Trade-offs or Complements? Balancing Diversified Stakeholder Expectations, Institutional Pressures, and Functional Demands in the Strategic Management of Business Schools

Anu Ojala

Abstract
While scholars and practitioners have warned that business schools are losing their edge in creating and disseminating relevant knowledge in the crosscurrent of environmental demands, the management and organization of higher education institutions (HEIs) have been described as "herding cats" and "organized anarchy". The teaching–research nexus forms the cornerstone of academic organization and has a quintessential role in strategic management. However, despite the growing body of literature on HEIs' teaching–research nexus, organization, and environmental changes, few studies have examined the interplay of the three. Therefore, this study combines two contingency-theory views to examine the effects of institutional pressures on the strategic latitude of business schools in balancing the nexus. How the interplay of institutional pressures and diversified stakeholder demands affect HEIs' ability to manage the nexus plays a vital role in how effectively universities can fulfill their mission and how effective public policy interventions and reforms are.

Keywords:
Teaching-research nexus, strategic management, higher education, management education and research, performance trade-off, complementarity, business schools, competition, data envelopment analysis, efficiency analysis, contingency theory, functional equivalence, equifinality

---

Anu Ojala is a Doctoral Candidate of Strategy and Entrepreneurship at the University of Jyväskylä, School of Business and Economics, Finland.
The author would like to thank the editor and anonymous reviewers for the constructive comments on the manuscript, as well as Juha-Antti Lamberg and Kimmo Alajoutsijärvi for their insightful comments and guidance throughout the research process. This research was supported by the Foundation for Economic Education and Jenny and Antti Wihuri Foundation.

1. Introduction

The teaching–research nexus is the defining characteristic of academic institutions. The mutually reinforcing relationship between the two is the cornerstone of the academic ethos. The functional nexus between knowledge creation and dissemination is seen as vital to high-quality universities and the competitiveness of the modern societies (for a review, see Horta, Dautel & Veloso, 2012; Malcolm, 2014). However, throughout its history, the management of this nexus has been influenced by multiple institutional logics stemming from the diverse environmental expectations. The shifts in the environmental pressures emphasizing one function over another have enhanced tensions between the two, with a potential to convert the complementarity into a trade-off relationship. These tensions have grown more evident in the past two decades, as higher education (HE) policies and strategies have evolved globally to rely on steering through competition as a route to more effective systems and operations (Marginson, 2013). These developments have led to the separation of teaching and research as independent production functions and, furthermore, have led both scholars and practitioners to issue warnings that conflicting environmental pressures challenge the complementarity of teaching and research.

In business schools (b-school), this discourse has culminated in criticism of the legitimacy and relevance of management education and research (Pettigrew & Starkey, 2016), which has challenged the complementarity of teaching and research by claiming that b-schools have downplayed their educational, societal, and knowledge impact, with a heightened emphasis on research productivity focusing on academic impact and ranking positions (see Henisz, 2011; Kieser, Nicolai & Seidl, 2015; Morgeson & Nahrgang, 2008). The underlying notion both in the b-school criticism and earlier studies on the teaching–research nexus is that excess emphasis on one activity will impede achievement in the other (Cadez, Dimovski & Zaman Groff, 2017). Teaching, research, practical relevance, and the societal impact of b-schools are often perceived as products of a zero-sum game (Aguinis, Shapiro, Antonacopoulou & Cummings, 2014). These views include a contingency assumption that the teaching–research nexus forms an organizational construct held together by mutual dependence, which is difficult and risky to disturb.

The literature describes a clear conflict between the institutional (DiMaggio & Powell, 1983) and contingency fit (Gresov & Drazin, 1997) related to the teaching–research nexus: b-schools must balance institutional isomorphic pressures of professional, academic, and societal relevance with conflicting functional demands for teaching and research in their search for legitimacy and impact (Pettigrew & Starkey, 2016). The institutional isomorphism and environmental pressures generate goal ambiguity, which has been argued to distract b-schools from their core missions (Alajoutsijärvi, Juusola & Lamberg, 2014). Institutional pressures emphasizing research performance and ranking positions are seen to exacerbate tension and impede the realization of an effective balance between teaching and research (Lewicki & Bailey, 2009). Both scholars and practitioners have warned that heightened emphasis on specific performance measures may lead to trade-offs between teaching and research, rigor and relevance, teaching and learning (e.g. Adler & Harzing, 2009; Aguinis et al., 2014; Bachrach et al., 2017; Ghoshal, 2005). The emphasis on research is seen to marginalize both the practical and the educational relevance of b-schools through the monopolization of measures of status and prestige in HE globally (Pearce & Huang, 2012). On the other hand, "big business" in MBA education is judged to eclipse the academic and practical impact of b-schools (Pfeffer & Fong, 2002: 78). Accordingly, both scholars and practitioners have questioned how conflicts related to the teaching–research nexus should be managed and whether increasing demands for competitiveness in the sector exacerbate conflict at the organizational level.

While the research has evolved significantly from the search for objective measures to the examination of the teaching–research nexus as part of organizational practices in higher education institutions (HEIs), much of the research has focused on the topic at the individual or systemic level, with less attention paid to the interplay of institutional pressures (Greenwood, Raynard, Kodeih, Micelotta & Loundsbury, 2011) and school-level strategic management in balancing the nexus. Therefore, to enhance our understanding of the HEIs' strategic management, this study combines two views of contingency theory, the idea of complementarity (Siggelkow, 2002) and the theory of functional equivalence (Gresov & Drazin, 1997), in examining the combination of conflicting functional demands, institutional pressures emphasizing competitiveness, and the strategic latitude available to HEIs in balancing the nexus. Drawing upon these two strands of research, this study examines whether the increasing emphasis of governmental authority and institutional environment on the research performance in the publicly funded b-school system leads to performance trade-offs between teaching and research indicating limited latitude in balancing the nexus at the school level, and thereafter substantiating the concerns related to the ability of b-schools to leverage teaching and research synergistically while facing conflicting functional demands and institutional pressures. This is done by evaluating and explicating the interplay through the analysis of teaching and research performance and institutional pressures related to the nexus in Finnish university b-schools (BSCs) between 1994 and 2009. The analysis considers the link between field-level change pressures and organizational strategy, i.e. how institutional pressures emphasizing a change from teaching-orientated b-school system towards more competitive research-oriented institutions and a new governance regime instituting competition and strategizing among HEIs reflect b-schools' ability to balance the nexus. In so doing, this study contributes to HE and strategy research by shedding light on the triad of institutional pressures, conflicting functional demands, and organizational strategy in balancing teaching–research nexus from the perspective of both institutional strategies and public-policy steering through a sample of b-schools.

2. Theoretical Framework, Industry Setting, and Hypotheses

2.1 Teaching–research Nexus: Trade-offs or Complements?

Teaching informed by research is deemed vital to the dissemination of research-based knowledge to future leaders and managers. Scholarly teaching is seen to provide an important channel for the spread of the latest ideas, research skills, research-based practices, and social consciousness in the field of management (Balkin & Mello, 2012; Burke & Rau, 2010; Walsh, 2011). Yet the relationship between teaching and research is considered complex due to the variety of conditions and contingencies enhancing or impeding the synergistic relationship between the two, including: competing time, resource, and knowledge demands; personal characteristics and beliefs of both faculty members and students; professional and disciplinary cultures; institutional and administrative strategies and policy; and diversified stakeholder expectations (for a review, see Burke & Rau, 2010; Henisz, 2011; Malcom 2014). The complexity of the relationship has culminated in a debate and inconsistent findings in studies on the nature of the nexus, its direction, and strength.

Despite an institutionalized historical ideal, which perceives teaching and research as complementary and mutually reinforcing activities in universities (Clark, 1997; Robertson & Bond, 2005), the potential trade-offs between teaching and research are widely acknowledged factors delineating the everyday operations and strategic choices of HEIs (Burke & Rau, 2010; Horta et al., 2012; Gautier & Wauthy, 2007). Most academics engaged in both teaching and research concede that the relationship between these two is complementary but not necessarily mutually reinforcing. Earlier research has shown that the nature of the nexus is heavily dependent on the context and measures. Quantitative and qualitative studies have yielded conflicting results regarding the nature and direction of the relationship, ranging from no relation to integrated, synergistic, or trade-off relationships (e.g. Marsh & Hattie, 2002; Gallbright & Merill, 2012; Robertson, 2007; Taylor, 2008).

For example, the results of Horta et al. (2012) and Robertson (2007) indicate a trade-off between teaching and research related to the allocation of time. The activities are deemed mutually supportive through the exchange of ideas 'linking student learning with the learning of academics (research)' (Robertson 2007: 548; Simons & Ellen, 2007). Durning and Jenkings (2005) show that the effective integration of teaching and research is essential for students to develop higher-level academic and professional skills. Teaching and research can be leveraged synergistically in graduate-level instruction, especially when students are integrated into the faculty's research activities (Horta et al., 2012). Moreover, Gallbright and Merill (2012) associate the higher research activity of faculty with student learning outcomes. However, studies on faculty and student perceptions of the complementarity of teaching and research suggest that the value of the active research engagement of a lecturer is higher in graduate-level teaching than bachelor-level (e.g. Arnold, 2008; Geschwind & Broström, 2015; Taylor, 2007).

In b-schools, competition in MBA rankings (Rubin & Dierdorff, 2009) and research (Adler & Harzing, 2009; Martin, 2012) are seen to conflict with the practical relevance and impact of management education and research. Furthermore, studies on the nexus have shown that reward and funding structures differ between teaching and research, which creates competitive tension between them (Durning & Jenkins, 2005; Halse, Deane, Hobson, & Jones, 2007; Robertson, 2007). There seems to be a disparity between teaching and research in terms of diversified stakeholder demands. Research is perceived as more reputable and meritorious in academia than teaching while, from the professional perspective, bad management theories are seen to destroy good management practice (Ghoshal, 2005; Horta et al, 2012; Khurana, 2007).

The literature reports a conflict between the institutional pressures and functional demands imposed on teaching and research. Where the compliance of an organization, its operations, and structure with the institutional criteria leading to legitimacy and external support (institutional fit) conflicts with the contingency fit, i.e. the alignment with the task environment (Donaldson, 2008). Discrepancy between the demands of the task environment, where management education is the main contributor to the institutional mission and resourcing of b-schools, and institutional pressures emphasizing specialized research performance have raised concerns about the effectiveness, impact, and relevance both of management education and research (Pettigrew & Starkey, 2016). Paradoxically, the diversified stakeholder demands related to management education and research are often described as exclusive (for a review, see Bartunek & Rynes, 2014; Henisz, 2011), while leveraging the pluralistic nature of the b-school constituencies is acknowledged as a way forward in developing b-schools to meet the current and future challenges of management education and research (Aguinis et al., 2014; Bartunek & Rynes, 2014; Lewis, 2017).

2.2. Diversified Demands, Organizational Responses, and Performance

Contingency theory is one of the classic theoretical approaches applied in studying the effects of environmental conditions, pressures, and opportunities on organizational performance (Van de Ven, Ganco & Hinings, 2013). For this study, it provides a starting point for the analysis of the effects of the conflicting demands and pressures described earlier. At the heart of the theory is the proposition that the performance outcome of an organization is contingent on the fit between the organizational design and environmental conditions (Donaldson, 2008). While early works in contingency theory have been criticized for disregarding the dynamism and complexity of both intra- and inter-organizational environments, later accounts of the theory have taken a more holistic and dynamic approach to organizational settings (Van de Ven et al., 2013). In contrast to the earlier views, these studies propose that, instead of one optimal fit, an organization has more than one effective option in designing strategies to cope with conflicting functional demands and environmental contingencies (Gresov & Drazin, 1997; Payne, 2006). The configuration and complementarity perspectives are both representatives of this development, where the examination of the fit between the organizational design and environmental demands transcends a single design-contingency pair, hence providing a more realistic view of the multidimensional reality of organizations. This study focuses on two specific streams within these views: the *theory of functional equivalence*, relating to the configuration view; and the *idea of substituting and complementing activities*, relating to the complementarity view (Gresov & Drazin, 1997; Porter & Siggelkow, 2008; Siggelkow, 2002, 2011).

