections add up to the following participation framework: As a sine qua non of a functioning KP, individuals must be capable and willing both to divulge and to absorb knowledge through it. Although a consistent and distinctive classification of motivational factors is difficult,[315] this individual readiness can be separated in resulting from intrinsic factors, derived from the individual's self-concept, (3.2.2.1.) and from extrinsic factors.[316] The extrinsic factors can comprise incentives (3.2.2.2.) or conditions for knowledge sharing through the KP, of which the directly system-related ones are treated here (3.2.2.3.). Note that these two types of factors are interrelated and enhance each other.[317] The wider socio-cultural environment, which additionally influences participation, is subsumed under the challenge of an unfavorable OC.[318]

3.2.2. Common Issues

3.2.2.1. Lack of Motivation

Usage motivation denotes factors of the decision for KP usage originating in the mental sphere of a participant. Obviously, motivational factors are mutually interrelated with environmental factors. They might be representations or fractions of organizational values and thus be intertwined with OC. Moreover, as mostly volitional participation decisions are at stake, it might be difficult to distinguish different levels of motivational processes that underlie usage behavior, which can be based on normative beliefs, that is, mere 'motivation to comply' (e.g., induced social norms), or on rather self-contained motivation (e.g., as a result of personal norms).[319] In this work, motivation is conceived in a strict sense as a user's intrinsic antecedents rooted in internalized values, beliefs, identification, or otherwise from the person's self-concept, which affect a user's attitude and behavior. This implies that the participation is not necessarily based on a user's cognition.[320]

First of all, KPs must address the users' motivation to contribute. The issue of knowledge seeking free riding[321] ought to be addressed and participants be motivated to add their knowledge even if it is not economically rational from their individual point of view.[322] An important motivational factor for contribution is an increase in self-efficacy, denoting a contributor's belief in their ability to perform a task, so that the contribution (being the confirmation of this belief) represents a benefit to

[306] Cf. Bock et al. (2006), 357.
[307] Cf. Goodman, Darr (1998), 423.
[308] Cf. Goodman, Darr (1998), 421.
[309] Cf. He, Wei (2009), 826-828.
[310] For an overview of important studies examining knowledge sharing antecedents cf. He, Wei (2009), 828.
[311] Cf. He, Wei (2009), 828; Voelpel et al. (2005), 14-16.
[312] Cf. Ryu et al. (2005), 268.
[313] Cf. Bock et al. (2005), 89.
[314] Cf. Kankanhalli et al. (2005a), 116; Wasko, Faraj (2000), 163-167.
[315] Cf. Malhotra, Galletta (2005), 122-124; Quigley et al. (2007), 71-72, 81-83.
[316] Cf. Kankanhalli et al. (2005a), 116; Malhotra, Galletta (2004), 93-94.
[317] Cf. Malhotra, Galletta (2004), 90-91.
[318] Cf. 3.3.
[319] Cf. He, Wei (2009), 826-827; Malhotra, Galletta (2005), 122-124.
[320] Cf. Malhotra, Galletta (2005), 140.
[321] I.e., users maximize their personal gains by seeking knowledge without any contribution in return.
[322] Cf. Bock et al. (2005), 91; Wasko, Faraj (2000), 161-162.

them.[323] A gain derived from belief might also arise out of reciprocity, denoting the expectation of being able to seek knowledge later on as compensation for an own contribution.[324] Moreover, based on the conviction that people share knowledge for altruistic pro-social reasons,[325] it is diagnosed that the joy of helping others while expecting nothing or very little in return is a solid motivator for users to contribute.[326] Finally, while the mere seeking of a social relationship is unlikely to be a participant's prior concern, the wish to belong to a community might matter.[327]

In terms of knowledge seeking, research has framed a variety of participant types differing in their predetermined mindsets of motivational factors. Readiness to receive knowledge naturally diverges among people, predominantly due to stable dispositions to learning, social interaction,[328] or risk aversion.[329] Moreover, these dispositions might exert influence on participation levels in rather unexpected and counter-intuitive ways. Individuals that show, for example, high learning orientation or risk aversion are even less likely to consult a KR for their information needs.[330] For this target group of participants, KPs must hence go beyond simple emission of fixed validated information and deliver a learning experience involving procedural knowledge[331], whereas other groups might just as well settle for rudimentary but goal-oriented information.[332]

The highest motivation to seek knowledge is found in dedicated social groups.[333] Analogically, in distributed contexts, motivation is likely to cede with anonymity, problem complexity, and tacitness of knowledge.[334] Hence, KP design must not only focus on individual aspects for encouragement of participation, but also consider the social conditions, under which information is processed, as they are likely to be the more prominent antecedents.[335]

For any participation type, there evidently is a strong link to OC and the implementation of KPs is hence heavily intertwined with change and culture management. As "old habits die hard"[336], an individual might refuse the adoption of a new system just because the alternative working style which they are used to is still kept in place.[337] Therefore, in order to 'convince' and indirectly create motivation to participate, it might be necessary to abandon incumbent systems.[338] It is also the user's expectancy that should be managed as it is a strong motivator for system use, too.[339]

3.2.2.2. Inconsiderate Incentive Plan

Given these parameters in an individual's intrinsic motivation, one might ask the consequent question what exterior triggers and deterrents for participation an organization may evoke. First of all, KP design ought to evaluate to what degree participation can be stimulated by incentives.

As regards the hierarchical level of goal attainment to which remuneration should be bound, the literature tends to argue in favor of incentives relating to team, unit, or organization goals as opposed to individual bonuses.[340] Generally, competition within a group appears to hamper

[323] Cf., e.g., Kankanhalli et al. (2005a), 116, 122, 132; Lin, Huang (2008), 412, 415-417.
[324] Cf. He, Wei (2009), 828.
[325] Cf. Wasko, Faraj (2000), 162.
[326] Cf. Kankanhalli et al. (2005a), 116, 122, 132.
[327] Cf. Alavi et al. (2005), 212, 216; Wasko, Faraj (2000), 167-168, 170.
[328] Cf. Gray, Meister (2004), 824-825.
[329] Cf. Gray, Durcikova (2005), 169-171.
[330] Cf. Gray, Durcikova (2005), 167-171, 178-182.
[331] Cf. Zack (1999), 46.
[332] Cf. Gray, Durcikova (2005), 180.
[333] Cf. Zimmer et al. (2007), 301.
[334] Cf. Goodman, Darr (1998), 421-422.
[335] Cf. Gallivan et al. (2005), 154.
[336] O'Dell, Grayson (1998), 164.
[337] Cf. Goodman, Darr (1998), 438; O'Dell, Grayson (1998), 164.
[338] Cf. Desouza, Awazu (2005), 766.
[339] Cf. Kee-Young, Song-Woo (2009), 11-12.
[340] Cf. Gupta, Govindarjan (2000), 73; O'Dell, Grayson (1998), 166-168; Quigley et al. (2007), 80-84; van Alstyne (2005).

knowledge sharing, also in situations where KT would benefit the individual, too,[341] making it appear questionable to induce it even more from the exterior. However, in order to reduce task-related risk for participants, the combination of individual and group incentives might be more rational.[342]

Beside the hierarchical adaptation of overall goals, one might connect direct material rewards to specific knowledge sharing activities. From a long-term perspective on the intrinsic motivators, they are often expected to be rather deterrent than helpful, as they might be conceived as manipulative[343] or incite egoistic behavior[344]. This refers to the standpoint that, fundamentally, incentives might be arbitrary in their effect on participation.[345] Yet, several authors[346] were able to clearly depict a positive correlation of incentives for knowledge contributions and KMS usage, reasoning that incentives can compensate the opportunity costs of additional knowledge sharing through KMS under the condition of other, more profound motivators.

Arguably, as a result, isolated direct material incentives are rather unlikely to result in more participation; they can only support but not replace the necessary inherent reward of knowledge sharing,[347] so that other drivers remain in need.[348] One driver could be indirect material rewarding, that is, the integration of KP use into the user's actual tasks and workload, on which they are remunerated. Individuals will be likely to source knowledge only if they perceive a discrepancy between information available and information needed.[349] In this vein, it can be argued that simply prompting people to participate is likely at most to make them use the system in a rather frivolous style.[350] Accordingly, a KP will presumably fail if the individuals' general tasks are not related to working with it[351] or if dealing with the KP is not explicitly made a coherent responsibility[352].

Further drivers can be immaterial incentives, generally translating into an appreciation of the user's behavior. As exemplary immaterial benefits, especially communication and recognition are considered to important.[353] Similarly, an individual's reputation could be fostered as an immaterial reward,[354] which might translate into an expected material reward if it leads to a better standing and job opportunities.[355] Recognition is particularly intertwined with the intrinsic sphere; it might even be considered a direct intrinsic motivator[356] or it might gradually influence others. Likewise, contributors tend to seek for feedback,[357] ideally uttered in a constructive manner.[358]

While recognition is an extreme case of the multilayered character of rewarding effects and the subjectivity of individuals, for all incentives, specific reward determination is a complex procedure. Users' perceptions about motivating benefits will differ,[359] leading to unleveled dispositions towards KMS.[360] Reward perception will further vary contingent on whether knowledge emission or

[341] Cf. 3.3.2.1.
[342] Cf. Siemsen et al. (2007).
[343] Cf. Malhotra, Galletta (2004), 93.
[344] Cf. Wasko, Faraj (2000), 162.
[345] Cf. Malhotra, Galletta (2004), 93-94.
[346] Cf. Kankanhalli et al. (2005a), 120-121, 132; Kulkarni et al. (2006), 335-336.
[347] Cf. Goodman, Darr (1998), 438; O'Dell, Grayson (1998), 168.
[348] Cf. Kulkarni et al. (2006), 321, 336-337.
[349] Cf. Zimmer et al. (2007), 300.
[350] Cf. Gray, Durcikova (2005), 161.
[351] Cf. O'Dell, Grayson (1998), 164-166.
[352] Cf. King et al. (2002), 93.
[353] Cf. Kulkarni et al. (2006), 341; O'Dell, Grayson (1998), 166.
[354] Cf. Wasko, Faraj (2005), 39-40.
[355] Cf. Alavi et al. (2005), 209.
[356] Cf. Alavi et al. (2005), 209.
[357] Cf. Goodman, Darr (1998), 421; Wasko, Faraj (2000), 167.
[358] Cf. Teo (2005), 155.
[359] Cf. Alavi et al. (2005), 218; Wasko, Faraj (2000), 163-164.
[360] Cf. He, Wei (2009), 826-828.

sourcing is concerned.[361] Moreover, one needs to be aware of the difficult assessment of performance of KM activities,[362] so that the basis on which incentives are set might be unreliable.

3.2.2.3. Deficient System Capacity

A further requirement for participation is a KP's capacity to deliver sound information supply. This thesis fundamentally adopts the IS success model by DeLone and McLean[363], which sees system quality as an independent variable towards information quality, having repeatedly been approved for IS[364] and KMS[365]. Hence, the quest for perceived system capacity is twofold for KPs as well; they must address both information quality and the overall system deployment.

3.2.2.3.1. Information Quality

A significant challenge to KPs is keeping information quality on a high level, so that it is effective without supplementary revision and refinement.[366] If this is not observed, first of all, semantic success (i.e., leverage of information into competitive advantage[367]) obviously will be low. More fundamentally though, low quality information also decreases the apprehended usefulness of information seeking, the system's credibility, and therefore the knowledge seeking frequency.[368] Thus, more precisely, it is the perceived information quality that counts; that is, "the extent to which an individual believes that a repository provides precise and accurate content that meets his or her knowledge needs"[369]. Even if factual information quality is high, in the user's perception, this might not be the case, to the point of declining participation.[370] Similarly, anchoring on false information poses serious threats to KP acceptance if the system does not deliver sound information right away.[371] The challenge might be more distinctive of KPs than of KRs, as KPs rely more heavily on interactivity of users. It deals with less stable information than plain data, with a stronger emphasis on timeliness and subjectivity,[372] so that, frequently, KP design is ignorant about exact knowledge demands.[373] Yet, the KP must provide not only incentive to formulate problem and solution, but also guidance how to deliver them in a way which is meaningful to other recipients.[374]

It also needs to be stated that KI has to be traded off with a coherent and qualitative information pool:[375] the vaster the integrated knowledge, the more diverse its original dispositions will be. Frequently, knowledge providers and seekers are separate groups with asymmetric knowledge utility, to the extent that knowledge providers are incentivized to lower information quality.[376]

Specifically, KP design struggles to be consistent when determining information validation processes. They are frequently implemented without prior preoccupation about participants' beliefs, perceptions, and behaviors, so that they represent an obstacle to contribution in the eyes of organization members.[377] Thus, on the one hand, participants might be demotivated if their contributions

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[361] Cf. He, Wei (2009), 827-828.
[362] Cf. 3.3.2.2.2.
[363] Cf. DeLone, McLean (1992), 62; DeLone, McLean (2003), 23-24.
[364] Cf. Rai et al. (2002).
[365] Cf. Kulkarni et al. (2006); Ward et al. (2009).
[366] Cf. Zimmer et al. (2007), 302.
[367] Kulkarni et al. (2006), 313.
[368] Cf. Durcikova, Gray (2009), 83, 85; Kankanhalli et al. (2005b), 1163-1164; Zimmer et al. (2007), 301-303.
[369] Durcikova, Gray (2009), 84 [originally italicized].
[370] Cf. Gray, Durcikova (2005), 182.
[371] Cf. Poston, Speier (2005), 234-235.
[372] Cf. Garud, Kumaraswamy (2005), 21.
[373] Cf. Benbya et al. (2004), 216.
[374] Cf. Goodman, Darr (1998), 421.
[375] Cf. Davenport, Klahr (1998), 200; Grant (1996), 380.
[376] Cf. Desouza, Evaristo (2004), 88-89.
[377] Cf. Durcikova, Gray (2009), 83, 85.

are reedited, rejected, or delayed,[378] to the extent that the system as a whole is conceived negatively[379]. On the other hand, the KP must possibly guarantee high degrees of objectiveness and reliability for other participants through stringent validation.[380] If this is not respected, this might overly demotivate risk aversive participants to seek knowledge from the system.[381] Reviewers need to have at least a minimum technical skill[382] or be experts[383], but they are also supposed to possess insights on how to deliver information so that it is meaningful to recipients. Competences of editors (such as domain experts) are to be carefully determined according to the particular information quality claim in varying contexts. Implementing quality preserving procedures that conciliate various demands, legalities, and formalities is therefore a challenging task.[384] Accordingly, investing into validation that is more motivating and transparent is often very resource-intensive.[385]

3.2.2.3.2. System Quality

System quality, as a further antecedent for KP participation, comprises two aspects: usability (3.2.2.3.2.1.) and usefulness (3.2.2.3.2.2.). At the same time, particularly for KPs, both have to be considered continuously, so that KP maintenance plays a special role (3.2.2.3.2.3.).

3.2.2.3.2.1. Usability

Presumably, the knowledge sharing effort (i.e., its costs) is a decisive factor for knowledge contribution and sourcing.[386] Hence, an adequate level of usability[387] can be considered a necessity for any IS,[388] no matter how powerful its functionalities are,[389] and its interrelation with usage intensity has been empirically shown.[390] Also functionality integration, having the central purpose to save the user time (and thus opportunity costs),[391] will have to consider usability.

Predominantly, there seems to be a tradeoff between comprehensive complex solutions and ease of use. Basically, if search is too time-consuming and not intuitive to users, the KP might finally be abandoned.[392] On the other hand, search should include virtually any (public) information that exists, to the extent that matching[393] of required and found information becomes more and more difficult. Contemporary search engines are powerful but they must be implemented and maintained in a way that they can actually access all knowledge sources and remain easy to use. An interrelation to the extensity of KRs can be attributed: If repositories become more and more fragmented, search times might increase the perceived costs of knowledge seeking.[394] Furthermore, the number of KT tools used simultaneously to the KP will reduce its acceptance and users expect the KP to integrate as many as possible.[395] Various communication capabilities[396] need to be combined while minimizing negative effects on the overall ease of use.

3.2.2.3.2.2. Usefulness

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[378] Cf. Alavi et al. (2005), 201.
[379] Cf. Durcikova, Gray (2009), 83, 85.
[380] Cf. Durcikova, Gray (2009), 81.
[381] Cf. Gray, Durcikova (2005), 182.
[382] Cf. Zhang (2006), 10.
[383] Cf. Durcikova, Gray (2009), 83.
[384] Cf. Alavi et al. (2005), 201.
[385] Cf. Durcikova, Gray (2009), 83, 85.
[386] Cf. He, Wei (2009), 829, 836.
[387] 'Usability' and 'ease of use' are used synonymously.
[388] Cf. Davis (1989), 334.
[389] Cf. Goodwin (1987), 232-233.
[390] Cf., e.g., Gray, Durcikova (2005), 178.
[391] Cf. Terra, Gordon (2003), 49.
[392] Cf. Chau et al. (2006), 1232, Zimmer et al. (2007), 304.
[393] Cf. Goodman, Darr (1998), 424.
[394] Cf. Desouza, Awazu (2005), 766.
[395] Cf. Desouza, Awazu (2005), 768.
[396] Cf. Goodman, Darr (1998), 423.

It is not only the cost side but also the effectiveness of usage on work performance that will determine the level of participation. In generating user acceptance, system usage, and also performance, usability is at least complemented and rather outweighed by perceived usefulness,[397] largely also applying to KMS.[398] Accordingly, in case of lacking perceived usefulness, KMS are likely to be disregarded by users and to be abandoned.[399] Usefulness might also involve timeliness, and, in collaboration, pertinence to the user's community.[400] It interplays with knowledge growth, which denotes learning progress independent from factual job performance.[401] The participants' estimation of the KP in terms of usefulness will be an enforcer for knowledge sharing both in the positive and negative direction.[402]

Before working on how information is represented, a KP must preselect what information is useful in a given context. Several authors[403] have established the standpoint that retaining nescience[404] is just as well a task for KM as knowledge dissemination. This is due to the irrevocability of knowledge[405], its fading out of different perspectives, and possible unintended accountability.[406] Similarly, in order to lower complexity and obtain an increased average quality, part of the challenge is to engage in the destruction of low quality or useless information.[407] Especially in repositories that are widely opened up for contributions, this might be a difficult task.

Once information is selected, it has to be reprocessed and implicitly personalized as far as possible in order to be perceived as useful. Obviously, this challenge is strongly conjoined with information quality and validation and both challenges together can be regarded as a major antecedent to user satisfaction[408]. However, due to the subjectivity of knowledge, it is a KP's major function to systemize information (no matter how high in quality it originally was) in order to make it useful especially for the intended range of participants,[409] who might, for instance, have different demands on the elaborateness of information.[410] In other words, a KP has to address questions of flawless codification of knowledge but also of differing absorptive capacities[411] of targeted users or user groups[412] to make them participate. Often, KPs must not simply standardize information, whereas, in fact, they need to adapt to the beneficial diversity of specific knowledge bases and absorptive capacities; empirical results show that KMS must adapt to the nature of the respective task.[413]

In general terms, KPs can exercise systemization of information contributions towards objectified information (useful for all), implicitly personalized information (useful for one recipient), or towards a mixture of both, for instance, objectification for more or less confined target groups.[414] All of these approaches have their pitfalls: Objectification will necessarily sacrifice special knowledge artifacts and impede direct practical application,[415] whereas implicit personalization, on the other

[397] Cf. Davis (1989), 319, 332-334.
[398] Cf. He, Wei (2009), 829; Kulkarni et al. (2006), 317, 333.
[399] Cf. Gray, Durcikova (2005), 182.
[400] Cf. Wasko, Faraj (2000), 170.
[401] Cf. He, Wei (2009), 829.
[402] Cf. Durcikova, Gray (2009), 82-83, 87-90.
[403] Cf. Gray (2003), 22; Schultze, Leidner (2002), 213-214.
[404] I.e., ignorance but without negative connotation.
[405] Cf. Gray (2003), 22.
[406] Cf. Schultze, Leidner (2002), 214.
[407] Cf. Desouza, Awazu (2005), 767.
[408] Cf. Kulkarni et al. (2006), 314-316, 333.
[409] Cf. Teo, Bing (2008), 558.
[410] Cf. Gray, Durcikova (2005), 180.
[411] Note that originally the term related to the capacity of a firm as a whole; cf. Cohen, Levinthal (1990), 128. Yet, allegedly, it can easily be devolved to subordinate entities; cf. Brown, Duguid (2001), 202.
[412] Cf. Gray, Durcikova (2005), 180-181.
[413] Cf. Hahn, Wang (2009).
[414] Cf. Scheepers (2006).
[415] Cf. Gelbuda, Soerensen (2005), 20.

hand, will necessitate a more sophisticated mechanism than plain keyword search in order to deliver just the right degree of detail and depth for any one knowledge seeker.[416]

Notably in application areas, where basic knowledge output can be considered to be sufficient to solve problems, emission of simple objectified information will often prevail, due to an increased necessity to trade off sumptuous improvement of system usefulness, KT effectiveness, and users' learning progress on the one side with speed on the other.[417] KP management would then need to commit to a consistent prioritization of either learning or efficiency.[418] Yet, the tradeoff is a delicate matter. Choosing efficiency might translate into decreasing usefulness to the extent that quickly found information can no longer be classified well enough by the user, so that time pressure might turn into staggering participation rates.[419]

In any case, contextualization is vital. Effective KT regularly requires more meta-information than plain data would.[420] If, for example, information is quickly available but meta-information which supports the choice of relevant information is absent, the system might not be frequented any more.[421] This translates into a need for information quality rating systems.[422] Only sufficient context can enable KP users to successfully translate the received information into personal useful knowledge and, thus, they seek for a connected perspective.[423]

3.2.2.3.2.3. Maintenance

Addressing usability and usefulness is feckless, if it is not done continuously. As a KP is a non-relational information source, it is subjected to the ongoing competition of accessibility and quality of relational knowledge sourcing.[424] Accordingly, a user's original system adoption decision must ex post be confirmed over and over again to guarantee sustainable usage.[425] For instance, input masks need frequent updating, reacting to participants' volatile information seeking demands.[426]

In this vein, it is argued that IS research as a whole does not put enough emphasis on enduring system reliability although in practice it is essential.[427] Accordingly, IS adoption and continuance have developed into distinct research fields, while KM-related approaches to continuance are still underemployed.[428] Yet, negligence of continuance is likely to be increasingly injurious to KMS, as knowledge is subjected to change more than other resources.[429] Simply providing central access to preset information insufficiently considers the dynamics of knowledge.[430] However, all too often, maintenance is disregarded: Impetus of KMS deployment is limited to system implementation and runs dry afterwards, leaving users with more and more irrelevant and opaque information.[431]

3.3. Unfavorable Organizational Culture

As it was depicted, the individual participation decision is a requirement for KP success. Yet, it will also rely on the broader socio-cultural context, which also generally affects implementation,

[416] Cf. Delen, Al-Hawamdeh (2009), 143-144.
[417] Cf. Gray, Durcikova (2005), 181; He, Wei (2009), 834.
[418] Cf. Gray, Durcikova (2005), 184.
[419] Cf. Gray, Durcikova (2005), 181-182, 185.
[420] Cf. Desouza, Awazu (2005), 767.
[421] Cf. Gray, Durcikova (2005), 182.
[422] Cf. Kulkarni et al. (2006), 339, 342.
[423] Cf. Desouza, Awazu (2005), 768.
[424] Cf. Malhotra, Galletta (2005), 140-141; Zimmer et al. (2007), 304-306, 319.
[425] Cf. Tiwana, Bush (2005), 87-88.
[426] Cf. Zhang (2006), 10.
[427] Cf. Butler, Gray (2006).
[428] Cf. He, Wei (2009), 826-827.
[429] Cf. Desouza, Awazu (2005), 766.
[430] Cf. Alavi et al. (2005), 203.
[431] Cf. Delen, Al-Hawamdeh (2009), 142; Desouza, Awazu (2005), 766.

pertinence, and performance of a KP. In this vein, authors[432] are convinced that it would be precarious to adopt a view of KMS as tools which are isolated from other organizational factors and socio-cultural antecedents. Due to profound contextual interlacements, this thesis will make an effort to shed light on OC as a social factor[433] and its connection to KPs. Social capital theory[434] will be categorized here as well, providing further reasoning for environmental factors of knowledge sharing.[435] As in prior chapters, the challenge will first be constituted (3.3.1.) in order to be examined in more detail afterwards (3.3.2.).

