Productization of Academic Research Services – A Framework for Business, Service, and Operational Models

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ABSTRACT

Collaboration in research between universities and industry is crucial for national development and innovation. However, as public organizations undergo restructuring and align with private sector advancements, navigating this transition can be challenging. Our approach aims to describe the essential components of academic service productization in response to new public management, aligning them with private sector needs. We adopted an integrative literature review, drawing from literature on new public management, public–private partnership logic, service-dominant logic, service design, design thinking, and service productization. Our framework, based on the objectives of the socio-economic learning economy—competence renewal, development acceleration, obtaining appropriate services, and increasing awareness and trust—forms the basis of our analysis. The main contribution lies in a framework that delineates the connection between business, service, and operational models. This study posits that new public management-oriented universities should consider private partners as co-creators in research and design service models that optimize processes for efficient collaboration. To ensure mutual understanding of research service deliverables and achieve joint desired outcomes, the productized operating model needs to be established to scale the delivery of service items.

Keywords *- collaboration, education, industry, partnership, university.*

INTRODUCTION

The evolution of public organizations has been accelerating, particularly since the 1990s, from several perspectives. Decreasing financial support alongside increased and more regulated tasks has created new requirements for the management of these organizations (Ferlie et al., 2008). In Finland, this change occurred in the 1990s and early 2000s. Funding became output-based but lacked direct guidance, leaving it up to individual organizations to determine how to deliver various outputs. Since then, universities and research institutes have been working to develop their deliverables and processes. For many organizations, this has been a laborious process as they learn to implement private sector

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management practices. This challenge is compounded by the rapidly changing operational environment. As a result, though many public organizations have been able to describe their deliverables and respective processes, the maturity of their process management remains relatively low (Vasikainen, 2014).

Universities and research institutes have not been exceptions in this regard. In Finland, during the 1990s and early 2000s, funding shifted to an output-based model without direct instructions, allowing organizations to determine how to deliver various outputs. Since then, universities and research institutes have been working to enhance their deliverables and processes. Many have found this to be a painful and labor-intensive experience as they adapt to private sector management practices, all while facing a rapidly changing operational environment. Consequently, while many public organizations have managed to articulate their deliverables and processes, the maturity of their process management remains typically low (Vasikainen, 2014).

Another aspect of driving development in public organizations is the increased collaboration among various stakeholders. Public services are increasingly viewed as part of value chains or business ecosystems (Tampio et al., 2022a, 2022b). For universities and research institutes, this has led to closer collaboration between business and research (Juntti, 2022). Concurrently, private companies are experiencing intensified competition and shorter business cycles, prompting more intensive investments in research and development (RDI) activities. The information intensity and overall volume of information necessitate collaboration in RDI. Although the intensity, scale, and duration of collaboration may vary, research has shown that collaboration benefits both business and academia (Juntti, 2022).

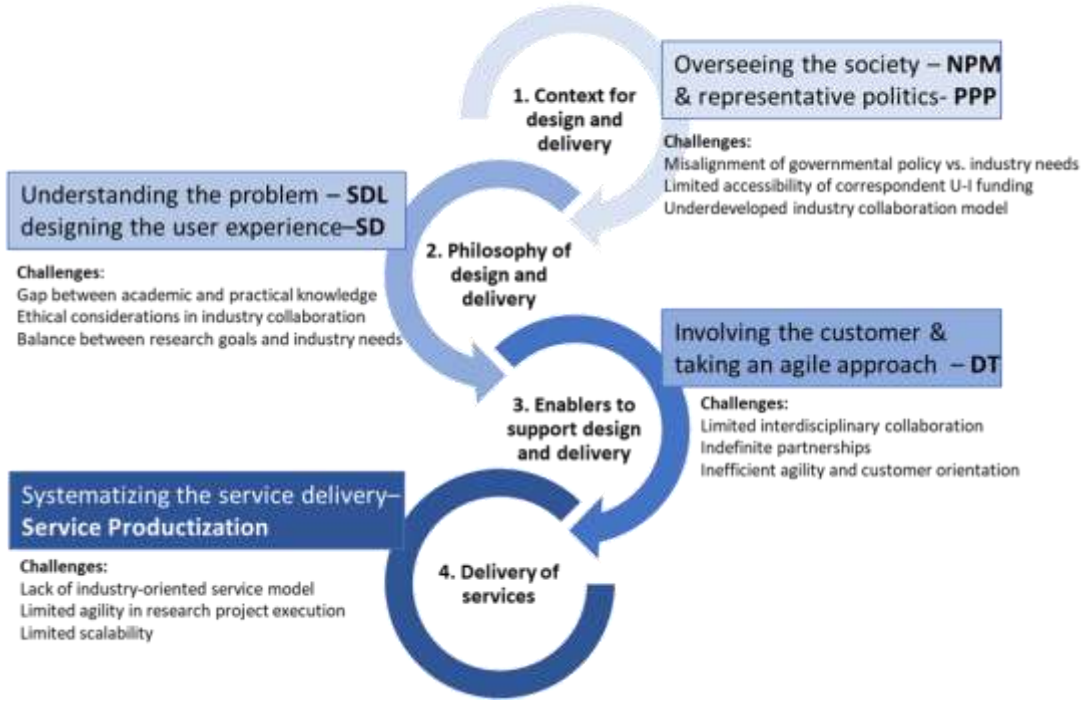
Considering these developments, our research aims to emphasize academic collaboration, and the systematic methods needed for effective research collaboration activities. We adopt a conceptual approach using an integrative literature review (c.f. Torraco, 2016) to analyze the literature related to intensifying and improving the overall productivity of RDI collaboration. Our focus is on the collaborative research process from the perspective of research institutions, with the aim of strengthening the systematization of the research process. Our research question is formulated as follows: *What are the fundamental components of development in academic service productization (SP) as a response to new public management?*

This manuscript effectively bridges theories from business model innovation, service management, and academic research commercialization, offering a robust conceptual framework that can significantly contribute to the literature on knowledge transfer and commercialization in academia. While the paper is purely conceptual, it provides a comprehensive overview of theoretical foundations and their practical implications.