The configuration view (Drazin & Van de Ven, 1985) sees fit as a multidimensional conformity between an organization's structural characteristics and environmental contingencies. To achieve high performance, an organization must focus on multiple intra- and inter-organizational configurations and contingency relationships. While there is more than one effective way to organize, organizational performance is dependent on complex interactions among the intra- and inter-organizational elements (Hargrave & Van de Ven, 2017) bringing about trade-offs that limit the strategic choices available to management (Child, 1972; Van de Ven et al., 2013). Conflicting functional and environmental demands, and limited latitude in organizational design, propose performance trade-offs between the activities of organization (Gresov & Drazin, 1997). Yet perceptive balancing between the intra- and inter-organizational pressures and demands affords organizations competitive and performance advantages (Porter & Siggelkow, 2008; Siggelkow, 2002, 2011; Volberda et al., 2012).

Interaction between the activities of an organization forms the core of the complementarity view on the contingency theory of organizations (Levinthal, 1997; Milgrom & Roberts, 1995). In this view, an organization's the activities are considered complements when investment in activity results in an improvement in the performance of its counterpart, and as substituting in a trade-off situation where an investment in activity results in decrease in the other (Milgrom & Roberts, 1990; Siggelkow, 2011). The configuration and complementarity perspectives have a common approach to the antecedents of organizational performance. According to these views, good performance results from orchestrating the whole rather than tweaking a single aspect of a system. Further, the complementarity view incorporates competitive advantage, stemming from the complex interaction among an organization's activities in the interplay with organizational structure and environmental demands (Porter & Siggelkow, 2008; Siggelkow & Levinthal, 2003), and the strategic importance of the managerial capability to discern complements and substitutes among the activities (Siggelkow, 2002).

2.3. Synthesis of Configuration and Complementary Views

Both the configuration and complementarity perspectives view organizations as holistic systems of interdependent elements (Massini & Pettigrew, 2003). Accordingly, the study adopts a view where efficiency differences are not solely dependent on fit between the external contingencies and organizational structure and thus are affected by the interaction between the organization's activities and strategic choices available to management defined by this interaction. Whether the activities are complements or substitutes plays an important role in an organization's performance outcome (Siggelkow, 2002). The analysis of this study begins by combining Gresov and Drazin's (1997) theory of functional equivalence with the idea of substituting and complementing activities (Siggelkow, 2002). Through this combination, the theory of complementing and substituting activities of the organization is seen to overlap with the classification of Gresov and Drazin (1997: 409), where the high level of conflict in the functional demands set by the environment and the constrained latitude in organizational design suggest performance trade-offs between an organization's activities. However, there are different strategic options or paths available to management depending on how flexibly and perceptively it can balance strategy and organizational design to meet the diversified organizational and environmental demands. These are *simple*, *optimal*, *suboptimal*, and *configurational* strategy settings, presented in Figure 1.

In *simple* and *optimal* settings, conflict between functional demands and institutional pressures is at a level unlikely to affect the organization's ability to perform effectively. The *simple* setting would, for example, represent a teaching-orientated b-school with an organizational design aligned to support teaching performance as a dominant activity. In the *optimal* setting, the organization faces limited conflict between the dominant activities. Performance trade-offs between the activities are possible but an organization has latitude in its design to gear activities efficiently. In this setting, an organization would be able to achieve high performance in both activities

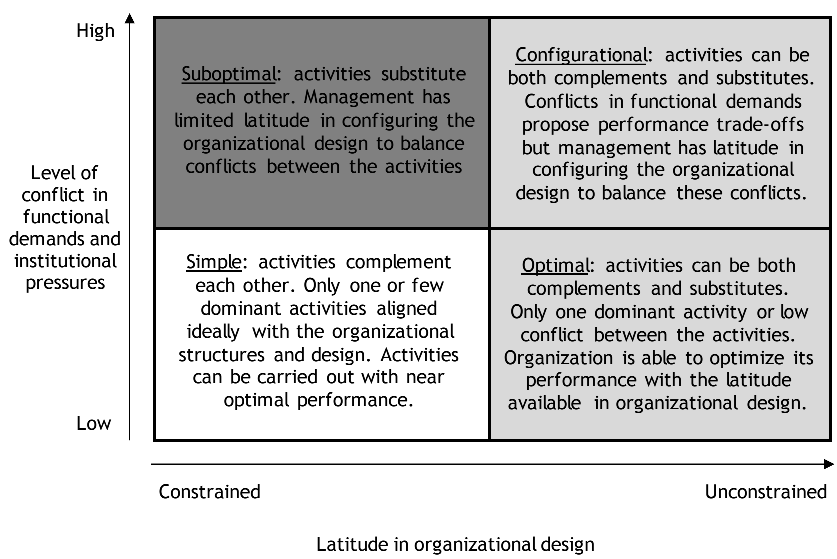


Figure 1. Strategy settings synthesizing the functional equivalence and complementarity views

with a perceptive management of the substitutes and complements. In the *suboptimal* setting, performance trade-offs are likely, as the organization faces conflicting demands and has limited latitude in its design to balance these conflicts. This means that activities with conflicting demands are likely to substitute each other, suggesting performance trade-offs between the activities. In the context of b-schools, this would entail performance trade-offs between teaching and research, in which schools are unable to achieve high performance in both activities due both to constrained latitude in organizational design and high conflict in functional demands and institutional pressures. In the *configurational* setting, conflicting demands and pressures suggest trade-offs between the activities but the organization can balance these conflicts with the latitude in its organizational design. However, it is unlikely to be able to navigate them all efficiently. Due to increased complexity, organizations in this situation are likely to settle for approximate performance with some activities performing higher than others.

2.4. Institutional Pressures and Conflicting Demands Related to Teaching–research Nexus in the Case Industry

Finnish university b-schools (BSCs) 1994–2009 form a case industry for the empirical examination of the theories above. BSCs (Table 1) were public tuition-free institutions, autonomous yet subordinate to the Ministry of Education (ME). Their governance system was characterized by centralized government steering and regulated by unified national legislation. The universities' core missions and evaluation were set out in the Universities Act (1997), specifying their missions to research, graduate and postgraduate education, and interaction with the surrounding society. The schools focused on university-level management education and research in business disciplines, economics, information technology, and communications. BSCs are an excel-

Table 1. Key characteristics of the business schools examined[1]

	Type*	Started	Regional GDP 2001[a]	Population in the region 2001	Students[b]	Degrees[c]	Teaching personnel[d]	Professors[d]	Publications quantity/ quality[e]	Outside research funding[f]
					1994 - 2009 mean					
BSC 1	Freestanding	1911	49 887	1 311 460	3 975	406	153	45	237 / 62	3 065 817
BSC 2	Faculty	1967	6 177	266 103	1 611	169	53	17	152 / 98	2 539 898
BSC 3	Faculty	1991	3 593	137 084	918	125	19	8	72 / 12	563 077
BSC 4	Faculty	1991	7 881	366 694	748	79	27	9	42 / 14	475 931
BSC 5	Freestanding	1909	49 887	1 311 460	2 303	238	100	31	182 / 41	1 484 540
BSC 6	Faculty	1966	11 731	450 819	1 373	130	39	13	53 / 12	733 196
BSC 7	Freestanding	1950	10 966	448 198	2 111	230	101	26	286 / 41	2 895 956
BSC 8	Faculty	1968	4 323	173 156	2 501	238	78	24	142 / 30	809 696
BSC 9	Faculty	1927	10 966	448 198	687	67	24	8	94 / 25	967 156

*Faculty = part of multi-disciplinary university

[a] at current prices million euros, [b] at all levels, [c] degrees per year: master's, doctoral, and licentiate (weight 0.75) degrees

[d] funded from the budgetary funds by person-years

[e] total number of publications (domestic and international publications: refereed articles, articles in compiled works, in printed conference proceedings, monographs, and university's own publication /series) / number of international refereed articles

[f] euros

[1] (Kukkonen & Frank-Möller, 1995; Ministry of Education, 2013; Official Statistics of Finland, 2009, 2013a, 2013b)

Table 2. Diversified demands and institutional pressures in the Finnish b-school system

	Barriers to international competition / competitiveness	Demand	Increased or abundant resources / Limited resource competition	Organi
1994 – 1998	National education system with limited research incentives: State accreditation requirement and lack of international comparability or transferability of degrees and study modules operated as barriers to competition. Due to limited resources, the policy recommendation for university research was to focus on the fulfillment of the current international commitments and domestic research cooperation. 12, 13, 31, 36	Demand for business and management professionals: pressure to increase student intake and shorten study times. Guidelines for the duration of studies were introduced. Increased students/staff ratio > demand for competent faculty (doctorates). Policy emphasis on faster graduation, continuing education, and effective research training through graduate schools, as well as on the diversification of the universities' research profiles and specialization of the research units. 2, 8, 12, 13	The government issued a supplementary R&D budget in 1997, which was allocated through competitive funding by the Academy of Finland and Tekes. In BSCs, this meant funding for research and education of doctoral students. The establishment of doctoral schools and a funding model that incentivized the production of doctoral degrees. 1, 4, 11, 14, 36	Teaching- and region system of governmen with limited latitude i formulation. Heavy te curbed research. Funding based on the operations and numbe conferred in the previ were government bud centralized workload staffing and wage pol organizational latitud Normative and centra steering suppressed s strategizing.
1999 – 2004	Education and research open to internationalization and international competition. Inability to attract international talent: the heritage of the previous decade's centralized staffing policies, limited resources, and latitude in organizing restricted wage competition and competitiveness. These created a system with limited research incentives. Limited mobility of postdocs as BSCs hire their own graduates. 1, 2, 22, 27, 37	Emphasis on the quality of teaching rather than the expansion of the system. Generalist education: interdisciplinary competencies that respond to the demands of internationalization and commercialization of business innovations. Increased emphasis on research-based relevance in teaching. The role entrepreneurship education was emphasized in the ME's memorandums. 1, 18, 20, 21, 34	The ME emphasized the development and expansion within and among existing university units in research and doctoral education. Further decentralization of the HE system should be avoided: emphasis on interdisciplinary synergy and cooperation within and among BSCs. The system incentivized doctoral education; however, incentives for international quality research were still weak. 2, 16	Policy changes empha university governance expectations of efficie and rationalization of shift from the input-or model towards a mode criteria. The Universities Act 1 university legislation a autonomy in organizin allocation > strategizin Performance-based ma introduced: lump-sum the goals set in perforn between the ME and u
2005 – 2009	ME reports recognized the need for a more strategic approach to research competitiveness. Diversification through strategic research profiles would limit inefficient domestic competition and reallocate resources to international competitiveness. Heavy teaching and supervision loads were seen to curb the research orientation, quality, and international competitiveness of BSCs. Fragmented research system (small units), undeveloped strategies, and resourcing limited BSCs' international competitiveness. 2, 30, 32, 33	The introduction of a third mission (interact with the surrounding society and promote the social and economic impact of university research) in the amendment to the Universities Act in 2004. The demand for business graduates was recognized, while the ME aimed to limit the number of units providing management education. Emphasis on interdisciplinary and business cooperation to enhance the practical implications and applicability of management education and research. 25, 27, 38	The ME's structural-development program and funding model incentivized Finnish universities to seek synergy and long-term cost savings through cooperation, consortiums, and mergers. New regulations (degree reform based on the Bologna treaty) limited the duration of university studies. 6, 10, 26, 27, 28, 29, 30	The stagnant organiza seen to hinder compet prepared university re universities from gove autonomous legal enti New regime: Universi obligated universities one board member ou organization. The ME's memorandu importance of the dive BSCs' research profile of labor between BSC

[1](Academy of Finland,1997; 2003; 2009), [2](Academy of Finland, 2005), [3](Alajoutsijärvi et al., 2012), [4](Fellman &
[10](Kunttu, 2012), [11](Michelsen, 2001), [12](ME, 1991), [13](ME, 1994), [14](ME, 1998), [15](ME, 1996),[16](ME, 2000a), [17](
[24](ME, 2005b), [25](ME, 2007a), [26](ME, 2007b), [27](ME, 2007c), [28](ME, 2007d), [29](ME, 2007e), [30](ME, 2010), [31](Por
2015), [36](Sitra, 2000), [37](Suhonen, 2013), [38](Universities Act, 1997).

