"The Winner Takes it All?" – Synthesising Evidence on the German Excellence Initiative's Effects on Vertical Stratification in Higher Education

Franca Philine Trenczek

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MSc in Education (Higher Education), 2025

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"The Winner Takes it All?" – Synthesising Evidence on the German Excellence Initiative's Effects on Vertical Stratification in Higher Education



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Abstract

This systematic review aims to synthesise empirical evidence of how the German Excellence Initiative (ExIn) affects dynamics of institutional hierarchisation, known as vertical stratification, in higher education. The launch of the ExIn as a competitive funding programme for German universities was intended to promote internationally competitive, excellent research in Germany by creating 'lighthouses of research', yet its effectiveness in doing so has been disputed. This systematic review intends to address the conflicting views on the effects of the ExIn on vertical stratification by synthesising the existing empirical evidence on this topic. This review identifies 19 empirical studies as relevant for inclusion, and conducts a qualitative evidence synthesis of quantitative, qualitative, and mixed-methods studies. The cross-synthesis finds that the ExIn increases vertical stratification between funded and non-funded universities through four evidenced indicators: (1) accumulation of funding, (2) research output quality and quantity, (3) student recruitment, and (4) rankings and reputational effects. This review argues that the ExIn exacerbates pre-existing differences between funded and non-funded universities through these indicators, and thus perpetuates a system of continuously advantaging select universities as 'winners'. Therefore, the ExIn marks a paradigm shift in the German higher education system from previous *unintentional* towards *intentional* vertical stratification. This systematic review consequently fills a significant gap as being the first to provide a synthesised, empirical understanding of the ExIn's system-wide effects on vertical stratification, which can be applied to inform future research and evidence-based decision-making in policy.

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Table of Abbreviations

Abbreviation	Term
CoEs	Clusters of Excellence
DFG	Deutsche Forschungsgemeinschaft (German Research Foundation)
DZHW	Deutsche Zentrum für Hochschul- und Wissenschaftsforschung
EPPI	Evidence for Policy and Practice
ExIn	Excellence Initiative
GWK	Gemeinsame Wissenschaftskonferenz
IEKE	Internationale Expertenkommission zur Evaluation der Exzellenzinitiative
WR	Wissenschaftsrat
QES	Qualitative Evidence Synthesis
ZSB	Centre for School and Educational Research Halle

1. Introduction

"The winner takes it all, the loser has to fall" (ABBA, 1980)

It is these lines of ABBA's famous song that capture the central puzzle of this research. From the earliest emergence of universities in the 11th century, differentiation based on reputation, excellence, and exclusivity has persisted in institutions like the UK's Oxbridge, or the US's Ivy League (Salmi & Altbach, 2011). In an attempt to keep up with these reputable and academically rigorous institutions, Germyn launched the Excellence Initiative (ExIn henceforth) in 2006, aimed at fostering select universities to exhibit "excellence in research [and] scientific merit" (DFG, 2010, para. 6). However, these systems of differentiated institutions in higher education have increasingly come under scrutiny for concentrating available resources at a small number of institutions, thus making them 'winners' of a system, while other, 'losing' institutions are continuously disadvantaged. This study intends to examine this dynamic of winners and losers by asking more closely what happens to institutions in the German higher education system through the ExIn.

Doing so in the form of a systematic review fulfils the objective of identifying if and where the ExIn leads to stratifying dynamics of hierarchisation, as a comprehensive assessment thereof has been neglected in the empirical literature. This review therefore aims to understand whether and how fostering excellence through the ExIn affects structures of hierarchisation in the German education system. As defined by Teichler (2008), hierarchisations or vertical stratification refer to a system where institutions differentiate through a clear hierarchical order of one being perceived as more valuable than another. Conceptual literature on the ExIn has already sparked a debate on whether the ExIn presents a shift to a new paradigm in the German landscape by going from a horizontal institutional different to a vertical one (DFG, 2024; Hartmann, 2007). It is therefore of particular importance to contribute to this debate by addressing the absence of an evidence-based overview of the existing empirical data (Teichler, 2009). This study aims to provide a synthesised overview of empirical findings to understand the role of the ExIn on vertical stratification dynamics in Germany, in the form of a systematic review.

This review will be situated in a broader body of literature that looks at institutional dynamics of fostering excellence through specific policy initiatives, and aims not merely to understand the effects of such programmes, but it further asks what value these can bring to the broader society. It is primarily concerned with trade-off questions of whether excellence allows for positive, system-wide stimulation effects through specifically targeting a small group of excellence, or instead causes negative externalities, such as downward spirals for non-supported universities (Allison & Stewart, 1974). Inherently, this debate is further concerned with questions on reward structures in excellence, i.e. whom do vertically stratified systems intend to reward, and do they subsequently end up rewarding

whom they intended to reward at the top of these hierarchies? These are questions to be asked by the broader literature that this review of the ExIn is situated in.

1.1. Background on the Excellence Initiative

The ExIn is a programme launched by the German Research Foundation (DFG), aimed at generating world-class research in Germany through the promotion of a select number of 'universities of excellence' (ExIn universities) (DFG, 2024). Modelled by similar programmes, such as the Ivy League in the US, or the Russell Group and the REF in the UK, the ExIn is intended to increase resources and capabilities at select ExIn universities for international competitiveness, measured by global ranking performance, visibility, and research output (Hartmann, 2006).

The ExIn was established as a competition for additional funding, where universities and departments apply for one of three funding lines. It has evolved over two phases: from its launch in 2006 to 2012, and secondly from 2012 up to its conclusion in 2017 (DFG, 2013). The three funding lines consisted of graduate schools for the education of young researchers, clusters of excellence (CoE henceforth) for the advancement of subject fields and differentiation through specialised research profiles, and institutional strategies (ExIn universities) for the development of excellent research quality at the overall institutions (DFG, 2013). These funding lines were set up cumulatively, by which the award of becoming an ExIn university was only possible for those who had previously been awarded CoEs and graduate schools (DFG, 2013). In total, fourteen universities have been awarded ExIn status, out of which six universities were funded for both phases, five were funded in the second phase only, and three universities were only funded in the first phase (Appendix 8.1.). Public and academic interest was particularly taken in this programme because it is one of the first of its kind in Germany; prior to its launch the only differentiation in the German system on an institutional, policy-driven level was a functional divergence between universities, universities of applied sciences, and apprenticeships (Krause-Pilatus & Schüller, 2014). Therefore debates have been sparked about the role of the ExIn in potentially creating a new hierarchy of institutions in Germany (Hartmann, 2006). This review intends to take these debates as a starting point and rationale for providing an evidence-based overview of the documented effects of the ExIn on such mechanisms of hierarchisation in the German education landscape.

1.2. Research Question

A research question will be derived from the objectives and aims of the study to explore the proposed phenomenon of interest:

RQ: What are the documented effects of the German Excellence Initiative on indicators of vertical stratification in higher education?

This research question operationalises the previously discussed aims, objectives, and rationale of the subject into a feasible study that can adequately address the largely unexplored and non-synthesised evidence on the effects of the ExIn on hierarchies in the German higher education system. Due to space and time constraints, the scope is limited to the relationship between ExIn and non-ExIn universities within in the German system, and only covers funding lines under the ExIn. This excludes currently running follow-up programmes, like the 2019 Excellence Strategy (ExStra, 2024).

In answer to the research question, this study presents the following argument on the basis of a qualitative systematic review: The ExIn has vertically stratifying effects measurable in four different indicators, but rather than being the sole or primary cause thereof, it has exacerbated, reproduced, and increased visibility of an already pre-existing vertical stratification. Therefore this review argues, that the ExIn presents a paradigm shift in the German higher education system, transitioning from an *unintentionally* vertically stratified system, to one that is *intentionally* vertically stratified.

1.3. Outline of Thesis

To outline this argument and conduct the systematic review, this study will be organised as follows: Chapter 2 provides an overview of the relevant literature in the field to explain key dynamics and philosophical underpinnings in the debates around stratification and excellence. Then, the methodological approach to explore the research question through a systematic review will be presented in Chapter 3, in particular the search strategy, study selection, data extraction and qualitative evidence synthesis (QES henceforth). After addressing relevant methodological limitations, Chapter 4 outlines the findings from the included studies in a thematic synthesis. Then, in Chapter 5, a discussion will interpret the results in relation to the research question and derive meanings for the wider body of literature and lastly, the review will be concluded in Chapter 6.

2. Literature Review

The following section will contain a comprehensive literature review of the key debates and scholars in the field of vertical stratification in higher education and the fostering of excellence. By presenting an overview of the larger philosophical and conceptual literature, it aims to organise, synthesise and critique relevant underpinnings of the debate around vertical stratification in higher education and the ExIn. This will serve as a baseline for identifying gaps in the existing literature which subsequently informs the rationale for the research question. The literature review reveals that there is a lack of nuanced understanding of indicators of vertical stratification, particularly contextual and qualitative ones. This necessitates the subsequent systematic review as a tool to address this gap and provide a comprehensive, synthesised overview of the vertical stratification effects of excellence formation through qualitative and quantitative indicators.

The literature review spans across substantive and conceptual texts, and will be organised in the following sections to align with this paper's aims and objectives: First, a discussion of the underlying purposes of education and how a fostering of excellence fits into educational purpose frameworks of the Humboldtian ideal of education will be presented. Next, the literature review will explore debates on how excellence is achieved in education systems, particularly looking at contributions of academic merit, and pre-existing forms of input capabilities under Bourdieu's Theory of Capital and the Matthew Effect. Lastly, these discourses will be linked to the current state of research on the German higher education system and ExIn to showcase existing understandings of the ExIn, and further, gaps in the research, which informed the rationale for the research question.

2.1. Excellence in Frameworks of Purposes of Education

Firstly, this section will discuss the underlying frameworks of the purpose of an education system that are observed to be at play in Germany; firstly, the Humboldtian ideal of education (Humboldt, 1792) and secondly, frameworks of Becker's Human Capital Theory (Becker, 1962) and Spence's Signalling Theory (Spence, 1973). In discussing these frameworks of purpose, one can understand if and how these systems value the formation of excellence. This section will show that the long-observed Humboldtian ideal of German higher education was less concerned with forming an elite or excellence in higher education; instead, it focused on education fulfilling the purpose of humanistic education, and cultivation of citizenship through education. This has led to an emphasis in the German system on the functional differentiation of higher education institutions based on their style of learning and teaching, as well as an emphasis on equilibria between research and teaching as integral components of a higher education institution's purpose (Bongaerts, 2022). However, with the launch of the ExIn, scholars have asked whether this programme redefines the purpose of the German education system. Because the ExIn encourages institutions to exhibit strong performance in research, and internationally comparable dimensions of quantitative output, it has been argued that this subscribes

to a more extrinsically-defined purpose of education, where also choices in and outcomes from higher education could be ranked through an associated value, i.e. vertical stratification (Kehm, 2013). Therefore, these two systems need to be discussed in more depth to facilitate an understanding of how these purposes shape a potential decision between horizontal or vertical stratification in a system of excellence.

The purpose of Humboldt's education philosophy commonly emerges as a perpetuator of an intrinsic purpose of education (Humboldt, 1792). Humboldt has shaped the German and international education landscape with his concept of 'Bildung' and the Humboldtian 'Bildungsideal', which encourages a humanistic cultivation of the human through participation in education (Sorkin, 1983). Rather than serving a utilitarian purpose of achieving a qualification, education is argued to be a form of "self-cultivation" (Sorkin, 1983, p. 55) that educates students for active participation in societal questions of politics, economics, and culture (Humboldt, 1792). Humboldt's views on education are often connected to an egalitarian view on participation, where economic resources and social background should not determine entitlement for receiving education, but instead all member of society should participate in education, for he sees it as a necessary step to civilisation and 'moralisation' rather than mere obtainment of subject knowledge (Humboldt, 1792). In practice, the Humboldtian 'Bildungsideal' encourages a strong interplay between research and teaching as core activities of a university (Bongaerts, 2022). While research is key to scholarly inquiry and advancement of innovative ideas, the pursuit of teaching activities is seen to be equally as vital for the 'cultivation' of active, humanistic citizenship, and distribution of knowledge in society (Humboldt, 1792). Similarly, Newman expands on the intrinsic purpose of education for active citizenship and humanistic education by arguing that the pursuit of education is aimed at "raising the intellectual tone of society" (Newman, 1982, p. 125). This aligns with Kerr's (2001) concept of the uses of a university, arguing that universities serve more than a mere purpose of knowledge inquiry, but rather are embedded in a broader system where they respond to societal pressures, and may encompass various missions. By offering this humanistic perspective on education as means of shaping character and political voice, Humboldt and Newman are connected to horizontally-stratifying systems of education (Hartmann, 2006) and policies for universal access (Tenorth, 2013). However, when appraising Humboldt for more egalitarian policies it has to be mentioned that the proposed access policies referred to universal primary school access; his works in higher education were predominantly concerned with the teaching-research nexus and purpose of higher education, which is why those are the dimensions this review will be focusing on (Tenorth, 2013).

In recent literature, Humboldt's and Newman's humanistic ideas of education serving an intrinsic purpose of knowledge inquiry and humanistic formation have come under scrutiny as concerns about employability, economic returns, and the need for capacity-building through education gained salience (Lepori & Jongbloed, 2018). Much of this critique is rooted in Becker's Human Capital Theory (1962), in which he argues that individuals pursue education to build capacities ('human capital') with

the expectation that those will yield returns of extrinsic nature, such as increased economic benefits, employability, and labour market productivity (Lauder et al., 2020; Robson, 2023). He proposes that education creates spaces for enhancement of skills, on-the-job training and information acquisition, and thus offers forms of building such capacities which then serve the purpose of gaining extrinsic rewards (Becker, 1962). In frameworks of excellence these hopes of extrinsic rewards through associated outcomes from pursuing education are not necessarily linked to an actual increase in capacities, as human capital theory suggests, but rather they are driven by the perception thereof. This can be linked to what Biesta calls a qualification function of education (Biesta, 2009), and Spence calls signalling in education (Spence, 1973). Biesta has defined three purposes of education, i.e. qualification, socialisation, and subjectification, whereby the qualification function suggests that obtaining an educational qualification allows for signalling one's skills to employers, society, and institutions (Biesta, 2009). Similarly, in Spence's theory of signalling, he claims that education fulfils a function of signalling apparent skills and qualifications to employers or other externals, given that the real or "productive capabilities" (Spence, 1973, p. 357) are often non-observable from the outside. Different to Human Capital Theory, signalling and qualification functions are not limited to actually acquired skills though; instead they also include perception and reputation of skills (Connelly et al., 2011). The signalling function of a qualification therefore contributes to the use of education or excellence labels for its extrinsic purposes (Marginson et al., 2023).

In relation to the ExIn, Hartmann (2006) has argued that the ExIn represents a paradigm shift between these two dynamics, moving away from the Humboldtian ideal of humanistic education and an equality between teaching and research, towards a more extrinsically-driven system of competing for capabilities, and becoming highly-resourced, research-intensive universities (Hartmann, 2006). Clark (1983) views this as a positive development, by claiming that this move away from functional differentiation and teaching, towards the creation of research-intensive universities is a vital step for achieving high-quality research, as he assumes an incompatibility of pursuing both teaching and research simultaneously at a high degree of quality (Clark, 1983; Wissenschaftsrat, 2020). Thus, a decision for the creation of merely research-intensive universities in the ExIn suggests a break from the intrinsic, Humboldtian view on humanistic education towards an extrinsically defined purpose of education (Hartmann, 2006), where rewards like rankings, publications metrics, and employability scores define excellence (Bloch et al., 2024). In these systems, excellence is therefore not found in the functional differentiation of providing different education opportunities that all reach the equally valued outcome of humanistic development (Humboldt, 1792), but instead excellence is understood to be clearly identifiable, rankable, and valuable as a positional good in competition for benefits accrual.

In comparative contexts of excellence frameworks, like the Research Excellence Framework (REF) in the UK, these competitive dynamics for extrinsic rewards in education have been linked to the theory of credentialism (Tomlinson & Watermeyer, 2022). This claims that in the process of competing for

funding, academic credentials have been commodified towards being a tool of status-affirmation, which allows gaining positional advantages like funding accrual over competitors (Tomlinson & Watermeyer, 2022). Universities may thus be inclined to conduct research that is likely to receive funding and reputational benefits, rather than research that is most valuable in the field, which thus again conflicts with the goals of undertaking high quality research (Watermeyer & Olssen, 2016). Shattock and Horvath (2020) criticise that these competitive tendencies shift the focus towards quantifiable metrics rather than quality or provision of teaching hours, and Tight (2016) again link this with a move away from the Humboldtian education ideal in Germany towards new structures. In the realm of this, scholars have taken the launch of the ExIn as a cause for debate on whether the ExIn has been driven by a motivation to increase research capacities for the sake of advancing knowledge in society and fostering academic inquiry, as Humboldt may have suggested (Humboldt, 1792), or whether it is instead driven by a convergence towards global trends in higher education that encourage extrinsically-defined competitive, market-driven dynamics and rewards (Marginson, 2016), thus attributing high value to a vertically stratified system for rewarding excellence.

Reviewing these underlying frameworks of how excellence is understood and whether it is seen as valuable to foster reveals that this understanding is dependent on the assigned purpose of education. It can either serve a more humanitarian, egalitarian perspective that promotes educational pursuit for knowledge inquiry in itself, or a more extrinsic purpose of capacity-building and qualification for signalling purposes instead. Understanding these institutional dynamics and uses of education is key to later assessing whether the way the ExIn fosters excellence presents a paradigm shift for the German system, or whether it is a natural continuation from the Humboldtian ideal of education.