LOGIC OF THE STUDY

This conceptual paper reflects existing literature from various perspectives and levels to outline the path for research service development in academic institutions. We follow an integrative literature review approach, as outlined by Torraco (2016), aimed at generating new knowledge through the review, critique, and synthesis of selected literature. For the highest level of our analysis (Figure 1), we use *new public management (NPM)* as a starting point to cover high-level changes and control mechanisms for public institutions, focusing on higher education institutions that deliver basic and applied research. The evolving challenges faced by higher education institutions demand innovative approaches, and strategic dialogue among government, universities, and industry is essential for enhancing academic capabilities and fostering cutting-edge solutions, thereby achieving the societal impact that governments aim for. This necessitates twofold collaboration, especially as discussions around *public–private partnerships (PPPs)* have emerged in response to changing global economic patterns, revised government funding models, and shifting economic structures.

Figure 1: The stepwise process of this study outlining the fundamental components of service path in the way of academic research service productization



Given that the deliverables of public institutions are typically services, we discuss the development of these services within the framework of *service-dominant logic (SDL)* and *service design (SD)*. Businesses and industries have been striving to elevate intangible SD to the level of tangible product development, facing numerous challenges inherent in intangible services. *Design thinking (DT)* is viewed as a promising approach, as it involves customers in the SD process. Finally, to effectively plan, organize, and control

processes, a unified understanding of deliverables is necessary, underscoring the importance of clarifying the concept of SP.

In public discourse, knowledge co-creation increasingly emerges as a crucial factor in national development. A growing body of literature characterizes this as requiring a socio-economic learning economy (Lundvall, 1996, Lundvall, 2002; Lundvall & Johnson, 1994). Practically, our integrative literature review utilizes four of Lundvall's (2002) objectives. The premise is that technological advancements, globalization, and regulation have collectively challenged the ability: *1) to renew competencies*. This pattern occurs simultaneously in both the industrial and university sectors. The *2) accelerated pace of technical and economic development*, in response to emerging changes, often overshadows the significance of any knowledge base. Production processes are diffused, work tasks are amended, and positions shift more frequently. New knowledge must be rapidly adapted, and the relevance of business-related knowledge is easily outmoded. Collaboration becomes increasingly vital, highlighting universities' ability *3) to generate appropriate services for industry*. To achieve this, there is a need *4) to ensure awareness and trust* within the entire learning economy to facilitate collaboration (Lundvall, 2002).

This approach combines multiple theoretical frameworks, providing a clear illustration of how the framework can be applied. The methodology is appropriate for the study's scope and supports the manuscript's objectives. While the paper does not include empirical validation, it offers valuable insights into the framework's application in real-world scenarios.

PERSPECTIVES FOR RESEARCH SP

Context for design and delivery

NPM

The ideology of NPM has significantly influenced the reform of administrative organizations and delivery systems in the public sector since the late 1970s (Aucoin, 2012; Borins, 1998). During this period, public administration faced issues such as incompetence, inefficiency, and corruption (Gruening, 2001; Pollitt, 1986; Schachter, 1989; Weber, 1956). In response to these challenges, NPM introduced a set of actions aimed at making public stakeholder collaboration more businesslike, enhancing efficiency, and applying private sector management tools to the public sector.

In the NPM era, qualities such as innovativeness, flexibility, and adaptability to environmental changes became essential for any public entity (Kallio & Kallio, 2014; Kekäle, 1997; Kuoppala, 2005). Meanwhile, critics argued that the rise of capitalism, as embodied by NPM, represented "the politicization of knowledge," which gradually endangered the public good in favor of industry interests (Rindermann, 2018; Vercellone, 2005). Despite these challenges, literature largely agrees on the key attributes promoted by NPM (Hood & Jackson, 1992).

Although numerous articles have discussed NPM in government, limited evidence pertains to higher education institutions, with most focusing on university policies (c.f. Vasikainen, 2014). Nevertheless, the literature indicates that NPM has fostered the management model of higher education institutions in terms of efficiency, organizational structures, standards, public authority relations, controllability, decentralization, and privatization (c.f. Vasikainen, 2014). As NPM draws practices from the private sector, it places pressure on accountability to industry preferences, sometimes leading to conflicts of interest in academia (Schedler & Proeller, 2000).

The literature offers little practical evidence on how NPM-inspired reforms have transformed universities into more efficient and effective (Table 1). This indicates a lack of scientific interest in single-case outcomes (Broucker & De Wit, 2015). Conversely, NPM does not conform to a universal, homogeneous framework; instead, it comprises a repertoire of instruments and methodologies available to policymakers, who can judiciously employ them based on contextual exigencies.