3.3.1. Influence of Organizational Culture on Knowledge Portals

Although there is no clear and inviolable definition of OC,[436] it can be specified as a holistic arrangement of structures,[437] to which organization members refer when they act or seek to generate action from others,[438] including rules, practices, behaviors, values, preferences, and attitudes,[439] marked by varying degrees of visibility[440] and little direct alterability[441]. Organizational values, ranked on a medium palpability level, play a particularly important role in IS research.[442]

According to a view of KM as inherently multi-disciplinary[443] and despite OC's low palpability[444], it is continuously regarded as a superordinate factor for KM[445] and also for KPs[446]. In simplified terms, the postulation is to be establish knowledge as a public resource.[447] While research on the interrelations of IS and culture is multi-faceted,[448] it is claimed that any implemented KMS depends on OC and, thus, should be aligned to it;[449] that is, the KP needs to complement rather than rival OC.[450] Beyond a fundamental impact on knowledge sharing, OC also accounts for complex influence on phenomena like technology selection, knowledge fluctuation, and organization-specific KM evolution.[451] While multilevel cohesions of OC shall not be depicted in detail,[452] this thesis builds upon the conception that KMS effectiveness heavily depends on OC[453]. Regarding their comprehensive integrative approach, KPs in particular must consider such far-reaching aspects.[454]

Empirical results show that knowledge sharing behavior through KPs is dependent on identity building rather than on an individual's formal position.[455] Knowledge sharing effectiveness can hence be hindered by a bounded sociality[456], necessitating a relationship between source and recipient.[457] Supposedly, moral obligation and the urge to be part of a community enforce knowledge

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[432] Cf., e.g., Alavi et al. (2005), 193; Kulkarni et al. (2006), 311-312, 317-322, 333; Malhotra (2003), 595-596; Malhotra, Galletta (2004), 90, 94.
[433] Cf. Alavi et al. (2005), 193; De Long, Fahey (2000), 120-121.
[434] Cf. Nahapiet, Ghoshal (1998).
[435] Cf. Kankanhalli et al. (2005a), 118.
[436] Cf. Alavi et al. (2005), 194.
[437] Cf. Bock et al. (2005), 89.
[438] Cf. Bates, Amundson (1995), 1568.
[439] Cf. Kulkarni et al. (2006), 318-319.
[440] Cf. Alavi et al. (2005), 194; Leidner, Kayworth (2006), 359.
[441] Cf. Bock et al. (2005), 90.
[442] Cf. Leidner, Kayworth (2006), 359.
[443] Cf., e.g., Alavi et al. (2005), 193; Argote et al. (2003); Kulkarni et al. (2006), 339.
[444] Cf. Alavi et al. (2005), 194.
[445] Cf., e.g., Davenport, Prusak (1998), 153-155; Gold et al. (2001), 189; Janz, Prasarnphanich (2003).
[446] Cf. Teo (2005), 158; Teo, Bing (2008), 569-570; Voelpel et al. (2005).
[447] Cf. Alavi et al. (2005), 197; Wasko, Faraj (2000), 155.
[448] Cf. Leidner, Kayworth (2006), 357-363.
[449] Cf. Goodman, Darr (1998), 438; Teo (2005), 155.
[450] Cf. Garud, Kumaraswamy (2005), 24-25.
[451] Cf. Alavi et al. (2005), 219-220.
[452] For a more detailed examination cf. Leidner, Kayworth (2006).
[453] Cf., e.g., Kulkarni et al. (2006), 318.
[454] Cf. Voelpel et al. (2005), 16-17.
[455] Cf. Gelbuda, Soerensen (2005), 6; Kane et al. (2005), 61-69.
[456] Cf. Gelbuda, Soerensen (2005), 23.
[457] Cf. O'Dell, Grayson (1998), 155.

sharing.[458] Consequently, culture and identity building predominantly take place on the group level and not on the superordinate organizational level,[459] so that both holistic and departmental approaches seem rather limited.[460] Even if a specific group overly expands, participation out of identification might seize.[461] The interrelation between resource allocation and identity is notable.[462] Hence, a 'differentiation view' ought to be adopted, according to which "organizations are umbrellas for collections of subcultures"[463] and competing values, originating from different levels.[464]

Similarly, one might diagnose a parallel to knowledge dispersion. OC might be considered an organization's common knowledge base[465] or its "silent broker"[466] and, thus, a lacking or unleveled OC exacerbates negative effects of knowledge dispersion on KT.[467] Cultural dispersion similarly affects the users' absorptive capacities; a noted phenomenon is the 'not-invented-here syndrome'[468], tagging organization members' reluctance to absorb knowledge flows from the outside. However, as it was for blanket KI, striving for a unified common OC might be too simplistic and falls short of distinct knowledge supply and demand patterns of certain groups.[469] Therefore, it is questionable to what degree OC should be 'equalized' or rather kept diverse.

An unfavorable OC can basically derive from two causes: First, knowledge sharing will be hindered if individuals or the groups hoard it (3.3.2.1.). On the other hand, an unfavorable OC can also be induced from the top, rooted in lacking management support for the KP (3.3.2.2.).

3.3.2. Common Issues

3.3.2.1. Knowledge Hoarding

Allegedly, individuals usually prefer to keep their knowledge for themselves and hoard it.[470] This might be evoked by a suspected loss of knowledge power, which occurs when a contributor's personal knowledge base becomes less unique and they are less irreplaceable after their contribution.[471] In this vein, competitive strive purportedly leads to individuals keeping their knowledge for themselves.[472] This is critical especially in the codification of tacit knowledge, as, in this case, individuals disclose more personal knowledge and partly give up their status.[473] As they partially avoid codification, network-related KMS supposedly are less susceptible to this issue.[474] On the other hand, individuals might over-emphasize their self-concept towards other users of KMS when sharing knowledge, thereby rather detaining them from usage.[475] It is hard to ascertain to what degree these behavioral patterns are a direct result of imposed organizational structures.[476]

All in all, the calculation is comparable to a public good dilemma, as emission of knowledge will make it available to others, irrespective of a direct compensatory reciprocal contribution.[477] Therefore, if striving uniquely for the expected individual outcome, participants might not contribute

[458] Cf. Alavi et al. (2005), 204; Wasko, Faraj (2000), 162.
[459] Cf. Brown, Duguid (2001), 202; Marks et al. (2008), 62; Robert et al. (2008), 320; Wasko, Faraj (2000), 168-170.
[460] Cf. Goodman, Darr (1998), 438.
[461] Cf. Wasko, Faraj (2000), 169.
[462] Cf. Gelbuda, Soerensen (2005), 10.
[463] Alavi et al. (2005), 196.
[464] Cf. Alavi et al. (2005), 195-196, 208-209; De Long, Fahey (2000), 117-118.
[465] Cf. Grant (1996), 380.
[466] De Long, Fahey (2000), 19.
[467] Cf. Voelpel et al. (2005), 15.
[468] Cf., e.g., Gupta, Govindarajan (2000), 73; O'Dell, Grayson (1998), 157.
[469] Cf. Alavi et al. (2005), 195-196.
[470] Cf., e.g., Bock et al. (2005), 87; Gupta, Govindarajan (2000), 71-74; Kräkel (2005); Morris (2001), 819.
[471] Cf. Davenport, Prusak (1998), 79-80; Kankanhalli et al. (2005a), 118-119.
[472] Cf. Kulkarni et al. (2006), 311; van Alstyne (2005).
[473] Cf. Morris (2001), 836.
[474] Cf. Tiwana, Bush (2005), 86.
[475] Cf. Wasko, Faraj (2000), 168-170.
[476] Cf. Morris (2001), 823; O'Dell, Grayson (1998), 157.
[477] Cf. Bock et al. (2005), 89; Marks et al. (2008), 63.

knowledge even though this would benefit them in the long run.[478] This paradox can be overcome if a knowledge sharing-friendly OC creates a different situation. It is supposed to lead to a state of less self-interest, in which the individual no longer considers the organization's knowledge as distinct from their own and feels the moral obligation to share,[479] based on the internalization of shared values.[480] Organizations succeed in making their culture part of the individual's mindset to quite unequal extents[481] and these efforts are subjected to external and overall economic factors as well[482]. Beside internalization and identification, OC can create strong social norms, which might significantly limit perceived costs of compliance to the system and reduce knowledge hoarding.[483]

In this vein, the concept of social capital was introduced, supposedly being a strong factor for KMS usage behavior, as it has a subsidiary and moderating effect on costs and benefits of participation.[484] It is beyond the scope of this thesis to elucidate the manifold implications of the concept and only a few indicative remarks to its relevance shall be made. Social capital can be divided into structural, relational, and cognitive capital[485] and affects knowledge sharing behavior both on the group and on the individual level[486]. In the specific context of knowledge sharing in organizations, particularly aspects of relational capital (i.e., norms, trust, identification) and structural capital (i.e., tie strength, centrality of members) are focused on, which recently evoked some criticism.[487] Moreover, social capital is greatly impalpable and it might turn into counterproductive results if inducing lacking severity of work. Thus, enhancing social capital cannot be considered a generic strategy to raise knowledge contribution.[488] Particularly, the impact of structural and relational capital remains complex and indefinite.[489] Thus, it is an environmental factor that is difficult to control but that is attributed enormous significance for KMS deployment.

Not only social capital applies to both the individual and the group level, also group benefits of knowledge sharing are considered a generic type complementing individual and organizational benefits.[490] Moreover, a substantial degree of autonomy ought to be given to teams as it supposedly provides them with a higher knowledge processing and IT capability.[491] Accordingly, organizational subgroups (be they implemented of self-emergent) tend to strive to achieve their own goals, such that, first of all, the group will not share knowledge or coordinate its exchange.[492] Yet, on condition of increased knowledge dispersion, knowledge hoarding might not even be a conscious behavior. As for departmental subdivisions, three types of knowledge divisions apply: The naïve division (departments are unaware of holistic organizational patterns), the unintended division (departments' competencies counteract), and the political division (departments consciously interfere).[493]

3.3.2.2. Lack of Management Support

Authors[494] specifically insist on senior management support playing a pivotal role for KM initiatives and thus for KPs. Frequently, knowledge is not valued in the first place, in that it is either not conceived as an asset or managers struggle to grasp it. Therefore, practitioners ought to be aware

[478] Cf. Chui et al. (2006), 1883; Voelpel et al. (2005), 15.
[479] Cf. Voelpel et al. (2005), 17; Wasko, Faraj (2000), 162, 168.
[480] Cf. Goodman, Darr (1998), 421; Malhotra, Galletta (2005), 122-123.
[481] Cf. Gupta, Govindarajan (2000), 71; Voelpel et al. (2005), 14-17.
[482] Cf. Goodman, Darr (1998), 422; Voelpel et al. (2005), 19.
[483] Cf. Malhotra, Galletta (2005), 122-123.
[484] Cf. Kankanhalli et al. (2005a), 116-118, 132.
[485] Cf. Nahapiet, Ghoshal (1998), 244.
[486] Cf. Wasko, Faraj (2005), 39.
[487] Cf. Roberts et al. (2008), 330.
[488] Cf. Prusak, Cohen (2001), 92.
[489] Cf. Levin, Cross (2004), 1477.
[490] Cf. Bock et al. (2005), 89.
[491] Cf. Caporarello et al. (2009), 10.
[492] Cf. De Long, Fahey (2000), 119; Goodman, Darr (1998), 418; Voelpel et al. (2005), 15.
[493] Cf. Gelbuda, Soerensen (2005), 9.
[494] Cf., e.g., Benbya et al. (2004), 217; Davenport, Prusak (1998), 156.

about the (long-term) resource qualities of knowledge,[495] reckoning it when estimating a KP's functionality risk (i.e., the danger in information systems development not to meet user needs[496]). Moreover, human resources policy is concerned, as knowledge retention logically translates into personnel retention,[497] and also IT executives' strategic power counts for IS support.[498]

Presumably, it is particularly important that knowledge workers perceive senior managers to live by the principles they preach.[499] Paradoxically, no matter how high the importance of senior management support is rated, this issue will transfer into a general leadership and cooperative guidance matter, as direct supervisors and coworkers are frequently seen as surrogates for the organization.[500] As a result, senior management support must also permeate all hierarchical levels, as it is reflected in KP practice.[501] Moreover, managerial support can aim at a continuum from compliance to commitment, contingent on the overall KMS model that is adopted according to the organization's economic environment.[502] The challenge is enhanced in virtual teams.[503]

Below, two catalysts of lacking management support will be looked at in more detail. First, KPs struggle to illuminate a clear vision about their relation to the organization's overall objectives and, secondly, to deliver a palpable statement of their performance. Causality is mutual insofar as management's skepticism towards the KP might be the reaction to these issues and, vice versa, biased managers might aggravate them by denial of support.

3.3.2.2.1. Unclear Relation to Organizational Objectives

Basically, a KP's purpose should be consistent with the overall mission and strategy of the organization;[504] practice has shown that lacking consistency and missing frames are frequent reasons for failure.[505] This is amplified in uncertain environments where KMS more actively shape innovation and adaption of changing performance outcomes to the dynamic economic surrounding.[506]

Yet, in practice, this finding is rarely emphasized and put into action. The mere technological feasibility of KMS will often lead to their implementation,[507] without preliminarily weighing different implementation implications.[508] Often, a mechanistic view of KMS is adopted that might be simplistic in volatile environments and that often cannot account for the various KMS performance issues.[509] For example, it is ignored that tacit knowledge codification is not per se beneficial; it is rather dependent on how self-reliable and flexible organization members are supposed to work.[510] This also concerns the detailedness of information: If knowledge sharing and learning are vital for the organization's competitive advantage, it should be elevated; yet, if efficiency is critical, it should be limited.[511] Hence, if competitiveness is rooted in non-routine and unstructured sense making, a view of KMS as catalysts for 'productive subjectivity' is more appropriate.[512]

However, even if the necessity of aligning the KP with the overall objectives is accepted, it might still be unclear how this alignment can be put into effect, what should be measured, and what is to

[495] Cf. Davenport et al. (1998), 47-48; Evanschitzky et al. (2007), 278-279; Kulkarni et al. (2006), 322.
[496] Cf. Tiwana, Keil (2006), 412.
[497] Cf. Delen, Al-Hawamdeh (2009), 144; Gupta, Govindarajan (2000), 73.
[498] Cf. Kearns, Lederer (2003), 21-24; Preston et al. (2008).
[499] Cf. Kulkarni et al. (2006), 333; O'Dell, Grayson (1998), 169.
[500] Cf. Kulkarni et al. (2006), 319-320.
[501] Cf. Schwabe, Salim (2002), 200.
[502] Cf. Garud, Kumaraswamy (2005), 14; Malhotra (2003), 593-594.
[503] Cf. Kayworth, Leidner (2001), 8.
[504] Cf. Malhotra (2003), 588, 593-594; O'Dell, Grayson (1998), 169.
[505] Cf. Davenport et al. (2008), R11; Gelbuda, Soerensen (2005), 22; Sabherwal, Sabherwal (2007).
[506] Cf. Malhotra (2003), 595.
[507] Cf. Davenport, Jarvenpaa (2003), 58-59.
[508] Cf. Kulkarni et al. (2006), 310-311.
[509] Cf. Malhotra (2003), 581.
[510] Cf. Garud, Kumaraswamy (2005), 26; Morris (2001), 834.
[511] Cf. Gray, Durcikova (2005), 184-185.
[512] Cf. Malhotra (2003), 583-587.

be stipulated with knowledge workers.[513] Accordingly, employees might not ascertain knowledge sharing as pertinent to complete their regular tasks and consider them as a waste of time.[514]

3.3.2.2.2. Difficult Performance Assessment

The basic challenge consists of the catchy question of how to make the immeasurable (knowledge) measurable.[515] In place of palpable KM performance assessment, more often than not, "there is an implicit assumption that desirable KM outcomes lead to desirable firm performance outcomes"[516]. While this is a subject that has riddled KM scholars and practitioners ever since, only some issues, that blend in the framework of OC shall be depicted.[517]

It can be argued that, although the assessment of performance is naturally subjected to severe methodological hindrances, an enhanced internal benchmarking can be a considerable impetus for change and improvement of KMS.[518] On the other hand, relying too much on measurements and performance indicators can lead to paralysis, as too many resources are spent on analysis rather than on drawing consequences from it.[519] Arguably, one might thus put forward that over-emphasized performance measurement might be more constraining than helpful.[520] Still, this can be considered a resigned reminiscence to the awkward properties of knowledge as a resource, which is quite an unsatisfactory result. The bottom line is that a calculation of the return on assets will have to be narrowed down to concrete goals, controllable by sturdy measures,[521] if KPs are supposed to prevail and dilute skepticism. This will certainly be all the more emphasized for corporate KPs.

Even though KPs offer simple and efficient ways to monitor knowledge sharing behavior,[522] the interrelation to concrete performance indicators is questionable.[523] Often, measurement systems, heavily relying on the observable time consumption of service workers, might therefore even set incentives not to share knowledge,[524] but to stick to more measurable tasks. Thus, system use frequency is insufficient as a single performance measure, so that more sophisticated indicators of the actual system acceptance and knowledge sharing behavior ought to be found.[525] Likewise, usage patterns, which supposedly reveal a stronger engagement in knowledge sharing,[526] could serve as indicators but not as direct measures. Due to the impalpability of knowledge, efforts have been made to measure perceived performance indicators,[527] however, being exposed to severe issues of subjectivity. Another critical aspect is KM's long-term orientation. Although, fundamentally, organizations increasingly succeed in translating KMS efforts into greater performance over time,[528] benefits of KMS might only be observable several years after their implementation.[529] As KPs cannot boast with palpable return on assets rates on short call, limiting their budget might be one of the first cost-cutting measures of choice in economically difficult times.[530]

Admittedly, for closed fields of application, assessment might be easier. If problems can be clearly formulated and solutions unambiguously monitored, effectiveness of knowledge sharing can be

[513] Cf. Sabherwal, Sabherwal (2007), 409-410.
[514] Cf. O'Dell, Grayson (1998), 166.
[515] Cf. Griffith et al. (2003), 282.
[516] Kulkarni et al. (2006), 322.
[517] For a basic framework of value measurement of KM investments cf. Hanley, Malafsky (2003).
[518] Cf. Cohen (2006); O'Dell, Grayson (1998), 170-171.
[519] Cf. O'Dell, Grayson (1998), 172.
[520] Cf. Malhotra (2003), 598-590, 593-594.
[521] Cf. Cohen (2006).
[522] Cf. Schwabe, Salim (2002), 195; Voelpel et al. (2005), 15-16.
[523] Cf. Gray, Meister (2004), 821.
[524] Cf. Cohen (2006); Davenport, Klahr (1998), 207.
[525] Cf. Kee-Young, Song-Woo (2009), 3, 11; Voelpel et al. (2005), 16.
[526] Cf. Kulkarni et al. (2006), 317.
[527] Cf. Kulkarni et al. (2006), 342-343.
[528] Cf. King et. al. (2002), 97.
[529] Cf. Kulkarni et al. (2006), 310.
[530] Cf. Voelpel et al. (2005), 17-18.

rather precisely determined.[531] Yet, objective and cross-sectional measures, which a holistic KMS is supposed to refer to, remain difficult to attain.[532] The consequence of an explicitly cascaded assessment system, differentiated according to distinct organizational units, is bound to yield new incongruities, less transparency, and potential malevolence.[533] As consistency of recognition and thus of monitoring is a must,[534] all in all, cascading measurement is not a too promising approach either. Often, soft KM indicators must be contented with, despite their lacking vigor.[535]

[531] Cf. Cohen (2006); Gray, Durcikova (2005), 164-165; Voelpel et al. (2005), 20.
[532] Cf. Kulkarni et al. (2006), 343.
[533] Cf. Voelpel et al. (2005), 16.
[534] Cf. Kulkarni et al. (2006), 340-341.
[535] Cf. Cohen (2006).

4. Empirical Approaches to Knowledge Portals

In the previous section, three major challenges to KPs were outlined. The upcoming fourth section will now try to shed light on selected ways to address these issues. By means of reviewing and systematizing, three approaches to KPs are illustrated. The first approach will depict measures to formalize and institutionalize processes that are promotive to KI (4.2.), thus referring to the challenge of 'Extensive and Dispersed Knowledge'. As regards the challenges of 'Insufficient Participation' and 'Unfavorable Organizational Culture', a separation of approaches distinctly addressing only one of these issues is difficult, as it will be outlined later on (4.3.1.). Therefore, the remaining approaches address KP participation and OC at the same time. Specifically, one approach considers opportunities provided by UoPs (4.3.2.), rather referring to an interpersonal, interactive, and network-related KP conception. The final approach complements the foregoing, eliciting more general means of KP governance (4.3.3.). Due to a KP's multi-layered nature, a short introduction preceding the actual approaches sets the course for the estimation of following empirical results (4.1.).

4.1. Preliminary Remarks on Approaches to Knowledge Portals

4.1.1. Framework of Empirical Research

As it was already indicated several times, effective knowledge management generally requires taking into account not only technological but also extensive behavioral, cultural, and organizational issues.[536] This is even more so the case for KPs, as their most salient purpose is to comprehensively integrate knowledge, having to operate and systemize the interplay of usually generic KMS types. Hence, KP research is intertwined with other KM and KMS subcategories. This thesis namely included KI, OC, social capital, KR, UoP, and general KMS research approaches, which was all the more necessary owing to the relative lack of directly KP-related findings. Largely referring to implications of the tacit-explicit distinction, it must again be pointed to the disparity of networking and repository KMS. Associated research often explicitly or implicitly only refers to one of them.

Accordingly, the forty-two reviewed studies can be classified into four categories of prior empirical research: Studies that apply to the networking sphere (twelve studies), to the repository sphere (six studies), to both spheres (thirteen studies), or directly to KPs as such (eleven studies)[537]. As a resultant implication, findings that adhere to the three former classifications have to be applied to KPs with prudence and sometimes limited to parts of the KP. Hence, this will be outlined throughout the whole section. For an overview of all included empirical studies, appendices A to D are referenced, summarizing all analyses, sorted by their respective KMS category in the form of four tables.