2.2. Rewards of Excellence: The *Who* and *What*

After the previous field of literature has explored how different educational purpose philosophies shape understandings of whether to reward excellence in an education system, it is relevant to further understand *who* or *what* is rewarded under the label of excellence, if systems or programmes like the ExIn choose to foster it, i.e. does it take meritocratic, academic achievements to be considered ‘excellent’ in research, or are other factors at play (Bell, 2014). For that, the scholarly debate around systems of stratification, rewards of meritocracy, and reproduction and accumulation of capital mechanisms under the theories of the Matthew Effect and Bourdieu’s forms of capital will be outlined. In relation to the objective of this paper, this theme is particularly relevant because it provides an indication of what factors are at play in the award of excellence, and thus informs relevant input factors to consider when assessing the ExIn’s effects on vertical stratification. The literature presented below suggests that excellence cannot unequivocally be equated to high-quality research, but rather it can also be reached through social origin, economic capital, or pre-existing differentiations. Therefore, finding that research excellence is conditioned by relevant input factors beyond merit, it justifies the posed research question of looking at vertical stratification not merely through

bibliometric indicators, but also considers nuanced, qualitative factors of vertical stratification in its search.

Teichler (1996) and Trow (1973) both link the question of who and what is rewarded in higher education systems to an inherent function of the set-up of institutional relations in the system. The set-up of education systems can be distinguished by their type of differentiation; this being either vertical or horizontal (Teichler, 1996). As briefly mentioned prior, a horizontally differentiated system is characterised by institutions that serve different purposes or functions, and offer different educational pathways or opportunities (Teichler, 2008). In theory, these options present a choice-set of equally valuable opportunities, and thereby are only distinguished by their distinct profiles or learning styles rather than quality, status, or value (Teichler, 1996). In vertically stratified systems on the other hand, institutions are assumed to exhibit clear characteristics that can be ranked and weighed against one another, where one option is more valuable or more highly regarded than another (Teichler, 2008). These systems are often linked to an idea of rewarding meritocracy, where the 'most gifted' or 'talented' are concentrated at the institutions with the highest quality of research and teaching, or prestige associated with it (Trow, 1973, cf. p.14). Davis and Moore (1945) link this to a stimulation effect; vertical stratification is assumed to foster innovation and exchange of ideas through concentration of motivation and talent, that intend to positively reinforce each other (Trow, 1973). Bloch et al. (2008) link this to the idea of a 'Leistungsspirale' (spiral of merit), where institutions that are selected as excellent will positively stimulate the system they are set in through growth, innovation, or enhanced research quality.

However, scholars like Clark (1983), Durst (2021), or Palfreyman and Tapper (2009), have expressed doubts whether these vertically stratified systems reward the highest quality of research or excellence, and are able to promote an upward spiral through this system. The critique is rooted in a concern that the systems do not necessarily select the most talented and stimulating to come out at the top of a vertical hierarchy, but instead pre-dispositioned factors such as social origin, or previous capabilities are relevant determinants (Palfreyman & Tapper, 2009). Merton (1968a) presents one of the key theories in this field of questioning merit-based winners in a vertically stratified education system by arguing that these systems instead perpetuate a so-called 'Matthew Effect'. This effect claims that the winners are picked by the principle of those who already have resources, will be given more resources (Rigney, 2010). Thus it becomes a reproductive system in which previously accumulated capital and resource availability determine success in a hierarchy, rather than merit, which in the long run, exacerbates cumulative advantage generation (Merton, 1968b). In the realm of research excellence, Allison and Stewart (1974) claim that researchers who have previously been rewarded as productive will continue to increase their capacities for productivity, while those performing at lower rates of productivity will be disadvantaged or driven out of the system, even if producing the same quality. Therefore, excellence in research is conditioned by pre-existing

advantages, such as access to education, permeability through the system, and early accumulation of information and resources (Ahrbeck et al., 2018).

Cantwell et al. (2018) apply this Matthew Effect to the participant-side, i.e. student-side in education, and argue that the stratification of higher education institutions between research-intensive universities, and non-research-intensive universities, as done in the ExIn, also comes with a differentiation indicator of students and the positional value they attribute to the education. Particularly, as education systems continue to grow and turn into high-participation systems (Cantwell et al., 2018; Trow, 1973), higher education becomes a positional good with an attributed social value, which may turn education into a mirror of society and pre-existing stratification (Cantwell et al., 2018). Because excellent universities commonly offer a high positional value, they are able to recruit students of high abilities and ambition, while non-research-intensive universities with lower positional value turn into demand-absorbing universities in the system (Trow, 1973). Therefore, while vertical stratification may have aimed for a divergence based on merit and quality, the dynamics of the Matthew Effect suggest that participants at the research-intensive universities are not necessarily distinguished by the highest merit but rather accumulated capital (Walberg & Tsai, 1983). This mechanism on the student side of the university will remain relevant for the research question of this review, because it exemplifies that vertical stratification of institutions is not merely measured by institutional characteristics, but relevant indicators can also be students at these institutions, thus making it relevant to look at student recruitment and access dynamics as well.

The existing literature further explores what kind of capital institutions and students in the higher education system accumulate and use to gain positional advantages and rewards of excellence. This literature takes a departure point in Bourdieu's theory on the 'Forms of Capital' (Bourdieu, 1986), in which he redefines the mono-sided term of capital towards including different forms of capital which can be accumulated, such as economic, social and cultural (Bourdieu, 1977; 1986). Similar to Merton's concept of the Matthew Effect, he connects capital to social origin and cultural differentiation (Bourdieu, 1986). In the case of higher education, findings of scholars like Van De Werfhorst and Mijs (2010), Reay et al. (2005), and Boliver (2013), which show that advancement in the education system is not only due to accumulated economic capital, but also cultural habitus and social background, exemplify Bourdieu's theory. They align with Trow's claim that "if intelligence is randomly distributed in a population [...], then any differences in the proportions from different social groups or strata who enter higher education [...] must be due to patterns of social discrimination and not to variations in individual ability" (Trow, 1973, p. 45). Therefore, as rewards in excellence are not necessarily 'won' by meritocratic achievements but rather by socioeconomic class and pre-existing means of capital (Reay et al., 2005; Boliver, 2013), Robson (2023) calls for higher education systems to actively work against reproducing these structures of social stratification. In this realm, the ExIn can be questioned for whether it has addressed this need to work against reproductive structures of social

and economic capital by, given its self-proclaimed goal of purely rewarding "scientific merit" (DFG, 2010, para. 6), or whether it instead continues to reproduce pre-existing capabilities.

This debate between a myth of meritocratic rewards in higher education, and instead a reproduction of capital and pre-dispositioned advantages leaves the existing literature at the question of what excellence programmes actually foster. If those with pre-dispositioned resources for success reap the rewards in a seemingly meritocratic system, what is the value in forming an elite or instating structures of excellence stratification, such as the ExIn?

2.3. Vertical Stratification in Context: The German Case for Excellence in Higher Education

The case of the ExIn is particularly interesting to consider against the backdrop of this literature, as Germany has been internationally acclaimed for a horizontally-stratified system, in which the type of institution and field of degree outweigh considerations of reputation or socioeconomic status of universities (Clark, 1983; Deppe et al., 2018; Schäfer, 2024). Disciplines and specialised research groups are seen as the driving forces for research excellence in higher education (Reimer & Pollak, 2010). Inspired by the Humboldtian ideal of education, the German education system was built up on an idea of pluralism, where equally qualifying research universities, applied sciences universities, and apprenticeship schemes, were built up to account for variety in styles of learning, research, demands, and purposes (Ahrbeck et al., 2018; Protsch & Solga, 2016). In practice however, this system has been questioned by scholars about how horizontally instead of vertically stratified it really is, and further whether this stratification has changed through the ExIn. Critiques of horizontal stratification in Germany continuously argue that despite initial intentions to differentiate the landscape based on function, under consideration of the Humboldtian ideal of humanistic education; in reality, the functionally different institutions come with tiered associated values, which have therefore rather vertically stratified the education landscape, even if unintentional (Kracke et al., 2024).

Kracke et al. (2024) have shown that the functionally differentiated institutions have come with tiered values, because participation in them is strongly correlated with students' socioeconomic origin, whereby attendance of a research-intensive university is correlated to being from a high-income or academic background (Kracke et al., 2024). In comparative studies with other OECD countries, this particularly high rate of socioeconomic reproduction in Germany has been attributed to the early tracking system that determines the pathway to higher education at elementary age already (Krause-Pilatus & Schüller, 2014). While early tracking per se may not necessarily be an issue in a horizontally stratified system, the combination of this tracking being dependent on socioeconomic background, and simultaneously a lack of permeability between the tracked streams is causing the problematic, tiered-value of higher education institutions, as the early tracked stream determines your opportunities in higher education (Protsch & Solga, 2016). Mayer et al. (2007) and Reimer and Pollak

(2010) support this finding to show these inequalities based on capital and social origin in the German system are caused by access inequalities and lack of mobility schemes allowing for permeability. As therefore attendance of research-intensive universities is correlated with higher socioeconomic status and different job opportunities afterwards, this has launched an institutional differentiation based on value between these institutions (Kracke et al., 2024). In the conceptual literature, these findings of the German system link to Clark's concept of university landscapes becoming indirectly or unintentionally vertically stratified despite having been intended for horizontal stratification, due to a "lack of parity of esteem" (Clark, 1983, p. 4), where the functional division comes with tiered implications of value (Clark, 1983).

The ExIn has been brought into this debate by scholars asking whether it exacerbates this value-driven differentiation of higher education institutions, or whether it presents an entirely new system dynamic (Bloch & Mitterle, 2017). In conceptual work, scholars like Hartmann (2006), Kehm (2013), and Neumann (2015) have attributed the ExIn to cause an entirely new shift in the system, claiming that the German system was previously horizontally stratified system with homogenously valued institutions, and now the ExIn causes a shift towards a vertically differentiated system. In these systems, they find teaching has been downgraded for the sake of encouraging research, and institutions have become more fragmented in their ability to compete on quantitative metrics (Kehm, 2013; Palfreyman & Tapper, 2009). Hartmann (2006) and Neumann (2015) raise a concern that in this new system of vertical stratification, the fostering of a small group of ExIn universities disadvantages the remaining non-ExIn universities, and permanently causes a system of competition and social selectivity that is bound to reduce quality for the German system overall.

To observe these claimed effects, empirical research on the ExIn has mainly consulted bibliometrics and other quantifiable outcomes, such as CoEs' highly cited publications (Möller et al., 2016), third-party funding (Mergele & Winkelmayer, 2022), funding concentrations (Frietsch et al., 2017), or efficiency rates (Gawellek & Sunder, 2016). Additionally, the ExIn has been put into comparative contexts with international stratification programmes, such as the Ivy League in the US, or the Russell Group in the UK (Hartmann, 2007), as it was intended to create similar 'lighthouses' of German research excellence (Barlösius, 2008). Salmi (2012) contextualises the ExIn by saying it followed a so-called 'world-class universities' recipe, where universities are assumed to gain international excellence by accumulating abundant resources, and faculty talent. This would allow ExIn universities to improve their efficiency and attract additional resources (Shattock, 2010). In order to do well in such world-class university assessments, Oancea (2019) has raised a concern that research is increasingly evaluated based on quantifiable metrics, which may steer programmes like the ExIn to strive for outstanding performance on internationally valued rankings for becoming 'world-class', but potentially at the neglect of contextual or qualitative indicators. In the ExIn literature, this is once again showcased in many of the empirical studies merely looking at bibliometric outputs for measuring

vertical stratification effects. Only few studies have addressed more qualitative indicators like reputation (Bruckmeier et al., 2017), or student ability-sorting (Fischer & Kampkötter, 2017).

Overall thus, it becomes evident that the current conceptual and quantitative focus of research on the ExIn in regards to vertical stratification is not comprehensive enough, as further system dynamics like socioeconomic background, pre-existing capabilities, and international visibility appear to be at play, and matter for measuring vertical stratification effects of the ExIn. Therefore, when assessing the effects of the ExIn on vertical stratification, these dynamics need to be accounted for through comprehensive, nuanced indicators to measure vertical stratification.

2.4. Rationale for Research Question & Literature Gap

This literature review has presented relevant debates in the field of excellence and elite formation in higher education, and dynamics of stratification, from which conclusive judgements about the literature and gaps in research can be drawn, which informed the subsequent research question.

Even though the policy goal of the ExIn to reach scientific excellence through vertical stratification of the higher education landscape has been communicated clearly, the empirical evidence on measuring the success of this goal has remained fragmented and largely non-synthesised. Additionally, this literature review uncovered that the discussion and scholarly literature for assessing vertical stratification effects of the ExIn lacks a multidimensional view on indicators of stratification, that go beyond quantitative metrics (Kehm, 2008). The subsequent research question and systematic review therefore aim to add this nuance to the understanding of vertical stratification by extending the simplified view towards a multidimensional consideration of input indicators to vertical stratification of quantitative and qualitative nature, brought together in a QES. Taking up Teichler's call to improve "the knowledge base [for] rationality of discourse" (Teichler, 2009, p. 131) on vertically stratified systems, this study aims to provide this vital step through a systematic review. As the state of research on the ExIn is relatively 'new' and evolving (cf. DFG & WR, 2025), the systematic review fills a gap by being the first to synthesise existing evidence and thereby decrease the current fragmentation of existing evidence on the ExIn (DFG, 2024; Neumann, 2015).

A research question will be used to operationalise the aims and objectives of this review's topic. Against the backdrop that the ExIn was founded to achieve research excellence through vertical stratification (Wissenschaftsrat, 2005), but the existing literature exhibits a lack of nuanced understandings of contributing factors to vertical stratification, the following research question was derived:

RQ: What are the documented effects of the German Excellence Initiative on indicators of vertical stratification in higher education?

The scope of the research question covers the first and second ExIn funding rounds, including its announcement in 2005 up until 2017 when the second funding phase concluded (DFG, 2019). It is not possible to reliably cover the follow-up 'Excellence Strategy' programme as its only recent start in 2019 has not allowed for empirical studies and evaluations to take place. Furthermore, the research question looks at the institutional effects of the ExIn, and therefore does not cover studies merely looking at the impacts of singular CoEs, unless linked to broader institutional dynamics. Further definitions of scope for the research question will be presented in the systematic review's inclusion and exclusion criteria in the subsequent Chapter 3.

3. Methodology

This chapter presents the methodology applied to answer this paper's research question. After outlining the underlying philosophical paradigm of research, this chapter will describe the approach of a qualitative systematic review by outlining the process of data extraction through the PRISMA paradigm and data analysis through a thematic QES. Lastly, methodological limitations will be addressed.

3.1. Research Paradigm

It is essential to first denote the underlying assumptions and guiding principles of this research, as it guides subsequent steps for data extraction, analysis, and interpretation of findings (Cohen et al., 2017; Lincoln & Guba, 1985). This systematic review is rooted in a research paradigm of critical realism. Critical realism follows the ontological underpinning of a stratified reality which is only partially observable as a phenomenon, while underlying dynamics of power or interaction may remain undetected (Bhaskar, 1975; Archer, 1995). In the case of this systematic review, this stratified reality is particularly relevant given the intention to observe the phenomenon of the ExIn in regards to stratification through indicators, which have partially been observable, but partially have also remained uncovered, and are intended to be considered for the first time in this study, such as mechanisms of reproduction (Moon & Blackman, 2014). In its epistemology, it acknowledges that knowledge can be imperfect and "mediated by our perceptions and beliefs" (Barnett-Page & Thomas, 2009, p. 5). This epistemological underpinning enables a more nuanced view of the indicators of vertical stratification that goes beyond a mere quantitative observation. It further allows for understanding critical, reproductive, and power dynamics in relation to the ExIn and vertical stratification. These epistemological and ontological underpinnings yield this review's methodological approach as a thematic synthesis of quantitative and qualitative studies, acknowledging that perceptions and different understandings of the ExIn as a phenomenon need to be uncovered from a partially non-observable reality. Rooting the systematic review within these philosophical understandings of research aims to contribute to the conduct of a rigorous systematic review.

3.2. Data Collection

To approach the research question, as mentioned, a systematic review was deemed an appropriate methodological approach. This method aims to fill the gap of a largely non-synthesised and fragmented state of current research on the ExIn, given its recent nature and variety of methods applied to explore this topic. Therefore, aligning with the overall objective of a systematic review to "facilitate a fuller understanding of a phenomenon" (Cohen et al., 2017, p. 431), it provides a key step into evidence-based understandings of the ExIn's effects, and allows for later, evidence-based policy making.

3.2.1. Search Strategy

This systematic review seeks to identify empirical studies which explore the effects of the ExIn on vertical stratification within the German higher education landscape through the use of qualitative, quantitative, and mixed methods. Prior to starting the systematic review, PROSPERO, EPPI, and IDESR were consulted to identify previous systematic reviews done on the ExIn in an attempt to avoid overlaps and redundancy; however none were identified (PROSPERO, 2025).

Inclusion and Exclusion Criteria

The search for relevant literature was conducted by employing inclusion and exclusion criteria, guided by the SPIDER Mnemonic for qualitative and mixed-methods studies to ensure specificity and sensitivity in the search (Cooke et al., 2012) (Table 1). While having sensitivity aims to retrieve all relevant reports and studies through a diverse, multi-sourced, broad search, simultaneous specificity through search terms allows for the retrieval of only those documents relevant to the precise research question and inclusion in the systematic review (Cooke et al., 2012).

The figure originally presented here cannot be made freely available via ORA because of copyright.

The figure was sourced at Cooke, A., Smith, D. & Booth, A. (2012). Beyond PICO: The SPIDER Tool for Qualitative Evidence Synthesis. *Qualitative Health Research*, *22*(10), 1435–1443. https://doi.org/10.1177/1049732312452938

Given the state of research on this topic and its recent nature and fragmentation of vertical stratification measurements in qualitative and quantitative indicators, there is value in synthesising data across all empirical studies, rather than being selective about the type of data collected. Additionally, while the scope of this review remains with research conducted after 2005, the systematic search will not apply a strict date of publication criterion, as the mere announcement of the ExIn has triggered the conduct of scholarly research prior to the first launch of the ExIn in 2006, and thereby also pre-implementation studies may provide valuable insights for the systematic review.