Table 1: New public management attributes relevant to academic service delivery

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Emphasizing management with engagement, freedom, and discretion. Altering government model.	Strategic approach to management	David, 2011; De Lima et al., 2013; Haapasalo et al., 2006; Kohlbacher et al., 2010; Monk & Wagner, 2012; Neubauer, 2009; O'Reilly & Tushman, 2021; Slack & Brandon-Jones, 2018
Acceleration of the development	Focusing on the measurement of execution with clearly set goals and targets	Performance management and accountability	Amaral & Magalhaes, 2002; Chevaillier, 2002; Jungblut et al., 2015; Kauppila, 2016; Kauppila et al., 2015; Melo et al., 2010; ter Bogt & Scapens, 2012
	Developing a government model where organizational structures are a framework to execution	Decentralization and participation	Amaral & Magalhaes, 2002; Chevaillier, 2002; Kallio & Kallio, 2014; Salter & Tapper, 2002
Obtaining an appropriate service	Enhancing the openness of the public sector and advancing competitiveness of the RDI services and related model	Customer orientation, privatization, competition	Kallio & Kallio, 2014; Möttönen, 1993
Increasing awareness and trust	Improving efficiency by reducing costs and improving results	Expulsion of provision and production	Gaebler, 1993; Kallio & Kallio, 2014; Kekäle, 1997; Kristensen et al., 2011; Kuoppala, 2005

When implementing NPM principles in *competence renewal*, the primary goal is to reshape managerial structures to foster more effective, agile, less hierarchical, innovative, and operational collaboration (Möttönen, 1993; Pollitt, 1986). Control mechanisms, such as performance metrics, should be used to redefine excellence and policy-driven control mechanisms, further improving effectiveness and influence (Aarrevaara, 2012).

Externally mandated metrics and control systems, derived from NPM, may be symbolic if not properly integrated into a partnership model (Cavalluzzo & Ittner, 2004). The success of performance measurement requires not only the demonstration of activities but also the ability to measure and evaluate their effects against preset targets. Furthermore,

effective performance measurement systems are critical for legitimizing resource use to stakeholders.

To *accelerate development*, NPM aims at decentralizing academic units and fostering an entrepreneurial mindset (Möttönen, 1993). The managerial attempt and ability to maximize public investments is referred to as "entrepreneurial thinking" in the literature (c.f. Gaebler, 1993). However, the conflict between NPM requirements and traditional academic values of autonomy and knowledge independence is evident (Möttönen, 1993). As a compromise, academic institutions are encouraged to use industry partnerships when the quantity and quality of expertise cannot be guaranteed otherwise.

The NPM-derived approach to *obtain appropriate services* has also led to increased competition between the public and private sectors (Amaral & Magalhaes, 2002; Chevaillier, 2002). However, this competition poses challenges to partnership collaboration and necessitates an open governance model that focuses on achieving common goals and information sharing (Turkulainen & Ketokivi, 2013).

The privatization of higher education fragments the traditional general education core, requiring universities to extend a compelling invitation to industry to *gain awareness and trust* (Kristensen et al., 2011). To succeed, the industry emphasizes a greater focus on efficiency (Kallio & Kallio, 2014). Performance management systems, viewed as social instruments and performance indicators, support rational decision-making and are required to monitor the conduct of collaborative operations (Melo et al., 2010; Ter Bogt & Scapens, 2012). Nevertheless, metrics are not straightforward solutions for managing higher education institutions due to the knowledge-intensive nature of academia (Kallio & Kallio, 2014).

(1) Finding: NPM has altered the higher education landscape, including shifts in partnerships, resource reform, autonomy, and management models. The adaptations of NPM have led to a greater focus on accountability and performance measurement, strengthening executive leadership, and pursuing common goals (Broucker & De Wit, 2015). Despite the potential benefits of NPM, universities have struggled to align with its principles (see e.g., Kallio & Kallio, 2014). The traditions of academic freedom, impartiality, and trustworthiness sometimes clash with NPM-derived private sector practices (Broucker & De Wit, 2015).

PPP

PPP, which emerged in the 1990s, was formulated to synergize the capacities of the public and private sectors as a strategic response to address complex societal issues with enhanced services (Osborne, 1996). In a PPP, one actor, often from the public sector, enters collaboration for altruistic motives, while the other party, typically represented by the private partner, seeks financial gains (Kivleniece et al., 2017; McQuaid, 1994, 2010). These divergent motivations must be harmonized not only at the outset but also throughout the partnership (Wößmann, 2006). The concept of PPP in the literature encompasses various forms of relationships across numerous contexts but is often rooted in synergy to some degree (Levin, 2003; Osborne, 2000; Rosenau, 2000; Tilak, 2010). While not all

participants may benefit equally at all stages, partnerships typically involve the development and delivery of strategies or operations that are beneficial to both parties in the long run (Kivleniece et al., 2017; McQuaid, 1994). Broadly, public-private collaboration refers to contractual or non-contractual cooperative ventures between public and private organizations, aiming to create new, appropriable benefits through the voluntary commitment of resources from both sectors (Kivleniece et al., 2017).

Primarily, PPP in education has been associated with developing countries as an effective strategy to establish educational services in situations where public actors are unable to provide them for various reasons (Osborne, 2000). Additionally, private sector participation in education via collaboration has increased in prosperous countries (Chattopadhay & Nogueira, 2014; Tilak, 2010). The growing participation of the private sector in such contexts is related to diversifying educational opportunities, fulfilling inadequate resources, and enhancing the quality of educational institutions (Ahmed, 2000; Aina & Akintunde, 2013; Akyeampong, 2009; Chattopadhay & Nogueira, 2014; Kohli et al., 2015; Shah & Lewis, 2010).

In academia, the significance of collaborative partnerships has been growing recently. This change is attributable to the heightened complexity associated with knowledge acquisition, shifts in government funding mechanisms, and the rapid evolution of economic structures (McQuaid, 1994, 1999, 2010; Weaver & Dennert, 1987). Another major driver has been the transformation of central–local government dynamics and attitudinal changes in public–private relationships (Vasikainen, 2014). In such contexts, PPP serves as both an emitter and an outcome (Osborne, 2000). As public organizations have concurrently adopted the NPM ideology, these two concepts are clearly intertwined in many respects (Amaral & Magalhaes, 2002; Chevaillier, 2002; Salter & Tapper, 2002).

There are various practical implementations of PPP in the context of higher education (Table 2). Typically, the public sector invites the private sector to joint projects or tasks. However, private partners can also initiate this process and persuade academia to participate in a business-oriented operation that both partners would subsequently deliver together (Aina & Akintunde, 2013; Frolova & Rogach, 2017; Gopalan, 2013; Linder, 1999; Osborne, 1997; Rosenau, 2000).