zation	Decreased or limited resources / Increased resource competition	Supply / National industry dynamics	International competition
ally oriented t budget offices n strategy eaching loads extent of er of degrees ous years. BSCs lget offices with allocations; icies limited e. lized government chool-level 2, 30, 31, 32, 33	The economic downturn and severe unemployment at the beginning of 1990s changed the funding of Finnish universities from guaranteed government funding and growth appropriations to 10–20 percent budget cuts. However, BSCs' admissions were not cut. Finland joins EU: the introduction of the EU project and research funding. Business studies were a popular minor; however, BSC were under-resourced to respond to the demand. 7, 8, 9, 31, 32	Two new university b-schools were established in 1991. Degree reform: two-tier degrees and pilot of the two-tier HE system. 600–1,500 students started vocationally oriented bachelor studies in business administration in polytechnics (later universities of applied science). The "centers of excellence" system was introduced to allocate performance-based competitive government funding for teaching and research. 14, 15, 19	Focus on national competitiveness, innovations, and technological development: policy emphasis on regional economic growth and the development of the national innovation system and export industries. First international b-school accreditations: AMBA, EQUIS, and research network partnerships. Introduction of English master's degree studies. BSCs' strategies were still quite generic. Pressures to develop teaching and research based on international benchmarks start to build. 3, 5, 10, 32, 35
sized autonomy in with the ncy, accountability, the HE system. A iented funding l based on output 997 unified and allowed more g and resource g entered BSCs. anagement was funding based on nance negotiations niversities. 7, 9, 14, 38	Limited resources and the ME's funding models emphasized the role of competitive research funding in university budgets. The ME's steering model introduced competition for external research funding. The government's basic budget funding decreased, while the proportion of funding (allocated based on competitive application rounds) from public funding agencies, such as the Academy of Finland and Tekes, increased. 1, 32	Three regional universities added business studies to their curriculums. However, the degrees in these programs were conferred by BSC 3 and BSC 4. By the end of the century, polytechnics were officialized as a permanent part of the HE system. The number of students had doubled from the 1980s. BSCs represent one-tenth of Finnish HE. Tensions between b-school model and economics research traditions. 9, 18	Increased autonomy and research orientation: the introduction of the management information system, international benchmarks, and school-level strategizing. The ME expected universities to craft strategies according to international benchmarks, aiming for creative and internationally competitive research and training. Introduction of Bologna process and European HE & Research Area unifying the European HE and R&D systems. International publications as hiring criteria in BSCs. 3, 9, 10, 14, 23, 32
tional structures are itiveness. The ME form, changing ernment offices to ties or foundations. ties Act 2004 to select at least tside the university ums emphasized the ersification of the es and the division s and polytechnics. 25, 27, 30, 38	In 2007, universities gained broader authority in fund-raising and management of their funds. Limited teaching resources: high student–teacher ratio (30/1). Digitalization (virtual university) was seen a means to improve efficiency and regional accessibility. The amount of the competitive external funding for BSCs had doubled since the beginning of the 1990s, while increases in government funding mainly covered the growing costs of facilities. 24, 27, 30, 38	Plans for the new national innovation university were launched, which meant a merger of Finland's largest b-school (BSC 1) with technology and art universities in the capital region. BSC 7 started to prepare a merger with the nearby multidisciplinary university. The number of PhDs exceeds demand in HE and the private sector. Pressures to increase the student intake of BSCs, while limiting the intake of polytechnics. 2, 9, 10, 26, 27, 28, 29, 30	Active strategy formulation and competitive strategies spread to all BSCs. B-school accreditations gained a foothold (first AACSB and triple accreditations) in the competitive strategies of BSCs. International research rankings and bibliometric analysis were included in the ME's accounts of research performance. This incentivized international research publications in BSCs. Bologna degree reform: adoption of the unified European credit system and degree structure. 3, 22, 32, 33

Forsén, 2009), [5](FINHEEC, 2003), [6](Huttunen, 2010), [7](Hölttä, 1998), [8](Katajamäki, 1998), [9](Kettunen, 2007), ME, 2000b), [18](ME, 2001b), [19](ME, 2003a), [20](ME, 2003b), [21](ME, 2004a), [22](ME, 2004b), [23](ME, 2005a), ropudas & Volanen, 2003), [32](Pöykkö & Jalas, 2011), [33](Pöykkö & Åberg, 2010), [34](Saarinen, 2005), [35](Salo, lent example of a field characterized by the developments in institutional pressures and functional demands described earlier: public governance and stakeholder expectations have increased tension between teaching and research, affecting the strategic latitude available for the effective management of the nexus.

Since the late 1950s, a strong regional emphasis has characterized the Finnish university system and policy, which aimed to provide a highly-educated workforce throughout the geographically large, yet sparsely populated, country to support regional economic and social development. This policy contributed to the BSCs' teaching orientation and, although academic research was the key differentiator between BSCs and other levels of management education, teaching has traditionally dominated over research in BSCs (AoF, 2005). During the examination period, the governance of Finnish universities changed from organization of the government budget offices to the institutionalization of quasi-market competition and competitive strategy among the units. The shift in institutional pressures encouraged teaching-orientated BSCs (accustomed to guaranteed government funding and growth appropriations) to adopt more research- and result-orientated strategies, focused on competitiveness, that would secure external research funding and internationally competitive R&D. The examination period can be divided into three regimes (Table 2), based on historical developments in the institutional pressures, functional demands, and stakeholder expectations. The first is the era of national competitiveness (1994–1998), the second is the introduction of international benchmarks (1999–2004), and the third is the establishment of global competition (2005–2009).

In the early years, the institutional pressures and functional demands of BSCs mainly concerned national competitiveness, focusing on producing of the business professionals under the strictly centralized steering of the ME. The system was output-orientated and focused on regional economic development through a growing flow of graduates and the education of future b-school teachers. The BSCs were part of the state budgeting bureaucracy and operated as government budget offices, with personnel employed as civil servants (Ylijoki & Ursin, 2013). The ME's centralized governance system left b-schools with limited strategic latitude, as it did not provide management instruments nor authority for unit-level strategy formulation (Pöykkö & Jalas, 2011). Accordingly, b-school strategies were generic statements loosely coupled to practice and follow-ups (FINHEEC, 2003).

The faculty operated under heavy teaching loads and diminishing resources, curbing research incentives. The economic recession in the early 1990s resulted in 10–20 percent budget cuts. At the same time, however, the intake of b-school students grew steadily. The introduction of the two-tier HE system, with polytechnic bachelor's degrees, added a new level of competition for undergraduates among b-schools. However, in the tuition-free system, competitive pressures mainly concerned the moderate competition for able students (as sources of budgetary resources) between universities, or between the universities' faculties and disciplines, and only secondarily on competition for students with polytechnics and other domestic or international institutions. The amount of state funding was based on the extent of operations, the number of degrees produced, and whether the budgetary targets were met (Appendix A). Student intake was negotiated with the ME and further between the faculties of the respective universities. The emphasis in the government steering models were on the agreements, performance planning, and information rather than on strict performance goals. It is estimated that the early funding models did not incentivize university units to set their degree targets at the level of the maximum performance, as underperformance was not penalized (Hölttä, 1998).

Both the ME and b-schools recognized the need for international quality research and the first steps to realize this goal were taken through the introduction of doctoral schools and funding models incentivizing doctoral education. HE policy had thus far emphasized universities as part of the national innovation and R&D system, responding to the demands of the knowledge economy in home markets (Kanerva, 2000). However, pressures to develop teaching and research based on international benchmarks started to build. BSCs opened themselves to internationalization in the mid-1990s with MBA and doctoral programs, network partnerships, increasing student exchange, and the introduction of international, refereed publications as a criterion for professorial appointments. However, it was not until to the end of the decade when the number of international publications reached the level at which this criterion was genuinely applicable (Alajoutsijärvi et al., 2012). This was foreseeable, as the first generation of the b-school researchers (Pöykkö & Åberg, 2010) were just coming through the doctoral schools established at the beginning of the decade.

In the second era, the aftermath of the economic recession led to a new public management regime aimed at transforming public bureaucracies to result-oriented organizations. The policy change highlighted the deficiencies of the regionally fragmented HE system, geared to serve the growing student body, and regional development policies (AoF, 2005). The ME's (2001b; 2000a) memorandums advised against further decentralization and encouraged interdisciplinary synergy and cooperation within and among the existing university units. It was not only a question of efficient resource allocation but also of concerns regarding the ability of the fragmented system to produce and sustain internationally competitive academic excellence while simultaneously meeting the knowledge needs of industry and innovation under increased globalization pressures. Excellence in research became part of the national strategy and universities' R&D expenditure increased (Davies, Weko, Kim & Thulstrup, 2009).

The new steering regime emphasized the efficiency, competitiveness, and accountability of universities through management by results, development of evaluation (ME, 2005c) and management-information systems (ME, 1998), and quasi-market mechanisms, such as competition for external research funding (ME, 2003a). While research was not a separate line item in the basic budget funding in the early 1990s (AoF, 1997), the new regime, with the increased autonomy and external funding for research, provided opportunities for BSCs to reduce the resource conflict between teaching and research. The institutional pressures in 1999–2004 were characterized by the introduction of international benchmarks such as the Bologna process and b-school accreditations. The enhanced strategic latitude resulting from the new Universities Act (1997), which delegated authority to university units and increased competitive external research funding, proved to be game changers in the home country. The officialization of polytechnics emphasized the role of research in BSCs, as it was a key factor differentiating the tiers. Research grew gradually more reputable and merited in Finnish academia, while the teacher–student ratio in BSCs did not improve substantially. The conflict in functional demands between teaching and research accumulated at the individual level among scholars striving for excellence both in teaching and research (AoF, 2005).

In the following years (2005–2009), Finland committed to the European higher education and research area, unifying the HE and R&D systems. University degrees were reformed to follow the European credit system with two-tier degrees and shortened study time (ME, 2005a). These international commitments, as well as renewed legislation (UniAct, 2004), emphasized further research-based relevance and impact. The research policy was divided between two agendas: the aspiration for world-class universities; and the deployment of research in promoting social and economic development. These were the projections of global competition, where academic excellence, entrepreneurial universities, and efficient production of mode-two knowledge were considered key sources of competitive advantage (ME, 2010).

Universities gained more autonomy in organizing (Table 2), allocating their resources, and raising and competing for the funds (ME, 2016), however, they became more accountable to diversified stakeholders. Increased competition for funding accentuated academic research merits, as they became a key criterion for external funding and employment in universities. One of the most substantial features of competitive pressures related to research was that the allocation of government R&D appropriations shifted from universities to external funding agencies. In Europe, this kind of development was most prominent in Finland and the UK, resulting in the most competitive university research funding systems in Europe (Auranen & Nieminen, 2010). This development has created pressures for BSCs to adapt their organization to external demands and agendas. Concerns related to the fragmented university system's international competitiveness (Council of State, 2004) led the government to launch a structural development program in 2005 incentivizing universities to seek synergy and long-term cost savings through consortiums and mergers (ME, 2010). The program resulted in the consolidation of universities into larger administrative units, merging the two freestanding BSCs into multidisciplinary universities in 2010. Moreover, the ME initiated preparations for university reform, changing universities from government offices to autonomous legal entities or foundations with financial responsibility, independent staffing policies, and strategic planning.

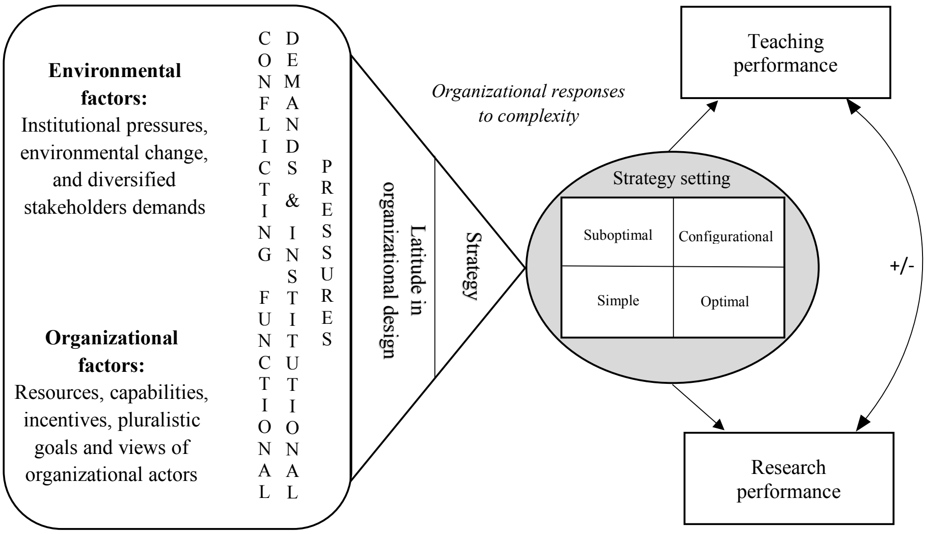
Between 1994 and 2009, BSCs' share of state-funding diminished by approximately 10 percent (Appendix A), while the overall funding more than doubled (ME, 2013). This meant increasing competition for external funding, channeled mainly through research activities. For example, more than 90 percent of teaching personnel in Finnish universities were employed with budgetary funding, whereas external funding covered 70 percent of the salaries of the research personnel (Suhonen, 2013), often employed in temporary positions (AoF, 2005).