Databases and Search Terms

The search terms for identifying relevant studies are presented below (Table 2), and were derived from the research question, as well as existing literature for indicators of vertical stratification (cf. Bourdieu, 1986; Clark, 1983; Trow, 1973). A variety of both multidisciplinary and discipline-specific databases were consulted to provide a comprehensive overview of the peer-reviewed, empirical literature in the field. In particular, the search spanned across the following databases: Web of Science, SCOPUS, EBSCOhost (Educational Research Abstracts Online, British Education Index), and ProQuest. In addition, select grey literature databases for policy documents (SocArxiv, OVERTON) were searched, but studies were only included if they matched the inclusion criteria (Thomas & Harden, 2008).

To ensure methodological rigour and transparency of the search process, this systematic review emphasises a collaborative approach. The search strategy and identification of relevant databases have been discussed with a librarian specialised in the social sciences, and checked against PRESS standards (McGowan et al., 2016). The search terms have been based on key literature in the field and reviewed together with a supervisor. Additionally pilot searches have been conducted across all utilised databases to allow for refinement of search criteria. Upon pilot searching and refinement of criteria, Table 2 outlines the final applied search terms.

Table 2: Search Terms

Key Word	Search Terms
Excellence Initiative	"Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR "Bildungspolitik" OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung
AND	
Germany	Germany OR German OR Deutschland OR Deutsch
AND	
Vertical Stratification	Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput
AND	
Higher Education	"Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor

See Appendix 8.2. for comprehensive search query strings in the respective databases.

3.2.2. Study Selection

The studies selected for inclusion in the systematic review have been detected using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) paradigm, which includes an initial screening stage of title, keywords, and abstract, and a full-text review stage (Page et al., 2021). To conduct these screenings, 1,591 articles were identified from the database searches and imported into the systematic review software Rayyan. After a preliminary stage of excluding 826 articles through the inclusion and exclusion criteria and duplicates screening, 765 records were moved to the first stage of title, keywords, and abstract screening. Out of those, 73 articles were deemed relevant for in-depth, full-text screening to determine final eligibility for inclusion. Reasons for exclusion and non-retrieval are recorded in the PRISMA diagram (Figure 1). After the final screening stage, and consideration of grey literature, 19 studies were chosen for inclusion in the final systematic review.

The figure originally presented here cannot be made freely available via ORA because of copyright.

The figure was sourced at Page, M. J., McKenzie, J. E., Bossuyt, P. M. & Boutron, I. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

To ensure methodological rigour and up-to-date evidence, the searches were re-run upon completion of the full-text screening and search alerts were reviewed continuously. All initial searches were conducted on June 21, 2025, and the re-running of searches was concluded on June 27, 2025. To allow for a rigorous, in-depth evidence synthesis, no new studies were reviewed from the search alerts after July 10, 2025.

3.3. Data Extraction and Qualitative Evidence Synthesis

3.3.1. Data Extraction

The selected studies for inclusion in the systematic review will be presented in a standardised data extraction table (Table 3) with bibliographic, process-related, and substantive information characteristics, guided by the EPPI-Centre guidance on data extraction (Gough et al., 2017). Specifically, this yields the extraction of the following characteristics from each study: Bibliographic (citation, year of publication, publication type, source of funding, publication language), study setting (context of study, aim, time period), methodology (dataset, data collection approach, measure of vertical stratification, data analysis method), findings, limitations, and ethical concerns. The extraction of these characteristics was deemed relevant in understanding how each study connects to the research question, which will be key for the QES in themes (Thomas & Harden, 2008), and allowed for comparability of studies useful for quality appraisal and findings synthesis (Gough et al., 2017).

Table 3: Summary of Study Characteristics for Data Extraction

No.	Study Title	Summary Findings	Time Duration	Aim of Study	Sample Dataset	Methodological Design	Data Analysis Method	Indicator of Stratification	Measure of ExIn
1	Möller et al. (2016): Assessing the effects of the German Excellence Initiative with bibliometric methods	Finds that most, if not all, highly-cited papers are attributed to CoEs. While it concludes that the ExIn has increased centres of excellent research in Germany, it questions whether these were caused or merely made visible by the ExIn, and further whether these are not just trends common in all scientific nations nowadays.	2003 – 2006 & 2008 – 2011	Match between Effects of ExIn Funding and ExIn Objectives	Publications of ExIn CoEs in Web of Science	Mixed Methods	Overlap Analysis, Bibliometric Counts	Research Output	HC-Publications of CoEs
2	Carayol & Maublanc (2025): Can money buy scientific leadership? The impact of excellence programs on German and French universities	Finds that ExIn had positive effects on quantitative and qualitative research output, as well as collaboration in- and outside of academia.	2013 – 2017	Assess effect of ExIn on ExIn universities	Universities of Excellence in France and Germany	Quantitative	Control Group Study, Difference-in-Difference Approach	Research Output	Publications
3	Guo (2019): Wettbewerbsmetaphern im Exzellenzinitiative-Diskurs	Finds that ExIn is commonly represented in five metaphors that represent concepts of competition, stratification, and a shift in paradigm from the current higher education system in Germany.	2004 – 2016	Understand shifts in discourse through ExIn	Media Outlet Publications and Institutional Texts	Qualitative	Discourse Analysis	Metaphors for Excellence	Metaphors of Excellence
4	Fischer & Kampkötter (2017): Effects of German Universities' Excellence Initiative on Ability Sorting of Students and Perceptions of Educational Quality	They find that the excellence label for universities matters significantly for students' perceptions of quality, job opportunities, and satisfaction in the short term, but not in the long-term.	1982 – 2013	Explores spillover effects of ExIn on Student Recruitment	Survey Data	Quantitative	OLS Regression & Descriptive Statistics	Student Recruitment	High-School GPA of Students
5	Lehmann & Stockinger (2018): Entrepreneurship in Higher Education: The impact of competition-based policy programmes exemplified by the German Excellence Initiative	This study looks at whole-system effects of the ExIn in its potential to increase knowledge, rankings and system-spillovers in the form of academic entrepreneurship. It finds that by looking at patents and third party funding that the ExIn has allowed funded universities to attract additional industry funding, pointing towards a Matthew Effect.	2004 – 2011	Spillover Effects onto Entrepreneurial Activity	Public Registrar Data	Quantitative	Difference-in-Difference	Non-Academic / Third Mission	Funding

6	Heinze et al. (2025): Field size as a predictor of "excellence." The selection of subject fields in Germany's Excellence Initiative	Finds that over the first and second phase of the ExIn, the size of the university (staff quantity, grant size, students) affected success in the Excellence Initiative with larger universities being more likely to succeed. Additionally, they suggest tendencies for path dependence of universities successful in the first phase being likely to succeed in the second phase as well.	2005 – 2017	Understand how size of universities affects ExIn Success	Institutional Size	Quantitative	Dependent & Independent Variables	ExIn Funding Success	ExIn Funding
7	Lang & Schwabe (2023): Graduates' early wages in Germany: Does a university's status of excellence make the difference?	This study looks at whether graduates from an ExIn university receive wage premium benefits in the labour market. It does not find a wage premium effect, but it does however find benefits through the signalling function of ExIn universities.	2001 – 2009	Effects of ExIn on students' wages	Public Registrar Data	Quantitative	Difference-in-Difference	Labour Market Outcomes	Wage Premium of Graduates
8	Civera et al. (2020): Higher education policy: Why hope for quality when rewarding quantity?	It finds that between Germany and Italy, both countries were able to increase outputs of research and individual professor research productivity, but they compromised on quality for the sake of quantity	2004 – 2013	Effects of ExIn	Publication Data and Citation Counts from German and Italian Universities	Quantitative	Difference-in-Difference & Fixed Effects Model	Research Output	Highly-Cited Publications, and Productivity per Professor
9	Wohlrabe et al. (2019): Wie effizient forschen Universitäten in Deutschland, deren Zukunftskonzepte im Rahmen der Exzellenzinitiative ausgezeichnet wurden? Ein empirischer Vergleich von Input und Output-Daten	This study has explored whether funding through the ExIn's Institutional Funding Line has increased efficiency. It finds that one can see efficiency increases, and further that there is an intra-ExIn differentiation between efficiency and super-efficiency of universities.	2010 – 2012	Effects of ExIn on Research Efficiency	Efficiency Rates of ExIn universities	Quantitative	Descriptive Statistics, Co-Efficiency Measures	Research Output	Input & Output of Research, Scale Efficiency Measures
10	Menter et al. (2018): In search of excellence: a case study of the first excellence initiative of Germany	It finds that the ExIn's funding has not necessarily increased research quality or quantity, but instead the announcement of it has had a relevant effect. Instead of the ExIn being a stimulus for research quality, it merely exacerbates and highlights pre-existing differences	1998 – 2012	Effects of ExIn on achievements of world-class universities	Rankings and Reputation of all public German Universities	Mixed Methods	Difference-in-Difference, Narrative	Rankings & Reputation	Measures of Academic Performance (Citations, Quality, Quantity), Student Recruitment, Rankings and Reputation
11	Buenstorf & Koenig (2020): Interrelated funding streams in a multi-funder university system: Evidence from the German Excellence Initiative	This study explores the effects of the institutional funding line of the ExIn and finds that in a multi-funding system, the effectiveness of competitive research funding is to a certain extent countered by non-funded universities receiving alternative funding, thus dampening effects of initiatives, such as the ExIn.	1999 – 2012	Effects of ExIn on Institutional Strategies of Universities	9 ExIn Universities, Control Group of Non-ExIn Universities	Quantitative	Difference-in-Difference Approach	Funding	Awarded ExIn Funding
12	Münch (2009): Stratifikation der Hochschullandschaft: Zwischen Leistungswettbewerb und Machtlogik	It finds that increase logics of competition and monopolies have caused allocations of excellence status and subsequent funding to be based on pre-existing resources, institutional size, and personal connections rather than 'merit-based' research.	1995 – 2004	Effects of the ExIn on Institutional Stratification	Funding Allocations for ExIn Universities in Round 1	Mixed Methods	Narrative Synthesis, Regression Analysis	Funding, Rankings & Reputation	Funding Allocation from ExIn
13	Schäfer & Walgenbach (2024): Navigating academic prestige: university choice and distinction of German upper milieu students	This study looks at the perception of the ExIn from a qualitative perspective of students, where it finds that students are more concerned with quality of teaching and departmental support rather than research, which is however what the ExIn targets. When making a distinction based on social origin, it does find that students from upper milieu classes are more concerned with the signalling function and reputation for purposes of status accumulation and maintenance	Non-Reported	Understand how ExIn affects student choices in education	95 Interviews with graduate students	Qualitative	Problem-Centred Interview Analysis through Narrative Analysis	Student Recruitment & Rankings	Label of Excellence
14	Koenig et al. (2017): Regional effects of university funding: Excellence at the cost of regional disparity?	This study looks at regional disparities in Germany through a lense of funding allocations, and finds that the ExIn has caused regional disparities in available funding, partially however not casual but rather exacerbation of pre-existing inequalities.	1999 – 2012; 2007 for ExIn Universities	Regional Effects of ExIn	Data from 270 Labour Units	Quantitative	Gini-Coefficients of Funding, OLS Regression Model	Funding	Concentration Variables of Funding

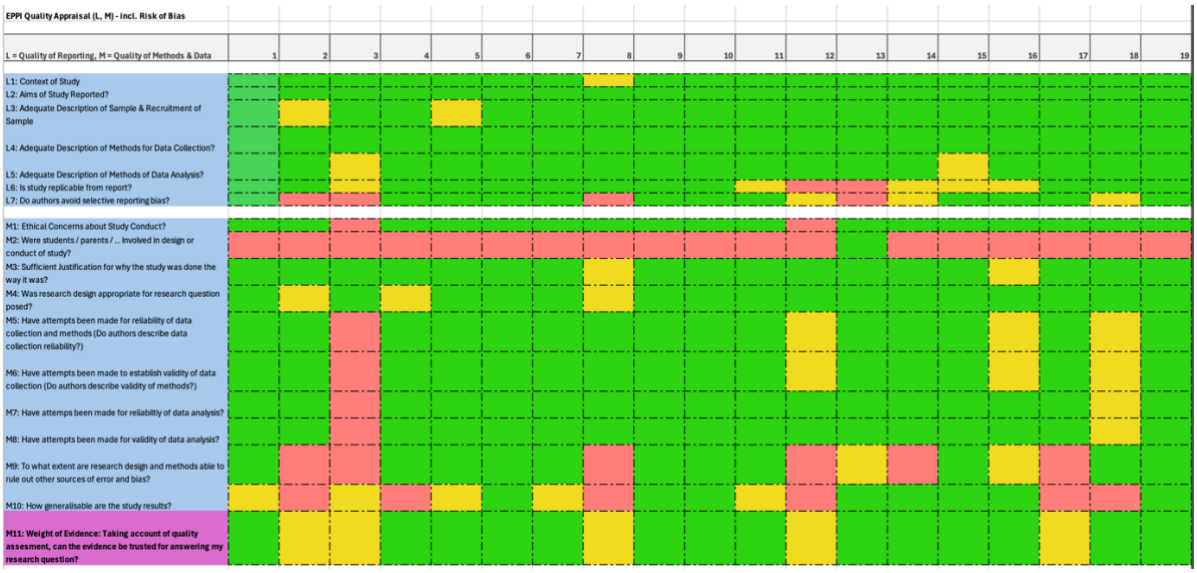
15	Müller & Schneijderberg (2020): The Emergence of the Organizational Academic Profession: Vertical differentiation of German universities and the research-teaching nexus	This study places an emphasis on exploring how the research-teaching nexus at German universities is affected by the ExIn. It finds that professors at ExIn universities lean towards stronger research orientation than non-funded, technical and small- or large-size institutions. This effect is exacerbated by an increased professionalisation of the profession.	1992 – 2018	Understand Effects of ExIn Universities on Professors, Research, and Teaching	3-Year Survey of Academics	Mixed Methods	Thematic Analysis, Descriptive Statistics	Education Quality, Research Output, Funding	Research-Teaching Divide, Third-Party Funding, Journal Outputs
16	Mergele & Winkelmayer (2022): The Relevance of the German Excellence Initiative for Inequality in University Funding	This study analyses the effects of the ExIn on third-party funding, and finds that third-party funding has increased for universities with a status of excellence. However, it only finds that this is a one-off effect and these differences do not further reinforce or reproduce themselves.	1999 – 2016	Understand whether ExIn has caused inequality in third-party funding	78 Universities in Germany (ExIn Funded, and Non-Funded), DFG and Destatis Data	Quantitative	Descriptive Statistics	Funding	Inequality in Funding
17	Horstschräer (2012): University rankings in action? The importance of rankings and an excellence competition for university choice of high-ability students	They find that ExIn universities are able to recruit more high-ability students, as students take the excellence status as an indicator for education quality. However, they also show that the main determinants for higher education choice in Germany still remain to be geographical distance from home, rather than status of excellence or not.	2002 – 2008	What factors influence decisions of students to go to university	German Medical Schools	Quantitative	Random Utility Model	Student Recruitment	Status of Excellence
18	Bruckmeier et al. (2017): Status Effects of the German Excellence Initiative	The study looks at whether receiving a status of excellence for universities increased the ability to recruit more and high-ability students. It finds that while the gain of the status of excellence did not have a notable effect, the loss thereof had a much larger, reputation-damaging effect.	2003 – 2012	Status Effects of ExIn on First-Year Student Enrolment	9 Universities in Badem-Württemberg	Quantitative	Regression Analysis, Descriptive Statistics	Student Recruitment	Status of ExIn
19	IEKE (2016): Internationale Expertenkommission zur Evaluation der Exzellenzinitiative	This report was developed by an appointed group of researchers in the form of a committee of experts for the particular sake of analysing the effects of the ExIn, comprehensively and independently between 2005 and 2016. The results document effects in international and national comparisons, differentiation, quality of research and teaching, careers and staff prospects, and inclusion in the wider system of science.	2005 - 2015	Effects of the ExIn on various indicators of research output, reputation, student recruitment, and ranking	Comprehensive Sample of all ExIn universities	Mixed Methods	Thematic Analysis, Descriptive Statistics, Presentation of Quantitative and Qualitative Comparisons	Research Output, Funding, Student Recruitment, Rankings and Reputation	Publications, Citations, Funding, Student Demand, Ranking Scores

Note: Due to space constraints the table is condensed to the key characteristics from the data extraction relevant for this review.

3.3.2. Critical Appraisal of Quality

The studies chosen for inclusion in the review will undergo critical quality appraisal guided by the EPPI Review Protocol for Quality Assessment and Appraisal, and Weight of Evidence Assessment (Gough, 2007). The EPPI tool was chosen because it allows for quality appraisal of qualitative, quantitative, and mixed-method studies under incorporation of *reliability* (quality assessment results being consistent) and *validity* (measuring the intended dimensions of quality and rigour) (Cherry et al., 2024). This quality appraisal is especially important because it informs the dependability, reflexivity, credibility, and transferability (Lincoln & Guba, 1985) of the collected data, and shapes the interpretation of the findings in light of the research question (Tong et al., 2012).

Figure 2: EPPI Quality Appraisal and Risk of Bias Assessment



The quality of studies under EPPI was assessed through a questionnaire, offering the reviewer to rate each question as fulfilled (Yes), not fulfilled (No), or partially fulfilled (some attempt) (EPPI-Centre, 2003). The sections for Quality of Reporting and Quality of Methods and Data have been utilised to conduct a comprehensive weight of evidence assessment, resulting in a final rating of each study's trustworthiness being rated either low, medium, or high (EPPI-Centre, 2003; Gough, 2007).