Table 2: Public-private partnership approaches relevant to service model

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Enhancing management models' agility and diversification	Diversified tools of knowledge acquisition. Advance in the dexterity of the supply.	Ansari, 2020; Child et al., 2019; Hodge & Greve, 2007; Osborne, 1996
Acceleration of the development	Focusing on networking with clearly set goals. Enhancing the openness of the public sector and advancing development by competing	Decentralized public entities (more open, accessible, and responsive to needs). Agile learning.	Amjad & MacLeod, 2014; Asadullah, 2009; Joshi, 2019; Osborne, 1996; Vertakova & Plotnikov, 2014
Obtaining an appropriate service	Establishing markets for private service providers, setting rules for output evaluation with indicators	Designed process that benefits the end-user and generates mutual motivation to collaborate.	Amjad & MacLeod, 2014; Asadullah, 2009; Kim & Han, 2015; Osborne, 1996; Singh & Segatto, 2020

Increasing awareness and trust	Stabilizing the macroeconomic environment	Exchange of best practices. Risk sharing.	Ansari, 2020; Kumari, 2016; Menashy & Dryden-Peterson, 2015; Smith & Joshi, 2016

In the context of partnerships, PPP contributes to *competence renewal* in various ways. It rejuvenates the management models of the public sector, granting it more autonomy, which has traditionally lagged the private sector (Amjad & MacLeod, 2014; Tilak, 2010). Public–private contracts have also bridged the gap between service supply and demand. Under PPP, the service portfolio becomes more equitable and regionally disaggregated, promoting agility (Levin, 2003; Wokadala & Barungi, 2015). PPP *accelerates development* and learning, fostering a deeper understanding, information flow, and mutual learning opportunities. This collaboration leads to new solutions, technologies, and methods emerging from the private sector (Hodge & Greve, 2005; Lee, 2008; Samii et al., 2002; Weiermair et al., 2008).

With the adoption of PPP, stakeholders, such as students, receive more *appropriate services* when the teaching is enriched with a broader selection of practical expertise defined in contracts. When choosing partners, universities must engage in open competition where the public sector establishes specific requirements (see, e.g., Tilak, 2010). PPP not only attracts additional resources but also accelerates the development of service delivery and management systems, improving the efficiency of public resource utilization (Odekunle & Babalola, 2008).

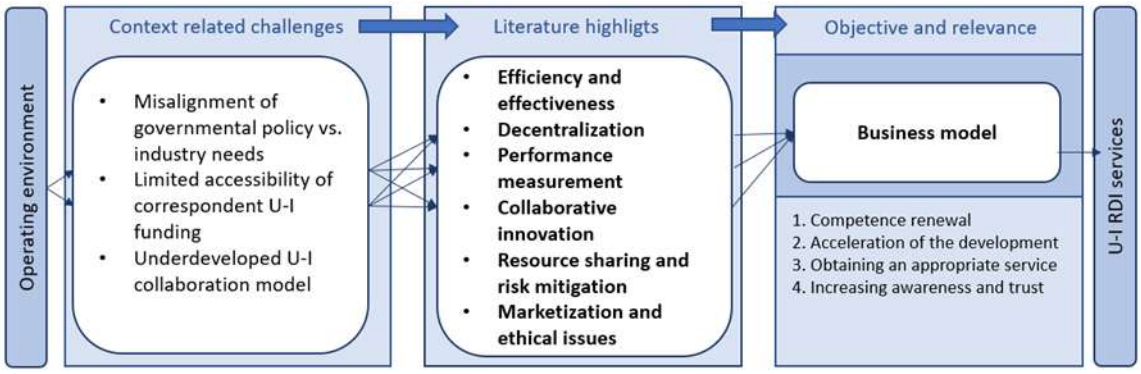
PPP stimulates competition in the knowledge transfer market and encourages the emergence of smart specialization within the industry. Conversely, public institutions compete for industry *awareness and trust*, prompting them to enhance the effectiveness of the partnership models they offer to succeed in the market (Krishna & Qaim, 2007; Levin, 2003).

(2) Finding: PPP contributes to macroeconomic stability by sharing the risks associated with service creation and delivery between the public and private sectors. This risk-sharing can improve service delivery efficiency or boost awareness and trust (Liu et al., 2015; Nisar, 2007). However, some researchers have argued that PPP might gradually erode public stakeholder collaboration and the "public good" nature of educational provision, potentially hindering impartiality (Tilak, 2010).

Synthesis of context for design and delivery

In summary, the changes in the context of academic service design and delivery reveal tensions between the traditional view of higher education as a public good and the industry-derived perspective that sees it as a marketable commodity (Figure 2).

Figure 2: Highlights of the NPM and PPP as a context for design and delivery



NPM and PPP ideologies can foster innovative practices and insights into academic business models, enhancing the effectiveness of educational units and regional development. However, they also highlight challenges, such as the potential risk of diminishing the "public good" approach to education and concerns regarding segregation, impartiality, and lack of trustworthiness. A transparent and effective business management and governance model is essential to navigate these complexities.

Philosophy of design and delivery

SDL

The basis of SDL is rooted in the work of Friedland from 1991. Friedland (1991) proposed a conceptual framework suggesting that society operates on three interrelated levels: individual, organizational, and societal. These levels collectively form a complex system of interorganizational relationships known as "institutional logic". Derived by Vargo and Lusch (2004) and expanded by Thornton and Ocasio (2008), SDL encompasses patterns of practices, assumptions, values, beliefs, and rules that shape how individuals engage in co-creation and sustenance within their social context. Since its emergence, SDL has represented a profound shift in understanding value creation and exchange (Grönroos & Gummerus, 2014; Vandermerwe & Rada, 1988). This transformational paradigm, rooted in both economic and sociological perspectives, challenges traditional economic theories and underscores the dynamic role of collaboration in academia. As scholars including Vargo (2011), Lusch (2011), Ordani and Pasini (2008), and others (Grönroos, 2012; Kuula et al., 2015, 2018; Prahalad & Ramaswamy, 2000, 2004; van Bommel et al., 2014) have observed, institutional logic has evolved significantly over time. This evolution culminated in the assertion that true value creation occurs only when stakeholders actively participate in the co-creation process (Kuula et al., 2019).