2.5. Theoretical Model and Hypotheses

Figure 2 combines the institutional developments and theories above into the theoretical model, which seeks to enhance our understanding of the complex teaching–research nexus from the perspective of strategic management theories. Furthermore, it provides a basis for the analysis aiming to clarify the effects of institutional pressures and strategic latitude available to b-school organizations in balancing the nexus in an industry setting, where shifting institutional pressures and conflicting functional demands and limited latitude in organizational design lead to a performance trade-off between the core activities of b-schools.

Heterogeneity of performance is key to the existence of the functional equivalence (equifinality) situation in organizations (Gresov & Drazin, 1997). Therefore, the null-hypothesis concerns the uniformity of teaching and research performance among BSCs. The hypotheses continue with the examination of whether teaching and research efficiencies reflect the shift in BSCs' institutional pressures and functional demands from a teaching orientation with generous state appropriations towards a higher emphasis on research

Figure 2. Factors underlining the organizational responses to diversified demands and institutional pressures



with an increased proportion of competitive research funding. This concerns whether the changes in the government's steering model reached their goals.

In the first examination period, the institutional pressures and functional demands on BSCs focused on teaching performance. The establishment of polytechnics added to the competitive pressures on teaching in BSCs, while emphasizing the role of basic research, as it was the main factor differentiating the tiers. The policy shift from regional development to meeting the demands of international competitiveness accentuated the institutional pressures, functional demands, and diversified stakeholder expectations related to research performance and, hence, augmented research competition. Finnish HE policies and strategy evolved to rely on steering through competition and increased autonomy as a route to a more effective system and increased research quality. The policy assumption that competition contributes to the efficiency in HEIs has been related (ME, 2011; Poropudas & Volanen, 2003) to the spread of the New Public Management regime, emulating corporate governance practices, and to economic and management theories linking competition to increased market performance (Marginson, 2013; Välimaa, 2004). According to these ideals, higher competitive pressures should be related to higher efficiency and, consequently, in the less-competitive settings, actors would be inclined towards inefficiency. Hence, BSCs should achieve higher performance in research than in teaching, particularly in the later examination periods. While the BSCs' organizational autonomy had increased, it was not until 2010 that universities became autonomous legal entities separated from the government organization with full responsibility for their finances and strategies. Thus, the BSCs' latitude in balancing the nexus was limited.

H1. B-schools achieve higher levels of efficiency in research than in teaching.

The following hypothesis considers the link between field-level change pressures and organizational strategy, i.e. how institutional pressures emphasizing a change from a teaching-orientated b-school system towards more competitive research-oriented institutions, and a new governance regime instituting competition and strategizing among HEIs, is reflected in b-schools' ability to balance the teaching–research nexus. Thus, the second hypothesis examines whether the mutually reinforcing relationship characterizes the teaching–research nexus in BSCs or whether the shifts in the environmental pressures, emphasizing one function over another, have converted the complementarity into a trade-off relationship, where teaching and research substitute each other. According to the theories presented in Figure 1, a substituting relationship would propose a trade-off between research and teaching efficiencies, where an improvement in the performance level of activity would imply a deterioration in its counterpart and complementarity would indicate a positive relationship between the two.

H2a. Teaching and research are substitutes.

H2b. Teaching and research are complements.

The final part of the analysis focuses on the link between field-level change pressures and strategic latitude through a more detailed examination of the performance differences and trends.

3. Methods

The performance of b-schools includes far more aspects than the measurement of a single input–output relationship can capture. Establishing the optimal efficiency ratio for service organizations is not possible in the same way as measuring the efficiency of a plant, nor is it possible to determine the absolute efficiency in service provision (Sherman & Zhu, 2006; Zhu, 2008). Efficiency in a b-school is a complex combination of technical, process, scale, and management efficiencies with diversified measures and qualifiers. Given that establishing a clear-cut optimum is not feasible, a comparison of best practices with Data Envelopment Analysis (DEA) between b-school units within a HE system will help to discern the efficiencies of service in organizations such as BSCs.

DEA, a total productivity measure utilized in this study, was developed to address the challenges in measuring the efficiency of non-profit service organizations (Charnes, Cooper & Rhones 1978). Since its introduction, DEA has been utilized and developed further in various studies addressing the efficiency-measurement problems of non-profit organizations, including university units (Abbott & Doucouliagos, 2003; Sherman & Zhu, 2006). The main advantage of DEA is that it has an empirical starting point, where efficiency is benchmarked in relation to the performance of existing decision-making units instead of theoretical standards or optima (Cook, Tone, & Zhu, 2014). DEA provides a measure for the relative efficiency of units with multiple inputs and outputs, enabling the inclusion of several inputs and outputs with different measures and attributes, as long as these measures are consistent among the units measured. The efficiency score of each unit is calculated by benchmarking its performance against other decision-making units to determine the efficiency of each unit in relation to other units within the examined set. DEA has advantages in situations where single financial or production efficiency measures are inappropriate and clear-cut production standards are hard to define (Zhu, 2008). This is the case in BSCs, where universities are public non-profit organizations and their efficiency has measures over and above price and technology without clear-cut production standards. The use of DEA is consonant with the aims of the study, i.e. applying the theories of configuration and complementarity (Van de Ven et al., 2013) in the context of the public and non-profit academic institutes. The unit of analysis is the efficiency level of a b-school unit in relation to the efficiencies of other units. The examination of functional equivalence through the measurements of empirical performance optimum is self-evident, as the dilemma of performance optimization lies at the core of contingency approaches.

3.1.Data and sample

Performance-related studies of organizational configuration have two major tendencies. The first is a theory-driven deductive approach, where different sets of configurations are derived through theory-based classification, and the second an industry-specific inductive approach, where the actual industry limits form the frames of examination (Short, Payne, & Ketchen, 2008). This study adopts the latter approach, examining performance differences between b-schools in one country. BSCs form a relatively homogeneous industry with common market and governance measures, where their main activities are regulated by government legislation and subsidies, thus providing comparable units for DEA. The data used in this study were constructed from the databases of the ME (2013) and Statistics Finland (OSF, 2013a, 2013b), including Finnish universities and employment statistics. The panel data consists of the data from nine BSCs (see Table 1) in the period 1994–2009. This sample was chosen as it represented a transition period in the steering of Finnish universities from centralized government regulation to increased institutional autonomy, funding competition, and governance through management by results and objectives. BSCs were gaining more autonomy in their management and fundraising. However, they were still government budget offices regulated by the ME[2]. Furthermore, the sample provided a well-documented industry setting in accordance with the system characteristics described in the classifications of Gresov and Drazin (1997).

[2] Management and decision-making system of Finnish universities was reformed in the beginning of 2010. Universities gained financial autonomy as independent legal units, either as public corporations or as foundations.

3.2. Production model, measures and variables

Knowledge production with context-dependent measures is perhaps the most common evaluation criterion of efficiency in studies on the performance of educational institutions (Worthington, 2001). In universities, knowledge production is divided between the domains of teaching and research, where research plays a key role in producing new knowledge and education in disseminating that knowledge. As mentioned earlier, a clear-cut optimum for the performance of a HE institution is hard to define, but an ideal should be an aggregate of both quantity and quality.

Earlier research has measured teaching performance either by numbers of students (Abbott & Doucouliagos, 2003) or degrees as a measure of both quantity and quality (Johnes, 2006; Kivinen, Hedman, & Peltoniemi, 2010), and quality moreover in terms of graduate employability (Colbert, Levary, & Shaner, 2000). Accordingly, this study adopts degrees and graduate employability as output measures of teaching performance and number of teaching personnel as input (Table 3). The selection of research-efficiency variables was based on the measures and characterizations of the research performance and quality used in earlier studies on HE performance (Korhonen, Tainio, & Wallenius, 2001; Worthington & Higgs, 2011). The number of international refereed articles is the first output variable, as a measure of high quality, innovative, and internationally recognized research. The second output variable consists of the total number of publications as a measure of overall research activity and participation in the scientific community. The third output variable is the number of licentiate and doctoral degrees as a measure of student supervision contributing to research activities. The number of professor person-years is the first input variable for research efficiency, as professors formed the core of research personnel, responsible for doctoral-student supervision and the initiatives competing for external research funding. The research funding outside the university budget is another input variable because it provided additional resources for the university units by covering more than 70 percent of the salaries of research personnel in Finnish universities (Suhonen, 2013).

An understanding of the organizational process and activities is the basis of model-orientation choice: whether to focus on input minimization or output maximization and whether all potentially relevant variables are included in the analysis. Variable selection entails striking a fine balance between too many input and output variables (deteriorating the discriminatory power of the analysis) and too few variables (eroding the idea of total factor productivity measurement) (Cook et al., 2014). An operable number of inputs and outputs are dependent on the sample size and DEA model chosen (Dyson et al., 2001). Emphasis on either output enhancement or input reduction in the DEA model should be based on the level of latitude management has over the organization's activities . More latitude in the inputs yields input orientation and vice versa. The selection of model factors was conducted according to procedures suggested in Cook et al. (2014) and in Golany and Roll (1989). The output-oriented DEA model is chosen as the managerial discretion in inputs was more constrained; management had more control over maximizing the outputs than

Table 3. Definitions of input and output variables for the DEA

Variables	Definition
Teaching efficiency	
Outputs:	
DEGREES	Number of master's, doctoral, and licentiate (weight 0.75) degrees conferred per year.
EMPLOYMENT	Employment one year after graduation: number of graduates employed or continuing their studies after graduation (masters, licentiates, and doctors).
Input:	
TEACHING	All teaching funded from the budgetary funds by person-years.
Research efficiency	
Outputs:	
POSTDEGREE	Number of doctoral and licentiate (weight 0.75) degrees conferred per year.
QUALITY	Quality of publications: number of international refereed articles.
QUANTITY	Activity in publishing: total number of publications (domestic and international publications: articles (refereed), articles in compiled works or in printed conference proceedings, monographs, and university's own publication series).
Inputs:	
PROFESSORS	Professors by person-years funded from budgetary funds
FUNDING	Outside funding for the research (euros)

minimizing the use of resources. Pairwise correlations between the input and output factors were examined to verify the factor classification. The relationships between inputs and outputs should be stronger than input–input or output–output relationships (Golany & Roll, 1989). Correlations between the input–output pairs were significant at the 0.01 level, thereby supporting the inclusion of the selected factors to the analysis. DEA is sensitive to zero values and these values were therefore imputed with a value of 0.1, according to the recommendations of earlier DEA studies.

This study utilizes two output-oriented model variations of the Charnes et al. (1978) (CCR) DEA model to test the hypotheses with different assumptions of returns of scale. The efficiency measure of each school in a given year is derived from the linear optimization problem, where the outputs produced are maximized while the inputs are held constant. In terms of relative efficiency, and based on the data under analysis, a b-school is rated 100 per cent efficient only when the performances of other b-schools in the data do not indicate that its inputs or outputs could be improved without impairing some of its other inputs or outputs (Cooper, Seiford, & Zhu, 2004). The efficiency scale in DEA is from 1 to 0, where 1 equals the most efficient unit(s). The detailed formulation of DEA models used in this study is presented in Appendix B. The DEA was undertaken using DEAP, the software written by Tim Coelli (1996).