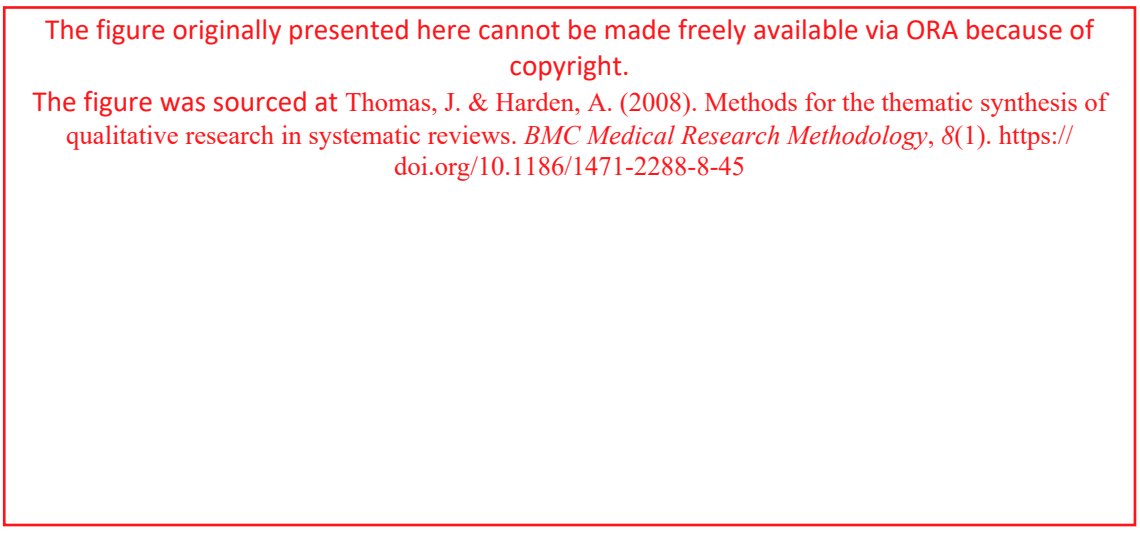
As presented in Figure 2, fourteen of the nineteen studies received a positive score for weight of evidence, indicating that results were deemed to be trustworthy and exhibit a low risk of bias assessment. The five studies receiving a medium score for weight of evidence and risk of bias were classified due to exhibiting a lack of sufficient justifications, reliability, or validity concerns, and will therefore be treated accordingly in the discussion of findings. Almost all studies received a negative rating for question M2 on the inclusion of participants in the design of the research approach; in this context however this is not necessarily an indicator for compromised quality, as methodologies without participant-involvement in design, can be appropriate for the research topic, given its focus on institutional dynamics. This quality appraisal will be considered in the assessment of the confidence in the findings from the evidence synthesis, as it limits interpretability and generalisability of those findings involving any of the five studies with medium ratings of weight of evidence and risk of bias.

3.3.3. Qualitative Evidence Synthesis

For the QES, the included studies were analysed thematically through Thomas and Harden's 'thematic synthesis' (Thomas & Harden, 2008). The reason for using this approach to QES is two-fold; for one, it allows for synthesising findings across quantitative, qualitative, and mixed methods studies, which is especially relevant given previous studies have assessed vertical stratification almost exclusively through quantitative metrics, and therefore neglected the analysis of qualitative stratification

indicators. To reach a more nuanced perspective and align with the epistemological underpinnings of critical realism, the inductive coding style of a thematic synthesis will allow for the inclusion of qualitative findings alongside quantitative findings in the synthesis. Secondly, despite a substantial number of the included studies in this review being quantitative, the varied reporting styles of the data, lack of comprehensive provision of data sets or calculations, and oftentimes qualitative, descriptive reporting of findings limited the feasibility of a quantitative meta-synthesis (Petticrew & Roberts, 2006, cf. p.205). Instead therefore, the thematic synthesis will be followed in three steps: (1) line-by-line-coding of the included studies, (2) development of descriptive themes, and (3) the generation of analytical themes that will inform the proposed research question (Thomas & Harden, 2008).

The first stage, line-by-line coding of all the studies, will be conducted in NVivo; codes were derived inductively from the presented data, and accumulated in a codebook. This was then used for coding of subsequent studies to allow for the "translation of concepts from one study to another" (Thomas & Harden, 2008, p. 5). When new codes emerged throughout the process, these were added to the codebook to retain the approach's inductive element. This first step has led to the development of 21 initial codes. In the second stage, these codes were compiled into 11 descriptive themes based on observable similarities and differences to facilitate "cross-study synthesis" (Petticrew & Roberts, 2006, p. 178). To find the 11 descriptive themes of this systematic review, a hierarchical tree was used, where the initial codes were subordinate to descriptive themes, aiming to "capture the meaning of groups of initial codes" (Thomas & Harden, 2008, p. 8). As a final step, the descriptive themes are turned into analytical themes that go beyond a mere description of the findings, and instead synthesise evidence with regard to the research question (Thomas & Harden, 2008). This key step in the thematic analysis has resulted in four analytical themes to emerge which explore indicators of how the ExIn has affected vertical stratification: (1) Accumulation of Funding, (2) Research Output, (3) Student and Personnel Recruitment, and (4) Reputation and Rankings (see Figure 3).



After conducting the QES, the GRADE-CERQual framework will be applied to assess the certainty of evidence, and confidence attributable to the respective findings of the review (Lewin et al., 2018). It aims to provide a transparent assessment of confidence across four standardised indicators that allow for a transparent reporting of confidence in evidence judgment.

3.4. Methodological Limitations

The limitations of the methodological approach to this systematic review consider the dimensions of reliability, validity, and reflexivity on the positionality of the researcher to ensure adequate rigour (Petticrew & Roberts, 2006; Gough et al., 2017).

Firstly, concerns about the reliability of the method address whether the methods are precise and accurate enough to be relied upon, so that in case replicated or applied to a different sample, similar results come up (Cohen et al., 2017). A lack of reliability may arise from the study inclusion through search terms and data extraction process through line-by-line coding, as these processes necessitate a judgement by the reviewer, i.e. in the definition of the search terms, the inductive line-by-line coding, and re-organisation and aggregation of codes into analytical themes. Given the scope of this master's thesis, an inter-rater reliability check for extracted codes and included studies, i.e. Cohen's Kappa (McHugh, 2012), has not been possible to conduct. Thus, the risk of the researcher's personal bias limits the reliability of extracted results. Despite this concern for reliability remaining, the systematic review has aimed to limit researcher bias by offering transparency in judgements made through reporting inclusion and exclusion criteria, search strings, the PRISMA paradigm, and EPPI data extraction guidelines, and still applying a collaborative approach where possible (Gough et al., 2017).

Secondly, validity of the research refers to ensuring that the phenomenon of interest intended to be measured is actually measured by the applied methods (Cohen et al., 2017). As mentioned previously, attempts for ensuring validity have primarily been made through investigator triangulation (Cohen et al., 2017), i.e. a multi-step collaborative approach on checking the search terms, redefining the inclusion and exclusion criteria, and consulting a specialised librarian on the database search. Still, a concern for validity arises from the recent nature of the evidence. Given that the ExIn was only launched in 2006, much of the literature either remains speculative, merely conceptual about potential outcomes of the ExIn (cf. Kehm, 2008), or non-longitudinal in its empirical findings (IEKE, 2016). To exemplify this limitation, one can note how the first round of the initiative from 2006 was only formally evaluated by a committee in 2014 (IEKE, 2016). Additionally, a longitudinal report on the overall ExIn until 2017 will only be officially assessed by the DFG in 2035 with comprehensive data sets (ExStra, 2024). Therefore, this limits the validity of results and conclusions drawn from the systematic review, as it cannot be guaranteed that the synthesised effects accurately represent the longitudinal, system-wide effects of the ExIn (Creswell, 2013).

Another validity concern arises from a lack of comprehensiveness of evidence, potentially caused by the competitive nature of the ExIn's funding programme. Because the programme is designed as a process whereby institutions apply to the funding body DFG and compete with other applicants, many strategic documents and application materials of institutions, as well as excellence evaluation criteria by the DFG, which would present valuable primary data for the data synthesis, remain private (Neumann, 2015). Particularly because institutions are subject to review and re-evaluation of receiving their awarded funding, there are low incentives to make information publicly available, even after successfully or unsuccessfully having gone through the application process. Therefore, this issue of data access has made it harder to find reliable primary data or studies that base their evaluations of the ExIn on comprehensive data.

Lastly, a risk of language bias needs to be addressed given the significant relevance of German empirical evidence for this review. A concern is derived from a dilemma that despite German search terms and inclusion criteria in this review trying to account for German language publications, not all German articles have been submitted to, or were accepted by in international journals and international databases, which some scholars link to a persistence of anglophone hegemonies in international research publishing (Paasi, 2005). Additionally, the German science system exhibited an interesting nuance where some relevant literature was published in chapters of largely conceptual (Neumann, 2015), or published in a separate discussion paper, independent from the empirical data collection done in wider research group papers (Werner et al., 2022; ZSB Halle, 2022). Therefore, this split between publication of findings and data analyses or calculations has prevented the inclusion of such data syntheses in the review, as the methodological and analytical rigour was not assessable, and thereby would have compromised on the quality and certainty of evidence of this systematic review. These studies could have nevertheless presented relevant findings which are now not represented in the review.

4. Results

In the subsequent section, the results of the QES will be presented along four analytical themes of (1) accumulation of funding, (2) research output, (3) student recruitment, and (4) rankings and reputational effects. The presented results build the overall argument that vertical stratification through the ExIn needs to be measured along multidimensional indicators of qualitative and quantitative nature. Doing so uncovers that the ExIn contributes to dynamics of vertical stratification between ExIn and non-ExIn universities, but not by causing this stratification; instead, it exacerbates and consolidates pre-existing hierarchies between ExIn and non-ExIn universities. This can later be interpreted as defining a policy shift from *unintentional* vertical stratification prior to the ExIn towards *intentional* vertical stratification. To outline this synthesis, after a short presentation of the descriptive study results, the QES will be presented along the four themes, and lastly limitations and a CERQual assessment will be discussed.

4.1. Within-Study Presentation of Descriptive Results

The included studies in the review have been organised and categorised along study characteristics to facilitate a baseline overview of systematic differences and underrepresented approaches, which can affect the thematic synthesis of indicators of vertical stratification, interpretation of results, and certainty of evidence assessment (Petticrew & Roberts, 2006) (see Appendix 8.3.).

Among the 19 included studies, the year of publication ranges from 2009 to 2025. The lack of studies from before 2009 is logically derived from the nature that empirical studies looking at impacts of the ExIn, including vertical stratification, will have to be conducted a few years after the first launch of the ExIn in 2006. The publication of studies prior to 2017 already, indicates that the sample of studies diverges by included funding rounds: six only look at the first round until 2012, one only looks at the second round, and nine combine both rounds; out of those some only take a partial dataset from within the rounds. Two more recent studies include the newest third round of funding ('Excellence Strategy'), but due to its recent nature, the weight of evidence from studies reviewing the third round is at risk, and findings will therefore not be considered. While all included studies have conducted a qualitative presentation of findings, sixteen of the included studies have included some form of quantitative data, either as descriptive statistics or models for the assessment of vertical stratification. Four studies have presented purely qualitative metrics. This leads to a potential over-representation of quantifiable analysis tools in the assessment of studies' findings, which needs to be addressed. Lastly, in the review of studies, only few include a public funding acknowledgement, which limits the ability to identify potential conflicts of interest and biases in the quality appraisal of the included studies.

Upon synthesising the descriptive elements of the included studies, it becomes evident that many of the studies have discussed the quantitative side of vertical stratification through bibliometric

measures, i.e. models and descriptive statistics that compare bibliometrics and quantifiable effects, while existing qualitative findings were given less attention in the studies or in relation to the ExIn. Therefore, this necessitates a more nuanced view of indicators of vertical stratification and cross-synthesis with quantitative and qualitative studies through the subsequent thematic synthesis.

4.2. Thematic Qualitative Evidence Synthesis

The following section addresses this identified need for a cross-method synthesis of evidence to provide a more nuanced view on vertical stratification. As a core dimension of this systematic review, it synthesises if and how the ExIn has vertically stratified the higher education landscape. The results show that vertical stratification can be observed through four, inductively derived thematic lenses; (1) accumulation of funding, (2) research output, (3) student recruitment abilities, and (4) rankings and reputational differentiation. However these effects are not merely a result of the launch of the ExIn, but rather, as the findings indicate, they have previously existed, and are merely exacerbated and reproduced through the ExIn. It exemplifies this review's overall argument of the ExIn being a policy shift from unintentional to intentional vertical stratification, rather than previous scholars' claims from horizontal towards vertical stratification.

4.2.1. Accumulation of Funding

The first theme emerging from the codes is that the ExIn stratifies universities based on their accumulation of funding. This theme in summary finds that ExIn universities are able to accumulate more funding than non-ExIn universities from public funds. At the same time, the study findings diverge on whether in the long-term, non-ExIn universities level out this lack of public funding through alternative sources, or whether differences are exacerbated by ExIn universities being able to attract even more funding after the ExIn award, and thus reproducing their funding accumulation advantage.

Numerous of the included studies first find that ExIn universities accumulate significantly more public funding than non-ExIn universities through the award of the ExIn. Prior to the launch of the ExIn, the funding landscape for higher education institutions in Germany was developing rather homogenously, with few funding decisions aimed at strategically advantaging a certain group of universities (Carayol & Maublanc, 2025; Mergele & Winkelmayer, 2022). Increases in funding of universities were spread across the whole system or part of a generally increased funding level in global science nations (Buenstorf & Koenig, 2020; Mergele & Winkelmayer, 2022; Wohlrabe et al., 2018). However, with the launch of the ExIn, several studies observe heterogeneous developments (Buenstorf & Koenig, 2020; Carayol & Maublanc, 2025; Mergele & Winkelmayer, 2022). ExIn universities were able to accumulate an abundance of financial resources for their institution or subject field, which Guo (2019) exemplifies through the use of metaphors for ExIn universities, like flowing or drowning in money. This sole allocation of funds to ExIn universities has necessitated non-ExIn universities to instead increase their capacities for research through the scarce, remaining funds (Münch, 2009). The differentiation is

found to differ in strength according to funding stream, i.e. those with ExIn university funding differentiate more strongly from non-ExIn universities than those with only partial excellence funding through CoEs (Buenstorf & Koenig, 2020; Mergele & Winkelmayer, 2022). When holding institutional and ExIn type constant, the differentiation based on funding is further shaped by the subject or academic field of research the ExIn university is placed in (Mergele & Winkelmayer, 2022). ExIn universities in the life sciences and STEM receive preferential treatment for funding (Mergele & Winkelmayer, 2022). However, weighing the received funding against costs in the field, STEM research for example exhibited higher costs of equipment and a rise in personnel recruitment, which partially levelled out subject-specific funding differences through the ExIn (Mergele & Winkelmayer, 2022).

The included studies raise concerns for the higher education system in the long run (Guo, 2019). For now, ExIn universities increase their research capabilities, undertake new projects and recruit new members of staff through the ExIn funding; however, once this funding runs out in 2017, IEKE (2016) find that any projects extending beyond then will need to be sustained using the remaining public funds for higher education. In this case, Guo (2019) raises the concern that this happens at the expense of smaller, non-ExIn universities. IEKE (2016) suggest therefore that a system of sustainable excellence differentiation is only viable in the long run with a follow-up ExIn programme. If neither a follow-up programme nor alternative, additional funding are offered, the ExIn as a tool for stratification through funding is found to disadvantage non-ExIn universities by limiting their access to funds:

> *"Offen bleibt auch die Frage, inwieweit die Schwerpunktsetzung nachhaltig ist. Manche Universitäten setzen für die künftige Finanzierung ihrer Forschungsschwerpunkte auf eine Fortsetzung der Geldflüsse aus der nächsten Phase der Exzellenzinitiative". (IEKE, 2016, p. 19)*[1]

In anticipation of this dynamic, included studies have further asked whether it has caused non-ExIn universities to place higher demand on third-party funding and industry collaborations in an attempt to level out the lack of received ExIn funding, but included studies diverge on whether these funds are primarily acquired by ExIn or non-ExIn universities. On one side, non-ExIn universities are found to have partially levelled out the lack of funding and thereby potential negative externalities by receiving systematically more funding from other governmental sources, industry, or own institutional funds, thus exhibiting a small substitution effect (Buenstorf & Koenig, 2020; Heinze et al., 2025; Müller & Schneijderberg, 2020). However, other studies point towards a reproduction of accumulation of funds by ExIn universities, where funding from third parties and industry is awarded to ExIn universities because they win the competition for funds based on their ExIn status, previously received ExIn funding, and research capacities (Münch, 2009). Heinze et al. (2025) take this dynamic of reproductivity in funding accumulation, and look at ExIn universities' ability to compete for both, third-party funding and additional ExIn funding. They find that the accumulation of funding exhibits path dependency, where 89% of previously funded universities and projects through the ExIn were able to

[1] All translations of German quotes into English are included in Appendix 8.4.

re-gain ExIn funding in the subsequent round as well (Heinze et al., 2025). According to Münch (2009), this leads to the generation of a 'two-class society' in the long run:

> *"Es wird auf diesem Wege eine Zweiklassen-Gesellschaft der Forschung konstruiert, weil bereits die nächsten Rankings bestätigen werden, was zuvor prophezeit wurde: dass sich einige wenige Universitäten bereits durch eine hohe Forschungsintensität auszeichnen, die der Sichtbarkeit des Forschungsstandorts Deutschland zuliebe auch weiterhin einer besonderen finanziellen Unterstützung bedürfen". (Münch, 2009, p. 261)*

When looking more closely at the causes of this path dependency, some studies link it to the relevance of input factors universities have when applying to the ExIn funding: Those universities with large capacities to dedicate towards applying to the ExIn (Guo, 2019; Heinze et al., 2025; Menter et al., 2018; Wohlrabe et al., 2018), previous scientific visibility (Heinze et al., 2025), long-standing history (Mergele & Winkelmayer, 2022), and experienced academic staff and relevant networks for insight on the application process (Heinze et al., 2025; Münch, 2009), are able to navigate the competition for ExIn funding successfully. These institutions are likely to succeed merely due to their existing resources, institutional size, and previously acquired knowledge, rather than necessarily exhibiting excellence through quality of research (Koenig et al., 2017). Therefore, when taking funding as an indicator for vertical stratification, the ExIn is found to exacerbate pre-existing hierarchies of capacities, and research-intensity by rewarding previously well-achieving universities, rather than stimulating new, world-class research:

> *"The funding itself constitutes only the reward of previous out-performance and hence does not create sufficient further stimuli, resulting in a non-positive treatment effect of the ExIn". (Menter et al., 2018, p. 1124)*

The studies of Buenstorf and Koenig (2020), Heinze et al. (2025), Möller et al. (2016) and Wohlrabe et al. (2018) however all note that funding comparisons as indicators of vertical stratification generally need to be treated carefully, especially when applying whole system interpretations, because the ExIn only makes up a small sum of the overall funding in the system, and therefore, not all developments and divergences between ExIn and non-ExIn universities can be explained entirely by the ExIn.