4.1.2. Guiding Principles to Knowledge Portal Effectiveness

In addition to this framework of KP and KP-related research, Ryu et al.[538] developed a theoretical model, aimed at sensitizing scholars and practitioners about necessary antecedents of KT and KI in a KP[539]. The authors weigh the productivity of learning processes against environmental factors and thereby assess under which circumstances individuals would invest in KT through a KP. This individual investment leads to optimal outcomes in particular if opportunity costs of learning are low, if the acquired knowledge is effective, if a person's initial knowledge base is elevated, if others' knowledge is copious, and if learning from others through communication (as opposed to imitation) is productive. Elevated opportunity costs, for instance, will occur during economically successful

[536] Cf., e.g., Davenport, Prusak (1998), 172-177; Desouza et al. (2008), 560; Gupta, Govindarajan (2000), 71-72; Kulkarni et al. (2006), 311.

[537] Of these studies, two do not explicitly refer to KPs but to web- or intranet-based KMS; cf. Braganza et al. (2009); Voelpel et al. (2005). However, these systems largely resembled KPs in the sense of this thesis.

[538] Cf. Ryu et al. (2005), 268-272.

[539] Ryu et al. conceive KPs as sophisticated 'enterprise information portals', but it transpires that their portal concept is largely equivalent to the (slightly broader) conception of KPs in this work.

times, implying that resources might be spent for greater effect elsewhere rather than for the KP-enabled KT.

This groundwork is further complemented by Markus et al.[540], who developed an IS design theory for a type of problems different from common decision-making, denoted as 'emergent knowledge processes'. These processes refer to highly combinative IS-enabled work patterns, marked by indeterminate 'deliberations', the need for integration of general, specific, and tacit knowledge, and high unpredictability of user groups and work contexts. The authors empirically validate that these kinds of work patterns implicate more complex process, user, and knowledge requirements and that KMS need to integrate repository and networking features. Obviously, this is exactly what a KP seeks for. Thus, it could possibly reconcile the disagreement among KM scholars whether a "high-tech 'contentful' system […] or […] a low-tech communication type system"[541] is needed for practical KM. What is more, these findings suggest that, if organizations do not deal with emergent knowledge processes, the integrative approach of a KP might be less appropriate already at the outset. In simplified terms, if an organization only requires straightforward top-down information dissemination or if it is involved in purely creative 'brain-storming' work, it might only require either a repository KMS or a networking KMS, but not an integrative KP.

Hence, KP design must not lapse into the promises of knowledge sharing and KI or adopt any of the proposed measures in an undifferentiated manner. It must be taken into account that the following elaborations are validated statements, but that they were established in determinate contexts and that they need to be qualified and relativized. As meticulous annotations of study contexts written out in full would have rendered the text rather difficult to follow, this is left to appendices A to D.

4.1.3. Matching Information Technology and Knowledge Portals

Finally, the role of IT for KPs ought to be outlined. IT is conceived as a supporting means for knowledge workers, whereas it cannot replace them.[542] In accordance with that supposition, the company's IT architecture itself will rarely represent a sustainable competitive advantage,[543] to the extent that "IT doesn't matter"[544], as it was coined rather provocatively by Carr. Moreover, authors[545] emphasize the delicacy of IT deployment and point to the potential role of IT as a "jealous mistress"[546] towards knowledge sharing, particularly inhibiting tacit KT in virtual contexts.

Yet, this critique ought to be relativized. IT is an essential enabling component[547] and has proven to be capable of facilitating KT[548] (e.g., through automated integration[549]), only that it does not represent the general remedy. Sophisticated technological solutions, for example, remain a key driver for knowledge codification cost efficiency[550] and can therefore facilitate the KI.

Thus, admittedly, the intricacies of IT implementation in KPs deserve special attention. Yet, having approved of prevailing socio-cultural factors for KP deployment, this thesis does not consider matching IT to KPs to be ample enough to constitute a generic approach to KPs, such that, only in the context of explicit KI[551], some research is referenced but not examined in detail.

4.2. Addressing Extensive and Dispersed Knowledge – Knowledge Portal Process Management Approach

[540] Cf. Markus et al. (2002).
[541] Marks et al. (2002), 205.
[542] Cf. Davenport, Klahr (1998), 206; Malhotra, Galletta (2004), 91-92.
[543] Cf. Carr (2003); Gupta, Govindarajan (2000), 72.
[544] Carr (2003), 41.
[545] Cf. Griffith et al. (2003); Robert et al. (2008); Sarker et al. (2005), 201-202; Schultze, Orlikowski (2004).
[546] Griffith et al. (2003), 265.
[547] Cf., e.g., Alavi et al. (2005), 193; Kulkarni et al. (2006), 314, 317; Malhotra, Galletta (2004), 90-91.
[548] Cf., e.g., Hwang, Kim (2007); Rodgers, Negash (2007).
[549] Cf. Bernstein, Haas (2008).
[550] Cf. Kankanhalli et al. (2005a), 134.
[551] Cf. 4.2.2.1.

When addressing knowledge dispersion, the success of a KP will first and foremost rely on the routines that knowledge workers adhere to. Therefore, KP design and management should implement, facilitate, and enhance processes, setting the course for KT and KI. Very fundamentally, IS have a capability to change processes in organizations.[552] According to that, aside from motivational and social factors, KM research must not underestimate the potential effectiveness of formalization and organizational structures.[553] In a similar vein, also KMS implementations must be accompanied by organizational policies, processes, and incentives in order to be successful,[554] which has turned out to be increasingly intricate and acute for KPs.[555] Therefore, a well-thought-out knowledge portal process management (KPPM) is deemed to be necessary for KP deployment.

KPPM will be conceived broadly as the promotive managerial exertion of influence on how individuals effectuate a stream of activity within or through the KP. Moreover, as this section addresses the challenge of 'Extensive and Dispersed Knowledge', the goal of this exertion of influence will primarily be KI. Thus, it will be built upon the KI mechanism framework compiled by Grant[556], which is widely accepted in the discourse of KI,[557] such that direction, routine, and self-contained and task-oriented teams are conceived as pertinent means of KPPM.

Although interlacements obviously exist, the implementation of business process portals, being only incidentally knowledge-oriented,[558] is not an issue here. In the context of this thesis, processes as such do not represent the fundamental goal, but they are mere knowledge sharing and KI facilitators, which the KP embraces or by which it is complemented. Accordingly, this chapter will not relate to KM process design in a strict sense,[559] but it will conceive KPPM as a flexible instrument, which more or less rigorously formalizes and institutionalizes structures and behaviors.

As it was outlined before,[560] a KP can chose to either address only knowledge originating from organization members or strive to attain the integration of external knowledge as well. Aside from inter-organizational KPs, in this context, this translates into a the options of internal KPPM (4.2.2.) or external KPPM, through customer integration or internet-derived knowledge artifact integration (4.2.3.). Beforehand, however, some basic principles should be recognized (4.2.1.).

4.2.1. Guiding Principles

KI is fundamentally assumed to lead to a sustained competitive advantage. This hypothesis was basically supported in empirical studies for contexts in which work was knowledge-intensive and expertise sharing increasingly important.[561] However, this is not an automatism; performance yields of KI can be doubtable under certain conditions, especially in case of low task interdependence.[562]

Generally, those KP processes ought to be formalized which take into account and address the actual responsibilities and workflows of organization members,[563] in order to embed knowledge sharing activities into them.[564] On the other hand, increased formalization can also lead to confinement of knowledge sharing,[565] so that the quest for the right degree of form is a delicate matter.[566] While this reflects the general debate among KM scholars, whether or not formal processes, technology-

[552] Cf. Garud, Kumaraswamy (2005), 14; Goodman, Darr (1998), 418.
[553] Cf. Gelbuda, Soerensen (2005), 1-2; Patnayakuni et al. (2006b), 548-549.
[554] Cf. Kulkarni et al. (2006), 311.
[555] Cf. Braganza et al. (2009), 505-512, 519; Lee et al. (2009), 3669.
[556] Cf. Grant (1996), 379.
[557] Cf., e.g., Alavi, Tiwana (2002), 1031; Robert et al. (2008), 315; Ryu et al. (2005), 269.
[558] Cf., e.g., Adamides, Karacapilidis (2006); Rozenfeld et al. (2009).
[559] For an overview of the interrelation of KM and business processes cf. Raghu, Vinze (2006).
[560] Cf. 2.3.1.; 3.1.3.4.
[561] Cf. Benbya (2006); Janz, Prasarnphanich (2009); Lin, Chen (2006); Okhuysen, Eisenhardt (2002); Patnayakuni et al. (2006b); Patnayakuni et al. (2007); Robert et al. (2008).
[562] Cf. Robert et al. (2008), 318-319.
[563] Cf. Benbya et al. (2004), 217.
[564] Cf. Kulkarni et al. (2006), 340; Patnayakuni et al. (2006b), 551.
[565] Cf. Alavi et al. (2005), 213-214, Davenport, Prusak (1998), 89.
[566] Cf. Patnayakuni et al. (2006b), 552-553; Raghu, Vinze (2006), 1077.

focus, and top-down approaches have their right to exist in KM, this thesis sees open collaboration on the one side and formalization on the other as complements and not as antithetic options.[567]

Hence, both formal and informal process applications ought to be examined in order to achieve enhanced KI. Important examples for formal integrative practices comprise the setup of teams, job rotation schemes, and the sharing of decision-making authority; whereas informal integrative practices are mainly constituted of spontaneous, unstructured knowledge exchange primarily through informal communication and are expected to induce direct tacit KT without intermediary codification.[568] Notably, both kinds of practices might implicate further positive impacts on performance irrespective of their enforcement of KI, for instance, in terms of conflict reduction, tacit knowledge pooling, and increased awareness for other stakeholders' needs.[569] As a result, it is imperative for KPPM to dynamically consider the organization's actualities; as KPPM ought to be aligned to the participants' characteristics, it needs to evolve in line with their values and preferences.[570] In accordance with that, especially bottom-up processes play a vital role here.[571]

Finally, the question arises which knowledge processes KPPM ought to address. It was already elaborated that KI accounts for KT, that it at the same time implies knowledge application, and that, finally, it can be seen as a form of knowledge creation.[572] As a result, one could state that integration of knowledge also means integration of knowledge processes. According to that, it is argued that knowledge creation and knowledge dissemination cannot be and should not be addressed by distinct means.[573] Thus, creating KMS only focusing on either knowledge creation or knowledge dissemination is seen to be ineffective,[574] which was also reflected in practical findings for KPs.[575] Consequently, as a basic principle, KPPM needs not and mostly should not distinguish in terms of its finality towards knowledge processes.

4.2.2. Internal Knowledge Portal Process Management

4.2.2.1. Explicit Knowledge Integration

It was outlined that, in principle, IS are more capable to deal with explicit knowledge.[576] In addition, tacit KT has shown to be intricate also in social networks.[577] Therefore, the KP ought to systemize knowledge that is explicit or can be explicated through codification. Accordingly, explicit KI can be attributed an important role in KPPM,[578] owing to its greater tractability. Yet, explicit KI needs to consider a basic tradeoff. Patnayakuni et al.[579] found that formalization had a negatively moderating effect on the otherwise positive correlation of explicit KI and performance. Formalization (independent of KI) had a genuinely positive effect on performance. In this constellation, it might be sensible to limit explicit KI by formalization if this is conducive to higher performance.

Yet, if explicit KI is deemed pertinent (which will regularly be the case), the necessary steps comprise codification, reviewing and categorization, and finally access.

4.2.2.1.1. Codification

In order to achieve maximum KI, first of all, knowledge codification must be facilitated. It is not only the 'recording' of anyway explicit knowledge but also the transformation of tacit knowledge that is concerned, as this has repeatedly proven positively effective on performance.[580] In the con-

[567] Cf. Patnayakuni et al. (2007), 296.
[568] Cf. Patnayakuni et al. (2007), 290-291.
[569] Cf. Patnayakuni et al. (2007), 290-291, 293-297.
[570] Cf. Alavi et al. (2005), 218-219.
[571] Cf. Kulkarni et al. (2006), 312.
[572] Cf. 2.1.3.; 2.2.2.
[573] Cf. Malhotra (2003), 596.
[574] Cf. Delen, Al-Hawamdeh (2009); Malhotra (2003), 585.
[575] Cf. Braganza et al. (2009), 516-519; Teo (2005).
[576] Cf. 3.1.3.1.
[577] Cf. Reagans, McEvily (2003), 261-265.
[578] Cf. Desouza et al. (2006), 36-37.
[579] Cf. Patnayakuni et al. (2006b), 558-562.
[580] Cf. Patnayakuni et al. (2006b), 560.

text of KPPM, fundamentally, this translates into the necessity of implementing knowledge codification throughout actual work processes. The appropriate rigor is contingent on the expected behavior and on the addressed knowledge type.[581]

Within the repository sphere, knowledge codification that is meaningful to all users ought to be rigorously implemented and required from contributors.[582] Meaning for others is obviously subjective and thus dependent on these potential knowledge seekers. The pre-determined information structures must thus be adapted according to the complexity of the knowledge that is supposed to be codified and retrieved by the KP's respective target groups.[583] Similarly, it is recommendable to involve future knowledge seekers already during codification, that is, to allow them to ask critical questions and give input and feedback, so as to adapt to their needs right away.[584] In this context, Garud and Kumaraswamy[585] point to the resource intensity of codification, leading to confinement of explicit KI, for instance, when knowledge workers are under time pressure.

On the other hand, in the networking sphere where room for creativity and self-determination is vital, it can be sensible to seamlessly integrate every codified knowledge artifact,[586] no matter if it is irrelevant or reaches beyond work processes,[587] in order to tear down every possible barrier to knowledge codification and achieve maximal KI. In such an indeterminate context, counter to intuition, formalization of tacit KI has been shown to even have an enhancing effect on the genuinely positive influence of collaborative knowledge sharing on performance; formalization functioned as a positive moderator and accounted for a more intense structure and higher effectiveness of otherwise loose KT and KI.[588] Therefore, submission of tacit knowledge codification under complementary formalization does in fact appear promising as long as this does not profoundly stall networking-enabled knowledge sharing. Consequently, prudent ways of formalization ought to be searched for. One way of subtle formalization is depicted by Alavi et al.[589]. In the case that they examined, codification processes which have formerly proven successful in a self-emergent manner were institutionalized by means of automation, standardization, and modeling. Thus, KPPM must not impose regulations on how work groups have to function, but that it rather needs to detect and elaborate which routines provide structure without exaggerated restriction of self-emergent groups.

An important general function for both spheres is feedback,[590] as knowledge emitters might learn over time if they were able to codify their contribution pertinently and how they could improve it. Contribution through codification requires resources and it has been shown empirically that sufficient organizational support in this sense is vital.[591]

4.2.2.1.2. Reviewing and Categorization

In a second step, knowledge should be reviewed and any knowledge artifact be attributed to categories, unified in the framework of the KP's knowledge organization system. Again, the exigency of KPPM will largely differ if either the repository or the networking sphere of a KP is concerned.

Rigorous, unified, and transparent validation processes have proven to be pivotal for repository-related KPPM.[592] Thereby, users from all departments can retrieve information relating to multiple evolving themes and, at the same time, contextualize it in a standardized manner.[593] Regarding

[581] Cf. Patnayakuni et al. (2006b), 558-562.
[582] Cf. Garud, Kumaraswamy (2005), 22-23; Kankanhalli et al. (2005a), 134; Schwabe, Salim (2002), 194.
[583] Cf. Voelpel et al. (2005), 16.
[584] Cf. Pugh, Dixon (2008).
[585] Cf. Garud, Kumaraswamy (2005), 23.
[586] Cf. Schwabe, Salim (2002), 194-195.
[587] Cf. Alavi et al. (2005), 208.
[588] Cf. Patnayakuni et al. (2006b), 558-562.
[589] Cf. Alavi et al. (2005), 210.
[590] Cf. Braganza et al. (2009), 516-519.
[591] Cf. He, Wei (2009), 829, 833-834; Voelpel et al. (2005), 17.
[592] Cf. Braganza et al. (2009), 516-517.
[593] Cf. Schwabe, Salim (2002), 192.

information quality, particularly the volatility of knowledge should be made transparent;[594] knowledge artifacts could be branded by stability indicators, in order to react to different demands of timeliness. For content categories, it is vital to nominate competent knowledge domain experts,[595] who filter and reframe contributions to render them useful,[596] at best within an agreed upon time frame.[597] A metric system for validity must be assessed and validity be monitored and publicized.[598] Relative to content specificity, commentary, discussion, and feedback functions ought to be added for all workers, including service agents with concrete and genuine experience.[599] In larger groups, leaders can take over the role as conveyors of postings towards the experts.[600]

As regards knowledge artifacts stemming from the networking sphere, information quality validation appears to be sensibly carried out in a more precautious manner to achieve maximum KI. Specifically, the outset will frequently be a question rather than a finite contribution (otherwise the contributor could have turned to the repository in the first place[601]) and the solution might evolve out of a discussion. In this case, for KI in dispersed contexts, it is pivotal to have an institutionalized mediator or conveyor, who is familiar with the different subjects and the designated experts.[602] It has proven sensible to keep and cultivate all (superficially reviewed and categorized) responses in the networking sphere and to transfer evidentially satisfactory results to KRs.[603]

Subsequently, a flexible categorization and access structure ought to be elaborated, as categories of information quality (relevance, timeliness, validation process, etc.) and of content (subject, product, project, client, access rights etc.) ought to be displayed.[604] While content categories should be maintained flexibly and be continuously adapted to current user and customer needs,[605] at a particular time, they should adhere to certain standards, which need to be observed by contributors, as this significantly facilitates reprocessing and access due to reduced complexity.[606] This is consistent with empirical findings that semantic consistency is vital for explicit KI in knowledge-intensive work.[607] It has turned out to be helpful to involve knowledge domain experts already in the system engineering phase in order to adopt categorizations to factual knowledge needs.[608] Classification of simple web pages can also be automated through sophisticated algorithms.[609] Information quality standards can then be adapted to any unique content category.

4.2.2.1.3. Access

It can be sensible to induce knowledge workers to also increase the breadth of their knowledge by devoting time to those artifacts that do not directly concern their specialization despite necessary costs.[610] Therefore, fundamentally, access to extensive explicit knowledge through KI in KMS is assumed to be promotive to performance. This effect has been empirically validated[611] and shown to be enhanced on condition of integration[612]. Given the two distinct spheres of a KP, a cascaded access process framework is most likely to enhance explicit KI and serve dispersed knowledge seekers: First they will be able to refer to the repository sphere for established, more stable, and

[594] Cf. Zack (1999), 56.
[595] Cf. Braganza et al. (2009), 516; Teo (2005), 158..
[596] Cf. Teo (2005), 152, 156; Voelpel et al. (2005), 13.
[597] Cf. Braganza et al. (2009), 503, 513-514.
[598] Cf. Braganza et al. (2009), 517.
[599] Cf. Braganza et al. (2009), 503, 514-515..
[600] Cf. Alavi et al. (2005), 206.
[601] Cf. 4.2.2.1.3.
[602] Cf. Alavi et al. (2005), 206.
[603] Cf. Alavi et al. (2005), 206-208.
[604] Cf. Garud, Kumaraswamy (2005), 18; Schwabe, Salim (2002), 191-194.
[605] Cf. Teo (2005), 155.
[606] Cf. Desouza et al. (2006), 40-42.
[607] Cf. Patnayakuni et al. (2006b), 558-562.
[608] Cf. Liming et al. (2007), 292-293.
[609] For an up-to-date overview of web classification research cf. Qi, Davison (2009).
[610] Cf. Ryu et al. (2005), 269.
[611] Cf. Braganza et al. (2009), 516; McCall et al. (2008), 82, 91-92, 96-97.
[612] Cf. Benbya (2006), U4-U6.

validated information and, in a second step, they can turn to their wide-spread co-workers through the networking sphere if they need current information or have detected an unsolved problem.[613]

For dispersed KRs, Schwabe and Salim[614] depict how the information structure[615] can be supplemented by a navigational context structure that provides meta-information, such as access structures, content relations, established knowledge artifact combinations,[616] dynamic feedback, and other context schemes. Thereby, formerly unrelated information is automatically or manually provided with a logical framework of navigation and coordination. The resulting semantic consistency of accessed information was shown to increase work performance by Patnayakuni et al.[617]; it was attributed a positive disciplinary potential for cohesive assignments by providing all participants with identical information, such that all knowledge workers designated for one task are able to find themselves "'on the same page'"[618]. Finally, an abstract interface design, adaptable to the respective device and user needs, must be developed.[619]

As perspicuity of knowledge artifacts has shown to be essential for knowledge reuse, their representation should also be standardized.[620] All three configurations (information, navigation, and interface) therefore need to be mapped into one application, technically translating into a subordinated coordination layer, unifying the hypertextual view.[621] During this procedure, timeliness of access ought to be sufficiently valued, contingent on the respective user needs.[622] Participants can be offered the opportunity to make use of explicit personalization and sign in to relevant categories, giving them the possibility of being notified automatically when new information is contributed.[623] Moreover, users could be offered a collaborative filtering mechanism, yielding favored content credibility indications, enhancing purposeful follow-up requests, and moderation of negative anchoring.[624] The sumptuous establishment of such structures is certainly rather case-related. At any rate, concrete IS design ought to be conceded adequate and continuous significance through granting manpower and resources, hinting at the importance of management support.

In a similar vein, the necessity of making sufficient resources available also for users has been empirically validated;[625] thus, time should be explicitly spared to allow exploring other KRs and work schedules ought to be adopted accordingly.[626] As explicit knowledge exchange has turned out to be more contingent on accessibility,[627] in particular, KRs not being perceived as available need to be considered. Fundamentally, learning processes ought to be integrated with work processes.[628]

4.2.2.2. Tacit Knowledge Integration

It was outlined that, particularly for an increased tacitness of knowledge, codification and storage of knowledge in KRs is often not possible or pertinent. Moreover, also codified knowledge might demand supplementary tacit KT in the form of follow-up requests, updating, and adaption. Hence, the final and possibly most important component of KPPM is the effectuation of tacit KT, logically translating into collaborative interactivity both between users and the KP (asynchronous non-relational KT) and among users (synchronous relational KT). Thus, processes need to be estab-

[613] Cf. Braganza et al. (2009), 503.
[614] Cf. Schwabe, Salim (2002), 191-193.
[615] Cf. 4.2.2.1.2.
[616] For further insights on KP-adapted algorithm modeling of recommendation-based browsing cf. Zanker, Gordea (2006).
[617] Cf. Patnayakuni et al. (2006b), 558-562.
[618] Patnayakuni et al. (2006b), 560.
[619] Cf. Schwabe, Salim (2002), 193.
[620] Cf. Desouza et al. (2006), 40-42.
[621] Cf. Priebe, Pernul (2003), 217; Schwabe, Salim (2002), 193-194.
[622] Cf. Braganza et al. (2009), 514, 516.
[623] Cf. Teo (2005), 152, 154.
[624] Cf. Poston, Speier (2005), 228-238.
[625] Cf. He, Wei (2009), 829, 833.
[626] Cf. Kankanhalli et al. (2005b), 1164.
[627] Cf. Kankanhalli et al. (2005b), 1164.
[628] Cf. Janz, Prasarnphanich (2009), 629.

lished that enhance KI through interaction of dispersed individuals in order to finally increase knowledge workers' performance.[629]

4.2.2.2.1. Informality

In much the same manner and rather fundamentally, KPPM needs to allow for informality, insofar as enhanced formalization and fixation of processes confine interactional knowledge sharing via the KP.[630] Accordingly, collaboration might even be seen as tantamount to that informal communication which "provide[s] contextual specificity necessary to meaningfully […] share knowledge"[631] and also comprises the social factors of knowledge sharing. It is the aim to create an environment in which knowledge is leveraged through habitual and practiced collective and collaborative action such that it is integrated.[632] Patnayakuni et al.[633] found that open collaboration facilitates tacit KI, which resulted in an increase in performance. In another article, Patnayakuni et al.[634] empirically validated the enhancing effect of informal integrative practices in the sense of free communication on performance and on KI (which, itself, was also correlated to performance).