The panel data of BSCs provides a longer perspective on teaching and research performance, thereby increasing the validity of the analysis. The longitudinal examination increases the construct validity of the study, as it evens out sharp shocks that might interfere the validity of the measures in cross-sectional examination. The longitudinal comparison utilizes a window DEA method, which is based on the idea of a moving average, where each decision-making unit is benchmarked against other units in sequential period windows. Window DEA is a variant of sequential analysis, where, instead of including all past observations in the analysis, an idea of a moving periodical window of observations is utilized (Asmild, Aggarwall & Schaffnit, 2004). Observations in each window period are analyzed as intemporal; hence, window analysis is locally intemporal (Tulkens & Vanden Eeckaut, 1995). The data includes nine b-school units (U=9) over 13 benchmarking periods (T=13). The analysis is conducted in four-year windows (w=4). Yearly measures of each b-school unit are treated as different units in the analysis. The window analysis data includes 468 (U × w × T) technical efficiency ratings (TE) of an examined b-school, from 117 (U × T) sequential analyses of each b-school unit. The detailed formalization of the window analysis is in Appendix C. The ideal measurement period for the input and output factors in DEA is a period based on the "natural" operating cycles, such as accounting periods (Golany & Roll, 1989). The basic examination period in this study is one year, in accordance with the budgeting cycle of universities. The length of the DEA window analysis periods within the study is four years, which is based on a balance between window length and a preference for keeping technological and organizational changes (changes in curriculum, degree requirements, funding schemes, and target contracts between the ministry and universities) within the periods negligible (Asmild et al., 2004).

3.1. Analysis of efficiency trade-off

The analysis of efficiency trade-off begins with the examination of whether teaching and research are complements or substitutes. According to the theories, a substituting relationship would propose a trade-off between research and teaching efficiencies, whereas improvement in the performance level of one activity would imply a deterioration in its counterpart or vice versa. Complementarity would indicate a positive relationship between the two. The latter part of the analysis focuses on the further examination of the performance differences between BSCs to identify the different strategy settings (see Figure 1) among the b-schools. Efficiency trade-offs were examined with nonparametric partial correlations. For the further analysis of the relationship between teaching and research efficiencies, the analysis of variance (GLM/ANCOVA) was conducted, as follows.

$$TEACHING_j = b_0 + RESEARCH_j + YEAR_j + BSCHOOL_j + INTERACTIONS_j + e_j$$

Where *TEACHING* is a measure of teaching performance for *BSCHOOLj*, *RESEARCH*j denotes a covariate based on research performance, *INTERACTIONSj* is a vector of interactions of the independent variables, and *ej* is an error term. The differences in the efficiencies were analyzed in SPSS with the Kruskal–Wallis test and follow-ups with pair- and stepwise comparisons, as the theoretical distribution of the results of DEA is usually unknown and the distribution of results is skewed towards the higher end due to optimized weights and the benchmarking nature of the analysis (Cooper, Seiford & Tone, 1999).

4. Results

The initial DEA of this study included both output-orientated constant returns to scale (CRS) and variable returns to scale (VRS) models. CRS technical efficiency is a global measure of unit performance; however, the assumption of CRS is somewhat unrealistic in the situation of BSCs as they are subject to government regulation and imperfect competition due to government intervention. Furthermore, VRS has more discriminatory power when the units under analysis have considerable variation in size (Sherman & Zhu 2006). Hence, further analyses of performance uniformity and the trade-off between teaching and research efficiencies were conducted based on the results of the VRS model.

4.1 Overall efficiency ratings

To illustrate the interpretation of the efficiency ratings and give an overview of the performance of BSCs, Table 4 presents the results for CRS, VRS, and scale-efficiency models. CRS is a total measure of efficiency, which can be decomposed into measures of managerial “pure” efficiency (VRS) and scale efficiency. For example, in research efficiency, BSCs perform at a level of 74 percent (CRS median 0.739), 95 percent (VRS median 0.948), and 90 percent in scale efficiency (median 0.897). This means that, in total, BSCs could increase their research outputs by 26 percent (CRS), while inputs are held constant. According to the results of VRS model, research outputs could be enhanced by 5 percent with better organization, and 10 percent by adjusting the scale of operations. Outputs in teaching efficiency could be improved in total by 58 percent (CRS), by better organization of activities by 26 percent (VRS), and by adjusting the scale of operations by 36 percent.

Performance differences

The Kruskal–Wallis test with both pair- and stepwise comparison was used to examine the performance difference among the BSCs. The analysis examined the differences among nine b-school units regarding their performance for teaching and research based on VRS technical-efficiency ratings. Schools differ significantly in both teaching (χ^2 (8) = 219.983 $p < 0.001$) and in research efficiency (χ^2 (8) = 170.074 $p < 0.001$), which allows the rejection of the null-hypothesis. At the system level, in accordance to the policy assumptions, schools reach higher efficiency ratings in research, the activity connected to stiffer competition and lower efficiency in teaching with less competitive pressures, hence confirming H1.

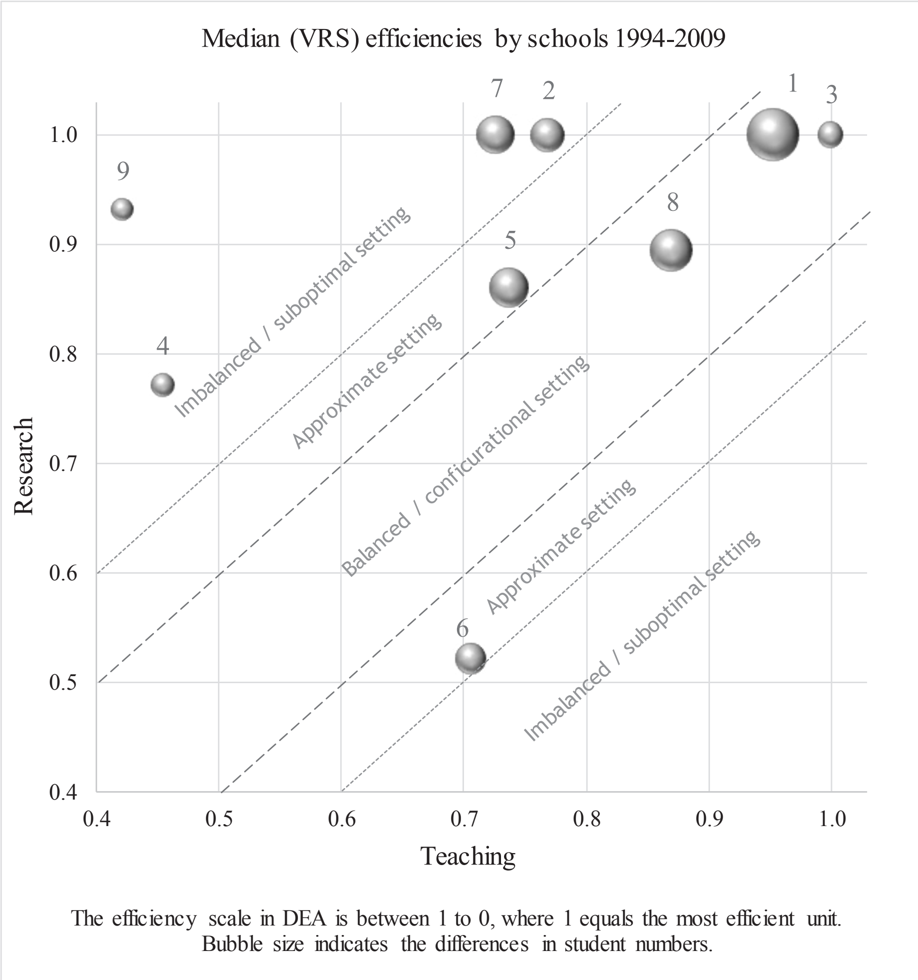
The results of pair- and stepwise comparisons (Figure 3) reveal performance differences between the schools. Schools were

Table 4. Efficiency ratings and correlations between teaching and research efficiencies

All window periods	Teaching efficiency							Research efficiency							Correlation teaching and research
					Percentiles		Std. Dev					Percen-tiles		Std. Dev.	
	Mean	Median	Min	Max	25	75		Mean	Median	Min	Max	25	75		
Total (N=468)															
CRS Model	0,45	0,42	0,02	1,00	0,30	0,55	0,20	0,73	0,74	0,17	1,00	0,56	0,94	0,21	
VRS Model	0,70	0,74	0,16	1,00	0,56	0,88	0,22	0,85	0,95	0,17	1,00	0,75	1,00	0,19	0.17**
Scale Efficiency	0,66	0,64	0,02	1,00	0,53	0,84	0,21	0,86	0,90	0,30	1,00	0,76	1,00	0,15	
BSC 1 (N=52)															
CRS Model	0,41	0,41	0,22	0,74	0,25	0,55	0,14	0,60	0,60	0,40	0,97	0,49	0,67	0,12	
VRS Model	0,89	0,95	0,35	1,00	0,87	1,00	0,19	0,97	1,00	0,86	1,00	0,97	1,00	0,04	0.15
Scale Efficiency	0,47	0,49	0,22	0,74	0,40	0,57	0,14	0,61	0,61	0,43	0,97	0,50	0,70	0,11	
BSC 2 (N=52)															
CRS Model	0,46	0,48	0,20	0,90	0,29	0,57	0,16	0,90	1,00	0,60	1,00	0,79	1,00	0,13	
VRS Model	0,75	0,77	0,26	1,00	0,71	0,87	0,17	0,94	1,00	0,62	1,00	0,90	1,00	0,10	0.37**
Scale Efficiency	0,62	0,65	0,34	0,90	0,58	0,68	0,14	0,96	1,00	0,78	1,00	0,95	1,00	0,07	
BSC 3 (N=52)															
CRS Model	0,80	0,88	0,02	1,00	0,71	1,00	0,23	0,84	0,97	0,30	1,00	0,76	1,00	0,20	
VRS Model	0,88	1,00	0,18	1,00	0,78	1,00	0,18	0,93	1,00	0,40	1,00	0,95	1,00	0,14	-0.22
Scale Efficiency	0,91	0,97	0,02	1,00	0,89	1,00	0,16	0,90	1,00	0,30	1,00	0,87	1,00	0,17	
BSC 4 (N=52)															
CRS Model	0,38	0,37	0,20	0,65	0,29	0,43	0,12	0,68	0,69	0,17	1,00	0,47	0,86	0,24	
VRS Model	0,47	0,45	0,23	0,71	0,38	0,56	0,12	0,76	0,77	0,17	1,00	0,53	1,00	0,25	0.26
Scale Efficiency	0,82	0,86	0,47	1,00	0,80	0,92	0,14	0,90	0,92	0,65	1,00	0,84	0,99	0,09	
BSC 5 (N=52)															
CRS Model	0,34	0,35	0,18	0,50	0,22	0,42	0,10	0,63	0,63	0,42	1,00	0,47	0,77	0,16	
VRS Model	0,70	0,74	0,26	1,00	0,63	0,79	0,16	0,83	0,86	0,61	1,00	0,71	0,96	0,13	-0.05
Scale Efficiency	0,50	0,53	0,27	0,71	0,47	0,55	0,12	0,75	0,74	0,50	1,00	0,67	0,83	0,11	
BSC 6 (N=52)															
CRS Model	0,48	0,52	0,21	0,74	0,34	0,57	0,14	0,49	0,49	0,25	1,00	0,38	0,56	0,17	
VRS Model	0,68	0,71	0,22	0,90	0,64	0,78	0,15	0,54	0,52	0,25	1,00	0,44	0,63	0,16	0.05
Scale Efficiency	0,71	0,71	0,48	0,95	0,63	0,76	0,13	0,90	0,92	0,72	1,00	0,84	0,98	0,09	
BSC 7 (N=52)															
CRS Model	0,34	0,36	0,16	0,60	0,20	0,44	0,13	0,83	0,86	0,47	1,00	0,71	0,93	0,14	
VRS Model	0,69	0,73	0,24	0,90	0,65	0,83	0,18	0,96	1,00	0,74	1,00	0,92	1,00	0,08	0.16
Scale Efficiency	0,49	0,54	0,25	0,71	0,45	0,57	0,13	0,86	0,89	0,60	1,00	0,80	0,94	0,11	
BSC 8 (N=52)															
CRS Model	0,43	0,45	0,18	0,70	0,30	0,52	0,12	0,74	0,74	0,40	1,00	0,61	0,89	0,18	
VRS Model	0,82	0,87	0,25	0,98	0,78	0,92	0,17	0,87	0,89	0,55	1,00	0,79	1,00	0,13	-0.10
Scale Efficiency	0,53	0,56	0,30	0,73	0,51	0,58	0,12	0,84	0,82	0,59	1,00	0,77	0,95	0,11	
BSC 9 (N=52)															
CRS Model	0,40	0,36	0,16	1,00	0,27	0,45	0,16	0,87	0,91	0,57	1,00	0,76	1,00	0,14	
VRS Model	0,46	0,42	0,16	1,00	0,34	0,58	0,18	0,89	0,93	0,64	1,00	0,77	1,00	0,13	0.28**
Scale Efficiency	0,87	0,85	0,65	1,00	0,76	0,99	0,11	0,97	0,99	0,84	1,00	0,98	1,00	0,05	

** Correlation (Spearman's rho) is significant at the 0.01 level (2-tailed), * significant at the 0.05 level (2-tailed). Second-order partial correlations were controlled for the effects of year and school. First-order partial correlations were controlled for year. The table presents technical efficiency ratings based on variable returns to scale model.