Overall, the theme of funding presents one of the indicators of how the ExIn exhibits mechanisms of vertical stratification. The reviewed studies find that the ExIn leads to funded universities accumulating significantly more funding than non-ExIn universities. However, as the studies also show, this ExIn award is not merely based on indicators of research quality, but rather also pre-existing input factors of institutional size, visibility, and capacities. Therefore, this finding of reproduction or path dependence concludes that the ExIn does not appear to cause vertical stratification through funding on its own, but rather it contributes to pre-existing differences in the capabilities that allow for funding accumulation by universities, and thus increase vertical stratification between institutions.

4.2.2. Research Output

A second theme finds ExIn and non-ExIn universities to vertically stratify through research output, measured along the dimensions of research quality, research quantity, and intensity of institutional research. It finds that ExIn universities produce higher quality research, are more tailored towards being research-intensive, and thus continue to gain international visibility, while non-ExIn universities instead carry out a massification of the system, and are potentially forced to compromise on quality of research output.

Referring back to the ExIn's proposed goal of creating world-class research at German universities, scholars have attributed this to an expected stratification based on quality of research, measured in highly-cited papers, types of journals scholars publish in, research productivity per academic staff member, or quantity of awarded doctoral degrees (IEKE, 2016). Civera et al. (2020) look at the dimension of professors at ExIn universities and find that ExIn professors increased their highly-cited publications by more than 56% after 2006, raising the average productivity per professor at German ExIn universities by 28.6%. This increase in quality, measured through highly-cited journals, can be observed both at the ExIn university level (Carayol & Maublanc, 2025; Civera et al., 2020; Möller et al., 2016), and at the CoE level (Koenig et al., 2017; Müller & Schneijderberg, 2020; Wohlrabe et al., 2018). Additionally, the studies highlight that this differentiation is expected to increase, as the rate of highly-cited papers from ExIn universities is growing faster than that of non-ExIn universities:

> *"Specifically, German Excellence Universities grew by 5.7% in terms of publications per professors and 9.6% in terms of citations per publications. German non-Excellence Universities grew by 9.6% in terms of publications per professor and 7.5% in terms of citations per publication". (Civera et al., 2020, p. 6)*

This quality divergence through the ExIn again varies based on the degree of involvement in the ExIn. Universities with institutional ExIn status exhibit more substantial increases in research quality, than those with 'mere' award of a CoE (Möller et al., 2016). This differentiation can further be taken to an intra-ExIn university level, where Wohlrabe et al. (2018) suggest that ExIn universities are differentiated on efficiency metrics. Larger ExIn universities are found to be "super-efficient" (Wohlrabe et al., 2018, p.10), compared to other ExIn universities, thus indicating a vertical stratification effect through efficiency and productivity of research (Carayol & Maublanc, 2025).

A stratification based on research output is further found when looking at collaborations with industry and international partners. ExIn universities have more collaborative research output with industry and international partners than non-ExIn universities, which particularly increased these ExIn universities' visibility beyond the academic context (Carayol & Maublanc, 2025). This divergence from non-ExIn universities based on visibility is at risk of being reproductive over time, as the visibility and connections from collaborations can translate into new research funds, higher citation counts, or talent attraction (Möller et al., 2016). Civera et al. (2020) conceptualise this as international visibility

being a signalling tool for universities to show their relevance, and perceived high quality of research, as it is 'externally validated' by collaborations.

The same study by Civera et al. (2020) applies this perspective of signalling and reproduction of visibility through research output to non-ExIn universities, to see what effects this causes in the realm of stratification for the broader system. They find that non-ExIn universities similarly strive for maximising their international visibility in order to reap associated benefits, but as they lack funding to increase quality and collaboration capacities, many are instead attempting to achieve this visibility through increases in the quantity of output, often at the neglect of quality (Civera et al., 2020; Münch, 2009; Wohlrabe et al., 2018).

Nevertheless, despite increases in quantity at non-ExIn universities, ExIn universities overall still exhibit higher quantities of research output in absolute terms (Koenig et al., 2017; Müller & Schneijderberg, 2020; Wohlrabe et al., 2018). Carayol and Maublanc (2025) partially explain this by showing that ExIn universities, even with increased visibility through research quality measures, are also inclined to compete based on quantity of output to maximise their visibility. They further show that dimensions of quantity and quality in research do not necessarily have to come as a trade-off, and in fact they may also increase simultaneously, particularly when universities are able to concentrate research-intensive resources, and a large, highly-qualified academic body of staff at their university (Carayol & Maublanc, 2025). This indicates that when assessing vertical stratification effects of the ExIn through research output, institutional size and previous research-intensity need to be accounted for. Lehmann and Stockinger (2019) link this accounting for previous institutional size and research-intensity to stratification based on research output again not being a *cause* of the ExIn, but rather a *reproduction* of it. In the long run, the ExIn is therefore found to reward ExIn universities as research-intensive institutions in the system of higher education, while smaller, less research-focused universities are driven out of the system, due to a lack of resource availability (Civera et al., 2020; Guo, 2019; Lehmann & Stockinger, 2019). Heinze et al. (2025) title this a concern for declining horizontal or functional differentiation in Germany, as only research-intensity and highly-cited knowledge is rewarded as excellent, thus downward-spiralling non-research-intensive universities, and subsequently also leading to a decline of a functionally differentiated system.

Therefore, the second theme can be summarised to find that ExIn universities diverge from non-ExIn universities through higher quantity and quality of research. This grants these universities higher international visibility which they can translate into receiving funding and resources accumulation. These increases in research output of ExIn universities are found to be reproductive through pre-existing capabilities, like institutional size, research-intensity, and visibility. In the long run, studies identify a risk of the ExIn causing non-ExIn universities to compete for the same visibility through a focus on quantity of research output at the expense of quality. Thus, the ExIn overall is found to further

perpetuate a system which stratifies institutions based on research-intensity, where being highly resourceful and producing both high quantities and high quality of research is rewarded as excellent.

4.2.3. Student Recruitment

A third emerging theme from the included studies is that the ExIn contributed to vertical stratification through the indicator of student recruitment. The studies find that ExIn universities are able to recruit more "high-ability students" (Horstschräer, 2012, p. 1163), than non-ExIn universities because the signal and perceptions associated with the ExIn label feed into students' educational strategies, i.e. their decision-making processes in education (Schäfer & Walgenbach, 2024).

To assess this dynamic, studies looked at the quality students associated with ExIn versus non-ExIn universities in terms of teaching quality, subjects offered, and academic rigour, as these contributed to students' educational decision-making strategies (Schäfer & Walgenbach, 2024). The ExIn has led to ExIn universities being perceived as providing better quality of education, job opportunities, and academic environments with motivated peers, and thus has made ExIn universities more attractive to high-ability students (Horstschräer, 2012; Schäfer & Walgenbach, 2024). Even though the ExIn is not necessarily a direct measure of these qualities, as it focuses on research, students perceive the label of excellence as an indicator for assuming positive spillover effects into teaching and other relevant indicators to their student life (Horstschräer, 2012). This is exemplified by students from ExIn universities being significantly more likely to report higher scores for the quality of education, expected job outcomes, and view on the institution after the ExIn label has been granted (Hortschräer, 2012).

> *"As hypothesized, the students' ratings of both the quality of their education and their job market expectations show significant positive short-term responses to the excellence label. Thus [...] students update their beliefs with respect to the quality of their education". (Fischer & Kampkötter, 2017, p. 677)*

Guo (2019), Heinze et al. (2025), Lang and Schwabe (2023), and Müller and Schneijderberg (2020) further reflect on this by showing that the receipt and award of excellence funding is seen as a quality indicator by students and staff, even without further indication of whether this correlates with better research infrastructure, publications, or high citations. Thus, the ExIn facilitates students updating their beliefs about an ExIn university's quality or prestige, which in turn feeds back into ExIn universities enjoying positional advantages for student recruitment (Schäfer & Walgenbach, 2024). Key to this result of the ExIn label allowing for student recruitment, is the word 'perceived' and 'beliefs', because it implies that the *perception* about the ExIn universities matters more than the *actual* quality. This is particularly exhibited in the announcement effect Horstschräer (2012) finds, which suggests that the odds of students to apply to a university increase after a university is announced to receive or be shortlisted for the ExIn label:

> *"The evaluation of the excellence initiative shows that in course of the competition the share of applicants increased at the winning universities, which are today known as 'excellence*

> *universities'. On average, achieving excellence status increases the odds to apply by 19% of the prior odds, which relates for the 'excellence universities' to an increase in applications of about 1.95% points". (Horstschräer, 2012, p. 1172)*
>
> *"The indicator for being shortlisted depicts a positive significant effect suggesting an increase by 28.9% of the prior odds, while the application decision for a failed university does not change significantly". (Horstschräer, 2012, p. 1170)*

This announcement effect is further expanded upon by looking at ExIn universities, which lost their status in the second funding round. Bruckmeier et al. (2017) find that the loss of status had an even greater impact on student recruitment and signalling strength of an institution than the award of ExIn status, which again supports the finding of the ExIn label being used as a perceptive indicator of research quality:

> *"In contrast, the withdrawal of the elite status has a significantly negative effect in all model specifications and for all subgroups [...]. They provide evidence that it is the loss of the elite status that counts, whereas the gain of the elite status does not". (Bruckmeier et al., 2017, p. 180)*

This dynamic presents a risk of being circular, as institutions are able to use these updated perceptions from the reception of the ExIn label to 'window-dress' being a university of excellent quality and research, even when this is not necessarily the case (Fischer & Kampkötter, 2017; Horstschräer, 2012). This subsequently allows institutions to further recruit more high-ability students, attract additional funding, recruit more staff, and inform rankings, which in turn further update students' perceptions of an institution, and thus feeds back into the window-dressing strategy of institutions for recruitment (Schäfer & Walgenbach, 2024). Thus, on the institutional side, the ExIn is found to differentiate universities by their ability to recruit high-ability students, and signal excellent quality of education to relevant stakeholders, students, and rankings (Schäfer & Walgenbach, 2024). These studies align on framing ExIn universities' education as positional goods, as an institution's ExIn label appears to exhibit greater 'signalling' strength than assessments of an institution's quality of research (Schäfer & Walgenbach, 2024). Fischer and Kampkötter (2017) however note that this effect only holds in the short term, and that in the long term, the updated perceptions about ExIn universities are levelled out. This is because if universities cannot live up to these updated beliefs and expectations by students, given they are often shaped by the *perceived* educational quality through the ExIn rather than a *real* quality update, the ExIn label evokes negative sentiments from students due to disappointment and a lack of parity between the expectations and lived experience (Fischer & Kampkötter, 2017).

In addition to that, Horstschräer (2012) further mitigates the signalling and recruitment function of the ExIn label by showing that its relevance for student recruitment is conditioned by further factors, such as geographical location, subject, student satisfaction, and social origin. From a subject view, students in fields like management and economics exhibit higher sensitivity towards the reputational status of ExIn universities than other fields (Lang & Schwabe, 2023; Schäfer & Walgenbach, 2024).

Additionally, students from upper milieus are often found to include prestige, reputation, and quality of research in their educational strategy, while mitigating factors, such as geographical location play a greater role for lower milieu students (Schäfer & Walgenbach, 2024). This is attributed to upper milieu students exhibiting higher awareness of opportunities gained from attending a highly prestigious, ExIn university, and therefore also show a higher likelihood to include the ExIn label in their educational strategy. Thus, the ExIn label does not merely lead to a differentiation between ExIn and non-ExIn universities on student abilities, but also a reproduction of socioeconomic class (Horstschräer, 2012; Schäfer & Walgenbach, 2024). Heinze et al. (2025) further link these reproductive mechanisms of student recruitment based on ability and socioeconomic class to a long-term risk of the ExIn causing a downward spiral for non-ExIn universities. While ExIn universities remain selective in their admissions for high-ability and higher socioeconomic standing of students, non-ExIn universities are faced with carrying out the system massification and absorbing the demand for higher education (Heinze et al., 2025).

In conclusion, this theme has shown that the ExIn label has provided a valuable tool for institutional differentiation through student recruitment, whereby ExIn universities are able to recruit more high-ability students than non-ExIn universities. This can be associated with circular long-term effects for visibility, reputation, and staff quality, as ExIn universities are able to use the signalling strength and perceptions associated with their institution for the recruitment of further high-ability students, and subsequently update perceptions about quality. Thus, this indicator exhibits a form of vertical stratification, where the ExIn differentiates universities by concentrating high-ability students at ExIn universities, while non-ExIn universities remain demand-absorbing. Therefore, the included studies find the ExIn to contribute to a reproduction of stratification based on student abilities, and further decision-making factors in students' strategies, such as socioeconomic background or geographical location.

4.2.4. Rankings and Reputational Effects

The previous finding of ExIn universities enjoying signalling strength for recruitment through the ExIn label, necessitates the underlying assumption that the ExIn comes with some form of reputational differentiation, as that is a key indicator for signalling strength (Fischer & Kampkötter, 2017). The results of this theme show that these reputational effects, commonly measured in the degree of international visibility, ranking performance, and attraction of international talent (IEKE, 2016), are reaped primarily by ExIn universities, and thus further create a divergence from non-ExIn universities.

The funding by the DFG through the ExIn has come with the intention of creating lighthouses of German research, where international visibility, ranking performance, and thereby accrued reputation are seen as indicators of excellence and quality (Guo, 2019). Particularly on the international stage, this is driven by the assumption that having few, world-class universities will allow for an overall system stimulation and positive level effect of the system, through recruiting international talent, accruing

more research funding, and concentrating high capabilities at few institutions (Heinze et al., 2025). Additionally, Münch (2009) argues, that this differentiated university landscape is needed to increase the quality and international attractiveness of Germany as a research location. When looking at this reputational and ranking performance for the ExIn, studies find only small increases after the launch of the ExIn, such as a representation of nine instead of three universities in the THE and Shanghai rankings from 2010 to 2015 (IEKE, 2016; Menter et al., 2018). However, overall the ExIn is not found to significantly or systematically change the performance of ExIn universities in rankings compared to non-ExIn universities (IEKE, 2016). This therefore suggests that those ExIn universities that were able to improve their positions in rankings, must have differentiated from other ExIn universities through further indicators for ranking performance. Münch (2009) exemplifies this by showing that instead, other institutional characteristics, such as size, professors, research output, and student satisfaction or abilities matter:

> *"Ein Status der sozial konstruierten Exzellenz wird durch die entsprechenden Mechanismen der Reproduktion gefestigt: Bereits vorhandenes Kapital schafft den Universitäten Wettbewerbsvorteile, mit denen sich Monopolrenten erzielen lassen. Den Erzeugnissen der besonders reputierten Institutionen kommt dann automatisch eine größere Aufmerksamkeit zu als den Erzeugnissen ihrer Konkurrenten". (Münch, 2009, p. 261)*

Guo (2019) picks up on this by finding that the ExIn incentivises universities to use all pre-existing capabilities to perform well in these rankings, thus reflecting a dynamic of "sports [and] competition" (Guo, 2019, p. 210). While the ExIn conceptualises this competition for "picking the winners" (Lehmann & Stockinger, 2019, p. 74) through international rankings as a quality stimulation for the broader system of higher education, Münch (2009) uncover that stimulation rarely happens, because rather than rewarding quality and system-stimulating activities, these rankings reward institutions to compete with and expand upon pre-existing absolute size, academic publications and staff member productivity. Therefore, as the winners in rankings and reputation are already pre-dispositioned and incentivised to reap benefits for their own visibility, it limits the ExIn's idea of having well-ranked, ExIn universities as lighthouse universities for guiding non-ExIn universities towards similar research excellence (Guo, 2019; Münch, 2009). IEKE (2016) further finds that the ExIn's focus on rankings leads to not those 'most excellent' receiving ExIn funding, but once again those with pre-existing capabilities that allow them to navigate the competition for reputation and ranking performance successfully.

This idea of a stimulation effect is debated by further studies, which find that moving all resources to a few, competitive universities, as the ExIn does through its funding, will not attract positive effects for the whole system, but rather encourage sustaining dynamics of competition in the education system (Lehmann & Stockinger, 2019; Menter et al., 2018). Doing so again merely allows for ExIn universities to expand on their received benefits through the ExIn by attracting further international funding, increased cooperations with international researchers, and further recruitment of international talent (IEKE, 2016). Lehmann and Stockinger (2019) thus connect this to a reproductive nature, where the

competition for international visibility incentivises ExIn universities to keep asymmetries with the non-ExIn universities, as it allows them to reap benefits, and thus, previous hierarchies and inequalities are exacerbated continuously. Here, Mergele and Winkelmayer (2022) differentiate from the rest of the studies slightly by claiming that instead of a continuous reproduction of these inequalities, the ExIn is a mere, one-off differentiation effect, which does not necessarily reproduce indefinitely in the future.