The core principles of SDL signify a profound paradigm shift, where the focus moves from tangible, material goods to intangible assets such as formulas, skills, information, and knowledge (Grönroos, 2008, 2012; Kuula et al., 2015, 2018). This shift emphasizes interactivity, connectivity, and systematic collaboration. Furthermore, the orientation transitions from a producer-centric approach to a consumer-centric perspective (see, e.g., Grönroos, 2012). The focus also shifts from exchanged services to the process of ex-

change, transcending static exchange mechanics to engage in dynamic, holistic partnerships that tackle complex problems adaptively (Vargo & Lusch, 2004). Consequently, the unit of exchange transforms from static, tangible services to an intangible service co-creation process (Juntti, 2022). This evolution is often referred to as "servitization" in the literature (Grönroos & Gummerus, 2014). The SDL literature related to SD (Table 3) is relatively underdeveloped (Grönroos, 1990, 1996, 2008, 2012). However, Kuula (2017) introduced three propositions that capture the service-related factors of SDL literature:

- Value creation (addressing customer needs and demands for value)
- Revenue stream (designing the offering and commercializing the value proposition)
- Strategic resources (identifying the key competencies and processes behind value co-creation and delivery to the customer)

These propositions highlight the collaborative nature of value creation, positioning it as a joint endeavor involving both service providers and customers. SDL underscores the equal importance of *competence renewal* in service provision (Vargo & Lusch, 2008). It posits that service should be the fundamental basis of exchange and advocates for collaborative innovation in partnerships (Lusch & Nambisan, 2015).

Furthermore, SDL encourages all operators to recognize themselves as service providers, viewing customers as co-creators of value (Vargo & Lusch, 2004). In SDL, the primary objective is not merely to deliver value but to present holistic value propositions that *accelerate development* (Anderson et al., 2006). Anderson et al. (2006) established that significant and profitable development occurs when these value propositions are distinctive, measurable, and sustainable.

Table 3: Service dominant logic approaches relevant to service model

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Focusing on management models and collaboration with clearly set targets.	Service as a fundamental basis of value creation. Industry is treated as customer, resource, peer, and co-creator.	Ballantyne et al., 2011; Cova & Salle, 2008; Kowalkowski, 2011; Tuli et al., 2007
Acceleration of the development	Setting clear structure to revenue stream and related collaborative operations	The basis of exchange underlying in the indirect exchange of well-established design, offering and value proposition	Chandler & Vargo, 2011; Edvardsson et al., 2011; Grönroos & Voima, 2013; Helkkula et al., 2012; Ramaswamy, 2011
Obtaining an appropriate service	Setting clear value proposition with key competences and processes	Focus on comprehensive value propositions providing competitive advantage	Bowden & D'Alessandro, 2011; Brodie & Hollebeek, 2011; Judson & Taylor, 2014; van Doorn et al., 2010; Vivek et al., 2012
Increasing awareness and trust	Stabilizing the process but tolerating tailoring when encountering the value to the customer	Value being alterable by the beneficiary and the occasion	Driscoll & Wicks, 1998; Hoffman & Kretovics, 2004; Svensson & Wood, 2007

SDL promotes selling items as distribution mechanisms for collaboration, offering comprehensive packages that encompass goods alongside support, self-service, and

knowledge (Grönroos, 2008). SDL has permeated academic institutions, extending beyond goods such as single-case projects, internships, and theses, to redesigning more holistic value propositions. This shift positions the industry as a co-designer of the educational service production process, fostering a market-oriented approach that prioritizes customer engagement, satisfaction, and needs. As a result, the industry benefits from *obtaining more appropriate services.*

This customer-centric orientation of SDL enhances the quality of stakeholder collaboration, instills *customer awareness and trust*, and transforms organizations into inherently industry-oriented entities (Maglio et al., 2009). SDL is rooted in the understanding that value is socially constructed and mutable, emphasizing its contextual and variable nature (Lusch & Nambisan, 2015). The implementation of SDL in higher education institutions is a topic of debate. The discourse revolves around the nuanced nature of customer engagement in educational provision (Grönroos & Gummerus, 2014). Some scholars contend that involving the industry as co-creators of educational services can address challenges faced by educational institutions (c.f. Hoffman & Kretovics, 2004; Kotzé & du Plessis, 2003; Schoemaker, 2008). Conversely, others argue that SDL has compelled universities to employ aggressive marketing strategies, potentially complicating the integration of a "public good" focus into decision-making processes (c.f. Driscoll & Wicks, 1998; Hoffman & Kretovics, 2004; Svensson & Wood, 2007).

(3) Finding: SDL serves as the cornerstone of academic customer engagement, advocating for a collaborative approach between service providers and customers in the value creation process. SDL encourages the shift from goods-dominant logic to a service-centered paradigm. To effectively implement SDL in academia, it must translate into structured practical applications, including goal clarification, solution design, prototyping, and integrating industry feedback (Wilson et al., 2016).