Figure 3. Distribution of teaching and research efficiency ratings by schools

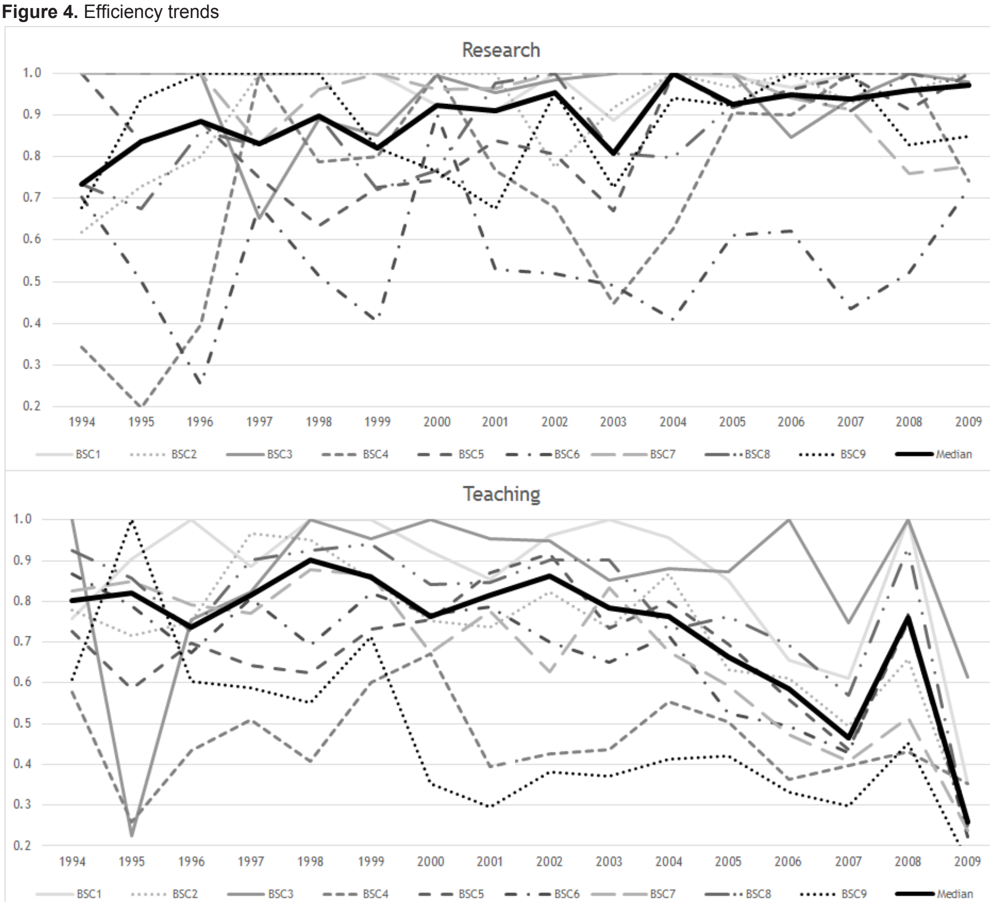


clustered in both teaching and research efficiencies based on the significant differences in pair- and stepwise comparisons. For research efficiency, high performing schools are 1, 2, 3, and 7, mid-performing schools 4, 5, 8, and 9, while school 6 is ranking the lowest. For teaching efficiency, schools 1, 3, and 8 are the top performers, followed by schools 2, 5, 6, and 7 with near average performance ratings. Schools 4 and 9 have the lowest rankings in teaching efficiency. When examined through the synthesis of the functional equivalence and complementarity views, the efficiency measures indicate that the BSCs were unable to balance the teaching–research nexus equally effectively. The balanced efficiency ratings of schools 1, 3, and 8 indicate a configurational strategy setting, where organizations balance the conflicting demands and pressures effectively. However, differences between teaching and research efficiencies of schools 2, 4, 7, and 9 suggest a suboptimal setting, where organizations are unable to balance teaching and research equally effectively. Schools 5 and 6 were situated somewhere between these two settings, indicating an approximate performance with some imbalance between the performance levels.

Trade-off between the efficiencies

The relationship and potential trade-off between teaching and research performance were examined by examining the correlation and analyzing differences between the two after controlling for the effects of school and year. The analysis of the efficiencies (Table 4) indicated that there is a slight positive correlation between teaching and research efficiencies, giving slight support to the complementarity hypothesis (H2b); thus, the trade-off hypothesis (H2a) was not supported. The analysis showed that school-specific factors explained more variation in teaching efficiency than did research efficiency. In the analyses of variance, teaching efficiency was examined against the effects of research efficiency, year, school, and the interactions (school * year, research efficiency * year, school * research efficiency, and school * year * research efficiency). Model R^2 was 0.903. School, $F(8, 468) = 115.01$, $p = 0.000$, partial eta squared = 0.794, accounted for a larger proportion of explained variance in teaching efficiency (after controlling for the effect of year, research efficiency, and their interaction) than did research efficiency, $F(1, 468) = 5.824$, $p = 0.017$, partial eta squared =

Figure 4. Efficiency trends



0.024 (after controlling for the effect of year, school, and their interaction). Research efficiency shared only 3 percent of the variance in teaching efficiency.

Performance trends

Figure 4 shows the trends in both efficiencies. The BSCs reach higher ratings in research than in teaching efficiency and there is more variation in teaching efficiency than in research-efficiency ratings, even when the effects of both down and upward peaks in teaching efficiency in the period 2007–2009 were excluded. The peaks are a good example of the role and effects of institutional pressures on BSCs. These are due to changes in the regulation of the degree system, when Finland adopted the European credit system as part of the Bologna process, reforming Finnish university degrees in 2005 (ME, 2005a). Students could finish their studies according to the old degree regulations until 2008, which momentarily doubled the number of master's degrees in all BSCs.

The developments in the teaching and research efficiencies were well in line with developments of the latitude in organizational design and environmental pressures of the BSCs between 1994 and 2009. At the beginning of the examination period (1994–1998), the Finnish b-school system reflected the characteristics of the simple strategy setting with the institutional pressures and functional demands focused on teaching performance. The BSCs concentrated on educating the growing body of business professional and teachers, while incentives for research were limited. The organizational design of b-schools was geared to support teaching, and the newly adopted management by results regime emphasized degree targets and efficient graduation. While the newly adopted management by results regime emphasized degree targets and efficient graduation, contemporary estimates suggest (Hölttä, 1998) that the early funding models did not incentivize university units to set their degree targets at the level of maximum performance. The BSCs recognized the problem of prolonged graduation. However, they were stretched thin in the teaching and doctoral-student supervision resources with the growing number of student admissions and legislation allowing unlimited duration of the studies (AoF, 2005). The increasing popularity of business studies as minor and complementary studies stretched the resources further (ME, 1994). Moreover, as government offices with limited latitude and incentives to formulate strategy, BSCs had few tools to enhance teaching efficiency, apart from negotiating increases to the student intake or gearing the curriculum. While BSCs did not reach optimal performance in either, teaching and research efficiencies were closer to each other than in the later examination periods. The competitive pressures related to both teaching and research were relatively limited in the early years of the examination period.

In the later periods, the increased policy emphasis on international competitiveness accentuated the role of research in BSCs. The majority of BSCs' resource growth was based on the increased research funding allocated through the competitive funding instruments of the Academy of Finland and Tekes. The student/staff ratio increased throughout the period 1994–2009, indicating growth in teaching load, while the proportion of budgetary funding, a primary funding source of teaching, simultaneously diminished. Employment and organizational structures related to teaching were more institutionalized and rigid than in research, where external funding supported the growing proportion of research personnel often employed in short-term research projects. The growing number of graduate and postgraduate students and increasing demand for internationally recognized research accentuated the conflict in functional demands between teaching and research among faculty members responsible both for teaching and research, limiting the BSCs' latitude in balancing the nexus. The aforementioned incentivized improvement in research performance, as BSCs with higher research performance would be able to compete more effectively for external funding providing resources and slack for the organization of b-schools. The funding policy in use in Finland encouraged BSCs to improve their competitiveness and enhanced research competition. The accentuated role of competitive research funding exerted more competitive pressures on research than on teaching. Thus, in the later periods, the Finnish b-school system evolved towards a configurational strategy setting, characterized in Figure 1.

Conclusions and avenues for future research

The earlier discussions and research on the teaching–research nexus have indicated that the two can be both substituting and complementing activities among HEIs. This indicates a configurational equifinality at the system level, where the nature of the nexus is largely organization-specific yet constrained by institutional pressures and diversified stakeholder demands. The dialectic views in the teaching–research-nexus research propose a substituting relationship and trade-offs caused by conflicting demands and pressures, whereas pluralistic views emphasize the complementarity of the two despite the conflicts (diversified pressures and demands). The discourse on the nature of the nexus is not trivial. Whether the key activities of HE organizations are complements or substitutes plays an important role in management and performance both at the organizational and policy level.

The empirical findings of this study confirm the configurational equifinality at the field level in the regulated, publicly funded b-school setting, indicating that the performance outcomes of conflicting activities are not entirely determined by environmental demands and institutional pressures. Thus, intra-organizational characteristics and organizational responses to conflicting functional demands and environmental pressures have an important role in determining the effectiveness of policy interventions. Environmental factors determine the arena of competitiveness, whereas intra-organizational characteristics determine the feasibility of the measures. The synthesis of the literature and results of this study indicate that complementarities and trade-offs related to the teaching–research nexus are not readily deductible from either institutional pressures or theoretical assumptions of complementarity or conflict at the system level. They are built up and balanced with organization-specific resources, capabilities, perceptions, and choices. Therefore, the strategic management of the potentially conflicting organizational activities, such as teaching and research, would benefit from strategies emphasizing the flexibility and adaptability of the organizational design, which includes perceptive consideration of the organization-specific connections and interactions with a potential to produce synergy or trade-offs when combined with the environmental demands and pressures.

The findings of this study, however, suggest that conflicting functional demands do not readily result in performance trade-offs in the field or at the organizational level, even when the conflict is fueled by the shift in institutional pressures. The complementarity was not absolute either; there is only a slight positive correlation between the efficiencies. Therefore, it would be interesting to evaluate in more detail the effects of both intra-organizational and environmental factors on the trade-off relationship with a larger and more detailed dataset with cross-country comparisons. Although one of the strengths of this study is in the longitudinal examination of an industry setting covering 16 years, this study has obvious limitations. The sample is limited to Finnish publicly funded b-schools and further examination of the interplay of the institutional pressures, diversified stakeholder demands, and strategic latitude in balancing the teaching–research nexus would benefit from cross-country and cross-system comparisons to widen the perspective to HE systems with different funding and organizational structures. Analysis of the other industries facing conflicting functional demands, such as social enterprises balancing the social and business goals, is also recommended. Furthermore, the analysis focuses on the performance measures based on the Finnish HE steering models, leaving room for further studies of potential trade-offs and complements related to other measures of effectiveness i.e. different combinations of input- and output-variables.

References

Abbott, M. and Doucouliagos, C. (2003). The efficiency of Australian universities: a data envelopment analysis. *Economics of Education Review* 22:1, 89–97.