Hence, it is important to generally leave communication more open than stipulated. In several cases, the creation of open knowledge sharing spaces and encouragement of informal communication has shown to be conducive.[635] Similarly, allowing for gatherings of representatives from dispersed groups has turned out to fuel knowledge exchange.[636] Informality might have to be adapted to the team's specific task though, as it causes members to value coordination over collaboration.[637]

4.2.2.2.2. Communication Intensity

Similarly, frequency and density of communication ought to be fostered even if it is not always conducive in terms of average knowledge quality. Sarker et al.[638] showed that knowledge contributors' extensity of participation and their credibility will prevail over their capability if KT ought to be enhanced out of the peer recipients' positive perception of the contributor. As the study took place in the context of virtual and geographically dispersed teams, the authors reason that the influence of perceived capability might be insignificant due to the ineptness of highly competent contributors to virtually explicate their knowledge. Similarly, Zhang[639] found that, over time, mere confrontation with issues from other sectors and departments without actual problem-solving can create a knowledge sharing atmosphere out of awareness for other participants' problems.

This is even more so the case for members of large groups that are widely distributed. In connection with research and development teams, perceived importance of interconnectivity and communication functionalities has been shown to rise with team dispersion, as individuals more strongly require and seek for facilitators of interaction.[640] In accordance with these findings, Voelpel et al.[641] report positive effects of continuous and induced face-to-face meetings on condition of immoderate dispersion, in this case accompanying the actual system acceptance process.

4.2.2.2.3. Unions of Practice

Ways to gently institutionalize interaction in particular include the fostering of UoPs. Notably, boundaries of UoPs are not equivalent to organizational boundaries and they represent means to

[629] Cf. Patnayakuni et al. (2006b), 551.
[630] Cf. Alavi et al. (2005), 213-214, Davenport, Prusak (1998), 89; Patnayakuni et al. (2006b), 552-553.
[631] Patnayakuni et al. (2006b), 551.
[632] Cf. Patnayakuni et al. (2006b), 560.
[633] Cf. Patnayakuni et al. (2006b), 558-562.
[634] Cf. Patnayakuni et al. (2007), 293-297.
[635] Cf. Garud, Kumaraswamy (2005), 20-21; Sarker et al. (2005), 209-214; Teo (2005), 156-157.
[636] Cf. Alavi et al. (2005), 210-211.
[637] Cf. Lee et al. (2009), 3668-3669.
[638] Cf. Sarker et al. (2005), 209-214.
[639] Cf. Zhang (2006), 23.
[640] Cf. Lee et al. (2009), 3667-3669.
[641] Cf. Voelpel et al. (2005), 13.

easily transcend the inner organizational sphere, whereas, admittedly, KI determination becomes incomparably more nebulous in this case.[642]

Alavi et al.[643] depict a sophisticated and highly plausible framework for UoPs[644] in their case-based analysis of a globally operating knowledge-intensive organization. The implementation of UoPs in this firm means effectuation of collaboration that is by and large informally organized across sections and, for instance, aligned to customer segments or subjects. The organization puts in place community procedures that determine informal roles and activities for voluntary participants. UoPs receive backing and sustainability by executive sponsors and members can bill the amount of time spent for contributions. Thereby, the establishment of norms and processes is guaranteed but they are enforced by community members themselves as one of their activities and under self-set goals. Knowledge dispersion rooted in organizationally induced isolation can be limited by creating a higher visibility and identification with groups and the organization. KM leaders take over roles as intermediary navigators. They are first of all responsible to detect and route knowledge instead of simply absorbing it themselves. They account in particular for structure and the averting of information overload. In the past, the organization was able to further structure the process of UoP evolution without drastically inhibiting it by the iterative elaboration of a UoP development manual. One role model UoP was able to build up an elaborate monitoring and return on assets scheme. Overall, it arises from the analysis that original institutionalization ought to be restricted to the least possible explicitness of form and specification and only provide the groundwork for self-emergent autonomous groups.

This is consistent with case-based experience of Braganza et al.[645]. The examined KP loosened the incumbent hierarchical structure and transferred it into a matrix pattern. At the same time, the KP integrated the largest part of communication by establishing enhanced channels. Thereby knowledge workers from dispersed business units were able to seamlessly cooperate according to their task-related needs without the boundaries of overly fixed organizational allocations and accountability. Garud and Kumaraswamy[646] account for an important condition of self-emergent groups, as, at the outset, members require means to locate knowledge. The organization which they examined implemented a 'People Knowledge Map' to visualize the locus of experts.

Within particularly loosely tied NoPs, one way that has proven vital is the implementation of a knowledge broker or knowledge champion that will fill in structural holes[647] and function as a facilitator and catalyst of direct knowledge exchange.[648] This is also consistent with more elaborate and directly KP-related findings of Lee et al.[649]. In the context of knowledge being extremely dispersed, their analysis found that perceived interconnection and communication become all the more salient. Knowledge workers tend to emphasize the role of direct interchange, as they see it as the only means to figure out where the pertinent knowledge resides.

In a similar vein, studies examining the relevance of tie strength contribute to the reasoning of tacit KI via UoPs. Reagans and McEvily[650] underscore the relevance of strong ties in social networks and of social norms on condition of weak ties, but state that tie strength does not determine the knowledge type that is transferred. Levin and Cross[651] confirm that tie strength has no effect on the type of knowledge which is transferred and they find trust to be a mediator of the positive effect of strong ties. These findings implicate that even widely dispersed UoPs are not necessarily subjected to difficult or impossible tacit KI. Once they build up a minimum level of trust, also tacit

[642] Cf. Roberts (2006), 636.
[643] Cf. Alavi et al. (2005), 203-216.
[644] Owing to the wording of this work, UoP is appropriate for the group that Alavi et al. describe; cf. 4.3.2.1.
[645] Cf. Braganza et al. (2009), 513.
[646] Cf. Garud, Kumaraswamy (2005), 19.
[647] Cf. Nahapiet, Ghoshal (1998), 245.
[648] Cf. Braganza et al. (2009), 516-519; van Baalen et al. (2005), 300.
[649] Cf. Lee et al. (2009), 3667-3669.
[650] Cf. Reagans, McEvily (2003), 261-265.
[651] Cf. Levin, Cross (2004), 1485-1486.

knowledge can be integrated and KP participants need not necessarily be collocated in small teams to endogenously impose strong relationship ties. If the KP promotes trust among users, particularly by allowing direct interaction and communication when they are desired by users, tacit KI might be even more powerful as in closely linked small groups. However, admittedly, the build-up of trust and tie strength might be intertwined and both are costly, so that it might often remain the most efficient way to utilize established strong links for more sumptuous tacit KI.

4.2.2.2.4. Organizational Structures

More concrete action for enhanced KI must be taken though in terms of fundamental organizational structures. Perceived importance of certain KP features has manifested to be contingent not only on individual participants but also on team characteristics and tasks.[652] Accordingly, the KP should attempt to loosen up fossilized structures, responsible for boundaries of knowledge exchange, to reduce knowledge dispersion. As a first measure to enhance knowledge dissemination, the flattening of hierarchies has been identified.[653] Top-down processes are possibly deterrent, as dissemination of innovative knowledge was found to require a framework for social collective interaction.[654] In much the same manner, formally effectuating participative decision making has been shown to have a direct positive effect on performance but also an indirect one through enhanced KI, underscoring the relevance of formally structuring practiced patterns that have proven effective by themselves in the past.[655] Voelpel et al.[656] confirmed these findings; in the case that they depict, blending centralized responsibility for KP maintenance with more participative strategic decision-making resulted in a sustainable cooperation and integration of knowledge workers.

As a second ingredient, team structures ought to be valued.[657] Fundamentally, the positive effect of team building as a formal integrative practice has been empirically underscored and it could be correlated both directly and indirectly to performance, as it was partially mediated by KI.[658] As tacit KI is concerned, digitization of communication through the KP is deemed to impact knowledge exchange.[659] Denotative results of a study proposed by Robert et al.[660] indicate that a team's common history and future expectation (constituting its social capital) can overcome barriers of trimmed communication channels in digitally enabled teams. The authors showed that relational capital takes effect notwithstanding the communication environment of a team, while structural and cognitive capital become all the more important if digital communication plays a stronger role. For digitally enabled teams, an equalized (as opposed to centralized) structure, based on task interdependence, and a common knowledge base of all members proved to be decisive for decision-making quality. Hence, an organization must not expect the simple integration of formerly dispersed organization members in a digital team to automatically increase KI and performance; outcome of digitally enabled teams with low structural and cognitive capital is likely to be marginal. This is aggravated by the increasing difficulty to build up social capital in digital environments. Consequently, the results indicate the necessity of long term focused investments in KI (especially through task interdependence) and the futility of ever changing team structures, particularly if members work together through digital means of a KP.

Autonomy of teams has proven pivotal for KI and interactional knowledge sharing in a recent study of Janz and Prasarnphanich[661]. Autonomy was mediated by different facets of collaborative learning (namely positive interdependence of team members, group process[662], and promotive interac-

[652] Cf. Lee et al. (2009), 3668-3669.
[653] Cf. Alavi et al. (2005), 210.
[654] Cf. van Baalen et al. (2005), 301.
[655] Cf. Patnayakuni et al. (2007), 293-297.
[656] Cf. Voelpel et al. (2005), 12-14.
[657] Cf. Robert et al. (2008), 314.
[658] Cf. Patnayakuni et al. (2007), 293-297.
[659] Cf. 3.1.3.2.; 4.1.2.1.
[660] Cf. Robert et al. (2008), 328-331.
[661] Cf. Janz, Prasarnphanich (2009), 627-631.
[662] Speaking of group process, the authors refer to constructive intra-group discussion and feedback rounds.

tion among group members) towards performance and user satisfaction. In a consequent step, positive interdependence led to increased satisfaction, while group process correlated with an increase in work performance. The impact of promotive interaction in groups on these fundamental goals was insignificant. The authors find that personnel autonomy and planning-related autonomy constitute a team's overall autonomy, whereas product-related autonomy does not. The results clearly hint towards the sensibility of team level rewarding for enhanced knowledge sharing. Moreover, autonomy is also relevant for singular persons, as individual autonomy might help them to sense the responsibility and necessity to engage in knowledge sharing through the KP, particularly in connection with geographical dispersion.[663] However, these two levels of autonomy might be conflicting as team autonomy might impair a member's individual orientation.[664]

Once KI within teams has been achieved, KPPM also ought to address the question of inter-group KT. In doing so, diversity of the inner team structure has shown to be promotive. In a field study in an internationally operating telecommunications enterprise by Cummings[665], structural diversity and dispersion of people within work groups proved beneficial rather than inhibiting on performance, yielded by knowledge flows between these groups. Groups that comprised members from different regions and variable backgrounds generated a higher value of inter-group knowledge sharing while maintaining comparable levels of productive inner-group knowledge exchange. Although Cummings does not specifically treat the question of KI, the proliferous effect of external knowledge sharing of groups that he describes implicates a certain systemization of formerly dispersed knowledge and hence organization-wide KI. Therefore, as long as social capital and informal communication are not overly hampered, the KP ought to interlink knowledge workers in rather heterogeneous work groups with functional ties, for example, composed from different business units, and attribute interdependent tasks to them, whereas KPPM should not try to synchronize or level a team structure in order to integrate knowledge on an inter-group level. Yet, certain dispositions of functional purposefulness, low enough cognitive distance, and positive interdependence must be present; otherwise, as Cummings admits, issues of knowledge stickiness, hierarchies, and diverging knowledge backgrounds might lead to different results. These results appear more solid though in the light of a study of Braganza et al.[666], in which structural and knowledge diversity accounted for higher performance in a KP as well. They are further underscored by findings of Hansen et al.[667], who validated the statement that dense and frequent intra-team relations are detrimental to inter-subsidiary KT. The authors additionally point to the relevance of perceived inter-group competition, which hampered inter-group knowledge exchange by increasing costs, and inter-group relations, which enforced in particular tacit KT. This leads them to the diagnosis that inter-group knowledge hoarding is partially an effect of competitiveness and not a 'natural' (e.g., psychic) tendency. As an overall result, intra-group structures ought to be diversified, whereas inter-group linkage ought to be enhanced by KP group coordination.

4.2.3. External Knowledge Portal Process Management

4.2.3.1. Customer Knowledge Integration

The intricacies of KM directly involving the customer were highlighted. Accordingly, not many conclusive examples of organizations exist that address this challenge. Therefore, in this subsection, elaborations are subjected to case-relatedness and constrained generalizability more than otherwise. Notwithstanding, some prominent results shall be exemplified.

Notably, a KP depicted in a case study by McKemmish et al.[668] puts customers into focus. The authors insist on the relevance of ongoing and intensive consultation of customers, whose needs have to be considered from the very start of the implementation process. Although they treated a

[663] Cf. Alavi et al. (2005), 212, 216.
[664] Cf. Janz, Prasarnphanich (2009), 630.
[665] Cf. Cummings (2004), 357-363.
[666] Cf. Braganza et al. (2009), 518.
[667] Cf. Hansen et al. (2005), 785-792.
[668] Cf. McKemmish et al. (2009).

KP in health care relating to the intimate and rather finical subject of breast cancer, they emphasized subjectivity and context-relatedness of knowledge for the KP both in contribution and sourcing and tried to convert this into personalized accessing of subjectively pertinent information. In light of these knowledge properties and prevalence of (subjective) information quality, they found reviewing of information and consequent provision of meta-information about accuracy, provenance, authority, and reliability of knowledge to be salient. Accordingly, they point to the positive effects of quantity of quality markers. In terms of automation, the authors emphasize the inclusion of quality reporting in source selection metadata. Hence, they propose a framework of enhanced meta-information and user autonomy to be the most conducive groundwork for customer KPPM.

Desouza et al.[669] have empirically validated the customers' seeking for simplicity and risk avoidance of knowledge output. In the context of knowledge artifacts intended to be accessed by customers, this results in the necessity to establish more rigorous processes and guidelines emphasizing brevity and quality of knowledge contributions and to enforce knowledge validation and reviewing, even if this is bound to somewhat stall knowledge contribution. Due to the prevalent impact of the customer's perceived relative advantage on their knowledge sourcing behavior, especially the potential benefits of a knowledge product need to be outlined to them and seemingly secured in a straightforward manner. Interestingly, in this study, low complexity was correlated both with increased explicit knowledge sourcing and with perceived compatibility from the customer's viewpoint. The authors hence reason that customers see these variables as interrelated.

Alavi et al.[670] found the looseness of ties to be a capability in their already cited study. In a virtual open knowledge sharing area, organization members could meet clients and colleagues, extending collaboration from the intra- to the inter-group sphere. They report positive effects of accidental intercourse of knowledge workers. Similarly, Schwabe and Salim[671] underscore the relevance of an organization to adapt to customer needs. They consider the original goal of their KP to function as the decisive nexus of dispersed individuals and knowledge. However, they fail to deliver concrete measures to intertwine customer and internal knowledge.

4.2.3.2. Internet-Derived Knowledge Artifact Integration

As for KI from the web, mechanisms exist which structure abundant search results and tackle information overload and thus knowledge dispersion, such as automated indexing, text classification and clustering, and self-organizing or topic maps.[672] Powerful but complex solutions are recommender systems,[673] which implicitly personalize web access in a rather sophisticated style. These systems are based on the assumption that KP participants require information which will frequently refer to a certain domain. In this context, Chau et al.[674] have brought forward a web KP model that combines meta-searching in various sources, content analysis, keyword suggestion, and a portal database which is domain-specifically fed by a vertical web searching mechanism combined with a simple document indexing system. For effective knowledge flow, particularly content analysis both for document clustering and for the individual document level will prove vital, as it provides the user with the means to contextualize and categorize information. The detailed technical background will not be treated here but, as they depicture a generic design and claim that their model is not bound to one field of application, it could serve as a useful basic model, easily adaptable to the specific needs of an organization.

669 Cf. Desouza et al. (2006), 40-42.
670 Cf. Alavi et al. (2005), 208.
671 Cf. Schwabe, Salim (2002), 194.
672 Cf. Chau et al. (2006), 1218-1219, 1224.
673 Cf. Forsati, Meybodi (2010).
674 Cf. Chau et al. (2006), 1220-1225, 1235.

4.3. Addressing Participation and Organizational Culture

4.3.1. Intertwinement of Participation and Organizational Culture

In the cost-benefit ratio of knowledge sharing, elements of OC might be key moderating variables on both sides.[675] In this vein, it has come to be an established standpoint that KMS implementations have to be accompanied by a socio-cultural groundwork in order to be satisfactorily effective.[676] Whereas there is no direct equivalence of effectiveness and knowledge sharing, there is nonetheless a strong link in the context of knowledge intensive work. Hence, OC initiatives for the most part will be intended to enhance knowledge sharing, as, at the outset, it is usually deficient for the various elaborated reasons. OC is further interrelated with participation; if the system is aligned to the organization's overall KM concept, knowledge sharing will translate into KMS use. Empirical analysis has shown that OC is associated with multiple KM dispositions in a complex framework and that values on different organizational levels do in fact influence KMS use,[677] as they interfere with intrinsic motivators. Moreover, OC, compounded by structures, values, identification, and norms, can be considered a higher degree of abstraction of the conception of intrinsic motivators and social capital, which strongly account for participation. Hence, owed to the often cited social disposition of knowledge, KMS participation and OC are strongly intertwined.

As regards the adduced challenges, OC was considered separately, it going beyond the question of participation insofar as it also concerns KP success factors such as design, system implementation, or management conviction. Moreover, OC is attested a huge role in KM research, as it was depicted, and thus needed to be conceptualized and commented on in more detail. Once questions of approaches are treated, however, OC cannot be considered an end in itself. All culture-related endeavors are explicitly or implicitly directed towards enhanced knowledge sharing for better performance. Cases are rare in which a knowledge-friendly OC itself might yield performance gains without an increase in knowledge sharing. Hence, as for troubleshooting, it is pertinent to look at different foci in terms of abstraction from singular entities and thus treat participation and OC as different issues.[678] When it comes to approaching the issues, however, any initiative tackling OC must be aimed at increasing knowledge sharing and participation. This is reflected in results of empirical research, too, as, for instance, Hwang and Kim[679] empirically found that OC is fully mediated by attitudinal individual factors of internalization (value-related) and identification (relationship-related) in its effect on electronic communication frequency. This implicates that, if knowledge sharing is voluntary, OC itself strongly correlates with participation and yet cannot count as a distinct participation factor; then again, OC permeates the validated participation antecedents, as individually felt internalization and identification will in a way be micro-representations of OC, which mutually interfere with the broader, holistic OC. Altogether, it transpires from these reflections and findings that distinct conceptualization of OC and participation approaches to KPs seem arbitrary and rather inane.

Hence, in the following, two approaches shall be formulated that refer to both participation in KPs and OC; one referring more directly to social interaction and knowledge sharing through the KP (4.3.2.) and a second regarding more general means of continuous KP governance (4.3.3.).

4.3.2. Unions of Practice Approach

Owing to the intertwinement of social environment and KMS and given the comprehensive approach of a KP, means of intensified social exchange underlying KT ought to be integrated into it.[680] In this vein, the concepts of UoPs as powerful knowledge sharing facilitators have received broad attention of KM scholars.

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[675] Cf. Goodman, Darr (1998), 426; Kankanhalli et al. (2005a), 116-118.
[676] Cf., e.g., Alavi et al. (2005), 218; Kulkarni et al. (2006), 311; He et al. (2009b), 179.
[677] Cf. Alavi et al. (2005), 216, 219-220.
[678] Cf. Voelpel et al. (2005), 15.
[679] Cf. Hwang, Kim (2007), 240-245.
[680] Cf. Alavi et al. (2005), 218.

As social relations affect all knowledge sharing, generally, both the repository and the networking sphere of the KP will be affected. However, the enablers of interaction in a KP are presumably the more effective field of application to actively configure and frame the social environment of knowledge exchange. Therefore, the following section conceives a UoPs approach in a circumscribed sense: It predominantly refers to the networking sphere of the KP, although externalities and synergies with the repository model are possible. This is why findings for KRs are little applicable here.

Differences between CoPs and NoPs are found in tie strength, reach, and CoPs' dependence on 'high bandwidth' communication (i.e., face-to-face contacts or at least sophisticated and frequent electronic contact via video conferencing). Yet, the concepts largely overlap and also conflations are possible, as there is no precise demarcation. Hence, some basics will be treated (4.3.2.1.) before specific findings for the two UoP types will be depicted (4.3.2.2.; 4.3.2.3.).

4.3.2.1. Guiding Principles

Fundamentally, any UoP is a social network, which can be defined as a patterned organization of the collection of more than two actors, their relationships, shared norms, and (resource) exchange.[681] A social network stands opposed to hierarchical structures, in that there is no legitimate authoritative entity for resolving conflict, and it cannot simply be founded but rather emerges over time.[682] Both types of UoPs can be conceived as specific forms of social networks with differing levels of cognitive distance between participants.[683] Thus, UoPs are separate from organizationally set structures (e.g., designated teams and work groups), in that their primary condition is self-emergence. In terms of knowledge seeking, they refer to the dimension of group sourcing.[684] Members of UoPs follow similar practices, providing them with a social-epistemic bond[685] (i.e., a similar background and mutual understanding). On this basis, social interaction and identity in UoPs account for enhanced tacit KT.[686] Moreover, social interaction in UoPs is diagnosed to determine OC; readiness for collaboration is likely to evolve in a bottom-up fashion if participants' values are favorable.[687] In this vein, it needs to be pointed to the fact that, although UoPs represent somewhat secluded groups, they interact with and depend on the broader socio-cultural environment of the organization and conceivably even of society.[688] As a result, KPs can provide the basic conditions for the foundation and development of UoPs, by offering knowledge maps, expertise localization mechanisms, or other technical facilitators for social networks[689] and encourage participants to use them, thereby integrating work-related social network activity into the organization's IS. Other than that, it has to rely on participants to actively promote and cultivate UoPs, so that the their interrelation with OC is mutually dependent. Accordingly, on the one hand, UoPs are means for KPs to foster participation; on the other hand, KPs are means for existing UoPs, facilitating interaction.