SD

SD emerged in the early 1990s in response to the lack of suitable design tools in the service sector (Sangiorgi & Pacenti, 2010). It is characterized as a holistic, co-creative, and user-centered approach (Mager & Sung, 2011; Polaine et al., 2013; Stickdorn et al., 2011). At the core of this approach is the end user or customer (Polaine et al., 2013). This methodology views all elements of a service or customer experience as part of a larger service encounter process, aimed at maintaining high standards when introduced to the customer at the frontline. The process emphasizes the inclusion of various stakeholders in co-creation. Baranova (2011) outlined key implications for designing stakeholder collaboration within SD, particularly focusing on the service process, touchpoints, and various activities related to enhancement, implementation, and monitoring. These implications emphasize competence renewal, development acceleration, obtaining appropriate services, and increasing awareness and trust (Table 4).

Table 4: Service design approaches relevant to service model

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Enhancing the agility of the collaboration management models	Service path mapped as a process entity	Ballantyne et al., 2011; Samalionis, 2009; Shostack, 1984; Mager & Sumg, 2011, Winhall, 2011
Acceleration of the development	Rules to evaluate the value propositions and partnership operations	Enhancement, implementation, and monitoring activities planned.	Ballantyne et al., 2011; Kowalkowski, 2011; Saarela et al., 2013; Ojasalo & Ojasalo, 2009; Shostack, 1984
Obtaining an appropriate service	Enhancing the openness of operations and deliverables	Steps of the journey detailed by using service blueprinting	Chalcraft et al., 2015; Chandler & Vargo, 2011; Geum &Park, 2011; Lim & Kim, 2014; Vacek & Varnum, 2018
Increasing awareness and trust	Stabilizing the process but tolerating variations	Touchpoints and points of failure or excessive waiting identified	Ballantyne et al., 2011; Glushko & Tabas, 2009; Lusch, 2011; Yazdanparast, 2010

Literature supports the benefits of SD in achieving a competitive advantage through competence renewal. These benefits extend beyond customer orientation to include the satisfaction and commitment of all stakeholders involved (Ballantyne & Varey, 2006; Lusch, 2011; Merz et al., 2009; Vargo & Lusch, 2008). To apply SD effectively, service blueprints are employed. A service blueprint is a visual tool that helps map the key activities of the service delivery process, including subprocesses and subsystems relevant to the customer (Crossman et al., 2013; Kelkar et al., 2017; Lim & Kim, 2014). It is widely used to break down complex service processes for detailed analysis, assessment, and improvement, with the goal of accelerating development. O'Brien and Deans (1996) suggested that academia should embrace the SD ideology and tools, emphasizing integration and collaboration with industry. An improved focus on customer needs and stakeholder involvement is likely to lead to more appropriate services.

The service blueprint is instrumental in identifying points of failure, areas of excessive waiting, and components that create value and enhance service provision (Sanders & Stappers, 2008; Steen et al., 2011). It systematizes the process, making it easier to understand, thereby fostering *awareness and trust* among partners.

Some publications have argued that SD may be unsuitable for higher education institutions due to the personalized and context-specific nature of academic partnerships and collaborations (Blood, 1994; Chia & Holt, 2008; Collins, 1996; Rafols et al., 2012; Rynes & Trank, 1999). This perspective suggests that knowledge creation should be an ongoing process in which industry plays a central role, supported by supplier contexts and contacts (Ridoutt et al., 2005). Nevertheless, collaborative knowledge creation is recognized as a valuable approach in managerial settings, although further analysis of related approaches, such as problem-based or project-based learning, may be needed to understand the full impact (Illeris, 2003).

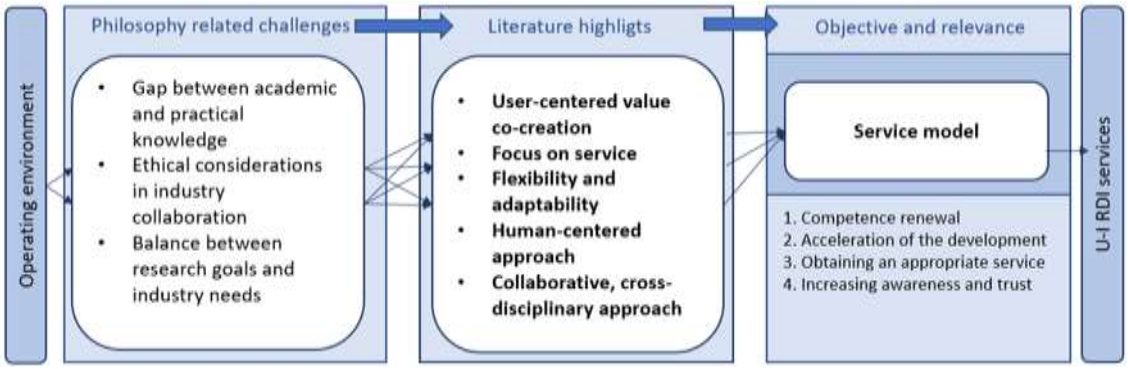
(4) Finding: SD recognizes the importance of stakeholder-centric approaches, tailoring educational services to meet the diverse needs of industries. Additionally, service design principles enhance overall customer experience

by optimizing administrative processes and improving communication channels within academic institutions.

Synthesis of philosophy for design and delivery

Adopting SDL and SD as guidelines for the philosophy of design and delivery in academic institutions emphasizes the customer orientation of the service creation process (Figure 3). The creation of a service-centered, collaborative service model must be strategically encouraged, potentially leading to positive outcomes in U-I collaboration.

Figure 3. Highlights of the SDL and SD as a philosophy of design and delivery



Enablers of design and delivery

DT

Herbert A. Simon introduced the term design thinking (DT) in 1969, revolutionizing the understanding of rational decision-making processes. He emphasized the limitations of conventional rational choice models and introduced the concept of bounded rationality. Simon's (1969) research underscored the need for systematic methods to navigate decision-making in a rapidly changing environment. DT has found application in "wicked problems," referring to complex circumstances that are ill-defined and challenging to tackle. The concept of wicked problems was initially introduced by Horst Rittel in the 1960s, highlighting the need for innovative problem-solving methods (Buchanan, 1992).