Building on this overall finding of negative system externalities through the ExIn's enforcement of competition for reputation, some studies have explored whether a positive stimulation effect can instead be seen elsewhere, i.e. in interaction with third-parties, such as industry, and universities' attempts to fulfil a so-called third mission of having greater system-wide impact (Lehmann & Stockinger, 2019). However, even here, the indicator of reputation is found to advantage ExIn universities, as ExIn universities' visibility and pre-existing capabilities allow them to increase collaborations with non-academic institutions and attract further third-party grants (Lehmann & Stockinger, 2019). This finding is mitigated to some extent by the previous finding that non-ExIn universities have reverted to finding substitutes for the lack of ExIn funding (Buenstorf & Koenig, 2020; Heinze et al., 2025; Müller & Schneijderberg, 2020). However, in the realm of this theme, purely looking at the reputational indicator of stratification, it holds that third-party funding through reputation merely advantages ExIn universities with already high exposure to international and industry collaborations (Münch, 2009). These mechanisms of reproduction thus cause an asymmetrical development in the education landscape.

In summary, this last theme has shown how the ExIn has vertically stratified universities based on their ranking performance and associated reputation. While ExIn universities did not differ systematically from the ExIn in ranking performance, they did exhibit higher rates of international visibility and collaborations. This was not merely attributable to the ExIn though, as pre-existing input capabilities and accrued reputation mattered. Thus, the ExIn is found to exacerbate stratification based on reputation and international visibility, which ExIn universities can use to compete for reputation and additional funding, but it was not the sole cause of a stratification.

4.2.5. Summary of QES Results

To conclude the QES overall, this thematic presentation of findings has uncovered that the current literature on the ExIn's effects on vertical stratification can be classified along four main categories: funding, research output, student recruitment, and ranking or reputational performance. In funding accumulation, ExIn universities differentiate by being able to attract more public funding than non-ExIn universities. While non-ExIn universities are found to partially level out this lack of ExIn funding through accumulating third-party or industry funding, the ExIn is found to enable ExIn universities to use their awarded funding, as well as previously existent funding for accrual of further funding, both from the ExIn and also third parties and industry funds. Secondly, for research output, ExIn universities are found to exhibit higher rates of quantitative and qualitative research output. However, this is not

merely conditioned by the ExIn initiative, as these ExIn universities have also exhibited high research-intensity prior to receiving the ExIn label. For the next indicator of student recruitment, the ExIn label is found to allow ExIn universities to recruit more high ability students, as the signal of the label updates the external perceptions of ExIn universities' quality, thus vertically differentiating them from non-ExIn universities. Lastly, the included studies identified the dimension of reputation and ranking performance as a relevant indicator for vertical stratification. While the universities are not found to substantially stratify based on ranking performance, ExIn universities were identified as exhibiting stronger international visibility and scientific reputation. While the ExIn enabled them to further reproduce these, and turn them into accrual of more funding, and collaborations, further factors of previous institutional size, pre-existing reputation, and pre-ExIn collaboration networks appeared to matter as well. Therefore, across all indicators, the studies find that the ExIn does have an effect by increasing system-wide vertical stratification, but it is evidently not the primary cause of such stratification through the respective indicators. Instead, it exacerbates or uncovers already pre-existing stratifications between research and non-research universities. Before interpreting and discussing this collected evidence from the studies in light of the research questions, the certainty of evidence for the themes needs to be assessed below.

4.3. Certainty of Evidence Assessment

As part of the systematic review, the confidence of findings presented in the QES above will be assessed via the GRADE-CERQual tool, with the aim of judging how much confidence can be applied to the review findings (Lewin et al., 2018). This confidence in findings is reviewed through Lewin et al.'s (2018) four-dimensional framework: methodological limitations, coherence, adequacy of data, relevance, and publication bias. In light of these dimensions, each study will be assigned an assessment on a scale from high to very low confidence level (Lewin et al., 2018).

Table 4: CERQual Assessment of Confidence in Evidence

Review Finding	CERQual Assessment of Confidence in Evidence	Explanation of CERQual Assessment	Studies Contribution to the Review
Finding 1: Accumulation of Funding The ExIn has led to ExIn-universities receiving more funding than non-ExIn universities; however this finding is not merely attributed to the ExIn; it depends on path dependency and reproduction of pre-existing differences.	Moderate Confidence	Minor concerns raised that funding effects and accumulation were subject-specific, Thus funding levels diverged beyond ExIn and non-ExIn universities; a subject-specific assessment would be necessary.	1, 2, 3, 6, 9, 11, 12, 14, 15, 16, 19
Finding 2: Research Output The ExIn stratified universities on research-intensity, ExIn universities exhibit higher quality and quantities of	High Confidence	Low concerns as data was provided through bibliometric, measurable indicators & analysed with transparent,	1, 2, 3, 5, 6, 8, 9, 10, 12, 14, 15

research; however, unclear if this is caused by the ExIn or attributed to previous research capacities and visibility.		statistical methods in the included studies	
Finding 3: Student Recruitment ExIn universities differentiate from non-ExIn universities through higher-ability student recruitment; not due to increases in quality, but due to the announcement, perceived status, and signalling function of an excellence label	Moderate Confidence	Minor concerns about some studies' methodological approach with only some subject fields included, and adequacy of data, as sample sizes were small and context-dependent.	1, 3, 4, 6, 7, 13, 15, 17, 18
Finding 4: Reputation and Rankings The ExIn has not been found to systematically differentiate ExIn from non-ExIn universities in rankings, but it has increased competition through previous capabilities for the gain of reputation and international visibility.	High Confidence	Rankings were measured through objective positions and transparent data reporting. While reputation was more subjective, the included studies attempted to offer rigorous triangulation of results.	3, 4, 5, 6, 10, 11, 12, 15, 16, 19

In summary, the GRADE-CERQual assessment has resulted in being able to assign moderate certainty to findings one and three, and high certainty to findings two and four. Medium certainty was assigned for those findings where studies exhibited methodological and comprehensiveness concerns, for example when subject-variance could not be accounted for, or where the critical quality appraisal reported concerns for weight of evidence, or risk of bias. This was the case for five studies (cf. Carayol & Maublanc, 2025; Civera et al., 2020; Guo, 2019; Horstschräer, 2012; Münch, 2009). The GRADE-CERQual assessment therefore yields that special attention needs to be paid to the interpretation of the findings on funding accumulation and student recruitment, as the certainty of evidence is limited.

4.4. Limitations of Results

Upon presenting the results of the thematic synthesis, several limitations to the validity and reliability of this review have to be addressed concerning the process of data extraction and generation of findings. Firstly, the choice of Thomas and Harden's thematic synthesis and subsequent application of line-by-line coding inherently comes with a certain degree of subjectivity; first at the stage of selective coding, and secondly at the translation of codes from descriptive into analytical themes (Thomas & Harden, 2008). In the process of selective coding and thematic re-grouping, judgements need to be made by the reviewer, which causes a lack of transparency in the process of translating descriptive themes into analytical ones, as well as potentially leads to a neglect of context (Dixon-Woods et al., 2006). The review has aimed to address this concern through transparent code reporting

in a hierarchical tree (Figure 3), and triangulation by reflexively considering the role of the researcher in the methodological limitations (Thomas & Harden, 2008).

Secondly, a concern is raised about the data sample being rather heterogeneous in characteristics of funding rounds, time period, and type of funding (Appendix 8.3.), which has questioned the extent to which the synthesised data can adequately approach answering the research question. While this heterogeneity was intended to account for the varying dimensions through which the ExIn and vertical stratification can be measured, it has limited comparability and confidence in the findings. This concern has been attempted to be addressed through the use of a standardised data extraction table to enhance comparability, as well as including the extracted data in considerations of the quality appraisal and CERQual assessment (Gough et al., 2017).

Lastly, by using Thomas and Harden's thematic synthesis, the generation of analytical themes essentially exhibits a form of categorisation, which may appear to be arbitrary (Lewin et al., 2018). The categorisation was intended to assist the creation of a comparable overview of the different indicators through which the ExIn affects vertical stratification, despite heterogeneity in studies. However, in practice, this categorical organisation of codes may result in an arbitrary thematic divide, where the inclusion of findings into one category subsequently necessitates exclusion from another, and thus risks taking away meaning from the initial intention of the author (Lewin et al., 2018). This has been partially addressed by allowing different codes from the same studies to be included in multiple themes, but to ensure overall rigour in theme generation, each individual code could still only be assigned to a single theme.

These presented limitations on validity and reliability in the form of subjectivity in coding, heterogeneity in the included studies' data, and categorisation in thematic coding, have provided a relevant triangulation of the review's findings. In combination with the CERQual assessment, these can be used to inform the interpretations and next steps drawn in the subsequent discussion of this systematic review.

5. Discussion

After conducting the QES and presenting the relevant findings thematically, these results now facilitate the subsequent discussion, aimed at answering the proposed research question: "What are the documented effects of the German ExIn on indicators of vertical stratification in higher education?".

In an attempt to answer this question, the discussion will first present and interpret the most important findings in the context of the existing literature and under simultaneous considerations of the studies' quality and certainty of findings, before presenting the answer to the research question. After discussing the research question and the gap that this review has filled, strengths and limitations of the review will be presented.

5.1. Contextualisation of Findings

The analytical themes shed light on the multitude of factors that go into assessing the effects of the ExIn on vertical stratification. Initially, previous conceptual literature and empirical studies have focused on assessing vertical stratification through quantitative metrics, and measurable effects. The findings of this review provide a new perspective on vertical stratification by considering a broader range of indicators, more specifically, accumulation of funding, differentiation in research output quantity and quality, student recruitment abilities, and accrued reputation and ranking positions.

These findings are mirrored in early definitions of Kerr's (2001) purpose of the university being embedded in a broader system of society, and Trow's (1973) claims that differentiation between universities can be measured in a multitude of factors. Beyond divergence in funding accumulation, which was outlined already in the DFG's proposal of the ExIn (DFG, 2024), the results on research output match with Kehm's (2013) claims that the ExIn fosters the creation of research-intensive universities in the long run, and thus puts the Humboldtian research-teaching nexus at risk with a neglect of teaching activities in ExIn universities (Humboldt, 1792). Further, the findings on student recruitment being driven by perceived signals from the ExIn label and reputation being a relevant indicator for stratification matches with Spence's Signalling Theory (Spence, 1973) and Biesta's qualification function (Biesta, 2009), as students use the ExIn to signal academic rigour, personal qualities, and expectations for job market benefits. It connects to the idea of the ExIn label being a positional good that institutions can use to reap external benefits and for window-dressing (Ball, 2003). In moving away from the teaching-research nexus balance and focusing on the window-dressing effects of education, these results mirror a previously conceptualised concern in the literature that excellence programmes encourage a focus on measurable outputs that increase positional, competitive advantages, at the expense of teaching and research quality (Shattock & Horvath, 2020).

However, looking not merely at *which* factors shape differentiation, but also *how* these factors shape differentiation, all four thematic lenses of this review indicate that the ExIn cannot be attributed as the sole cause of vertical stratification between ExIn and non-ExIn universities, but instead, differences have already existed prior to this programme; the ExIn has merely made these differences visible or exacerbated them. This particularly links to the existing literature on the relevance of social, economic, and cultural capital by Bourdieu (1986), and critiques of meritocracy, which claim that 'excellence' is rarely achieved by mere academic quality or "scientific merit" (DFG, 2010, para. 6), and is instead caused by accumulated capital. The limited effect of the ExIn in creating 'novel' stratification dynamics can further be interpreted as selectivity based on excellence having occurred elsewhere in the system already. In the German education system this may be reflected by streams of early tracking and eligibility for different pathways in higher education being determined at elementary age already (Mayer et al., 2007). Hence, the ExIn merely highlights these differences, or if anything consolidates them through its ExIn label (Lang & Schwabe, 2023). The potential of the ExIn contributing to the exacerbation of stratification again mirrors the concept of a 'Matthew Effect', in which those are deemed excellent, who already have previous forms of capital accumulated that they merely reproduce (Merton, 1968a).

This review thus provides a new angle on the ExIn by conceptualising the reproductive dimension of the ExIn in its system-wide effect: instead of the ExIn being a *prospective* funding tool for stimulating excellent research and innovation, it can be characterised as a *retrospective* funding tool, which rewards previous strengths, achievements, and research capacities with additional ExIn funds. Looking at this through the initial framing of the ExIn potentially creating winners and losers in a vertically stratified system, this nature of retrospective funding for previously advantaged universities does mirror a system where the winners are found to 'take it all' (ABBA, 1980), while non-ExIn universities are disadvantaged. Different however to the initial expectation that the ExIn would *create* these winners and losers, it appears that the divergence into 'winners' (research-intensive universities with an abundance of resources) and 'losers' (demand-absorbing, non-research universities) has existed prior to the ExIn already, and thus the ExIn again plays a role in uncovering and consolidating these dynamics, rather than being the one to create them.

The synthesis of vertical stratification effects across different indicators has thus further allowed for the emergence of a new finding that previously was not represented in the conceptual or theoretical literature. While Hartmann (2007), Kehm (2008), and Neumann (2015) have claimed that the ExIn presents a paradigm shift from horizontal towards vertical stratification, the results indicate that instead, the ExIn is rather a paradigm shift from an *unintentional*, pre-existing vertical stratification to an *intentional* vertical stratification. While before, this differentiation was evidenced in the German system by an unintended stratification through a "lack of parity of esteem" (Clark, 1983, p. 4), it has now turned into a deliberate policy shift towards an institutionalised, vertical hierarchy. In the realm of finding the ExIn to be a tool of reproductivity and consolidation of a previously existing vertical

stratification, rather than causing a system change, it is appropriate to ask whether policymakers and the conceptual literature over-anticipated the potential the ExIn would have for presenting a paradigm shift from horizontal to vertical differentiation (Hartmann, 2007), given that the ExIn only makes up a minor financial resource of the overall higher education sector funding (DFG, 2024; Möller et al., 2016).

5.2. Answer to the Research Question

By combining the results from the included studies and the literature, it allows to draw up an answer to the research question: firstly, the ExIn affects processes of vertical stratification through four primary indicators, which are funding accumulation, research output, student recruitment, and reputation and rankings. The documented effects of these indicators are that ExIn universities are able to accumulate more funding from public sources, but that this is partially levelled out by non-ExIn universities recruiting for alternative funding sources. The studies further indicate that for research output, ExIn universities exhibit higher rates of research quality and quantity output, measured in productivity, and highly-cited journal publications. For non-ExIn universities, this has enforced dynamics of competition, where in order to keep up, non-ExIn universities have increased quantity output, even if potentially at the expense of quality. For the effects on student recruitment, the ExIn was found to allow for recruiting more high-ability students; however not due to ExIn's substantially better quality of education or research, but due to the perception of prestige associated with receiving an ExIn label. Lastly, reputation and rankings are found to differentiate ExIn universities by increasing their international visibility, and thereby granting them more access to resources, research output, collaborations, and student recruitment. However, with all these documented effects, the studies have also pointed out that the ExIn was never found to be the sole or first cause of these dynamics, and instead, ExIn universities already exhibited pre-existing qualities and differences, that allowed them to compete with and outperform non-ExIn universities along these four indicators.

The review's overall answer to the research question is therefore, that the existing evidence in the field documents the ExIn to increase vertical stratification between ExIn and non-ExIn universities through the four indicators of funding accumulation, research output, student recruitment, and reputational effects. However, instead of being the cause of vertical stratification in the German education system, the studies show that the ExIn allows for previously well-resourced and advantaged universities, also conceptualised as 'winners' of the system, to build upon and reproduce these pre-existing, vertical differences. By doing so, this retrospective funding nature of the ExIn exacerbates vertical stratification between ExIn and non-ExIn universities, which thus grants the overall answer to the research question, that the ExIn exhibits a paradigm shift from previously *unintentional* towards *intentional* vertical stratification in the German higher education system, instead of, as the conceptual literature anticipated, a move from a horizontal to vertical stratification system.

5.3. Strengths and Limitations of the Review

It is essential for the evaluation of the findings and suggestions for future research to address the strengths and limitations of this review. The most significant strength of this review lies in its successful attempt to address a relevant research gap in the field of the ExIn's effects. Prior to this review, no comprehensive synthesis of evidence on the effects of the ExIn on stratification, either quantitatively or qualitatively, has been conducted across different methodological and analytical designs. Additionally, previous, empirical attempts to measure select effects of the ExIn have neglected the inclusion of qualitative, non-quantifiable indicators of stratification, such as the perception of the ExIn label, as this review has done. Therefore this review has intended to address this neglect. Furthermore, a strength lies in the comprehensive search for evidence conducted, as well as rigorous adherence to methodological standards across widely acclaimed guidelines of PRISMA, EPPI, and CERQual, which enables the review to make a significant contribution to the current state of research and literature.

However, at the same time, several limitations of this review need to be addressed. Due to time and scope constraints, the review was not able to employ a multi-reviewer approach throughout the full PRISMA approach, which has increased the risk of personal bias from the researcher as the single reviewer (Higgins & Thomas, 2019). As the credibility of the review is inherently reliant on the quality and context of the included studies, a rigorous selection process for the studies is key towards developing valid and reliable findings. Further, the highly contextualised nature of the different indicators and their interaction with each other, presents a challenge to some findings, as presented in the CERQual assessment. Further, the categorisation into analytical themes may have limited the ability to account for context and heterogeneity in the findings. In the future, and in anticipation of being able to generate policy recommendations for the development of future ExIn funding rounds, more qualitative research on the indicators of vertical stratification, and across complete ExIn sample sets should be conducted to allow for increased reliability and validity of results.