As a sine qua non for the functioning of UoPs, KP participants must have a favorable attitude towards this type of interactive knowledge sharing. This transpires from several studies and was explicitly stated, for example, by Tiwana and Bush[690], who underscored the role of user perceptions towards UoPs and empirically affirmed the relevance of reputation tracking and of relational capital. This is paralleled by findings of Lin and Lee[691], considering knowledge sharing the dependent variable of socio-technical factors (i.e., micro-level OC), hinting to the need for members' commu-

[681] Cf. Jones et al. (1997), 913-915; Liebeskind et al. (1996), 430; van Baalen et al. (2005), 303.
[682] Cf. van Baalen et al. (2005), 303-304.
[683] Cf. van Baalen et al. (2005), 303.
[684] Cf. Gray, Meister (2004), 823.
[685] Cf. Brown, Duguid (2001), 207; Diemers (2003), 168.
[686] Cf. Diemers (2003), 167-169; Roberts (2006), 637.
[687] Cf. Alavi et al. (2005), 218-219.
[688] Cf. Roberts (2006), 634-636.
[689] Cf. 2.4.1.-2.4.3.; 3.1.3.1.
[690] Cf. Tiwana, Bush (2005), 89-90, 93-97.
[691] Cf. Lin, Lee (2006), 81-85.

nity spirit. Moreover, findings for both UoP types indicate the salience of championing socially competent UoP leaders,[692] although with varying specific functions.

A salient example of the possible blending of both types of UoPs can be found in the named study of Alavi et al.[693]. Mostly speaking of 'communities', they picture an exemplary group with approximately 1,500 members, which, at first glance, represents a NoP in the sense of this thesis. Yet, they further report that it has numerous thematic subgroups and partly members have a strong relationship with each other, which they cultivate through video conferencing. Apparently this UoP unites elements from both concepts. The authors generally attest a strong role to UoP leaders, performing roles of navigation, mediation, and also monitoring of KM and collaboration activities.[694]

4.3.2.2. Networks of Practice

In a NoP, participants can come from inside and outside the organization and are by and large unknown to each other.[695] The threat of knowledge leaking is accordingly high.[696] The participants follow similar practices but there are only weak links between them; cooperation is indirect and explicit, whereas reach is usually large. As ties are weak in any way, the concept can easily be transcribed to the electronic context.[697]

In NoPs, reciprocity is problematic: the balances of knowledge supply and demand will differ among participants,[698] to the extent that the NoP might be faced with a social dilemma and finally collective disaster.[699] In this vein, Brown and Duguid[700] originally claimed a social-epistemic bond between members to be necessary for enhanced knowledge sharing. More recent studies, particularly in the field of electronic NoPs, provide a different picture. Van Baalen et al.[701] argue that a mere mutual expectation scheme (i.e., minimal reciprocity) is sufficient, regarding, for example, communities and networks in the online world. This could also be underscored by empirical findings in the general knowledge sharing context.[702] Other empirical analyses of NoPs also queried the necessity of minimal reciprocity for participation; results indicated that only a user's structural embeddedness in the NoP and their knowledge sharing experience is required.[703] At the same time, the prevalence of self-interest seemingly persists.[704] Out of these insights, a generalized new reciprocity might be constructed: knowledge sharing is no longer mutual between two individuals but between the individual and the prescinded sphere of the network.[705] Therefore, it has proven equitable to emphasize the network's role towards the user. A KP will only establish the NoP if it accounts not only for the relation of user and peer, but also of user and the network itself. Empirical analysis has been able to demonstrate that the expected group outcome is prevalent towards the expected individual outcome as a participation antecedent,[706] such that the former ought to be focused on right from the start. This can be achieved by informing participants about community events, group meetings, regular briefings, etc. and about what is expected of them.[707] In this vein, for instance

[692] Cf. Alavi et al. (2005), 211-212, 220-221; Garud, Kumaraswamy (2005), 23; Zboralski (2009), 98.
[693] Cf. Alavi et al. (2005), 200-216.
[694] In the following, other findings from the named study by Alavi et al. are classified according to whether they refer more to group elements of CoPs or NoPs.
[695] Cf. Brown, Duguid (2001), 205; van Baalen et al. (2005), 302-303; Wasko, Faraj (2005), 37.
[696] Cf. Brown, Duguid (2001), 206-207.
[697] Cf. Wasko, Faraj (2005), 37.
[698] Cf. Wasko, Faraj (2005), 51.
[699] Cf. van Baalen et al. (2005), 311-313.
[700] Cf. Brown, Duguid (2001), 207.
[701] Cf. van Baalen et al. (2005), 304.
[702] Cf. Bock et al. (2005), 99-100.
[703] Cf. Chiu et al. (2006), 1883; Wasko, Faraj (2005), 35, 51, 53.
[704] Cf. Chiu et al. (2006), 1884-1885.
[705] Cf. Wasko, Faraj (2005), 51.
[706] Cf. Chui et al. (2006), 1883.
[707] Cf. van Baalen et al. (2005), 304.

through reputational mechanisms,[708] free riding can be limited and reciprocity enhanced.[709] This was underscored by empirical findings on the relevance of reputation in NoPs.[710]

Accordingly, NoPs showed potential to build up knowledge sharing enabled by structural capital, which was also validated in the case of a KP.[711] As for relational capital, prima facie, findings suggest that it has no or only partial influence on participation in NoPs;[712] yet, social norms have shown to impact the ease of KT especially through weak ties.[713] As to the reasoning of this outcome, it is brought forward that, already at the outset, loose electronic networks lack a common history, are little interdependent, and interaction takes place on a more occasional basis.[714] Yet, it remains an ostensible paradox that KT occurs notwithstanding a weak relational capital. It can be explained though to a great extent by the already mentioned findings of Levin and Cross[715]. They depict the role of trust as a mere mediator for KT in the context of strong ties. This implicates that weak ties will unveil hidden benefits and lead to more productive KT of non-redundant information, given a constant level of trust between coworkers. The authors conclude that the relevance of relational capital cannot be ruled out in any social network and that trust does play a role in all knowledge sharing (particularly if knowledge is tacit), only that its lack can be outweighed by the power of weak ties. Complementing this finding, the mere network range was identified as a strong KT catalyst. In studies by Reagans and McEvily[716] and Hansen et al.[717], the number of linkages was estimated to increase boundary spanning and alleviate redundancy of KT. Consequently, in NoPs, trust might be weak and yet KT be strong, but trusted weak ties seem to represent the ideal for KT. Thus, in general, a KP will be an appropriate means to enhance or build a NoP and foster knowledge sharing mostly without per se achieving a state of direct reciprocal exchange and strong relational capital between peers. It is to be determined by KP design if palpable reciprocity and relational capital are definite necessities for overall participation in the long run.

Due to the weak linkage of participants, a priori, there should be a minimum perceived urgency of knowledge sharing.[718] Also, without any awareness of the existence of the required knowledge, no participation will materialize. Similarly, an elevated level of self-rated expertise is of use.[719] Hence, there has to be minimum, possibly vague awareness of knowledge demand and potential supply.[720]

Moreover, it was shown that trust is all the more important if knowledge is increasingly tacit.[721] Therefore, at least during the initial phase, creating a loose NoP proved pertinent if only the dissemination of explicit knowledge was intended.[722] Tacit knowledge exchange is not totally excluded of course; it might occur on an occasional basis even if linkage is weak.[723] Therefore, also in NoPs, communication channels should maintain the possibility of informal contact.[724] Accordingly, enriching possible ways of communication and the available media mix is seen conducive for NoPs.[725] The preferred way to communicate is also contingent on participants' local values.[726]

[708] Cf. Wasko, Faraj (2005), 50, 52.
[709] Cf. van Baalen et al. (2005), 306, 311-312.
[710] Cf. Alavi et al. (2005), 209; Wasko, Faraj (2005), 39-40, 49-51.
[711] Cf. van Baalen et al. (2005), 300-301, 311-313.
[712] Cf. Chiu et al. (2006), 1883; Wasko, Faraj (2005), 39-40, 49-51.
[713] Cf. Reagans, McEvily (2003), 261-265.
[714] Cf. Wasko, Faraj (2005), 49-51.
[715] Cf. Levin, Cross (2004), 1485-1486.
[716] Cf. Reagans, McEvily (2003), 261-265.
[717] Cf. Hansen et al. (2005), 785-792.
[718] Cf. van Baalen et al. (2005), 305, 309-310.
[719] Cf. Wasko, Faraj (2005), 50-51.
[720] Cf. van Baalen et al. (2005), 305-306, 309-310.
[721] Cf. Levin, Cross (2004), 1485.
[722] Cf. van Baalen et al. (2005), 300, 310-311.
[723] Cf. Zhang (2006), 22.
[724] Cf. van Baalen et al. (2005), 313; Zhang (2006), 23.
[725] Cf. van Baalen et al. (2005), 304.
[726] Cf. Alavi et al. (2005), 216.

However, independently from media mix constraints in electronic communication, the capacity of a NoP has generally proven to be heavily contingent on structural capital and members' centrality.[727]

Therefore, it is a very important measure to introduce a knowledge broker, especially if the NoP is supposed to be built from scratch. A knowledge broker might establish indirect links that are necessary to reach a stage where the NoP is self-emergent.[728] This scheme is comparable to a critical mass strategy, which is considered pertinent for NoPs.[729] Wasko and Faraj[730] alternatively propose a rather stable centre of few individuals, basically referring to more numerous but less formalized knowledge brokers. By implementing such catenations, structural holes in direct links between knowledge seekers and contributors can be overcome, as they are replaced by the direct linkages between individuals and the KP,[731] so that the NoP's overall usefulness is increased.[732] This is also consistent with the findings of Alavi et al.[733], who underscore the important role of what they call KM leaders, who champion knowledge sharing and function as navigators. In extensive NoPs, it is up to them to detect areas that are not yet occupied by work groups and to actively foster the engagement of co-workers for them. The authors also consider encouragement of these people to be a valid alternative to laborious OC initiatives. These key personalities will be comprised of a group of few but central people who dispose of extensive insights and influence on all participants' perception, attention, and accessibility and who, therefore, might be the key to enhancing knowledge sharing behavior.

4.3.2.3. Communities of Practice

CoPs are small, mostly 'noncanonical' groups of strongly interrelated members with solid reciprocal norms, who enhance their knowledge exchange by face-to-face contacts.[734] They are fundamentally seen as a prominent means for KPs to productively achieve the sharing of tacit knowledge, which often arises out of and is necessary for specialized practices.[735] Supposedly, fostering CoPs genuinely provides a prominent means to enhance knowledge sharing.[736] At the same time, the establishment of CoPs is supposed to lead to a stronger emphasis on the public character of knowledge and tear down competitive barriers to knowledge sharing.[737] This can be reasoned once more by the findings of Levin and Cross[738], stating that the impact of strong ties on KT is mediated by perceived trustworthiness of coworkers, such that a strong tie without trust can be regarded as little productive. Moreover, a positive influence of trust on information quality could be established.[739] In addition, management backing in terms of resource provision and a general recognition of CoP needs was elaborated as a perceived knowledge sharing antecedent.[740]

However, it is important to recognize that CoPs are a practice-related concept: They are self-emergent and usually not explicitly set up to resolve a task, such that participation regularly arises from professional interest or out of necessity,[741] which is also supported by empirical analysis.[742] Therefore, the possibility of endogenously creating such groups is finite and imposing structures might even disturb existing CoPs; this implies that rather detection, informal institutionalization,

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[727] Cf. Wasko, Faraj (2005), 50.
[728] Cf. van Baalen et al. (2005), 306-310.
[729] Cf. Wasko, Faraj (2005), 50.
[730] Cf. Wasko, Faraj (2005), 52.
[731] Cf. van Baalen et al. (2005), 306.
[732] Cf. Wasko, Faraj (2005), 52.
[733] Cf. Alavi et al. (2005), 211-212, 220-221.
[734] Cf. Brown, Duguid (1991), 49; Brown, Duguid (2001), 203; van Baalen et al. (2005), 303; Wasko, Faraj (2005), 37.
[735] Cf. Ryu et al. (2005), 269.
[736] Cf. Chiu et al. (2006), 1885; Levin, Cross (2004), 1484.
[737] Cf. Wasko, Faraj (2000), 171.
[738] Cf. Levin, Cross (2004), 1484-1486.
[739] Cf. Chiu et al. (2006), 1883-1885.
[740] Cf. Zboralski (2009), 98-99.
[741] Cf. Alavi et al. (2005), 203; Goodman, Darr (1998), 428-429, 438; King et al. (2002), 93.
[742] Cf. Zboralski (2009), 98.

and support must be focused on.[743] If the KP attains to enhance a CoP, participation will likely follow naturally out of group identification processes and the urge to help other community members.[744] Participation and shared practices in a CoP will also provide new members with established collective explicit and tacit knowledge of that group.[745]

Wang et al.[746] claim a more drastic approach to KMS design for CoPs. Accepting CoPs' practice-relatedness, they claim the necessity of peer-to-peer technology, so as to reflect social reality in system architecture. Whereas they have yet to empirically verify their findings, this is certainly an interesting approach towards higher consistency of social factors of knowledge sharing and KMS.

Beyond the establishment of participation within CoPs, the KP can also render inter-community coordination more efficient, being another pivotal strategic task in KM.[747] As CoPs do not exist in a vacuum and rely on broader organizational support,[748] for instance, the KP might attribute or convey an executive sponsor to any CoP,[749] achieving management involvement and participants' commitment at the same time. Moreover, established and recognized KM leaders can search for fields of application where CoPs would represent an effective alternative to explicit project teams and then foster and support their establishment actively.[750] Organization of people in CoPs furthermore facilitates the determination of roles: All members of a CoP can be provided with identically compiled information that is necessary for their common function.[751]

4.3.3. Knowledge Portal Governance Approach

In this final section on approaches to KPs, remaining means of governance will be determined that have been able to tackle lacking participation and unfavorable OC. Governance is conceived here in a broad sense, unifying personnel policy, incentive-setting, culture and change management, performance assessment, and so on.

It was pointed out that social networks and UoPs are by and large self-emergent, such that they must appear only intricately open to managerial influence and forthright governance can be somewhat discarded. Therefore, this section will complement the foregoing one and rather relate to results of KR and general KMS research. KPPM also involves means of governance, questioning the sensibility of KP governance as a generic approach. Yet, it deserves special attention insofar, as KPPM particularly refers to dispersion of knowledge, whereas the following section will finalize the presented assortment of approaches by introducing universal and overarching recommendations accounting for a broader applicability and effectiveness towards participation and a knowledge sharing-friendly culture. In other words, this section will round off and complement what was elaborated before, giving fundamental advice and guidelines for KP governance.

4.3.3.1. Organizational Stimulation of Participation

4.3.3.1.1. Guiding Principles

Although KP participation as such does not equal performance, the fundamental interrelation could be shown.[752] However, empirical evaluation also underpins that KMS managers have to address multiple issues in order to increase usage frequency and intensity.[753] Particularly social relationships play a vital role both for knowledge contribution and sourcing,[754] but also the user's internal-

[743] Cf. Alavi et al. (2005), 203-204; Brazelton, Gorry (2003), 25; Brown, Duguid (1991), 49; Zboralski (2009), 98-99.
[744] Cf. Alavi et al. (2005), 205, 217-218.
[745] Cf. Brown, Duguid (2001), 202-205.
[746] Cf. Wang et al. (2009).
[747] Cf. Brown, Duguid (2001), 207.
[748] Cf. Roberts (2006), 634.
[749] Cf. Alavi et al. (2005), 203-205.
[750] Cf. Alavi et al. (2005), 211-212.
[751] Cf. Davenport et al. (2008), R11.
[752] Cf. Teo, Bing (2008), 564-572.
[753] Cf. He, Wei (2009), 833-834; Kankanhalli et al. (2005a), 132; Kulkarni et al. (2006), 337; Teo (2005), 154-158; Wasko, Faraj (2005), 49-53.
[754] Cf. He, Wei (2009), 833-834.

ized values and identification with the system complement perceived usefulness as antecedents to system use.[755] KPs will thus have to seek for the ideal congruence between intrinsic and extrinsic participation motivators and likewise between individual and organizational goals.[756] In doing so, an important aspect is sustainability of participation, as the ability of managerial means to not only yield conformance but also commitment varies,[757] particularly for volitional use.[758]

Moreover, fundamentally, participation behavior and its subjective purpose have proven to be contingent on inconsistent, unrelated local values and cultures, such that, in proportion to organization size and cultural differences, the implementation of a KP will be challenged by staggering and unleveled readiness to engage in it.[759] Therefore, KP design necessitates a compromise or an adaptable solution which appeals to as many local groups as possible.

4.3.3.1.2. Elicitation of Social Capital

Fundamentally, an organization deploying a KP must elicit given conditions of social capital. This assessment then forms the basis on which further measures can be adopted and adapted. If social capital conditions are unfavorable for a certain KP concept, the KP's orientation might need to be alternated or its deployment might even have to be delayed and social capital be addressed in a long-term endeavor. Manifold studies were carried out that examined the influence of social capital on knowledge sharing behavior and participation in KRs and KMS, of which some of the more relevant ones shall be introduced. Scholars primarily focused on relational capital, such that strong interrelations of the following remarks with OC apply.[760] Fundamentally, a positive influence of trust on participation (be it mediated or not) has been established in multiple studies,[761] which shall not be further explicated in detail at this point.

Benbya[762] finds identification to be an important antecedent of KMS usage and is supported by Hwang and Kim[763] in the context of general electronic knowledge sharing. This is further underscored by results of Malhotra and Galletta[764] for IS usage, stating the general relevance of both identification and social norms. The latter alleviate the negative influence of compliance on system adoption and on continuous usage when system use is voluntary. However, the authors carve out the irrelevance of norms for the cognitive aspect of attitude towards the system and emphasize the prevalence of intrinsic motivators. Mixed influence of collaborative norms on knowledge-seeking was shown by Bock et al.[765]; these norms deferred users' emphasis on both immediate and expected knowledge seeking costs, but, at the same time, they deteriorated perceived KR usefulness.

Contrarily to the bottom line of these results that social norms do indeed enforce KMS usage, Kankanhalli et al.[766] cast doubt on some frequent intuitive claims in both of their studies. Particularly, contentions that see pro-sharing norms and enhanced identification with the organization as factors deviating users' emphasis on knowledge codification and seeking costs have for the most part failed confirmation. Specifically, scrupulosity that users might blench from KRs for fear of a loss of knowledge power under conditions of weak pro-sharing norms did not attain empirical validation. On the other hand, the authors found that strong social norms deferred participants from insisting on reciprocal benefits when contributing, which, in turn, is relativized by more recent

[755] Cf. Malhotra, Galletta (2005), 136-144.
[756] Cf. Malhotra (2003), 585.
[757] Cf. Kulkarni et al. (2006), 340.
[758] Cf. Malhotra, Galletta (2005).
[759] Cf. Alavi et al. (2005), 216-220.
[760] Cf. 4.3.1.
[761] Cf., e.g., He et al. (2009a); Kankanhalli et al. (2005a); Lee, Choi (2003); Levin, Cross (2004).
[762] Cf. Benbya (2006), U4-U6.
[763] Cf. Hwang, Kim (2007), 240-245.
[764] Cf. Malhotra, Galletta (2005), 136-144.
[765] Cf. Bock et al. (2006), 357.
[766] Cf. Kankanhalli et al. (2005a), 129-133; Kankanhalli et al. (2005b), 1164-1165.

findings on general KMS, stating that reciprocity does not account at all as a contribution antecedent.[767]

Consequently, the effects of relational capital in the repository sphere are more diffuse than for the networking sphere. In general KMS research, however, they were constantly found to play a strong role. Also, the influences of structural and cognitive social capital on members and their participation could be more generally established.[768] Hence, fundamentally, it transpires that the social capital of social networks is decreasingly important the more the repository sphere is concerned, but it can never be totally left aside, which is consistent with other recent IS research.[769]

4.3.3.1.3. Elicitation of User Motivation

Intrinsic motivators have proven to figure as substantial drivers of participation, not only in the networking but also in the repository sphere.[770] Apparently, elevated self-efficacy of KMS use further contributes to the individual's submission to peer groups' norms, leading to an enhanced intention to share knowledge.[771] Furthermore, it accounts for greater self-set goals and consequently increased performance.[772] Individuals who enjoy helping others additionally tend to contribute more useful information.[773] Moreover, participants have in general shown to seek for reciprocal relationships when sharing knowledge.[774] Accordingly, the cost factor of loosing knowledge power does not seem to be a significant deterrent.[775] Accounting for the benefits of knowledge sharing, persuasion for participation should hence rather be pulled out of people's necessities and awareness than pushed onto an organization. This was implicitly underscored by He and Wei[776], as they showed that mere knowledge growth without preoccupation for job performance cannot account for a knowledge sharing motivator in corporate settings. Yet, these factors being rather deeply rooted in values, attitudes, and cognitive capacity, principally long term staffing policy or change and culture management can address them. Garud and Kumaraswamy[777] depict the case of an organization dedicated to valuing human capital and hiring only individuals showing a high 'learnability'.

4.3.3.1.4. Provision of Comprehensive Organizational Support

Assuming a minimum degree of participants' motivation, the KP can address the creation of favorable conditions for knowledge sharing through the KP by providing organizational support, for instance, through communication and relation-building measures.[778] In this vein, encouragement of informal and non-work-related exchange via the KP has shown to be conducive to significantly foster participation levels.[779] Internal communication and promotion measures should be addressed most comprehensively, to the extent that, in order to place the KP in people's minds in an early phase, a proper KP marketing campaign might be indispensable notwithstanding the KP's overall quality.[780] Also expectancy management has been found to be critically relevant.[781] Hence, especially in the initial phase of implementation, it is recommendable to convince people of changing their knowledge seeking and contribution convictions by all means. However, general KMS re-

[767] Cf. He, Wei (2009), 832-836.
[768] Cf. Robert et al. (2008), 328-331.
[769] Cf. Sykes et al. (2009).
[770] Cf. Bock et al. (2006), 357; Hwang, Kim (2007), 240-245; Kankanhalli et al. (2005a), 131-132; Lin, Huang (2008), 415-417; Malhotra, Galletta (2005), 136-144; Quigley et al. (2007), 80-83; Voelpel et al. (2005), 12, 16.
[771] Cf. Bock et al. (2005), 99-100.
[772] Cf. Quigley et al. (2007), 80-83.
[773] Cf. Wasko, Faraj (2005), 50.
[774] Cf. Bock et al. (2005), 99-100.
[775] Cf. Kankanhalli et al. (2005a), 130.
[776] Cf. He, Wei (2009), 833-835.
[777] Cf. Garud, Kumaraswamy (2005), 17-19.
[778] Cf. Braganza et al. (2009), 516-518; Kankanhalli et al. (2005a), 133; Schwabe, Salim (2002), 200; Wasko, Faraj (2000), 170-171.
[779] Cf. Teo (2005), 156-157.
[780] Cf. Voelpel et al. (2005), 15-17, 20.
[781] Cf. Kee-Young, Song-Woo (2009), 12.

search by He and Wei[782] further differentiates the picture; it is stated that image and knowledge growth are irrelevant to participation. Resource-intensive measures aiming at the protection of the uniqueness of users' knowledge and at image feedback hence appear inept to foster participation.