Academy of Finland (AoF) (1997, 2003, 2009). *Suomen tieteen tila ja taso*.

Academy of Finland (AoF) (2005). *Research in Business Disciplines in Finland: Evaluation Report*.

Adler, N. & Harzing, A.-W. (2009). When Knowledge Wins: Transcending the Sense and Nonsense of Academic Rankings. *Academy of Management Learning and Education* 8:1, 72–95.

Alajoutsijärvi, K., Kettunen, K., & Tikkanen, H. (2012). Institutional evolution of business schools in Finland 1909-2009. *Management & Organizational History,* 7:4, 337–367.

Alajoutsijärvi, K., Juusola, K., & Lamberg, J.-A. (2014). Institutional logic of business bubbles: lessons from the Dubai business school mania. *Academy of Management Learning and Education* 13:1, 5–25.

Aguinis, H., Shapiro, D.L, Antonacopoulou, E.P., & Cummings, T.G. (2014). 'Scholarly Impact: A Pluralist Conceptualization'. *Academy of Management Learning and Education* 13:4, 623–639.

Arnold, I.J. (2008). Course level and the relationship between research productivity and teaching effectiveness. *Journal of Economic Education 39:4*, 307–321.

Asmild, M., Paradi, J.C., Aggarwall, V., & Schaffnit, C. (2004). Combining DEA window analysis with the Malmquist index approach in a study of the Canadian banking industry. *Journal of Productivity Analysis* 21, 67–89.

Auranen, O. & Nieminen, M. (2010). University research funding and publication performance—An international comparison. *Research Policy* 39:6, 822–834.

Bachrach, D.G., Bendoly, E., Ammeter, D.B, Blackburn, R., Brown, K.G., Burke, G., ... Voss, D. (2017). On Academic Rankings, Unacceptable Methods, and the Social Obligations of Business Schools. *Decision Sciences 48:3*, 561–585.

Balkin, D.B., & Mello, J.A. (2012). Facilitating and Creating Synergies Between Teaching and Research. *Journal of Management Education 36:4*, 471–494.

Bartunek, J.M. & Rynes, S.L. (2014). Academics and Practitioners Are Alike and Unlike: The Paradoxes of Academic–Practitioner Relationships. *Journal of Management* 40:5, 1181–1201.

Burke, L.A. & Rau, B. (2010). The research-teaching gap in management. *Academy of Management Learning and Education* 9:1, 132–143.

Cadez, S., Dimovski, V. & Zaman Groff, M. (2017). Research, teaching and performance evaluation in academia: the salience of quality. *Studies in Higher Education 42:8*, 1455–1473.

Charnes, A. Cooper, W.W., & Rhodes, E.L. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research* 2:6, 429–444.

Child, J. (1972). Organizational structure, environment and performance: The role of strategic choice. *Sociology* 6:1, 1–22.

Clark, B.R. (1997). The modern integration of research activities with teaching and learning. *Journal of Higher Education* 68:3, 241–255.

Coelli, T. (1996). *A guide to DEAP version 2.1: a data envelopment analysis (computer) program*. Centre for Efficiency and Productivity Analysis, University of New England.

Colbert, A., Levary, R.R. & Shaner, M. (2000). Determining the relative efficiency of MBA programs using DEA. *European Journal of Operational Research* 125:3, 656–669.

Cook, W.D., Tone, K., & Zhu, J. (2014). Data envelopment analysis: Prior to choosing a model. *Omega* 44, 1–4.

Cooper, W.W., Seiford, L.M., & Tone, K. (1999). *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References, and DEA-Solver Software*. Kluwer Academic Publishers.

Cooper, W.W., Seiford, L.M., & Zhu, J. (2004). "Data envelopment analysis: History, models and interpretations". In W.W. Cooper, L.M. Seiford & J. Zhu (Eds.), *Handbook on Data Envelopment Analysis* (1–39). Kluwer Academic Publishers.

Council of State (2004). *Osaava, avautuva ja uudistuva Suomi: Suomi maailmantaloudessa -selvityksen loppuraportti* (2004:19).

Davies, J., Weko, T., Kim, L., & Thulstrup, E. (2009). *OECD Reviews of Tertiary Education: Finland*. OECD.

DiMaggio, P.J. & Powell, W.W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* 48:2, 147–160.

Donaldson, L. (2008). The conflict between contingency and institutional theories of organizational design. In R. Burton, B. Eriksen, D. Håkonsson, T. Knudsen, & C. Snow (Eds.). *Designing Organizations: 21st Century Approaches* (3–20). Springer.

Drazin, R. & Van de Ven, A.H. (1985). Alternative forms of fit in contingency theory. *Administrative Science Quarterly* 30:4, 514–539.

Durning, B. & Jenkins, A. (2005). Teaching/research relations in departments: the perspectives of built environment academics, *Studies in Higher Education* 30:4, 407–426.

Dyson, R.G., Allen, R., Camanho, A.S., Podinovski, V.V, Sarrico, C.S., & Shale, E.A. (2001). Pitfalls and protocols in DEA. *European Journal of Operational Research* 132:2, 245–259.

Fellman, S., & Forsén, A. (Eds.). (2009). *Hundra år av utbildning och forskning: Svenska Handelshögskolan 1909-2009*. Bookwell.

Finnish Higher Education Evaluation Council (FINHEEC) (2003). *Suomalaista kilpailukykyä liiketoimintaosaamisella* (2003:6).

Gautier, A. & Wauthy, X. (2007). Teaching versus research: A multi-tasking approach to multi-department universities. *European Economic Review* 51:2, 273–295.

Geschwind, L. & Broström, A. (2015). Managing the teaching–research nexus: ideals and practice in research-oriented universities. *Higher Education Research & Development* 34:1, 60–73.

Ghoshal, S. (2005). Bad management theories are destroying good management practices. *Academy of Management Learning and Education* 4:1, 75–91.

Golany, B. & Roll, Y. (1989). An application procedure for DEA. *Omega,* 17:3, 237–250.

Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. & Lounsbury, M. (2011). Institutional Complexity and Organizational Responses. *The Academy of Management Annals* 5:1, 317-371.

Gresov, C. & Drazin, R. (1997). Equifinality: Functional equivalence in organization design. *Academy of Management Review,* 22:2, 403–428.

Halse, C., Deane, E., Hobson, J. & Jones, G. (2007). The research–teaching nexus: what do national teaching awards tell us? *Studies in Higher Education* 32:6, 727–746.

Hargrave, T. & Van de Ven, A.H. (2017). Integrating Dialectical and Paradox Perspectives on Managing Contradictions in Organizations. *Organization Studies 38:3–4*, 319–339.

Henisz, W. (2011). Leveraging the financial crisis to fulfill the promise of progressive management. *Academy of Management Learning & Education* 10:2, 298-321.

Horta, H., Dautel, V. &Veloso, F.M. (2012). An output perspective on the teaching–research nexus: an analysis focusing on the United States higher education system. *Studies in Higher Education* 37:2, 171–187.

Hölttä, S. (1998). The funding of universities in Finland: Towards goal-oriented government steering. *European Journal of Education* 33:1, 55–63.

Johnes, J. (2006). Data envelopment analysis and its application to the measurement of efficiency in higher education. *Economics of Education Review* 25:3, 273–288.

Kanerva, R. (2000). *Hattu, miekka ja diplomi: ekonomikoulusta kansainvaliseksi tiedeyhteisoksi, Turun kauppakorkeakoulu 1950-2000*. Turun sanomat.

Katajamaki, H. (1998). *Oman alueensa yliopisto: Vaasan yliopiston kolme vuosikymmenta*. Vaasan yliopisto.

Kettunen, P. (2007). Kauppatieteet. In A. Virtanen (Ed.), *Taloustieteitä 40 vuotta: Jyväskylän yliopiston taloustieteiden tiedekunnan historiaa (7-30)*. Jyväskylän yliopisto.

Khurana, R. (2007). *From higher aims to hired hands: The social transformation of American business schools and the unfulfilled promise of management as a profession*. Princeton University Press.

Kieser, A., Nicolai, A., & Seidl, D. (2015). The Practical Relevance of Management Research: Turning the Debate on Relevance into a Rigorous Scientific Research Program. *The Academy of Management Annals 9:*1, 143–233.

Kivinen, O., Hedman, J. & Peltoniemi, K. (2010). *Kohti parasta A-luokkaa: Tutkimuksen ja opetuksen tuloksellisuus suomalaisissa yliopistoissa.* RUSE.

Korhonen, P., Tainio, R. & Wallenius, J. (2001). Theory and methodology value efficiency analysis of academic research. *European Journal of Operational Research* 130, 121–132.

Kukkonen, A. & Frank-Möller, H. (1995). *Ekonomikoulutus Suomessa.* Gummerus.

Kunttu, T. (2012). *Kohti monialaista tiedeyliopistoa: Turun kauppakorkeakoulun kasvun ja muutoksen vuodet 2000-2010*. Turun kauppakorkeakoulu.

Lehtimäki, H. & Peltonen, T. (2011). Kauppatiede muutoksen kourissa: Kentän monimuotoistuminen ja Helsingin kauppakorkeakoulun rooli, *Tiedepolitiikka* 36, 31–40.

Levinthal, D.A. (1997). Adaptation on rugged landscapes. *Management Science* 43:7, 934–950.

Lewicki, R.J., & Bailey, J.R. (2009). The Research-Teaching Nexus: Tensions and Opportunities. In S. Armstrong & C. Fukami (Eds.). *The SAGE Handbook of Management Learning, Education and Development* (385–402). SAGE Publications.

Malcolm, M. (2014). A critical evaluation of recent progress in understanding the role of the research-teaching link in higher education. Higher Education 67:3, 289–301.

Marginson, S. (2013). The impossibility of capitalist markets in higher education. *Journal of Education Policy* 28:3, 353-370.

Marsh, H.W. & Hattie, J. (2002). The relation between research productivity and teaching effectiveness: complementary, antagonistic, or independent constructs? *Journal of Higher Education,* 73, 603–641.

Martin, R. (2012). The Price of Actionability. *Academy of Management Learning and Education 11:2*, 293–299.

Massini, S. & Pettigrew, A.M. (2003). Complementarities in organizational innovation and performance: Empirical evidence from INNFORM survey. In Pettigrew, A. M., Whittington, R., Melin, L, Sánchez-Runde, C., den Bosh, F. et al. (Eds.). *Innovative Forms of Organizing: International*

Perspectives (133–172). Sage Publications.

Michelsen, K.-E. (2001). *Vuosisadan tilinpäätös: Helsingin kauppakorkeakoulu 1911-2001*. Helsingin kauppakorkeakoulu.

Milgrom, P. & Roberts, J. (1990). The economics of modern manufacturing: technology, strategy, and organization, *American Economic Review* 80:3, 511–528.

Milgrom, P. & Roberts, J. (1995). Complementarities and fit strategy, structure, and organizational change in manufacturing. *Journal of Accounting and Economics* 19:2, 179–208.

Ministry of Education (ME) (1991, 1996, 2000b, 2004a, 2007a). *Koulutuksen ja tutkimuksen kehittämissuunnitelmat: 1991-1996, 1995–2000, 1999–2004, 2003–2008, 2007–2012*.

ME (1994). *Kauppatieteellisen alan kokonaisselvitys* (1994:15).

ME (1998, 2001a). *Management by Results in Higher Education* (1998:55; 2001:84).

ME (2000a, 2001b). *Liiketoimintaosaamisen kehittäminen korkeakoululaitoksessa* (2000:6; 2001:1).

ME (2003a). *Suomalaisen korkeakoulutuksen uudistaminen: reformeja ja innovaatioita* (2003:25).

ME (2003b). *Suomalaista kilpailukykyä liiketoimintaosaamisella* (2003:6).

ME (2004b). *Yliopistojen ja ammattikorkeakoulujen tutkimuksen rakenneselvitys* (2004:36).

ME (2005a). *Reform of university degrees*.

ME (2005b). *Opetusministeriön hallinnonalan tuottavuusohjelma 2006-2010* (2005: 32).

ME (2005c). *Yliopistojen tulosohjauksen kehittämistyöryhmä III* (2005:24).

ME (2007b). *Itä-Suomen yliopisto – tulevaisuuden yliopisto ajassa* (2007:15).

ME (2007c). *Lisää liiketoimintaosaamista korkeakouluista* (2007:38).