When assessing the value of this review for future steps, it is key to acknowledge the limited transferability of the findings to broader contexts (Cohen et al., 2017). As the highly contextualised nature of the four thematic effects, and the CERQual and EPPI assessment suggest, it is hard to transfer the findings to other excellence programmes in international contexts, or even generalise the findings across the whole of the German ExIn. Despite extracting common characteristics and appraising them accordingly, the ExIn funding rounds, ExIn funding streams, or measures of stratification effect varied substantially. While it was valuable to have conducted this systematic synthesis of evidence, given the current total absence thereof, more comprehensive and extensive empirical research under inclusion of multiple indicators of stratification, and all funding lines and periods of the ExIn is needed to make generalisable and transferable claims for future steps or policy recommendations.

6. Conclusion

This systematic review has aimed to address the persistent gap in the literature on the ExIn's vertical stratification effects. Specifically it sought to comprehensively synthesise evidence on *which* indicators contribute to the ExIn's stratification effects, and offer a cross-study synthesis of findings on *how* these indicators influence stratification. By combining studies across quantitative and qualitative input metrics, it countered the scattered evidence nature of empirical findings on the ExIn and developed a multidimensional view on vertical stratification indicators.

Upon reviewing the results of the cross-study synthesis in thematic fields, this review can make two relevant arguments on the state-of-the-art literature in the field, as well as give recommendations for future research and next steps. Firstly, the ExIn has stratifying effects on the higher education landscape, measured through multiple indicators, but rather than being the sole or primary cause of these effects, it merely exacerbates and reproduces pre-existing differences that have emerged elsewhere in the system. Secondly, despite not being the cause, but rather a reproducing force of differences, the ExIn still presents a relevant paradigm shift, because it has moved the previous *unintentional* vertical stratification towards an institutionalised policy shift of *intentional* vertical stratification in the German higher education system.

This novel finding about the ExIn's presented paradigm shift, emerging from the synthesis of existing empirical evidence on stratification opens up relevant implications for future research. The previous discussion has already called for more comprehensive empirical research that covers all funding periods and lines of the ExIn for increasing the certainty of evidence. More precisely however, the findings have indicated a particular absence of in-depth qualitative studies of ExIn effects. These are particularly valuable to explore further through interviews and ethnographic methods to gain a more nuanced understanding of vertical stratification effects from the perspective of key policymakers and stakeholders at the ExIn universities. This would allow for overcoming the lack of access to confidential policy and application documents on the ExIn, thereby again increasing evidence credibility on the ExIn's effects on stratification. Once these steps have been taken, a future review based on more comprehensive, empirical studies, can claim to make relevant, evidence-based policy recommendations for future steps of the ExIn. For now, this systematic review has filled the gap of being the first to synthesise the fragmented, empirical evidence on the ExIn's effects on vertical stratification, and through that uncovered a novel finding that the ExIn shifted the German education system's institutional paradigm from *unintentional* towards *intentional* vertical stratification.

7. References

ABBA. (1980, July 21). *The Winner Takes It All* [Audio recording]. Polar.

Ahrbeck, B., Felder, M. & Schneiders, K. (2018). Lessons from Educational Reform in Germany: One School May Not Fit All. *Division of International Special Education and Services*, *21*(2), 23–33.

Allison, P. D. & Stewart, J. A. (1974). Productivity Differences Among Scientists: Evidence for Accumulative Advantage. *American Sociological Review*, *39*(4). https://doi.org/10.2307/2094424

Archer, M. S. (1995). *Realist Social Theory: The Morphogenetic Approach* (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511557675

Ball, S. J. (2003). *Class Strategies and the Education Market: The Middle Classes and Social Advantage*. Routledge. https://doi.org/10.4324/9780203218952

Barlösius, E. (2008). „Leuchttürme der Wissenschaft“: Ein metaphorischer Vorgriff auf eine neuorientierte Wissenschaftspolitik. *Leviathan*, *36*(1), 149–169. https://doi.org/10.1007/s11578-008-0009-y

Barnett-Page, E. & Thomas, J. (2009). Methods for the synthesis of qualitative research: A critical review. *BMC Medical Research Methodology*, *9*(1). https://doi.org/10.1186/1471-2288-9-59

Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. Journal of Political Economy, 70(5), 9–49. https://doi.org/10.1086/258724

Bell, D. (Ed.). (2014). The Coming of Post-Industrial Society. In *Social stratification: Class, race, and gender in sociological perspective* (4th ed.). Routledge. https://doi.org/10.4324/9780429494642

Bhaskar, R. (1975). *A realist theory of science*. Routledge.

Biesta, G. (2009). Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability*, *21*(1), 33–46. https://doi.org/10.1007/s11092-008-9064-9

Bloch, R., Keller, A., Lottmann, A. & Würmann, C. (Eds). (2008). Making Excellence. Grundlagen, Praxis und Konsequenzen der Exzellenzinitiative. W. Bertelsmann Verlag.

Bloch, R. & Mitterle, A. (2017). On stratification in changing higher education: The “analysis of status” revisited. *Higher Education*, *73*(6), 929–946. https://doi.org/10.1007/s10734-017-0113-5

Bloch, R., Mitterle, A. & Seidenschnur, T. (2024). How do universities compete? Introduction to the special issue. *Studies in Higher Education*, *49*(10), 1701–1709. https://doi.org/10.1080/03075079.2024.2395418

Boliver, V. (2013). How fair is access to more prestigious UK universities? *The British Journal of Sociology*, *64*(2), 344–364. https://doi.org/10.1111/1468-4446.12021

Bongaerts, J. C. (2022). The Humboldtian Model of Higher Education and its Significance for the European University on Responsible Consumption and Production. *BHM Berg- und Hüttenmännische Monatshefte*, *167*(10), 500–507. https://doi.org/10.1007/s00501-022-01280-w

Bourdieu, P. (1977). *Outline of a Theory of Practice* (1st ed.). Cambridge University Press. https://doi.org/10.1017/cbo9780511812507

Bourdieu, P. (1986). The Forms of Capital. In *The Sociology of Economic Life* (3rd ed., pp. 78–92). Routledge. https://doi.org/10.4324/9780429494338-6

Bruckmeier, K., Fischer, G.-B. & Wigger, B. U. (2017). Status effects of the German Excellence Initiative. *International Journal of Economics and Finance*, *9*(3), 177. https://doi.org/10.5539/ijef.v9n3p177

Buenstorf, G. & Koenig, J. (2020). Interrelated funding streams in a multi-funder university system: Evidence from the German Exzellenzinitiative. *Research Policy*, *49*(3). https://doi.org/10.1016/j.respol.2020.103924

Cantwell, B., Marginson, S. & Smolentseva, A. (Eds). (2018). *High participation systems of higher education* (1st ed.). Oxford University Press.

Carayol, N. & Maublanc, F. (2025). Can money buy scientific leadership? The impact of excellence programs on German and French universities. *Research Policy*, *54*(2). https://doi.org/10.1016/j.respol.2024.105155

Cherry, G., Boland, A. & Dickson, R. (2024). *Doing a systematic review: A student's guide* (3rd ed.). SAGE Publications.

Civera, A., Lehmann, E. E., Paleari, S. & Stockinger, S. A. E. (2020). Higher education policy: Why hope for quality when rewarding quantity? *Research Policy*, *49*(8). https://doi.org/10.1016/j.respol.2020.104083

Clark, B. R. (1983). Work. In *The Higher Education System: Academic Organization in Cross-National Perspective* (pp. 28–71). University of California Press. https://www.jstor.org/stable/3324285?origin=crossref

Cohen, L., Manion, L. & Morrison, K. (2017). *Research Methods in Education* (8th ed.). Routledge. https://doi.org/10.4324/9781315456539

Connelly, B. L., Certo, S. T., Ireland, R. D. & Reutzel, C. R. (2011). Signaling Theory: A Review and Assessment. *Journal of Management*, *37*(1), 39–67. https://doi.org/10.1177/0149206310388419

Cooke, A., Smith, D. & Booth, A. (2012). Beyond PICO: The SPIDER Tool for Qualitative Evidence Synthesis. *Qualitative Health Research*, *22*(10), 1435–1443. https://doi.org/10.1177/1049732312452938

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE Publications.

Davis, K. & Moore, W. E. (1945). Some Principles of Stratification. *American Sociological Review*, *10*(2). https://doi.org/10.2307/2085643

Deppe, U., Lüdemann, J. & Kastner, H. (2018). Internationalisation, Stratification and Elite Formation in the German Education System. In *Elite Education and Internationalisation* (pp. 309–330). Springer International Publishing. https://doi.org/10.1007/978-3-319-59966-3_19

DFG. (2010). New Phase of the Excellence Initiative by the German Federal Government and States Begins. *Press Release*. https://www.dfg.de/en/service/press/press-releases/2010/pressemitteilung-nr-12

DFG. (2013). *Excellence Initiative at a Glance*. Deutsche Forschungsgemeinschaft. https://www.dfg.de/resource/blob/171164/exin-broschuere-en.pdf

DFG. (2019, June 16). *Excellence Initiative (2005-2017/19)*. Deutsche Forschungsgesellschaft. https://www.dfg.de/en/research-funding/funding-initiative/excellence-initiative

DFG. (2024). *Förderatlas 2024*. Deutsche Forschungsgemeinschaft.

DFG & WR. (2025, May 22). Decisions in the Second Round of Competition under the Excellence Strategy: Excellence Commission Selects 70 Clusters of Excellence. *Press Release*. https://www.dfg.de/en/service/press/press-releases/2025/press-release-no-10

Dixon-Woods, M., Bonas, S., Booth, A., Jones, D. R. & Miller, T. (2006). How can systematic reviews incorporate qualitative research? A critical perspective. *Qualitative Research*, *6*(1), 27–44. https://doi.org/10.1177/1468794106058867

Durst, A. K. (2021). Education as a Positional Good? Evidence from the German Socio-Economic Panel. *Social Indicators Research*, *155*(2), 745–767. https://doi.org/10.1007/s11205-021-02619-5

EPPI-Centre. (2003). *Review Guidelines for Extracting Data and Quality Assessing Primary Studies in Educational Resaerch. Version 0.9.7.* EPPI-Centre, Social Science Research Unit.

ExStra. (2024, October). *Antworten auf den Fragenkatalog des „Netzwerks Nachhaltige Wissenschaft“*. Exzellenzstrategie.

Fischer, M. & Kampkötter, P. (2017). Effects of German Universities' Excellence Initiative on Ability Sorting of Students and Perceptions of Educational Quality. *Journal of Institutional and Theoretical Economics*, *173*(4), 662–687. https://doi.org/10.1628/093245617X14816371560173

Frietsch, R., Schubert, T. & Rothengatter, O. (2017). *An analysis of the Excellence Initiative and its effects on the funded universities* (Studien Zum Deutschen Innovationssystem) [Working Paper]. Frauenhofer Institut.

Gawellek, B. & Sunder, M. (2016). *The German Excellence Initiative and Efficiency Change among Universities, 2001-2011* (Working Paper No. 142). University of Leipzig.

Gough, D. (2007). Weight of Evidence: A framework for the appraisal of the quality and relevance of evidence. *Research Papers in Education*, *22*(2), 213–228. https://doi.org/10.1080/02671520701296189

Gough, D., Oliver, S., & Thomas, J. (2017). *An introduction to systematic reviews* (2nd ed.). SAGE Publications.

Guo, J. (2019). Wettbewerbs-Metaphern im Exzellenzinitiative-Diskurs. *Muttersprache*, *129*(3), 203–219. https://shop.gfds.de/produkt/60133/

Hartmann, M. (2006). Die Exzellenzinitiative—Ein Paradigmenwechsel in der deutschen Hochschulpolitik. *Leviathan*, *34*(4), 447–465. https://doi.org/10.1007/s11578-006-0064-1

Hartmann, M. (2007). *Eliten und Macht in Europa: Ein internationaler Vergleich*. Campus Verlag.

Heinze, T., Habicht, I. M., Eberhardt, P. & Tunger, D. (2025). *Field size as a predictor of "excellence." The selection of subject fields in Germany's Excellence Initiative*. *20*(3). https://doi.org/10.1371/journal.pone.0300828

Higgins, J. & Thomas, J. (Eds). (2019). *Cochrane handbook for systematic reviews of interventions* (2nd ed.). Wiley-Blackwell.

Horstschräer, J. (2012). University rankings in action? The importance of rankings and an excellence competition for university choice of high-ability students. *Economics of Education Review*, *31*(6), 1162–1176. https://doi.org/10.1016/j.econedurev.2012.07.018

Humboldt, W. v. (1792). *Ideen zu einem Versuch, die Gränzen der Wirksamkeit des Staates zu bestimmen*.

IEKE. (2016). *Internationale Expertenkommission zur Evaluation der Exzellenzinitiative*. Internationale Expertenkommission zur Evaluation der Exzellenzinitiative.

Kehm, B. (2008). The German 'Excellence Initiative' and Its Role in Restructuring the National Higher Education Landscape. In D. Palfreyman, *Structuring Mass Higher Education: The Role of Elite Institutions* (1st ed.). Routledge. https://doi.org/10.4324/9780203889725

Kehm, B. (2013). To Be or Not to Be? The Impacts of the Excellence Initiative on the German System of Higher Education. In *Institutionalization of World-Class University in Global Competition* (pp. 81–97). Springer Netherlands. https://doi.org/10.1007/978-94-007-4975-7_6

Kerr, C. (2001). *The uses of the university* (5th ed.). Harvard University Press.

Koenig, J., Brenner, T. & Buenstorf, G. (2017). Regional effects of university funding: Excellence at the cost of regional disparity? *Review of Regional Research*, *37*(2), 111–133. https://doi.org/10.1007/s10037-017-0117-8

Kracke, N., Schwabe, U. & Buchholz, S. (2024). Neuer Bildungstrichter: Trotz Akademisierungsschub immer noch ungleicher Zugang zur Hochschule. In *DZHW Brief 02/2024* (Version 1.0, DZHW Brief). German Centre for Higher Education Research and Science Studies. https://doi.org/10.34878/2024.02.DZHW_BRIEF

Krause-Pilatus, A. & Schüller, S. (2014). Evidence and Persistence of Education Inequality in an Early-Tracking System: The German Case. *Scuola Democratica*, *2*.

Lang, S. & Schwabe, U. (2023). Graduates' early wages in Germany: Does a university's status of excellence make the difference? *Research in Social Stratification and Mobility*, *83*. https://doi.org/10.1016/j.rssm.2023.100765

Lauder, H., Brown, P. & Cheung, S. Y. (2020). *The death of human capital? Its failed promise and how to renew it in an age of disruption*. Oxford University Press.

Lehmann, E. E. & Stockinger, S. A. E. (2019). Entrepreneurship in Higher Education: The impact of competition-based policy programmes exemplified by the German Excellence Initiative. *Higher Education Quarterly*, *73*(1), 70–84. https://doi.org/10.1111/hequ.12188

Lepori, B. & Jongbloed, B. W. A. (2018). National resource allocation decisions in higher education: Objectives and dilemmas. In B. Cantwell, H. Coates, & R. King (Eds), *Handbook on the Politics of Higher Education* (pp. 211–228). Edward Elgar Publishing. https://doi.org/10.4337/9781786435026

Lewin, S., Booth, A. & Glenton, C. (2018). Applying GRADE-CERQual to qualitative evidence synthesis findings: Introduction to the series. *Implementation Science*, *13*(1). https://doi.org/10.1186/s13012-017-0688-3

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

Marginson, S. (2016). The worldwide trend to high participation higher education: Dynamics of social stratification in inclusive systems. *Higher Education*, *72*(4), 413–434. https://doi.org/10.1007/s10734-016-0016-x

Marginson, S., Cantwell, B., Platonova, D. & Smolentseva, A. (2023). Intrinsic and extrinsic outcomes of higher education. In *Assessing the Contributions of Higher Education* (pp. 12–37). Edward Elgar Publishing. https://doi.org/10.4337/9781035307173.00010

Mayer, K. U., Müller, W. & Pollak, R. (2007). Germany: Institutional Change and Inequalities of Access in Higher Education. In *Stratification in Higher Education* (pp. 240–265). Stanford University Press. https://doi.org/10.1515/9780804768146-012

McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V. & Lefebvre, C. (2016). PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *Journal of Clinical Epidemiology*, *75*, 40–46. https://doi.org/10.1016/j.jclinepi.2016.01.021

McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, *22*(3), 276–282.

Menter, M., Lehmann, E. E. & Klarl, T. (2018). In search of excellence: A case study of the first excellence initiative of Germany. *Journal of Business Economics*, *88*(9), 1105–1132. https://doi.org/10.1007/s11573-018-0909-5

Mergele, L. & Winkelmayer, F. (2022). The Relevance of the German Excellence Initiative for Inequality in University Funding. *Higher Education Policy*, *35*(4), 789–807. https://doi.org/10.1057/s41307-021-00233-1

Merton, R. K. (1968a). *Social theory and social structure*. Free Press.

Merton, R. K. (1968b). The Matthew Effect in Science: The reward and communication systems of science are considered. *Science*, *159*(3810), 56–63. https://doi.org/10.1126/science.159.3810.56

Möller, T., Schmidt, M. & Hornbostel, S. (2016). Assessing the effects of the German Excellence Initiative with bibliometric methods. *Scientometrics*, *109*(3), 2217–2239. https://doi.org/10.1007/s11192-016-2090-3

Moon, K. & Blackman, D. (2014). A Guide to Understanding Social Science Research for Natural Scientists. *Conservation Biology*, *28*(5), 1167–1177. https://doi.org/10.1111/cobi.12326

Müller, L. & Schneijderberg, C. (2020). *The Emergence of the Organizational Academic Profession: Vertical differentiation of German universities and the research-teaching nexus*. Research Institute for Higher Education, Hiroshima University. https://doi.org/10.15027/48954

Münch, R. (2009). Stratifikation der Hochschullandschaft: Zwischen Leistungswettbewerb und Machtlogik. *Zeitschrift für Pädagogik*, *55*(2), 258–273. https://doi.org/10.25656/01:4249

Neumann, A. (2015). *Die Exzellenzinitiative: Deutungsmacht und Wandel im Wissenschaftssystem*. Springer.