A different kind of organizational support can be derived from training, which has shown to aid participation in the continuance phase.[783] Yet, also in the implementation period, guiding support and colleagues' opinions have proven to directly and indirectly limit barriers of resistance, making training courses as well as measures for publication of participants' positive opinions and switching benefits appear helpful.[784] Similarly, in order to address participants' inertia to use the KP more personally in their day-to-day work, it has turned out to be adjuvant to install KM assistants, taking over a coaching or championing function,[785] which is similar to what was established for UoPs. They spend part of their time uniquely to promote the benefits of KM and the organization's KP in the context of enhanced teamwork, informal encouragements, and goal setting. Thereby, they might also be able to underpin participants' generalized trust[786] and take over monitoring functions[787].

In terms of attributed tasks to KP participants, setting up workloads that involve a high degree of intellectual demand appears to stimulate knowledge sourcing.[788] At the same time, sufficient resources both for knowledge contribution and seeking must be allocated.[789] There are conflicting results regarding the impact of task interdependence on participation. Whereas Lin and Huang[790] found a positive relation to KMS participation, Teo and Bing[791] found the relation to be insignificant for KPs. However, according to the latter authors' definition, KPs do not comprise expertise localization mechanisms or other networking features for individuals, such that mainly explicit KI can take place. Consequently, they reason that participants might require relational tacit knowledge sourcing in case of high task interdependence, deteriorating their KP participation. Thus, the results must be interpreted with care, as task interdependence in full-fledged KPs, which involve also tacit KI, might very well benefit participation, particularly regarding the positive results established in the context of KPPM. Moreover, the authors' narrow KP definition also explains the negative impact of task tacitness on participation, being another result of their study.

4.3.3.1.5. Adjustment of Incentives

Designated immaterial incentives have proven effective to certain degrees and might also function as catalysts for cultural change and KP acceptance.[792] Positive effects could be established for means of recognition and communication, which decidedly abdicate material rewarding,[793] but also for repeated managerial prompting (i.e., reminding participants of rivals and desired or agreed upon behavior).[794] In smaller organizations, dedicated recognition from senior management might particularly valorize contributions.[795] Kulkarni et al.[796] also find a generally positive effect of incentives (material and immaterial ones) on participation and call for direct monitoring of knowledge sharing behavior and for appraising it publicly, as their results indicate both an indirect and a direct interrelation of such measures to KMS usage. However, according to a study by Kankanhalli et al.[797],

[782] Cf. He, Wei (2009), 833-836.
[783] Cf. He, Wei (2009), 829, 833.
[784] Cf. Kim, Kankanhalli (2009), 578-580.
[785] Cf. Garud, Kumaraswamy (2005), 23; Kulkarni et al. (2006), 336-337, 340; Voelpel et al. (2005), 11-12.
[786] Cf. Kankanhalli et al. (2005a), 130-132.
[787] Cf. Voelpel et al. (2005), 13.
[788] Cf. Gray, Durcikova (2005), 181.
[789] Cf. He, Wei (2009), 833-835; Hwang, Kim (2007), 240-245.
[790] Cf. Lin, Huang (2008), 415-417.
[791] Cf. Teo, Bing (2008), 564-571.
[792] Cf. Teo (2005), 154-155.
[793] Cf. Kankanhalli et al. (2005a), 133; Wasko, Faraj (2000), 170-171.
[794] Cf. Marks et al. (2008), 64-65.
[795] Cf. Teo (2005), 155.
[796] Cf. Kulkarni et al. (2006), 331-343.
[797] Cf. Kankanhalli et al. (2005a), 131-134.

participants of KRs do not devote any attention to gains in reputation through contributions to KRs, so that recognition must not be mingled with reputation building in the KP's repository sphere.

As for material incentive-setting, empirical results are conflicting.[798] In the same study of Kankanhalli et al.[799], KR usage was correlated to direct organizational rewards in general terms but also contingent on identification. Hence, it appears most pertinent to specifically award knowledge contributors that identify themselves with the organization. This is consistent with Teo's[800] experience with a full-fledged KP. Moreover, another empirical analysis by the same authors found that knowledge seeking through KRs is all the more enhanced by incentives under conditions of strong task interdependence, rendering participants with such a workload an attractive target group for incentives, especially in an initial quest for a critical mass.[801] This result might also contribute to the ambiguity of task interdependence described above; possibly, task interdependence needs to be combined with incentives in order to yield participation. Referring to material incentive-setting, Lin and Huang[802] underscore the necessity of personal and performance-related outcome expectation as KMS participation antecedents. However, Bock et al.[803] directly contradict these findings and state that, "[c]ontrary to commonly accepted practices associated with knowledge management initiatives, a felt need for extrinsic rewards may very well hinder – rather than promote – the development of favorable attitudes toward knowledge sharing"[804]. Quigley et al.[805] present empirical results that underscore the need to complement material incentives with pro-sharing norms, indicating the relevance of group incentives. Results of He and Wei[806], yielding no significant impact of organizational reward on knowledge sharing, clarify little but further hint towards the ambiguity of material incentives. Apparently, experience stating that material prizes are only bonuses, supplementing the immaterial sphere,[807] encapsulates the essence of the ineptness of isolated material rewards.

If KP design views material incentive-setting as pertinent, it still has to elaborate a well-thought-out incentive-system. Siemsen et al.[808] carve out the relevance of given linkages between workers. They develop a model of participant linkages, among which are also knowledge linkages (i.e., an individual's knowledge is useful to another one), and empirically validate that different linkage dispositions result in different optimal incentive combinations, aiming at maximum knowledge sharing and outcome. In case of existing knowledge linkages, it has proven to be optimal to set incentives both on the individual and on the group level. Whereas group incentives (as expected) accounted for increased knowledge contribution, individual incentives incited effective knowledge application. Hence, another example can be found here for which the claim for increased knowledge sharing (in this case equivalent to the claim for unique group incentive-setting) can be simplistic, regarding the actual productivity of knowledge workers. In case of virtually no linkage between knowledge workers, individual incentives might also promote knowledge contribution. Voelpel et al.[809] depict a fundamentally motivating effect of contribution-related material incentives, but, at the same time, describe issues of decreasing quality and highly unleveled participation, concluding that the incentives must be prudently adapted to the respective user groups and cultures. In accordance to this experience, Garud and Kumaraswamy[810] observe similar effects of direct individual incentives. In the examined case, incentives had the opposite effect to what was intended, as KP participants excessively contributed knowledge, which became increasingly low in

[798] Cf. He, Wei (2009), 834.
[799] Cf. Kankanhalli et al. (2005a), 131-134.
[800] Cf. Teo (2005), 155.
[801] Cf. Kankanhalli et al. (2005b), 1163-1164.
[802] Cf. Lin, Huang (2008), 145-147.
[803] Cf. Bock et al. (2005), 98-101.
[804] Bock et al. (2005), 98-99.
[805] Cf. Quigley et al. (2007), 80-85.
[806] Cf. He, Wei (2009), 833-834.
[807] Cf. Schwabe, Salim (2002), 200.
[808] Cf. Siemsen et al. (2007), 1545-1547.
[809] Cf. Voelpel et al. (2005), 20.
[810] Cf. Garud, Kumaraswamy (2005), 16-23.

quality, finally leading to information overload. They also attest a detrimental effect on OC; incentives lessened the readiness to share 'for free'. Accordingly, to maintain high information quality, practice has shown that users should be urged to criticize the usefulness of retrieved information[811] and be rewarded also for evaluation, not only for contribution[812]. Admittedly, these findings are not applicable in contexts where no individual output can be attributed whatsoever, which certainly might often occur in knowledge work. Nonetheless, a KP should consider the system of linkages between participants and carefully outweigh incentives and their externalities on different levels.

4.3.3.1.6. Provision of Management Support

It was elaborated before that also demonstrative senior management support for the KP, translating into pertinent leadership on all hierarchical levels, is an elementary part of OC influence.[813] In their already quoted study, Kulkarni et al.[814] show not only leadership's positive effect on OC but also its impact on knowledge use and participation levels. This positive influence is represented in both a direct correlation of leadership and knowledge use and an indirect one via improved information quality and user satisfaction. The authors argue that "senior management should take on the role of exemplar" as "the practice of defining desirable behavior and enticing staff into exhibiting that behavior may lead to conformance but not to commitment"[815]. In this study, leadership is KM-related if, in participants' perception, senior management shows commitment, understanding, and regular reviewing of KM, which should be translated into organizational structure and responsibility. These results are confirmed by Benbya's[816] findings, who states that management support both has a direct effect on KMS usage and an indirect one via an increase of participants' identification with the organization. In a recent analysis of Kim and Kankanhalli[817], a moderating influence of management support on user resistance to IS can be further underpinned. Yet, when comparing the influence of management support on knowledge contribution and seeking, He and Wei[818] find that management support is only adequate for enhancing knowledge contribution. On a case-based argumentation, Garud and Kumaraswamy[819], as well as Teo[820] conclusively depict the overarching and permeating positive effect of management support on multiple levels. These cases illustrate very well the necessity for managers to constantly analyze and dynamically configure a KP.

4.3.3.2. Dynamic System Deployment

4.3.3.2.1. Permanent Information and System Quality

Perceived information and system quality, as they were elicited in this thesis, were often validated as participation predictors also in KMS research.[821] Teo and Bing[822] subsume these factors under a KP's task compatibility, which they found to be decisive for performance and usage of KPs. It should be pointed to the special role of information quality, which constantly proves to be one of the strongest predictors of KMS usage in terms of knowledge seeking,[823] and to the salience of usefulness, which, contrary to usability and user attitude, accounts for a strong factor for system usage intention in all stages of system deployment.[824]

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[811] Cf. Wasko, Faraj (2005), 45.
[812] Cf. Voelpel et al. (2005), 16.
[813] Cf. 3.3.2.3.1.; 4.2.2.2.4.
[814] Cf. Kulkarni et al. (2006), 320-321, 324, 327, 333, 340-341.
[815] Kulkarni et al. (2006), 340.
[816] Cf. Benbya (2005), U4-U6.
[817] Cf. Kim, Kankanhalli (2009), 578-579.
[818] Cf. He, Wei (2009), 833-834.
[819] Cf. Garud, Kumaraswamy (2005).
[820] Cf. Teo (2005).
[821] Cf., e.g., Benbya (2006), U4-U5; Kulkarni et al. (2006), 325-326, 333.
[822] Cf. Teo, Bing (2008), 564-571.
[823] Cf. Desouza et al. (2006), 40-42; Durcikova, Gray (2009), 95-103; Kankanhalli et al. (2005b), 1163-1164; Zimmer et al. (2007), 297-298.
[824] Cf. Benbya (2006), U4-U5; Malhotra, Galletta (2005), 136-144.

Owing to the relevance of information quality, constant system acceptance is contingent on reviewers of knowledge contributions, who will in many cases remain necessary.[825] They must be attributed a certain standing and provided with sufficient resources.[826] Durcikova and Gray[827] empirically deduce some denotative insights. In their study, knowledge contribution was negatively correlated to restrictiveness and positively correlated to transparency of validation. Yet, no significant correlation for these factors to validation duration could be established. Hence, it must not be the aim of reviewers to simply filter out low-quality contributions; in fact, they should rather follow standardized processes, attentively and thoroughly analyze contributions, prioritize information quality in their decision, and finally communicate the process to the contributor. During this last feedback step, they might involve suggestions for reorientation in order to motivate the contributor to pursue their proposition. Yet, presumably, the estimated validation duration should not surmount an intolerable level. Finally, Poston and Speier[828] suggest mechanisms for more transparent and valid information quality, such as content and rating credibility indicators (whereas empirical results hint at users' preference of the former), for instance, enabled through collaborative filtering. Yet, validity of both information quality and ratings must be maintained on a high level; the results further showed that individuals are strongly subjected to both positive and negative anchoring.

Furthermore, Durcikova and Gray[829] show a somewhat counterintuitive result: The higher the perceived information quality, the less knowledge contributions are made. Consistent with earlier findings,[830] the authors reason that a high information quality standard intimidates the user or that it makes the user consider their contribution as probably redundant. This is consistent with other experience referring to language difficulties that might daunt users away from contributing.[831] On the other hand, Desouza et al.[832] specify knowledge seekers' claim for high information quality and point to relevant negative effects of perceived complexity and risk, evoking a delicate tradeoff situation between the aspirations of knowledge seekers and contributors. Moreover, the tradeoff might also work in the opposite direction. Garud and Kumaraswamy[833] report in their case study about a scenario where overly incited contributors created a mass of information that could not be sustainably handled by reviewers.

4.3.3.2.2. Priority Adaptation

Beside constant predictors of system acceptance, several insights on changing priorities during different phases of KMS and KP deployment have been gathered. Accordingly, before or parallel to implementation, incumbent systems that hamper the acceptance of the new one must be abandoned. Consistently, several authors[834] describe the users' resistance to system transitions. Switching costs have been shown to have a direct effect on the perceived value of the innovative system and, hence, have to be realized as a significant burden to system acceptance.[835] Similarly, rigorous customization of features to the organization is vital,[836] to the extent that an organization should seek for an in-house KP solution if it has the means to do so.[837] Persistently, the assessment of user needs and their classification has shown to be an essential success factor for KP design[838] and, in order to handle the possibly extreme diversity of participants, it is argued in favor of dedicated segmenta-

[825] Cf. Kankanhalli et al. (2005b), 1164.
[826] Cf. Voelpel et al. (2005), 13.
[827] Cf. Durcikova, Gray (2009), 95-103.
[828] Cf. Poston, Speier (2005), 228-238.
[829] Cf. Durcikova, Gray (2009), 95-103.
[830] Cf. Wasko, Faraj (2000), 168-169.
[831] Cf. Voelpel et al. (2005), 14.
[832] Cf. Desouza et al. (2006), 40-42.
[833] Cf. Garud, Kumaraswamy (2005), 21-22.
[834] Cf. Desouza, Awazu (2005), 766; Kim, Kankanhalli (2009), 568-569.
[835] Cf. Kim, Kankanhalli (2009), 578-589.
[836] Cf. Jasperson et al. (2005), 548.
[837] Cf. Teo (2005), 153-154; Zhang (2006).
[838] Cf. Braganza et al. (2009), 516-518; Lee et al. (2009), 3669; McKemmish et al. (2009), 1792; Teo (2005), 150; Voelpel et al. (2005), 11-12.

tion prior to KP implementation.[839] This is also due to the seeming prevalence of intrinsic motivators and social influences; thus, it should be devoted an important amount of effort and time even before system implementation.[840]

In the actual implementation stage, user consultation ought to be continued, accepting the fact that KP design is too complex to be successfully predetermined optimally. Some 'teething troubles' will be unavoidable, for instance, considering the necessary time to build up a critical mass of users, but early disappointments must be addressed forcefully, as they might represent an important burden for KP acceptance.[841] Hence, as a means to gradually investigate users' preferences and biases, intensive participant surveys paralleling a phased implementation turned out to be helpful.[842] For instance, the deployment of a business game with clearly defined rules prior to KP implementation might be an option.[843] Tiwana and Bush[844] point to the intricacies of enabling explicit personalization and show that it might even inhibit participation intention in an initial stage before its gains materialize. This indicates that ease of explicit personalization is extremely important in the early stages of KP adoption and loses its salience afterwards. This is consistent with findings of Malhotra and Galletta[845], who find that overall perceived ease of use significantly influences the user's attitude towards the system (resulting in usage intention) in the adoption period but does not affect the intentional system usage behavior by any means in the later stage. The authors reason this outcome by attesting an increasing personal meaningfulness of the system for the user, which deviates the relevance of usage costs and thus ease of use.

Following the implementation phase, KMS have to be forcefully and sustainably adapted in order to keep system acceptance and participation rates on a high level.[846] Even if intentions are KMS-friendly at the outset, habits might moderate them, such that it is essential that KMS implementation is followed by continuous adaptation.[847] Moreover, flexibility is required in terms of ongoing adaptation to inhomogeneous user groups with different KMS preferences. Varying underlying values of groups will effectuate different KMS usage patterns and functionality choices.[848] This has to be accounted for more intensely beyond the adoption phase, as empirical results show that values and identification will begin to have a direct rather than a mediated effect on usage intention, whereas the more conscious and cognitive element of attitude towards the system loses its impact, due to a more fundamental psychological attachment.[849]

4.3.3.3. Alignment to Organizational Objectives

In order to address OC and participation more holistically in an organization, it is important to implement the KP consistently with the overall strategy. This necessity is largely interwoven with KPPM and it will mainly be reflected in the KP's fit to knowledge workers' tasks (primarily achieved through user need assessment[850]), but it reaches beyond these factors in terms of management commitment and organizational hierarchies. Concrete responsibility for the KP must be explicit and assertive, that is, accompanied by significant power and competence.

This was underscored in particular by Teo's[851] case-based experience of a KP. He described that, first of all, management ought to attribute sufficient significance to KM as a whole in order to provide a sound organizational environment for the KP implementation. This might be achieved

[839] Cf. Scheepers (2006).
[840] Cf. Malhotra, Galletta (2005), 141-142.
[841] Cf. Voelpel et al. (2005), 15.
[842] Cf. McKemmish et al. (2009); Schwabe, Salim (2002), 194-199; Teo (2005), 155-156.
[843] Cf. Schwabe, Salim (2002), 196-200.
[844] Cf. Tiwana, Bush (2005), 96-97.
[845] Cf. Malhotra, Galletta (2005), 136-144.
[846] Cf. Kulkarni et al. (2006), 337, 341; He et al. (2009b), 177-178.
[847] Cf. He, Wei (2009), 829-830, 833-834.
[848] Cf. Alavi et al. (2005), 216-217.
[849] Cf. Malhotra, Galletta (2005), 136-144.
[850] Cf. 4.3.3.2.2.
[851] Cf. Teo (2005), 149-157.

preeminently by integrating KM in the organization's mission or establishing KM as an overall corporate goal and value. In this vein, KM goals should be closely coordinated with business planning and sufficient resources need to be allocated, such that participants are constantly kept aware of the meaningfulness of KM. Secondly, in the period of KP implementation, two aspects have proven vital: On the one hand, KP designers must undertake a comprehensive analysis of necessities for information flows. As it is not the KP's task to create unique content, it must elicit the existing conditions arising from incumbent objectives and adapt to them. On the other hand, major KP designers (in most cases the implementation project leader and their team) ought not to be technicians but understanding, experienced, and broadly skilled executives, who can conciliate IS engineering with resistance from organizational politics and cultural biases. Thirdly, once the KP is set up, it must be valued as an important asset also immaterially. KP representatives should be appointed to direct report posts in order to underline their significance and influence. Persons responsible for the KP ought to encounter dedicated recognition and support from senior management, just as well as the actual KP users, at least in an initial phase.[852]

4.3.3.4. Performance Assessment

A clear argument that transpires consistently from empirical results is that the definite assessment of the degree to which performance is due to shared or integrated knowledge must be left to experts or locals (domain experts, UoP leaders, local managers), who can best estimate at least some relatively precise measures.[853] Yet, even this approach will be subjected to varying feasibility, contingent on the nature of the respective activity.[854] Otherwise, specific performance assessment largely needs to be customized for the respective organization implementing the KP, such that it is hard to find generalizable results.

As one example of at least moderate success, Voelpel et al.[855] depict the insightful modus operandi of KMS managers of an internationally operating enterprise and a KP's business case. Managers followed an in-depth investigation of profits yielded by the system involving users and local system managers. Evaluation of profit attributable to knowledge sharing through the system was carried out on a case-by-case basis first-hand by local managers and counterchecked by representatives in the headquarters. Determining the KP's share of benefits, dedicated contribution keys for projects and contracts were established and submitted to local managers. Profits were weighed with man-days necessary for contribution and seeking, whereas opportunity costs could in large part not be determined. Similarly, an assessment of spillover effects through contributions to the central KR was avoided. Remarkably, the clear profit-loss calculation was only carried out after the KP got under serious pressure due to an economic downturn of an important business sector. Moreover, KP representatives admitted that their business case does not precisely reflect the actual profits and losses yielded by the system; they rather conceived the monitoring as a disciplinary endeavor yielding insights in opportunities for system optimization.

[852] Cf. Schwabe, Salim (2002), 197.
[853] Cf. Alavi et al. (2005), 206; Braganza et al. (2009), 517, 519; Voelpel et al. (2005), 17-18.
[854] Cf. Voelpel et al. (2005), 20.
[855] Cf. Voelpel et al. (2005), 17-18.

5. Evaluation and Discussion of Challenges and Approaches to Knowledge Portals

In this section, an effort will be made to confront the challenges with the approaches and to systemize the insights into a largely coherent KP effectiveness framework with palpable implications. First, the severity of the challenges will be estimated (5.1.), in order to, secondly, assess the effectiveness of the adduced approaches (5.2.).

5.1. Relevance of Challenges

It transpired from the examined empirical literature that theoretically assessed common issues appear to vary strongly in reality regarding both their intricacy to be overcome and their acuteness to be tackled. Table 1 summarizes what this thesis perceives to be persistent overall tendencies.

Common Issue	Average Intricacy	Acuteness
Extensive and Dispersed Knowledge		
Knowledge Diversity	High	**High**
Information Diversity	Medium	**Low**
Repository Dispersion	Low	**Medium**
Participant Dispersion	Medium	**Medium**
Insufficient Participation		
Lack of Motivation	High	**High**
Inconsiderate Incentive Plan	High	**Medium**
Deficient System Capacity	Medium	**High**
Unfavorable Organizational Culture		
Knowledge Hoarding	Medium	**Medium**
Lack of Management Support	Medium	**High**

Table 1: Average Intricacy and Acuteness of Challenges

Notably, the analyzed practical experience showed that knowledge diversity, intrinsic knowledge sharing antecedents, system capacity, and management support are critical for KP success. There was fundamental agreement about the relevance of these issues, which is also reflected in more extensive theory building around themes of the organization as a distributed knowledge system, psychological and value-related KMS usage motivation, IS and KMS success models, and the determination of OC through management support. In spite of the paucity of generalizable sources that are directly KP-related, it arose from the growing case-based and first survey-based empirical evidence that these issues are particularly critical for KPs when compared to other KMS. Especially, knowledge diversity and participants' lack of motivation should be pointed out, as they cannot be simply grasped, such that explicitly accounting for them in KP design is arduous.

As an opposite tendency, results were more airy for information diversity. Apparently, this issue is confronted by ongoing technological evolution, such that an increasing share of 'swirling' information can be efficiently integrated in an automated fashion and the optimal information structure for an organization appears to be a question rather of managerial or technical discipline and unbiased tradeoffs, which is not irresolvable.

Repository dispersion was not explicitly pointed out as overly challenging in practical settings, though the necessity to address it was underscored. Substantial analytical effort has been devoted to participant dispersion, but often its implied promises overwhelmed the challenges. Knowledge hoarding did not occur as a solid distinct phenomenon; it was rather indicated by participant dispersion.[856] Incentive-setting was depicted as very intricate, but at the same time, it was rarely attributed a central relevance; while incentives partially even had a deteriorating effect on participation, at most, they functioned as supplements to establish participation but not as initiation.