In relation to RDI services, DT embraces complex issues and enables the development of solutions using design tools (Buchanan, 1992). As a multidisciplinary field, it integrates practices from various domains, emphasizing customer-centered research, prototyping, and usability testing, similar to the principles of SDL and SD (Kuula et al., 2018). A fundamental tenet is that it is not the service but the *value* to be co-created with partners (Kuula et al., 2015).

The application of agile prototyping methods, often referred to as "quick and dirty" prototyping, emphasizes rapid concretization and testing of technical feasibility, customer desirability, and business viability (Brown, 2008; Smith, 2002). DT (Table 5) shares parallels with agile development and lean thinking, promoting user-centricity, iterative learning, and extensive communication (Kuula et al., 2019). DT has made significant inroads into higher education institutions, reshaping competence and promoting customer-centric

processes in development (Blomkvist & Holmlid, 2010; Dunne & Martin, 2006; Patrício et al., 2011). It comprises iterative cycles of abduction, deduction, implications, and induction to generate an appropriate service (Dunne & Martin, 2006).

Table 5: Design thinking approaches relevant to service model

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Enhancing the flow of work to be customer-centered	The flow of work has transformed into sprints. Human resources are allocated by roles, not by status.	Ballantyne et al., 2011; Samalionis, 2009; Shostack, 1984; Mager & Sumg, 2011, Winhall, 2011
Acceleration of the development	Setting rules to the style of prototyping	Teams are empowered with collaborative tasks. Teams work iteratively. Failing fast through piloting.	Ballantyne et al., 2011; Kowalkowski, 2011; Saarela et al., 2013; Ojasalo & Ojasalo, 2009
Obtaining an appropriate service	Conducting usability testing in managing teams	Foundation for inductive, deductive, and abductive thinking established. Projects divided into phases and managed with the double diamond model	Chalcraft et al., 2015; Chandler & Vargo, 2011; Geum &Park, 2011; Lim & Kim, 2014; Vacek & Varnum, 2018
Increasing awareness and trust	Value as a source of status and dominant attitude	Achieved solution iterated with a co-creative mindset.	Ballantyne et al., 2011; Glushko & Tabas, 2009; Lusch, 2011; Yazdanparast, 2010

DT in higher education goes beyond a scientific theory; it serves as a mindset and framework to understand industry needs. It challenges established assumptions, provides a solution-based approach to problem-solving, and links strategic thinking with hands-on methods (Brown, 2008; Kuula et al., 2019). The co-creational approach to value creation aims to increase industry awareness and trust toward academic institutions.

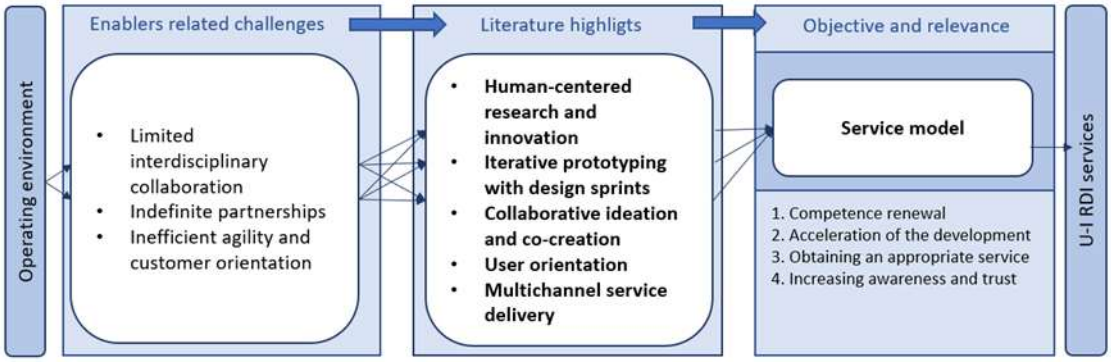
To conclude, DT literature introduces various paradigms and terminologies, resulting in multifaceted vocabulary and methods. The systematic application of DT-derived methods can either obstruct a user-centric approach or hinder problem recognition (see e.g., Seidel & Fixson, 2013). Successful implementation requires the ability to tailor the method to different phases of development (Seidel & Fixson, 2013).

(5) Finding: DT represents a transformative approach to problem-solving and value creation, uniting principles of design, innovation, and customer-centered thinking. DT enables multiple disciplines in RDI service management, challenging conventional thinking, promoting co-creation, and empowering teams to tackle wicked problems (Figure 4). Its impact on problem-solving processes in higher education institutions lies in the systematics of co-creational service models.

Synthesis of enablers of design and delivery

Viewing DT as an enabler of the philosophy of design and delivery in academic institutions emphasizes interdisciplinary collaboration and partnerships (Figure 4). Agility and customer orientation must be strategically encouraged to potentially lead to positive outcomes in U-I collaboration.

Figure 4: Highlights of the DT as an enabler to support design and delivery.



Delivery of the services

SP

In recent decades, the focus on the business world has significantly shifted manufacturing to customer problem-solving (Matthyssens & Vandenbempt, 2008). This transformation is referred to in the literature as servitization (Raddats et al., 2019; Vandermerwe & Rada, 1988). Simultaneously, service-oriented businesses have been creating more product-like sets of deliverables (Härkönen et al., 2015, 2017). SP distinguishes itself from goods productization through its focus on tangible origins and the simultaneous sale and consumption of collaboration without any change in ownership (Kotler, 1972). In this article, this shift is referred to as SP (Härkönen et al., 2015, 2017).