ME (2007d). *Teknillisen korkeakoulun, Helsingin kauppakorkeakoulun ja Taideteollisen korkeakoulun-yhdistyminen uudeksi yliopistoksi* (2007:16).

ME (2007e). *Turusta tieteen huippukeskittymä* (2007:14).

ME (2010). *Yliopistojen rakenteellinen kehittäminen, akateemiset yhteisöt ja muutos* (2010:5)

ME (2011). *Tutkimuksen tuottavuuden kehitys Suomen yliopistoissa* (2011:2)

ME (2013). *KOTA online database for statistics on Finnish universities and fields of education* Available at: https://kotaplus.csc.fi (Accessed 29 October 2014).

ME (2016). *Yliopistolakiuudistuksen vaikutusten arviointi* (2016:30).

Morgeson, F. & Nahrgang, J. (2008). Same as It Ever Was: Recognizing Stability in the Business Week Rankings. *Academy of Management Learning & Education 7:1*, 26–41.

Official Statistics of Finland OSF (2009). *Regional Account*. Available at: http://www.stat.fi/til/altp/tau.html (accessed 1 November 2016).

OSF (2013a). *Employment.* Available at: http://www.stat.fi/til/tyokay/index.html (accessed 22 September 2013).

OSF (2013b). *Educational structure of population.* Available at: http://www.stat.fi/til/vkour/index_en.html (accessed 18 August 2013).

Payne, G.T. (2006). Examining configurations and firm performance in a suboptimal equifinality context. *Organization Science* 17:6, 756–770.

Pearce, J.L & Huang, L. (2012). The decreasing value of our research to management education. *Academy of Management Learning & Education* 11:2, 247–262.

Pettigrew, A.M. & Starkey, K. (2016). The Legitimacy and Impact of Business Schools—Key Issues and a Research Agenda. *Academy of Management Learning & Education* 15:4, 649–664.

Pfeffer, J. & Fong, C.T. (2002). The End of Business Schools? Less Success Than Meets the Eye. *Academy of Management Learning & Education* 1:1, 78–95.

Poropudas, O. & Volanen, M.V. (Eds.). (2003). *Kohti asiantuntija yhteiskunnan koulutuspolitiikkaa*. Helsinki

Porter, M.E. & Siggelkow, N. (2008). Contextuality within activity systems and sustainability of competitive advantage. *Academy of Management Perspectives* 22:2, 34–56.

Pöykkö, E., & Jalas, A. (2011). *Liikkeessä! Kauppakorkeakoulun vuosisata*. BTJ Finland.

Pöykkö, E., & Åberg, V. (Eds.). (2010). *Tulkintoja, tosiasioita, tarinoita: Helsingin kauppakorkeakoulun historiaa*. WS Bookwell.

Robertson, J. (2007). Beyond the "research/teaching nexus": exploring the complexity of academic experience. *Studies in Higher Education* 32:5, 541–556.

Robertson, J. & Bond, C. (2005). The research/teaching relation: A view from the "edge". *Higher Education* 50:3, 509–535.

Rubin, R. & Dierdorff, E. (2009). How Relevant Is the MBA? Assessing the Alignment of Required Curricula and Required Managerial Competencies. *Academy of Management Learning & Education* 8:2, 208–224.

Saarinen, T. (2005). From sickness to cure and further: construction of 'quality' in Finnish higher education policy from the 1960s to the era of the Bologna process. *Quality in Higher Education* 11:1, 3–15

Salo, M. (2015). Julkisten peruspalveluiden rakentamisesta teknologia-aaltoon. Suomen yliopistollisten koulutusalojen määrällinen kehitys 1950-luvulta 2010-luvulle. *Kasvatus & Aika* 9:3, 172–243

Seidl, D., & Werle, F. (2018). Inter-organizational sensemaking in the face of strategic meta-problems: Requisite variety and dynamics of participation. *Strategic Management Journal* 3:9, 830–858.

Sherman, H.D. & Zhu, J. (2006). *Service Productivity Management Improving Service Performance using Data Envelopment Analysis (DEA)*. Springer.

Short, J.C., Payne, G.T, & Ketchen, D.J. (2008). Research on Organizational Configurations: Past Accomplishments and Future Challenges. *Journal of Management 34:6*, 1053–1079.

Siggelkow, N. (2002). Misperceiving interactions among complements and substitutes: organizational consequences. *Management Science* 48:7, 900–916.

Siggelkow, N. (2011). Firms as systems of interdependent choices. *Journal of Management Studies* 48:5, 1126–1140.

Siggelkow, N. & Levinthal, D.A. (2003). Temporarily divide to conquer: centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. *Organization Science* 14:6, 650–669.

Simons, M. & Elen, J. (2007). The "research–teaching nexus" and "education through research": an exploration of ambivalences. *Studies in Higher Education 32:5*, 617–631.

Sitra (2000). *Tutkimuksen lisärahoituksen arviointi* (Sitran raportteja No. 1)

Suhonen, T. (2013). Are there returns from university location in a state-funded university system? *Regional Science and Urban Economics* 43:3, 465–478.

Suomen Ekonomiliitto (2010). *Opiskelijavalinta, opintojen eteneminen ja opintoihin sitoutuvuus kauppatieteellisellä alalla* (3/2010).

Tulkens, H. & Vanden Eeckaut, P. (1995). Non-parametric efficiency, progress and regress measures for panel data: Methodological aspects. *European Journal of Operational Research* 80:3, 474–499.

Universities Act (UniAct) (1997). Universities Act 1997, Amendments 715/2004, 556/2005, 1453/2006. Finland.

Van de Ven, A., Ganco, M., & Hinings, C.R. (2013). Returning to the frontier of contingency Theory of organizational and institutional designs. *Academy of Management Annals* 7:1, 393–440.

Volberda, H.W., van der Weerdt, N., Verwaal, E., Stienstra, M., & Verdu, A.J. (2012). Contingency Fit, Institutional Fit, and Firm Performance: A Metafit Approach to Organization–Environment Relationships. *Organization Science* 23:4, 1040–1054.

Walsh, J. (2011). Presidential address: Embracing the sacred in our secular scholarly world. *Academy of Management Review* 36:2, 215–234.

Worthington, A.C. (2001). An empirical survey of frontier efficiency measurement techniques in education. *Education Economics* 9:3, 245–268.

Worthington, A. & Higgs, H. (2011). Economies of scale and scope in Australian higher education. *Higher Education* 61:4, 387–414.

Välimaa, J. (2004). Nationalisation, localisation and globalisation in Finnish higher education. *Higher Education* 48:1, 27–54.

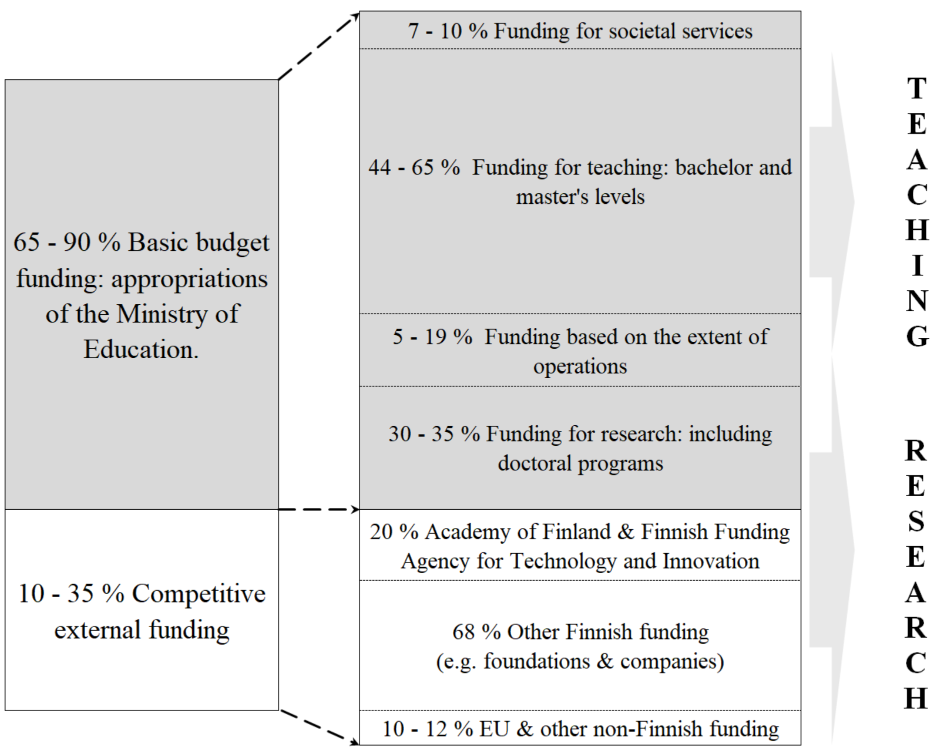
Välimaa, J. (2005). Social Dynamics of Higher Education Reforms: The Case of Finland. In Å. Gronitzka, M. Kogan, & A. Amaral (Eds.), *Reform and Change in Higher Education: Analysing Policy Implementation* (245–268). Springer.

Ylijoki, O.-H. & Ursin, J. (2013). The construction of academic identity in the changes of Finnish higher education. *Studies in Higher Education* 38:8, 1135–1149.

Zhu, J. (2008). *Quantitative Models for Performance Evaluation and Benchmarking: Data Envelopment Analysis with Spreadsheets* (2nd ed.). Springer.

APPENDIX A

The funding grounds of BSCs in 1994–2009



APPENDIX B

Output-orientated constant returns to scale (CRS) model

$$\underset{\theta,\lambda}{\text{Maximize}} \quad \theta,$$

$$\begin{aligned} \text{Subject to} \quad & -\theta y_{\text{i}} + Y\lambda \geq 0, \\ & x_i - X\lambda \geq 0, \\ & \lambda \geq 0, \end{aligned}$$

Output-orientated variable returns to scale (VRS) model

$$\underset{\theta,\lambda}{\text{Maximize}} \quad \theta,$$

$$\begin{aligned} \text{Subject to} \quad & -\theta y_{\text{i}} + Y\lambda \geq 0, \\ & x_i - X\lambda \geq 0, \\ & N1'\lambda = 1 \\ & \lambda \geq 0, \end{aligned}$$

We have N b-school units, with data on S inputs and U outputs on each of units. For the ith unit these are represented by vectors y_i and x_i.

i = number of unit compared in the DEA analysis

θ = scalar, technical efficiency rating of the unit evaluated in the DEA analysis (distance of unit from origin to frontier on a scale 0 to 1)

x_i = vector of S x 1 inputs of ith unit

y_i = vector of U x 1 outputs of ith unit

X =matrix of S x N input

Y = matrix of U x N output

λ = N x 1 vector of constraints (weight (coefficient) assigned by DEA analysis)

APPENDIX C

The window analysis in output-orientated constant returns of scale model

$$\theta'_{k_w t} = \max_{\theta,\lambda} \theta$$

Subject to

$$-\ \theta\ y'_t + Y_{k_w}\lambda \geq 0$$

$$x'_t - X_{k_w}\lambda \geq 0$$

$$\lambda_n \geq 0\ (n=1,\ldots,N \text{ x } w)$$

Where we have N b-school units (n=1,..,N), which are observed over T periods (t=1,…,T) with S inputs and U outputs for each unit. Observation n in period t, has S dimensional input vector x_t^n = $(x_1^n, x_2^n, \ldots, x_{st}^n)$ and U dimensional output vector $y_t^n = (y_1^n, y_2^n, \ldots, y_{ut}^n)$. The window k_w starting at year k, $1 \leq k \leq T$ and width w, $1 \leq w \leq T - k$ includes N x w observations. Output and input matrices are hence

$$X_{k_w} = (x_k^1, x_k^2, \ldots, x_{k,}^n x_{k+1,}^1 x_{k+1}^2, \ldots, x_{k+1}^n, \ldots, x_{k+w}^1, x_{k+w}^2, \ldots, x_{k+w}^n) \text{ and}$$

$$Y_{k_w} = (y_k^1, y_k^2, \ldots, y_{k,}^n y_{k+1,}^1 y_{k+1}^2, \ldots, y_{k+1}^n, \ldots, y_{k+w}^1, y_{k+w}^2, \ldots, y_{k+w}^n)$$