[856] Cf. Hansen et al. (2005), 785-792.

5.2. Effectiveness of Approaches

All in all, forty-two conclusive empirical studies were systemized into three approaches to KPs, which are more complementary than reclusive. The results can be analyzed as follows: First, the outlined approaches to KPs offered varying results in terms of their vigor; whereas, at times, concrete measures and guidelines for KP deployment could be derived, in other cases, approaches were confined to mere apprehension of conditions and addressing them indirectly and with a long-term focus. Constantly, due to the intractability of knowledge, some more or less severe tensions remained. Comparing these different degrees of feasibility and capability of the adduced approaches with the intricacy of challenges, disparately significant degrees of resolvability can be attested. Finally, resolvability should be roughly adjusted by the acuteness of the challenge in order to detect salient gaps in KP research. Table 2 gives an overview of this multilayered reconciliation.

Common Issues	Approach / Component	Approach Vigor[1]	Tensions and Lasting Issues	Resolvability[2]	Gap Importance[3]
Extensive and Dispersed Knowledge					
Knowledge Diversity	Explicit KI	High	Loss of knowledge context Tradeoff between formalization and KI	Medium	**Medium**
	Tacit KI	Medium	Resource intensity Low tractability Limitations through virtuality and (low-trust) weak linkage KI is determined by impalpable SC	Low	**High**
Information Diversity	Explicit KI	High	Resource intensity for adaption of unstructured information from networking sphere Tradeoff between centralization and detailedness	Medium	**Low**
	Internet-Derived KPPM	Medium	Information relevance Tradeoff between breadth and depth of integration	Medium	**Low**
Repository Dispersion	Repository Access	High	Personalization Visualization	High	**Low**
Participant Dispersion	Tacit KI	High	Tradeoff between buildup of SC and aiding intra-group heterogeneity	Medium	**Medium**
	Customer KPPM	Medium	Resource intensive Elevated cognitive distance	Low	**Medium**
Insufficient Participation					
Lacking Motivation	UoPs Approach	Medium	Elevated uncertainty due to self-emergence Tradeoff of informality with performance Long-term focus	Medium	**Medium**
	Elicitation of SC	Medium	Long-term focus Low tractability	Low	**High**
	Elicitation of User Motivation	Low	Long-term focus Low tractability Uncertain concrete implications	Low	**High**
	Provision of Comprehensive Organizational Support	Medium	Resource intensity, no concrete return on investments Low tractability Long-term focus Possible tensions with organization's actual tasks	Medium	**High**
	Provision of Management Support	High	Outcome uncertainty Biases towards KM	Medium	**Medium**

Common Issues	Approach / Component	Approach Vigor[1]	Tensions and Lasting Issues	Resolvability[2]	Gap Importance[3]
Inconsiderate Incentive Plan	Adjustment of Incentives	Medium	Lack of clarification about conduciveness of material rewards Possibly cultural differences Tradeoff of participation with performance (group vs. individual level incentives)	Low	**Medium**
Deficient System Capacity	Dynamic System Development	High	Resource intensity and complicacy of user need assessment Resource intensity of reviewing Tradeoff information quality and knowledge contribution	High	**Medium**
Unfavorable Organizational Culture					
Knowledge Hoarding	UoPs Approach	High	Elevated uncertainty due to self-emergence knowledge sharing spirit not equivalent to performance	High	**Low**
	Elicitation of SC	Medium	Long-term focus Low tractability	Medium	**Medium**
	Elicitation of User Motivation	Low	Long-term focus Low tractability Uncertain concrete implications	Low	**Medium**
	Provision of Comprehensive Organizational Support	High	Resource intensity, no concrete return on investments Low tractability Long-term focus Possible tensions with organizations actual tasks	High	**Low**
	Provision of Management Support	High	Outcome uncertainty Managers biasesed towards KM	High	**Low**
Lack of Management Support	Elicitation of SC	Medium	Long-term focus Low tractability	Medium	**High**
	Elicitation of User Motivation	Low	Difficult assessment Low tractability Uncertain concrete implications	Low	**High**
	Alignment to Organizational Objectives	Medium	Issues of strategic decision-making power Potential vicious circle between management support and alignment	Medium	**Medium**
	Performance Assessment	Medium	Resolute measurement issues Subjectivity and partiality of expert-based assessments	Low	**High**

Table 2: Challenges, Approaches, and Gaps of Knowledge Portal Research and Practice
[1] Approach Vigor estimates comprehension, palpability, and capacity of adduced approaches.
[2] Resolvability partially adjusts approach vigor by challenge intricacy; cf. Table 1.
[3] Gap Importance is diametric to resolvability, partially adjusted by challenge acuteness; cf. Table 1.
Abbreviations: KI – knowledge integration; KM – knowledge management; KPPM – knowledge portal process management; SC – social capital; UoPs – Unions of Practice

Meanwhile, the assumed intertwinement of participation and OC becomes obvious, as many facets of approaches in these fields account for more than one challenge. Notable is also the interconnected role of management support; it is concatenated with other approach facets and issues, such that it can be apprehended both as holding promise and being a potential menace to KPs. There are further intertwinements and overlaps, reflecting the ineptness of a KP to "address issues at different

organizational levels in a piece-meal manner"[857]. Appendix E provides supplementary visualization of the multilayered character of impacts that was found in this thesis.

5.2.1. Resolved Challenges

If the resistant gaps are examined, notably, there is low need for improvement of KP research in the areas of information dispersion and repository dispersion. Conceivably, information diversity, which is already initially low in acuteness relatively seen to other challenges, can be tackled fairly well by means of technology and standardization. Similarly, for information from the internet, it is stated that diverse technological solutions of web search mechanisms exist and that they have simply not yet been prudentially integrated and adapted.[858]

Moreover, knowledge hoarding cannot be considered a persistent challenge that needs to be addressed in particular. More and more empirical evidence specifies the reasons for which individuals hesitate to share and it was explicitly or implicitly stated in many of the adduced studies that knowledge hoarding is not in human nature. Behavior that is classified as knowledge hoarding is rather evoked by social and other organizational conditions. The results from empirical analysis showed that when social capital conditions are favorable, individuals will share their knowledge and they mostly keep it only when competition is externally induced. Loss of knowledge power could not be established as a deteriorating factor and, in turn, knowledge growth (that could incite seeking without contributing) did not account as a benefit either. Therefore, knowledge hoarding can be regarded a construct that is better grasped in terms of social capital effects and organizational structure, such that it does not explicitly have to be accounted for in the design of a KP. If conditions are sound, individuals are unlikely to keep their knowledge to themselves only for the sake of it.

5.2.2. Enduring Challenges and Implications for Research

Yet, for most challenges, at least a moderate gap of insights on how they could be tackled persists. This is less serious when a moderate gap meets moderate acuteness of challenges, as is the case for participant dispersion. Several empirical results illustrated how even large multinational organizations can integrate participants that are widely dispersed.[859] Heterogeneity of teams and subunit exchange rather yielded promising results in performance. Social capital was found to play an important role for KI, in particular in digitized contexts. The role of informal communication, face-to-face meetings, and flat hierarchies was emphasized. As a result, there is a lot to be done and to be learned for organizations, which do not yet dispose of such flexible and still (gently) formalized team-focused structures. On the other hand, there are rather palpable ways to achieve participant integration, all in all making this challenge addressable. The picture is a different one though for customer KPPM, as only KPs having no intra-organizational function raised questions how to integrate consumers.[860] Seemingly, KP design has no appreciation of tapping into customers' knowledge and blend it with internal resources. However, approaches like open innovation, crowd sourcing, or virtual customer logs are relatively inexpensive measures that could be integrated. Presumably, such experiments are not overly profitable, but worth at least to take into consideration.

As for system capacity, incentive-setting, and explicit KI, conclusive results were found, but they also brought to light significant and difficult tradeoffs. The capacity of a KP to meet user needs has proven to be outstandingly decisive for participation in numerous cases. Yet, at the same time, it is not at all obvious how this could be efficiently effectuated, given a KP's incapability to predetermine relevant user groups. This also concerns reviewing intensity. Certainly, emphasis should be laid on information quality but the price could be to starve contribution. On the other hand, extensive reviewing, aimed at transparency and feedback through developmental reviewing processes,[861]

[857] Garud, Kumaraswamy (2005), 14.
[858] Cf. Chau et al. (2006), 1219.
[859] Cf., in particular, Alavi et al. (2005); Braganza et al. (2009); Voelpel et al. (2005).
[860] Cf. McKemmish et al. (2009); van Baalen et al. (2005).
[861] Cf. Durcikova, Gray (2009), 99-100.

will be overly expensive for KPs, given their more heterogeneous users compared to KRs. Moreover, the induced quantity of (codified) contributed knowledge has shown to be a risk to information quality. This is where the elevated intricacy of incentive-setting intervenes. It was shown that inciting KT does not necessarily equal inciting knowledge application and that the induced behavior might vary contingent on social capital and culture. In addition, recognition plays a key role but is certainly hard to determine. Most conclusively, Garud and Kumaraswamy[862] have depicted the delicacy of these considerations. However, as onerous the balancing of incentives, contribution, and information quality may appear, in the same case study, the authors showed that contribution and quality can be united if incentives and community-related endeavors are matched and the actual OC is apprehended. It also transpired that information quality and reviewing are intertwined with explicit KI. The latter similarly faces the challenge of weighing formalization with KI's enhancing effect on performance. Generally, the establishment of sound codification, categorization and reviewing processes is likely to be rather costly in terms of necessary time and manpower to implement and maintain them. There is an ongoing need to further examine the antecedents of performance through KI and how these tradeoffs can be optimally weighed or deferred.

Most importantly, gaps persist in the elicitation of tacit KI, user motivation, and management support. While several pertinent approaches arose, their outcome remains uncertain in many situations.

The deteriorating impact of digitally enabled communication on tacit KT could generally not be overcome. Expressly, Teo and Bing[863] (based on a sparsely networking-related KP definition) categorically recommend excluding tasks that are high in tacitness from KPs and also van Baalen et al.[864] (referring to a KP-enabled NoP) find that tacit KT is not likely to be effectuated through a KP. Accordingly, owing to the present understanding of KPs as facilitators only of weak links and repository access, tacit KI is underrepresented. Lee et al.[865] suggest that team dispersion and team size enhance the necessity of collaboration, connectivity, and communication features, similarly hinting towards the arduousness of tacit KI at least in technologically simple KPs. Levin and Cross[866] encourage IS design by valuing trusted weak links, but often weakly linked KP participants will have no impetus for enhanced trust-building among each other. Thus, in sum, particularly for UoPs that are spread throughout or beyond the organization it is advisable to establish sound channels and facilitators for communication and interaction in order to foster tacit knowledge exchange. Self-determined social interaction in all its facets, as time- and resource-consuming as it may be, represents the most pertinent underlay for knowledge exchange in dispersed environments.[867] Admittedly, UoP approaches (both as a facet of tacit KI and as a generic approach) yielded promising results in terms of participation and OC, as particularly cases of Alavi et al.[868], as well as of Garud and Kumaraswamy[869] depicted. Due to the mutual dependence of UoPs and OC[870], however, they can be both virtuous or vicious circles of KPs:[871] one factor will enhance but also constrain the other. Overall, these findings reflect a common conundrum for practitioners in KM: either they address tacit knowledge in a long-term focused, interaction-related, and laborious manner within collocated organizational settings or they content themselves with more frugal explicit KI, usually yielding timely results and being more adequate for extremely dispersed (e.g., supra-organizational) settings.[872] No single option is superior to the other and none can be dismissed. Ideals of swift valuable tacit KT within organizations or medium-dated tacit KT beyond organiza-

[862] Cf. Garud, Kumaraswamy (2009), 21-23.
[863] Cf. Teo, Bing (2008), 567-571.
[864] Cf. van Baalen et al. (2005), 309-313.
[865] Cf. Lee et al. (2009), 3667-3669.
[866] Cf. Levin, Cross (2004), 1485-1486.
[867] Cf. Alavi et al. (2005), 211-212; Bock et al. (2005), 101; He, Wei (2009), 833-835.
[868] Cf. Alavi et al. (2005), 200-216.
[869] Cf. Garud, Kumaraswamy (2005), 22-23.
[870] Cf. 4.3.2.1.
[871] Cf. Garud, Kumaraswamy (2005), 24-27.
[872] Cf. Desouza et al. (2008), 562-563.

tional boundaries are mostly rather aspired than achieved or comprehended.[873] Yet, apprehension of these dispositions and of the necessary basis of decision-making as such might already prevent mismanagement, often guided by false expectations of easy gains through KPs. Still, more insights are needed on opportunities of more efficient tacit KI in order for KPs to be more performant.

Moreover, elaborate findings exist that clarify more and more the intrinsic antecedents of KMS usage intention and behavior. However, this is of little use to KP designers if they are not provided with guidelines how to address lacking motivation. There is a clear gap between the extent of research underscoring the prevalence of intrinsic motivators and the paucity of available measures to address them. It is obvious that reaching the intrinsic sphere of an individual is intricate. As for now, only long term change and culture management, as well as staffing policy appear to be capable of tackling these issues. However, human computer interaction or psychological studies could try to shed more light on short-term ways to engage motivation, at least on the attitudinal level. KP design, for instance, could cooperate with product development teams of modern communication and entertainment devices to render KP usage more attractive and seamless. Furthermore, research ought to address usage factors contingent on national culture. For example, Bock et al.[874] and Marks et al.[875] point to a possible effect of collectivism on knowledge sharing behavior and the pertinent measures to stimulate it. The same applies for UoPs, as they can be attributed a much wider significance as a superordinate social phenomenon of society and might therefore be foredoomed to be successful only on condition of a favorable collectivistic environment.[876]

Finally, management support has shown to be both vital and challenging to attain for effective KP deployment. Purportedly, senior executives in an organization (not only the chief information officer) ought to commit to the KP and value it as a major organizational feature, that is, not consider it as a plain IT tool. Admittedly, managers also need to be wary with several popular side effects of KM; knowledge sharing for the sake of it does not automatically lead to increased performance, as was illustrated in several examples. More importantly though, they must develop an understanding for the resource character of knowledge and its broad, multilayered implications. Management positively attuned to KM has multiple positive effects on all-important KM-aspects like OC, social capital, and also more concrete organizational structures. For various KP functions, resources have to be provided and recognition has shown to be an effective immaterial incentive. What was framed as the 'Organizational Stimulation of Participation' certainly needs management backing and occasionally rather fundamental change. Similarly, this thesis found that management support is a perfect example having mutual causal relations with other factors of KP deployment, in particular, user motivation and social capital. Thus, one should consider management support as another possible virtuous or vicious circle of KPs: If management acts promotive of a KP, this will probably incite users to participate, which will in turn fuel KP performance and encourage stronger management support. Yet, this could quickly revert into a vicious circle if one link is missing, for example, performance assessment. The feasibility of this assessment, however, is still insufficient and could only be established in largely circumscribed context. Long term research on this is required.

Eventually, KP deployment must be adapted to a 'systems perspective'[877]. Owing to the strong interlacements of comprehensive KPs with various actualities of an organization on all levels, KP design must attempt to grasp this distributed knowledge system as a whole. It ought to bear in mind the intractability of knowledge, just as well as its superior outcome when it is managed considerately and flexibly. Thus, thinking in a long term perspective and developing a certain sageness and moderation towards KM appear necessary. As Garud and Kumaraswamy phrased it:

> "These observations highlight a key paradox of knowledge management: that an organization's knowledge system contains seeds of its own destruction. Leave it alone, and virtuous knowledge

[873] Cf. Desouza et al. (2008), 563.
[874] Cf. Bock et al. (2005), 100.
[875] Cf. Marks et al. (2008), 65.
[876] Cf. 4.3.2.1.
[877] Cf. Garud, Kumaraswamy (2005), 29.

circles may never materialize. Intervene to couple processes at and across different levels, and vicious circles are bound to emerge."[878]

[878] Garud, Kumaraswamy (2005), 26-27.

6. Conclusion

KPs have not yet been fully conceptualized in KM research. This is reflected in the relative lack of empirical research on the subject aside from case-based investigations. Given the promise of KPs to function as 'one-stop knowledge shops', this is a surprising detection. A gap was diagnosed in KM and IS literature between calls for integrative KMS and the actual focus in KMS research on more circumscribed systems, which mostly either adhere to a repository or to a networking model.

It was shown that KPs are powerful tools to effectuate a suchlike integration, as they unite both models. Principally, it was illustrated that KPs dispose of more ample means for KI, accounting for tacit and explicit knowledge, as well as for multiple user groups. However, KPs commonly face three major challenges when deployed; they need to address knowledge dispersion, induce participation, and deal with the organization's culture. These challenges have shown to be enhanced by the high degree of integration and comprehensiveness that KPs embrace.

In response, this thesis has systematized three approaches, based on an extensive review of conclusive KP and KMS research. The approaches comprise the setup of a KPPM, the fostering of UoPs, and more general measures of KP governance. All in all, many of the specified issues could be tackled or at least better apprehended. For instance, the approaches offered substantial insights on levers for increased participant integration, on the understanding of knowledge hoarding, and on important priorities in KP system design. Whereas, thereby, some issues could be shown to be acceptably appreciated, others were made out constituting important and enduring gaps in KP research and practice. Specifically, tacit KI, intrinsic motivators, and management support are critical factors for KP success, but they cannot be adequately negotiated yet.

Moreover, it was illustrated that, due to their integrative character, KPs are subjected to important interlacements and overlaps of approaches and challenges. This indicates the existence of significant mutual causal relationships between singular measures. Hence, it is recommended that KP deployment strives to take in a 'systems perspective' and to consider multiple organizational dispositions. The implementation of a KP must be accompanied and supported by a multi-faceted and holistic organizational endeavor. This has consistently been confirmed throughout the reviewed studies. Only if an organization commits substantial investment to KPs and only if it is capable to adapt to initial intricacies by 'sensing' the gains of KM, KPs will become success stories.

7. Outlook

KPs are complex KMS and a myriad of subsequent investigations are imaginable. Yet, this work indicates that research on KPs should above all be continued in two directions:

First, the complicacies of KP deployment imply that research ought to elicit in more detail to which organizations KPs match in the first place. Many of the proposed measures are marked by high resource intensity and outcome uncertainty. In accordance with the framework of Ryu et al.[879] and practical experience, it is most probable that only organizations with current medium profitability invest in KPs: In times of elevated economic success, opportunity costs are a burden; in times of economic downturn, cutting KM budgets evokes the least palpable damage. Moreover, principally organizations embracing tasks that refer to emergent knowledge processes will substantially profit by KMS integration. These two hypotheses need further empirical confirmation. For example, case studies of KP deployments in small and medium-sized enterprises, operating in less 'knowledge-intensive' fields, could yield interesting counterpoints to established cases from multinationals.

Secondly, broader, more palpable, and more generalizable empirical research in the form of field studies and surveys on KPs is required. As yet, the introduced approaches have to gain confirmation as truly genuine. The evidence for integrative KPs almost exclusively derives from cases. This is a rather unsatisfactory setting for practitioners, seeking for adoptable solutions and clarity about the vicious and virtuous circles in KPs. Research needs to react to this requirement.

[879] Cf. Ryu et al. (2005).

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VII.Appendix

Overview

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Author(s) (Year)	**Field of Research**	**Concerned Challenge/s**	**Method**	• **Subjects and Location**	• **Major Findings**
Braganza et al. (2009).	KM through intranet-based system	D, P, C	Case study	• Schlumberger (oilfield services operator) • Internationally operating firm	• 30 attributes for KT through intranet-based KMS could be found for Schlumberger. • Numerous benefits of the intranet-based could empirically be validated and the theory-practice gap be limited. • The intricacies of KMS implementation reaching beyond issues of technology could be depicted and illustrated. • The relevance of metric systems for KM activities was underscored. • KI is a matter of repositories and of people and it concerns all phases of the knowledge life cycle.
Chau et al. (2006).	Design of a scientific web portal	D	Case study	• 20 nano science researchers, result from NanoPort implementation • Internet portal	• In the design of a web KP, various technologies should be considered and integrated. • A layered structure provides best flexibility results for implementation, maintenance, and updating.
Garud, Kumaraswamy (2005).	Mutually causal relations of knowledge processes	D, P, C	Case Study	• InfoSys (software services operator) • Internationally operating firm	• KM initiatives can have the opposite than intended outcome, as knowledge processes frequently are dynamic and mutually causal, such that they enforce each other. • A coherent KMS must trade off centralization and decentralization. • It is important to create unique taxonomies and 'knowledge hierarchies' in KRs. • Human capital must be explicitly accounted for. • KM in an organization is a holistic and highly dynamic endeavo having to adapt quickly and flexibly. • KM will evoke vicious and virtuous processes due to diverse mutually causal processes.
Lee et al. (2009).	Relative importance of KP features for research and development teams	D, P, C	Survey	• 142 members of research and development teams from research institutes • Korean public organization	• A KP needs to be integrated with project processes. • Perceived relevance of KP features is contingent on team tasks, such that organizations should dispose of means to align team structures. • The need for collaborative and communication features increase with team size. • Team tasks on the commercialization level value coordination higher than collaboration and communication. • The need for connection and communication features is contingent on team member dispersion. • Team member dispersion has no effect on the need for collaboration and coordination. • The need for content, customization, and community features is not contingent on dispersion or team size.

McKemmish et al. (2009).	Consumer empowerment through KPs	D, P, C	Case study	• Breast Cancer Knowledge Onlin Portal project	• Subjectivity and context of knowledge are the most pressing attributes a KP must account for. • User-sensitivity and personalization are particularly important features of a KP; they ought to be enabled by user information-needs analysis, knowledge-domain mapping, metadata modeling • Quality elements should be included in resource discovery metadata schema.
Schwabe, Salim (2002).	KP at Xerox Brazil	D, P, C	Case study	• Xerox Brazil • Brazilian subsidiary of internationally operating firm	• In the design of a KP, object oriented hypermedia design represents an adequate method to address the dynamics of knowledge • KP design for sound codification, reviewing, and access compris es information structuring, navigation structuring, and visualization. • A business game can be an adequate test and communication measure prior to KP implementation.
Teo (2005).	KM and KPs at Singapore Housing and Development Board	D, P, C	Case study	• Singapore Housin and Development Board • Singapore-based public organizatio	• Management must realize the value of KS and codification. • In particular, management support and the encouragement of (informal) KS are important. • Subsidiary organizational support factors are incentives, recogni tion, and reward. • Public organizations, tending to adhere to bureaucratic structure can particularly benefit from management-supported KM-initiatives. • A phased approach to KM and KPs is recommendable. • Knowledge domain experts are important for KM. • People and culture issues prevail over IT problems.
Teo, Bing (2008).	Task-technology fit for KPs	D, P, C	Survey	• 154 consultants from consulting firms • Chinese firms	• Tacitness of demanded knowledge hampers KP usage. • Task interdependence is not significantly related to KP usage. • KP usage is positively related to performance.
Van Baalen et al. (2005).	Role of KPs for NoPs	D, P, C	Case study	• Agro-logistics Platform • Dutch public and private organizations, external internet users	• A KP can impact KS of loosely coupled network members. • Fragmented awareness and urgency are necessary conditions for the emergence of a NoP. • A knowledge broker is an appropriate means to bridge structural holes in a NoP by decreasing cognitive distance. • Tacit knowledge is difficultly or not at all shared in a KP-enable NoP. • KS in a KP-enabled NoP is not reliant on reciprocity. • KS in a KP-enabled NoP is capable to permeate different structural levels.
Voelpel et al. (2005).	Web-based KM tool at Siemens	D, P, C	Case study	• 116 interviews wi high-level KM representatives from varying organization • 35 interviews with and observation o Siemens represent atives, company data • Internationally operating firms	• KMS deployment can be separated in 5 phases; conception, rollout, momentum building, expansion, consolidation and sustainment. • KMS deployment is subjected to favorable external conditions that free resources for investments without concrete RoA. • KMS implementation must be carried out forcefully and accompanied by sufficient initial communication and marketing effort. • User need assessment ought to be extensive. • In extremely distributed contexts, KMS implementation must be accompanied by training and promotion measures. • Intrinsic motivation accounts strongly for participation. • Organizational and national cross-cultural barriers can be severe barriers to KS and must be addressed explicitly. • Individual rewards fundamentally foster participation. • Reward systems that uniquely focus on knowledge contribution intensity will lead to cross-culturally unleveled effects and quali ty issues.