Newman, J. H. C. (1982). *The Idea of a University*. University of Notre Dame Press. https://doi.org/10.2307/j.ctvpj73nm

Oancea, A. (2019). Research governance and the future(s) of research assessment. *Palgrave Communications*, *5*(1). https://doi.org/10.1057/s41599-018-0213-6

Paasi, A. (2005). Globalisation, Academic Capitalism, and the Uneven Geographies of International Journal Publishing Spaces. *Environment and Planning A: Economy and Space*, *37*(5), 769–789. https://doi.org/10.1068/a3769

Page, M. J., McKenzie, J. E., Bossuyt, P. M. & Boutron, I. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

Palfreyman, D. & Tapper, T. (Eds). (2009). *Structuring mass higher education: The role of elite institutions*. Routledge.

Petticrew, M. & Roberts, H. (2006). *Systematic Reviews in the Social Sciences: A Practical Guide* (1st ed.). Wiley. https://doi.org/10.1002/9780470754887

PROSPERO. (2025). *PROSPERO Search: Excellence Initiative Germany* [Online post]. https://www.crd.york.ac.uk/PROSPERO/search

Protsch, P. & Solga, H. (2016). The social stratification of the German VET system. *Journal of Education and Work*, *29*(6), 637–661. https://doi.org/10.1080/13639080.2015.1024643

Prowe, G., Schneider, J., Morris, R. & Sawers, R. (2009). *Oxford Essential German Dictionary* (1st ed.). Oxford University Press.

Reay, D., David, M. E. & Ball, S. J. (2005). *Degrees of choice: Class, race, gender, and higher education*. Trentham Books.

Reimer, D. & Pollak, R. (2010). Educational Expansion and Its Consequences for Vertical and Horizontal Inequalities in Access to Higher Education in West Germany. *European Sociological Review*, *26*(4), 415–430. https://doi.org/10.1093/esr/jcp029

Rigney, D. (2010). *The Matthew effect: How advantage begets further advantage*. Columbia University Press.

Robson, J. (2023). Graduate employability and employment. In *Assessing the Contributions of Higher Education* (pp. 177–196). Edward Elgar Publishing. https://doi.org/10.4337/9781035307173.00019

Salmi, J. (2012). *The Challenge of Establishing World-Class Universities*. World Bank.

Salmi, J. & Altbach, P. G. (Eds). (2011). *The road to academic excellence: The making of world-class research universities*. World Bank. https://doi.org/10.1596/978-0-8213-8805-1

Schäfer, G. (2024). What is higher education to contemporary students in Germany? *Higher Education Quarterly*, *78*(1), 268–282. https://doi.org/10.1111/hequ.12464

Schäfer, G. & Walgenbach, K. (2024). Navigating academic prestige: University choice and distinction of German upper milieu students. *European Journal of Higher Education*, *14*, 109–126. https://doi.org/10.1080/21568235.2024.2386936

Shattock, M. (2010). Governing universities globally: Organisations, regulation and rankings. *London Review of Education*, *8*(3). https://doi.org/10.18546/lre.08.3.12

Shattock, M. & Horvath, A. (2020). The decentralisation of the governance of UK higher education: The effects of devolution to Scotland, Wales and Northern Ireland, and on England. *Policy Reviews in Higher Education*, *4*(2), 164–178. https://doi.org/10.1080/23322969.2020.1751688

Sorkin, D. (1983). Wilhelm Von Humboldt: The Theory and Practice of Self-Formation (Bildung), 1791-1810. *Journal of the History of Ideas*, *44*(1). https://doi.org/10.2307/2709304

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, *87*(3). https://doi.org/10.2307/1882010

Teichler, U. (1996). Comparative higher education: Potentials and limits. *Higher Education*, *32*(4), 431–465. https://doi.org/10.1007/bf00133257

Teichler, U. (2008). Diversification? Trends and explanations of the shape and size of higher education. *Higher Education*, *56*(3), 349–379. https://doi.org/10.1007/s10734-008-9122-8

Teichler, U. (2009). Types, Ranks and Profiles: The Patterns and Causes of Diversity in Higher Education. *Journal of Agriculture and Rural Development in the Tropics and Subtropics Supplement*.

Tenorth, H.-E. (2013). Bildung zwischen Ideal und Wirklichkeit. *Bundeszentrale Für Politische Bildung*. https://www.bpb.de/themen/bildung/dossier-bildung/146201/bildung-zwischen-ideal-und-wirklichkeit/#node-content-title-3

Thomas, J. & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*(1). https://doi.org/10.1186/1471-2288-8-45

Tight, M. (2016). Examining the research/teaching nexus. *European Journal of Higher Education*, *6*(4), 293–311. https://doi.org/10.1080/21568235.2016.1224674

Tomlinson, M. & Watermeyer, R. (2022). When masses meet markets: Credentialism and commodification in twenty-first century Higher Education. *Discourse: Studies in the Cultural Politics of Education*, *43*(2), 173–187. https://doi.org/10.1080/01596306.2020.1814996

Tong, A., Flemming, K., McInnes, E., Oliver, S. & Craig, J. (2012). Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. *BMC Medical Research Methodology*, *12*(1). https://doi.org/10.1186/1471-2288-12-181

Trow, M. (1973). *Problems in the Transition from Elite to Mass Higher Education*. Carnegie Commission on Higher Education.

Van De Werfhorst, H. G. & Mijs, J. J. B. (2010). Achievement Inequality and the Institutional Structure of Educational Systems: A Comparative Perspective. *Annual Review of Sociology*, *36*(1), 407–428. https://doi.org/10.1146/annurev.soc.012809.102538

Walberg, H. J. & Tsai, S.-L. (1983). 'Matthew' Effects in Education. *American Educational Research Journal*, *20*(3). https://doi.org/10.2307/1162605

Watermeyer, R. & Olssen, M. (2016). 'Excellence' and Exclusion: The Individual Costs of Institutional Competitiveness. *Minerva*, *54*(2), 201–218. https://doi.org/10.1007/s11024-016-9298-5

Werner, H., Heinz-Hermann, K. & Jasmin, L. (2022). *Exklusive Bildung und neue Ungleichheit. Ergebnisse der DFG-Forschergruppe 'Mechanismen der Elitebildung im deutschen Bildungssystem'*. https://doi.org/10.25656/01:24166

Wissenschaftsrat. (2005, July 18). *Bund-Länder-Vereinbarung gemäß Artikel 91 b des Grundgesetzes (Forschungsförderung) über die Exzellenzinitiative des Bundes und der Länder zur Förderung von Wissenschaft und Forschung an deutschen Hochschulen*. Wissenschaftsrat. https://www.wissenschaftsrat.de/download/archiv/ExIni_BLK-Vereinbarung_91b

Wissenschaftsrat. (2020). *Excellence Strategy | Excellence Initiative*. Wissenschaftsrat.

Wohlrabe, K., Bornmann, L., de Moya Anegon, F. & Gralka, S. (2018). Wie effizient forschen Universitäten in Deutschland, deren Zukunftskonzepte im Rahmen der Exzellenzinitiative ausgezeichnet wurden? *Ifo Institute - Leibniz Institute for Economic*. https://ideas.repec.org/p/ces/ifowps/_253.html

ZSB Halle. (2022, March 14). *Mechanisms of Elite Formation in the German Educational System (FOR 1612)*. https://www.zsb.uni-halle.de/forschungsprojekte/2503071_2617909/mechanismen_der_elitebildung/

8. Appendix

8.1. List of ExIn Universities (2006-2017)

The figure originally presented here cannot be made freely available via ORA because of copyright.

The figure was sourced at DFG. (2013). *Excellence Initiative at a Glance*. Deutsche Forschungsgemeinschaft. https://www.dfg.de/resource/blob/171164/exin-broschuere-en.pdf

8.2. Search Query Strings

All searches were conducted on June 21, 2025, and all searches were last re-run on June 27, 2025.

8.2.1. Web of Science Search String

TS=(("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung) AND (Germany OR German OR Deutschland OR Deutsch) AND ("Vertical Stratification" OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND ("Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) AND (English OR German) AND (Article))

8.2.2. SCOPUS Search String

TITLE-ABS-KEY (("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR exzellenzstrategie OR exzellenzinitiative OR exzellenzcluster OR "Exzellenz Cluster" OR excellence OR exzellenz OR "Education Policy" OR "University Reform" OR bildungspolitik OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR forschungsgelder OR hochschulfinanzierung) AND (germany OR german OR deutschland OR deutsch) AND ("Vertical Stratification" OR stratification OR "Institutional Stratification" OR hierarchy OR hierarchical OR "Vertical Differentiation" OR differentiation OR "Elite Formation" OR competition OR competitiveness OR inequality OR rankings OR enrolment OR awards OR reputation OR quality OR status OR achievement OR "Academic Performance" OR concentration OR excellence OR elite OR bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR elitenbildung OR differenzierung OR hierarchisierung OR hierarchie OR wettbewerb OR stratifizierung OR qualität OR konzentration OR ungleichheiten OR disparitäten OR produktivität OR publikationen OR forschungsoutput) AND ("Higher Education" OR universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR hochschulen OR universitäten OR universität OR forschung OR hochschulbildung OR hochschullandschaft OR hochschulsektor)) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "German")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "bk"))

8.2.3. ProQuest Search String

(abstract("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung) AND abstract(Germany OR German OR Deutschland OR Deutsch) AND abstract("Vertical Stratification" OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND abstract("Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) AND PEER(yes)) OR (subject("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung) AND subject(Germany OR German OR Deutschland OR Deutsch) AND subject("Vertical Stratification" OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND subject("Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) AND PEER(yes)) OR (title("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung) AND title(Germany OR German OR Deutschland OR Deutsch) AND title("Vertical Stratification" OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND title("Higher Education" OR Universities OR "Higher

Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) AND PEER(yes) AND la.exact (“English”) OR la.exact (“German”))

8.2.4. EBSCOhost Search String

Consulted Databases were limited to Educational Research Abstracts Online and British Education Index, as other relevant EBSCOhost databases were already included in the other consulted databases.

TI ("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants” OR Forschungsgelder OR Hochschulfinanzierung) AND TI (Germany OR German OR Deutschland OR Deutsch) AND TI (“Vertical Stratification” OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND TI (“Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) OR SU ("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR "Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants” OR Forschungsgelder OR Hochschulfinanzierung) AND SU (Germany OR German OR Deutschland OR Deutsch) AND SU (“Vertical Stratification” OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND SU (“Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) OR AB ("Excellence Initiative" OR "Excellence Strategy" OR "Clusters of Excellence" OR "Excellence Clusters" OR Exzellenzstrategie OR Exzellenzinitiative OR Exzellenzcluster OR "Exzellenz Cluster" OR Excellence OR Exzellenz OR "Education Policy" OR "University Reform" OR Bildungspolitik OR Excellence OR Exzellenz OR "Education Finance" OR

"Research Funding" OR "University Funding" OR "Federal Funding" OR "Institutional Funding" OR "Federal Grants" OR "Research Grants" OR Forschungsgelder OR Hochschulfinanzierung) AND AB (Germany OR German OR Deutschland OR Deutsch) AND AB ("Vertical Stratification" OR Stratification OR "Institutional Stratification" OR Hierarchy OR Hierarchical OR "Vertical Differentiation" OR Differentiation OR "Elite Formation" OR Competition OR Competitiveness OR Inequality OR Rankings OR Enrolment OR Awards OR Reputation OR Quality OR Status OR Achievement OR "Academic Performance" OR Concentration OR Excellence OR Elite OR Bibliometrics OR "Research Productivity" OR "Research Output" OR "Student Recruitment" OR Elitenbildung OR Differenzierung OR Hierarchisierung OR Hierarchie OR Wettbewerb OR Stratifizierung OR Qualität OR Konzentration OR Ungleichheiten OR Disparitäten OR Produktivität OR Publikationen OR Forschungsoutput) AND AB ("Higher Education" OR Universities OR "Higher Education Institutions" OR "Research Institutions" OR "Scientific Research" OR "Academic Research" OR Hochschulen OR Universitäten OR Universität OR Forschung OR Hochschulbildung OR Hochschullandschaft OR Hochschulsektor) AND (LA English OR LA German) AND PT Acaademic Journal)

8.3. Within-Study Presentation of Descriptive Results

Table 6: Descriptive Results of Included Studies Comparison

Study	Funding Acknowledgement	Quant or Qual	Funding Line(s) of ExIn	Funding Rounds	Publication Year
1	Missing	Mixed Methods	Clusters of Excellence	1st	2016
2	Missing	Quantitative (Models)	No Differentiation	2nd Funding Period	2025
3	Missing	Qualitative	Full ExIn	1st and 2nd	2019
4	Missing	Quantitative (Models)	Future Concept Strategy	1st, 2nd, and 3rd	2016
5	Missing	Quantitative (Descriptive)	No Differentiation	1st and 2nd	2018
6	No Specific Funding	Quantitative (Descriptive)	Future Concepts and CoEs	1st and 2nd	2025
7	No Specific Funding	Quantitative (Models)	Full ExIn	1st	2023
8	No-Concerns Statement	Quantitative (Descriptive)	Full ExIn	1st and 2nd	2020
9	Missing	Quantitative (Models)	Future Concept Strategy	1st Funding Period	2019
10	Missing	Mixed Methods	Full ExIn	1st	2018
11	No-Concerns Statement	Quantitative (Models)	Future Concept Strategy	1st	2020
12	Missing	Mixed Methods	Full ExIn	1st	2009
13	DFG	Qualitative	Future Concept Strategy	1st, 2nd, and 3rd	2024
14	Missing	Quantitative (Models)	Full ExIn	1st and 2nd	2017
15	German Federal Ministry of Education and Research	Mixed Methods	Future Concept Strategy	1st and 2nd	2020
16	No-Concerns Statement	Quantitative (Descriptive)	Future Concepts and CoEs	1st and 2nd	2021
17	German Federal Ministry of Education and Research	Quantitative (Models)	Full ExIn	1st	2012
18	German Federal Ministry of Education and Research	Quantitative (Descriptive)	Full ExIn	1st and 2nd	2017
19	Funded by GWK	Mixed Methods	Full ExIn	1st and 2nd	2016

8.4. Translation of Extracted Quotes for Chapter 4

All quotes used in the analysis in German are going to be translated and listed below in its English version. For adherence to rigour and originality of the point made, the analysis includes the original quote in German, when applicable. All translations have been facilitated by the researcher given fluency in both English and German. To ensure methodological rigour, the translations have been cross-checked with the language processing software (DeepL), idiom verification, and the Oxford German-English Dictionary (Prowe et al., 2009).

Table 7: Translation of German Quotes

Quote	Translation	Location in Text	Cited From
"Offen bleibt auch die Frage, inwieweit die Schwerpunktsetzung nachhaltig ist. Manche Universitäten setzen für die künftige Finanzierung ihrer Forschungsschwerpunkte auf eine Fortsetzung der Geldflüsse aus der nächsten Phase der Exzellenzinitiative". (IEKE, 2016, p. 19)	The question remains to what extent this generation of research focus profiles is sustainable in the long run. Some universities rely on continued flow of money from the next phase of the Excellence Initiative to maintain their research profiles.	Chapter 4.2.1., p. 27	IEKE. (2016). *Internationale Expertenkommission zur Evaluation der Exzellenzinitiative—Endbericht*. Internationale Expertenkommission zur Evaluation der Exzellenzinitiative.
"Es wird auf diesem Wege eine Zweiklassen-Gesellschaft der Forschung konstruiert, weil bereits die nächsten Rankings bestätigen werden, was zuvor prophezeit wurde: dass sich einige wenige Universitäten bereits durch eine hohe Forschungsintensität auszeichnen, die der Sichtbarkeit des Forschungsstandorts Deutschland zuliebe auch weiterhin einer besonderen finanziellen Unterstützung bedürfen".	In this way, a two-class society of research is constructed, because the next rankings will confirm, what has previously been foretold: where some few universities are already distinguished through high research intensity, which, for the sake of the visibility of German as a research location, will continue to require special financial support.	Chapter 4.2.1., p. 28	Münch, R. (2009). Stratifikation der Hochschullandschaft: Zwischen Leistungswettbewerb und Machtlogik. *Zeitschrift für Pädagogik*, *55*(2), 258–273. https://doi.org/10.25656/01:4249
"Ein Status der sozial konstruierten Exzellenz wird durch die entsprechenden Mechanismen der Reproduktion gefestigt: Bereits vorhandenes Kapital schafft den Universitäten Wettbewerbsvorteile, mit denen sich Monopolrenten erzielen lassen. Den Erzeugnissen der besonders reputierten Institutionen kommt dann automatisch eine größere Aufmerksamkeit zu als den Erzeugnissen ihrer Konkurrenten."	A status of socially constructed excellence is consolidated through according mechanisms of reproduction: Previously available capital yields competition advantages for universities, with which monopoly rents can be reached. The products of highly reputable institutions then automictically accrue higher attention than the products of its competitors.	Chapter 4.2.4., p. 34	Münch, R. (2009). Stratifikation der Hochschullandschaft: Zwischen Leistungswettbewerb und Machtlogik. *Zeitschrift für Pädagogik*, *55*(2), 258–273. https://doi.org/10.25656/01:4249

8.5. Mind-Map for Preparation of Analysis

For my personal understanding of the codes at hand and the interaction between different themes and codes, this mind map was derived to present an interactive overview of how the different codes condition each other. All the indicators of vertical stratification cannot be seen in isolation, and instead they impact each other. While stimulation loops imply that this interaction can have positively re-enforcing effects, where strong performance in one indicator stimulates strong performance in other indicators, this same dynamic may also be interpreted as strong performance in one indicator being necessary for achieving a strong performance in another, thereby suggesting the stratification effect based on pre-existing capabilities and hierarchies, that the thematic findings of the analysis have shown.

Figure 4: Thematic Map of Interconnectivity between Indicators of Vertical Stratification