Zhang (2006).	Wonder's KP	D, P, C	Case study	• Wonder, IS development firm • Chinese firm	• Mere confrontation with different units' issues can enhance KS-friendly OC. • Tacit knowledge exchange is intricate and only occurs on an occasional basis when enabled only digitally through a KP. • Users perceptions and usage strongly varies contingent on collaborative spirit. • As KP design requires great flexibility, in-house solutions are preferable if possible.

Appendix A: KP-Related Empirical Contributions to Approaches

Abbreviations: C – Unfavorable Organizational Culture; D - Extensive and Dispersed Knowledge; IT – information technology; KI – knowledge integration; KM – knowledge management; KMS – knowledge management system/s; KP – knowledge portal; KS – knowledge sharing; KT – knowledge transfer; NoP – network of practice; OC – organizational culture; P – Insufficient Participation; RoA – return on assets

Author(s) (Year)	**Field of Research**	**Concerned Challenge/s**	**Method**	**Subjects and Location**	**Major Findings**
Alavi et al. (2005).	Influence of OC on KMS usage and deployment	D, P, C	Case study	• High-tech firm • Internationally operating firm	• Local values will lead to unleveled usage of standardized KMS. • Diverse features of KMS will be used according to embedded cultural values. • Cultural differences will evoke differences between individual and organizational outcome of KMS usage. • In the presence of multiple cultures within one firm, bottom-up and top-down processes are likely to occur simultaneously.
Benbya (2006).	Antecedents of KMS effectiveness	P, C	Field Study (firm records, interviews, survey)	• 10 interviews with knowledge managers from 10 knowledge-intensive firms, survey forwarded to subject matter experts (number not specified) • Silicon Valley, U.S.-based firms	• Trust does not account as KMS usage or quality factor. • Senior management support fuels KMS usage both directly and contingent on identification. • Socialization fuels the interrelation of management support and identification. • Socialization has no effect on KMS usage. • KMS integration is a strong predictor for KMS usage and quality, yet it is a major challenge. • KMS accessibility is a strong predictor of KMS usage and quality, even more so on condition of KMS integration. • Knowledge quality leads to usage and perceived benefits.
Bock et al. (2005).	Antecedents of KS	P, C	Survey	• 154 knowledge and information managers from 30 public organizations in 16 industries • Korean public organizations	• Extrinsic rewards are counter-productive to KS intention. • Reciprocity is decisive for KS. • Subjective norms have positive impact on KS intention and attitude. • Fairness, innovativeness, and affiliation as aspects of organizational climate account for subjective norms and positive KS intention. • KS ought not be forced or mandated.
He, Wei (2009).	Antecedents of continuous knowledge contributing and seeking	D, P, C	Field study (survey, KMS usage data)	• 161 knowledge contributors, 201 knowledge seekers from 3 units of IT company • Internationally operating	• Habit strongly moderates both KMS usage intention and factual usage. • Organizational conditions tend to affect knowledge contributing more strongly than knowledge seeking (in particular, management support). • Social relationships play a role not only for knowledge contribution but also for knowledge seeking. • Knowledge growth does not account as a motivator for knowledge seeking behavior (in a corporate setting). • Reciprocity does not account as a contribution antecedent.
Hwang, Kim (2007).	Internalization and identification in KS	P, C	Survey	• 411 undergraduate students • Northern U.S.-based university	• Internalization and identification strongly account for electronic KS. • Collectivistic culture is fully mediated by internalization and identification.

Janz, Prasarnphanich (2009).	Autonomy of teams in cooperative learning and KI	D	Survey	• 206 IS development workers from 38 teams and 13 product- and service-related Fortune 500 companies • U.S.-based and Canadian firms	• Autonomy of teams accounts for higher levels of cooperative learning. • Cooperative learning can be divided in three subcategories (group process, promotive interaction, and positive interdependence), having different results on fundamental goals of work satisfaction and performance. • Positive interdependence accounts for satisfaction, group process for work performance.
Kulkarni et al. (2006).	KMS success model	D, P, C	Survey	• 111 midlevel managers enrolled in MBA program at large urban university • U.S.-based university	• KMS quality and knowledge content quality are determinants for KMS usage. • Enhanced supervisors, coworkers, leadership, and incentive enhance KMS usage both directly and indirectly (directly for incentive and leadership). • Overall user satisfaction with KMS (itself determined by KMS and content quality) positively affects KMS usage. • Perceived usefulness of KS enhances KMS user satisfaction.
Lin, Huang (2008).	Social cognitive / TTF for KMS	P, C	Survey	• 192 IS employees from various hierarchical backgrounds and industries • Taiwanese firms	• Task interdependence is positive related to KMS usage. • Task tacitness is negatively correlated to task-technology fit. • Personal outcome expectations are positively correlated to KMS usage. • KMS self-efficacy strongly accounts both for KMS usage and outcome expectations.
Malhotra, Galletta (2005).	Influence of user commitment on volitional IS adoption and usage	P, C	Survey	• 179 respondents, participants of collaborative IS in healthcare organization • Midwestern U.S.-based firm	• A model of volitional IS usage behavior comprising internalization, identification, and compliance (i.e., user commitment) as influence factors beside system quality can explain participation decisions. • User commitment influence usage intention directly during usage phase and indirectly via user attitude during adoption phase; internalization and identification have positive effects, compliance a negative one. • Perceived ease of use accounts indirectly for system adoption decision via the user's attitude • Perceived usefulness predicts system adoption and usage intention and is continuously enhanced by identification and internalization.
Marks et al. (2008).	Managerial prompting	P, C	Laboratory study	• 76 undergraduate students from 2 universities • U.S.-based universities	• Repeated managerial prompting leads to an increase in KS.
Patnayakuni et al. (2006b).	KI and process formalization in IS development	D	Survey	• Representatives from 60 organizations being clients of operating software vendor firm	• Collaboration integrating tacit knowledge positively impacts systems development performance. • Explicit KI across different phases of the systems development process positively impacts performance. • Formalization of processes (establishing routines and discipline) accounts for performance gains. • Effects of collaborative exchange are positively/of explicit KI are negatively moderated by the formalization.
Quigley et al. (2007).	Motivational factors for dyadic KS	P, C	Computer-based simulation	• Undergraduate students, 120 participants • U.S.-based Mid-Atlantic university	• KS can be better determined if norms and incentives are conceived interactively. • Isolated incentives cannot account for KS; group incentives are more adequate than individual incentives; combination of incentives with norms has strongest impact on KS. • KS accounts for personal goal-setting and thus performance.
Siemsen et al. (2007).	Incentives and KS	P	Survey	• 280 respondents from 4 organizations (private and public) • U.S.-based organizations	• Optimal incentive-setting is contingent on given linkages between workers. • In case of knowledge linkages, individual and group incentives are not antithetic but complementary for optimal outcome.

Appendix B: General KMS-Related Empirical Contributions to Approaches

Abbreviations: C – Unfavorable Organizational Culture; D - Extensive and Dispersed Knowledge; IS – information system/s; KI – knowledge integration; KM – knowledge management; KMS – knowledge management system/s; KS – knowledge sharing; P – Insufficient Participation; TTF – task technology fit

Author(s) (Year)	Field of Research	Affected Challenge/s	Method	Subjects and Location	Major Findings
Bock et al. (2006).	Norms and knowledge seeking	P, C	Survey	• *Only abstract available*	• Social norms positively affect knowledge seeking behavior both directly and through deteriorating the negatively perceived future obligation. • Social norms might deteriorate perceived usefulness of KRs.
Desouza et al. (2006).	Explicit knowledge sourcing	D, P	Survey	• 175 employees of software engineering firm • Internationally operating firm	• Simplicity is correlated to intention of explicit knowledge sourcing. • Perceived relative advantage determines explicit knowledge sourcing. • Risk aversion accounts for less explicit knowledge sourcing.
Durcikova, Gray (2009).	Validation processes and knowledge contributing in KRs	P, C	Survey	• 118 customer service analysts • U.S.-based firm	• Transparency of validation processes fosters knowledge contribution and perceived knowledge quality. • Validation duration has no effect on knowledge contribution but negatively influences perceived knowledge quality. • Restrictiveness of validation processes positively affects perceived knowledge quality but negatively affects knowledge contribution. • Perceived knowledge quality negatively affects knowledge contribution.
Kankanhalli et al. (2005a).	Antecedents of contributions to KRs	P, C	Field study (interviews, survey)	• Interviews: senior executives from 17 organizations; survey: 150 KM practitioners from 10 organizations • Singapore-based public organizations	• Loss of knowledge power is not a significant detriment to knowledge contributions to KRs. • Perceived codification effort is limited by generalized trust. • Perceived codification effort is not contingent on pro-sharing norms and identification. • Organizational reward affects contribution positively directly and contingent on identification. • Image building is no motivator for contributions to KRs. • Under conditions of strong pro-sharing norms, the need for reciprocity is lessened. • Self-efficacy and enjoyment of helping others strongly counts as contribution catalyst.
Kankanhalli et al. (2005b).	Antecedents to seeking from KRs	D, P, C	Survey	• 160 KM practitioners of 8 government-related organizations from 6 industries • Singapore-based public organizations	• Perceived output quality of KRs is a predictor for knowledge seeking from KRs. • For low task tacitness, KR availability strongly determines knowledge seeking from it. • Under conditions of high task interdependence, incentive availability is a predictor of knowledge seeking from KRs.
Poston, Speier (2005).	Impacts of content ratings and validity on knowledge sourcing	D, P, C	Laboratory study	• Experiment 1: 51 undergraduate students; experiments 2-4: 108 undergraduate students • Midwestern U.S.-based university	• The degree to which content ratings reflect information quality determines information seeking, in turn influencing decision-making quality. • High quality anchoring occurs with high validity ratings, low quality anchoring with low validity ratings; some raters adjust away from anchors. • Decision-making quality is highest for anchoring on high validity and lowest for anchoring on low validity without adjustment. • While collaborative filtering accounts as a credibility filter, number of raters and rater expertise do not.

Appendix C: Repository-Related Empirical Contributions to Approaches

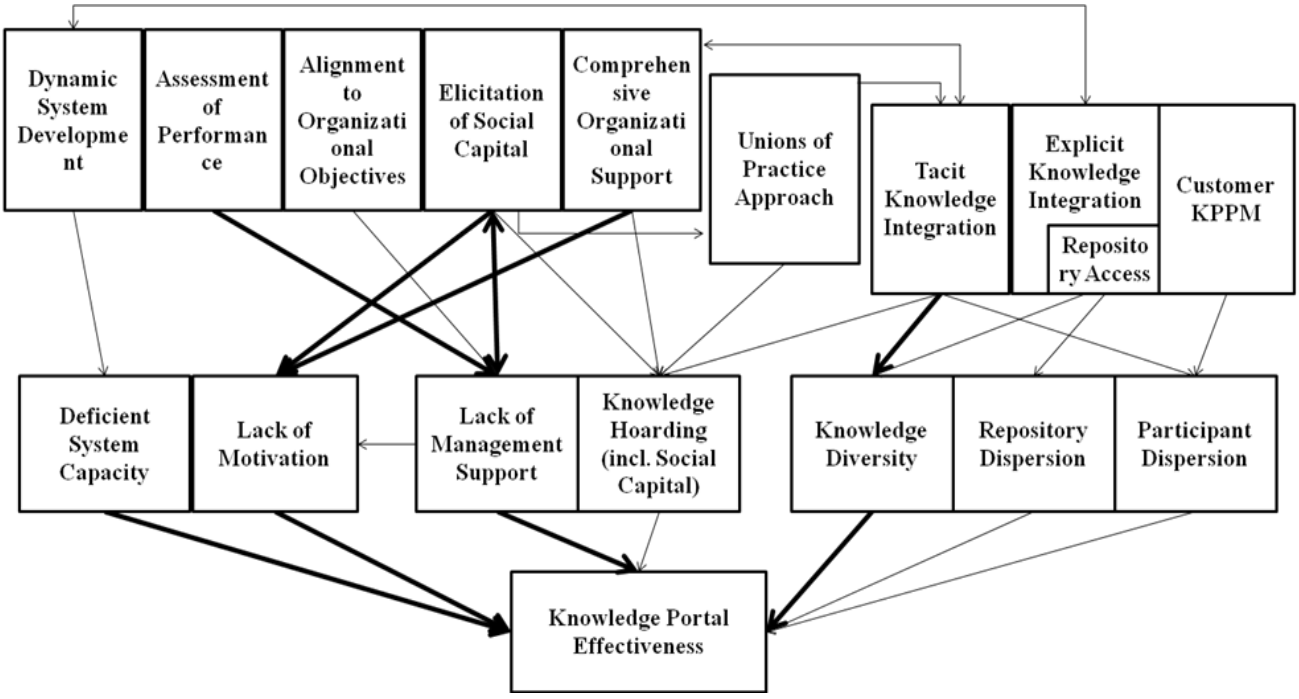
Abbreviations: C – Unfavorable Organizational Culture; D - Extensive and Dispersed Knowledge; KM – knowledge management; KR – knowledge repository; P – Insufficient Participation

Author/s (Year)	Field of Research	Concerned Challenge/s	Research Type	Subjects and Location	Major Findings
Chiu et al. (2006).	SC and social cognition in virtual communities	P, C	Survey	• 310 virtual community members of BlueShop • Taiwanese virtual IT community	• Community-related outcome expectations determine KS behavior in virtual communities, whereas personal-related ones do not. • Social ties, reciprocity, and identification increase KS in virtual communities, whereas knowledge quality does not. • Trust and common languages do not have an impact on KS behavior in virtual communities.
Cummings (2004).	External KS of work groups and structural diversity	D	Field study (records, interviews, survey)	• 182 work groups of Fortune 500 telecommunications company • Internationally operating firm	• Intra-group and external KS positively affect group performance. • Influence of external KS on performance is greater if groups are more structurally diverse.
Hansen et al. (2005).	Inter-subset KS	D, P, C	Survey	• 121 new product development teams from 27 subsidiaries of high-tech firm • Internationally operating firm	• Density and frequency of intra-team relations negatively affects inter-subsidiary KT. • Network range positively affects inter-subsidiary KT. • Inter-subsidiary relation strength increases search costs but not KT costs. • Perceived inter-subsidiary competition increases KT costs. • Inter-subsidiary relation strength decreases KT costs for tacit knowledge.
Levin, Cross (2004).	Dyadic KT in SNs	D, P, C	Survey	• 127 employees, 3 firms from 3 industries • U.S.-based, British, and Canadian firms	• Strong ties account for KT but are mediated by trust. • Strong ties do not account for KT of distinct knowledge type. • Under constant conditions of trust, weak ties account more strongly for KT.
Lin, Lee (2006).	Socio-technical factors and KS	P, C	Survey	• 154 senior executives from various backgrounds • Taiwanese firms	• Managers having a positive perception of KS are more likely to encourage it. • Pro-social organizational climate enhances KS. • IT support has no significant effect on KS.
Patnayakuni et al. (2007).	Integrative practices and KI across boundaries	D	Survey	• Mid-level managers from IS departments in 110 randomly selected firms	• KI across knowledge boundaries improves IS development performance. • Formal and informal organizational integrative practices enhances the integration of specialized knowledge within and across subunits. • The positive influence of formal and informal integrative practices on IS development performance is partially mediated by KI.
Reagans, McEvily (2003).	Network cohesion and range and KT	D, P, C	Survey	• 102 employees of research and development firm • Midwestern U.S.-based firm	• Social cohesion facilitates KT. • Network range facilitates KT. • Tie strength is not predictive for the ease of transferring different types of knowledge. • Tacit knowledge is harder to transfer than explicit knowledge under conditions of constant tie strength.
Robert et al. (2008).	SC and KI in digitally enabled teams	D	Laboratory study	• 172 junior-level business school students in 46 teams • U.S.-based universities	• KI in teams is promotive to team performance. • SC has a strong influence on KI in teams. • Structural and cognitive capital play an increased role in digitally enabled teams.

Sarker et al. (2005).	Antecedents of KT in virtual teams	D	Survey	• 96IS development students from 12 teams • U.S.-based and Norwegian universities	• KT in virtual teams is contingent on the contributor's credibility and their intensity of participation. • KT in virtual teams is not contingent on the contributor's capability.
Tiwana, Bush (2005).	Continuance in expertise-sharing networks	P, C	Survey	• 122 members of 4 expertise-sharing networks • Internet networks	• Postadoption irretrievable investments in expertise-sharing networks are constituted of relational capital and reputation. • Personalization has a negative effect on continuance intention. • Personalization has the strongest effect on continuance intention, followed by user satisfaction, relational capital, and reputation.
Wasko, Faraj (2005).	Impact of SC on knowledge contribution in electronic NoPs	P, C	Field study (usage data)	• 173 participants of electronic NoP of legal professional association • U.S.-based association	• Perceptual increase of professional reputation is a knowledge contribution antecedent. • There is weak evidence that people who enjoy helping others contribute more useful knowledge. • Intrinsic motivators only weakly influence knowledge contribution behavior. • SC influences contribution behavior, most significantly structural capital. • Relational capital has no effect on knowledge contribution behavior in NoPs.
Zboralski (2009).	Antecedents of KS in CoPs	P, C	Survey	• 122 members of 36 CoPs within multinational firm • Internationally operating firm	• Community leaders and management support predict interaction quality. • Interaction is driven by personal profit, mainly derived from intrinsic motivators. • Individuals participate if it helps their current projects, networking, and career progress. • Passing on knowledge and KS as such are not objectives of members of CoPs. • Individual motivation does not predict interaction quality.

Appendix D: Networking-Related Empirical Contributions to Approaches

Abbreviations: C – Unfavorable Organizational Culture; CoP – community of practice; D - Extensive and Dispersed Knowledge; IS – information systems; IT – information technology; KI – knowledge integration; KS – knowledge sharing; KT – knowledge transfer; NoP – network of practice, P – Insufficient Participation; SC – social capital; SN – social network



Appendix E: Intertwinement of Challenges and Approaches

Challenges with low acuteness and approach facets with low vigor are omitted. Challenge-approach relations with high gap importance and challenge-effectiveness relations with high acuteness are marked by bold arrows.

Abbreviation: KPPM – knowledge portal process management

VIII. Submitter's Declaration

Hiermit versichere ich, dass ich diese Diplomarbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe. Die Stellen meiner Arbeit, die dem Wortlaut oder dem Sinn nach anderen Werken entnommen sind, habe ich in jedem Fall unter Angabe der Quelle als Entlehnung kenntlich gemacht. Diese Arbeit hat in dieser oder einer ähnlichen Form (auch auszugsweise) noch nicht im Rahmen einer anderen Prüfung vorgelegen.

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Nicolas Friederici

Köln, den 22.12.2009

IX. Curriculum Vitae

Curriculum Vitae

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Oct. 2005 – present	**Studies of Media Science / Media Management**
	Fields of study: **Media Management / Media Law**
	Required elective subject: **Economic and Social Psychology**
Feb. 2007	**Pre-Diploma**, Grade: 1.6
Apr. 2007 – present	**Advanced Studies**, 7th semester of studies
Jun. – Dec. 2009	**Diploma Thesis:**
	'Integrated Customer-Oriented Knowledge Portals – Conceptual Challenges and Selected Empirical Approaches'
	University of Cologne
Sep. 2007 – Jun. 2008	**ERASMUS, Studies Mainly of European and International Law**
	Average Grade: 15.1 ≈ 2.0
	Université Paris I – Panthéon Sorbonne
Aug. 1997 – May 2004	**Secondary School ('Gymnasium')**
Jun. 2004	**General Qualification for University Entrance ('Abitur')**, Grade: 1.0
	Eichsfeld-Gymnasium Duderstadt

Internships

Aug. – Sep. 2009	**Internship at T-Home, Deutsche Telekom AG**
	Three-month internship in department of market and quality management, initiation of knowledge management/dissemination approach for T-Home and Deutsche Telekom AG in Germany
	Deutsche Telekom AG, Bonn
Jul. – Aug. 2007	**Internship at Deutsche Telekom AG / T-Mobile / Vivento**
	Six-week internship in company communications and marketing, assistance, authorship of a newspaper feedback report, administration of a promotional marketing project
	Deutsche Telekom AG / T-Mobile / Vivento, Bonn

Commitment

Jul. 2006 – May 2007	**Commitment for Student Council** Supervision of freshmen and organization of social projects and events Media Science Student Council, Cologne
Mar. 2007	**Support of Press Team at 11th World Business Dialogue** International economic conference where students, business leaders and scientists gather; organized voluntarily by students and the OFW Organisationsforum-Wirtschaftskongress (OFW), Cologne
Apr. – Jun. 2006	**Apprenticeship at Local Student Radio Station Kölncampus** Ten-week short-time apprenticeship at radio station, contribution to broadcasting of university-related programs Campus-Welle e.V., Cologne
Jul. 2004 – Sep. 2005	**Voluntary Social Year in Scotland instead of Civil Service** Supervision of difficult homeless teenagers from socially deprived backgrounds during ten-month stay abroad, additional seminars in Germany Community Service Volunteers (CSV), Blackburn, West Lothian, Scotland Verein für internationalen und interkulturellen Austausch e.V. (VIA e.V.), Berlin, Dransfeld

Scholarships

Nov. 2006 – present	**Deutsche Telekom Scholarship** Scholarship for high potential students, monthly financial support, seminars on social and professional competences, mentoring program, internship/job procurement Deutsche Telekom AG
Dec. 2005 – present	**e-fellows.net Scholarship** Network for outstanding and/or highly committed students, material support, platform to get in touch with business representatives e-fellows.net

Languages

German	Native language
English	Business-fluent
French	Highly proficient
Italian	Basic
Spanish	Basic
Portuguese	Basic
Latin	Basic