SP entails transforming partnerships into tangible or intangible deliverables. This concept is essential for commercialization and innovation development (Suominen et al., 2009). In practice, it is a complex process that involves identifying and analyzing partners' needs and merging suitable tangible and intangible assets into standardized, repeatable sets of deliverables that can be further communicated and evaluated.

Productizing the service model can offer significant benefits to both parties. Studies have shown that increased clarity and uniformity are appreciated by partners across industries (Härkönen et al., 2015; Johnston & Clark, 2008; Sääksvuori & Immonen, 2008a, 2008b). Furthermore, implementing a product-like set of service delivery enhances the efficiency and cost-effectiveness of the service provider, such as a university (Sipilä, 1999).

An ultimate form of SP (Table 6) is standardization (Ma & Fuh, 2008; Ruohonen et al., 2006). Through standardization, contractual collaboration results in easily distinguishable deliverables with unique features, making them comprehensible, modular, and redeemable. Standardization leads to more product-like service packaging, ultimately increasing predictability, scalability, and risk mitigation while reducing the resources required relative to results (Münstermann & Weitzel, 2008; Stetten et al., 2008).

Table 6: Service productization approaches relevant to service model

Objective	Focus Attribute	Implication	Key literature
Competence renewal	Systematizing workflow to series and modules	Interactions between the counterparts systematized	Aapaoja et al., 2012; Härkönen et al., 2015; Leon & Davies, 2008; Lukka & Partanen, 2014; Nagy, 2013; Rajahonka et al., 2013; Suominen et al., 2009
Acceleration of the development	Iterating the service components and related processes	Tangibility, comprehensibility, scalability, repeatability, and uniformity enhanced.	Artto et al., 2008; Gupta, 2011; Hemple et al., 2015; Ritala et al., 2013; Valminen & Toivonen, 2012
Obtaining an appropriate service	Setting rules to the contractual partnership model	Controllable and predictable service delivery model established	Flamholtz & Aksehirli, 2000; Flamholtz & Hua, 2002, 2003; Jaakkola, 2011; Nagy, 2013; Rajahonka et al., 2013; Saarela et al., 2013; Valminen & Toivonen, 2012
Increasing awareness and trust	Maximizing the resources/ results earnings	Inefficiency and risk of failure eliminated, creating a seamless collaboration process	Danson et al., 2004; Djellal et al., 2013; Heaslip, 2013; Nystén-Haarala et al., 2010; Ritala et al., 2013

Jaakkola et al. (2011) outlined seven stages of productization: conceptualizing customer needs, tangibilizing the service offering, determining levels of systemization and standardization, creating service packages, defining compensation systems, collecting feedback, and analyzing feedback for future development. It is evident that dismantling the delivery process aids in overseeing critical activities and assists in renewing related competences. The literature unanimously indicates that productization can add value to collaboration. To achieve this, service items should be analyzed to enhance their tangibility, comprehensibility, scalability, repeatability, and uniformity (Härkönen et al., 2015). When well-implemented, it can lead to higher outcomes in terms of revenue and customer value with fewer inputs, thereby accelerating mutual development (Sipilä, 1999).

A systematic approach to partnerships is also essential in the context of service production. The ability *to offer appropriate service* requires frequent interaction between partners (Aapaoja et al., 2012). A structured interaction forum is likely to foster mutual commitment, *awareness, and trust*.

Despite the numerous advantages of SP, challenges can arise. Issues such as insufficient information flow, lack of motivation, scattered systems, disintegration, and personnel-related problems can impede the process. These challenges are typically not inherent to SP but stem from poor implementation and a lack of stakeholder commitment. Engaging, participating, communicating, and mapping out common content are crucial for successfully productizing stakeholder collaboration (Aapaoja et al., 2012).

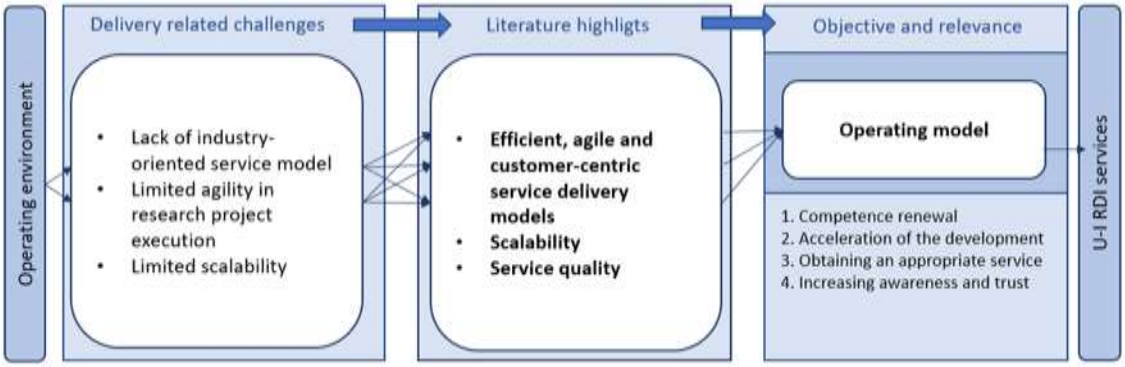
(6) Finding: SP literature underscores the significance of systematic cooperation between academic institutions and industry in service delivery, encouraging units to productize key processes of collaboration. The conceptualized operating model can help academic institutions address management dispersion. Productization clarifies the value proposition and makes

the operational conduct process more understandable, controllable, and manageable, ultimately benefiting both parties in university–industry collaboration.

Synthesis of service delivery

By clarifying, perceiving, and managing service offerings and related processes through productized configurations, a sustainability program that serves both internal and external stakeholders can be created (Figure 5).

Figure 5: Highlights of the productization literature in delivery of services



Overview of the literature review

Previous chapters provided a theoretical foundation based on demand, highlighting the need for strategic positioning, management, customer orientation, quality, service orientation, and systematization to enhance U-I collaboration. The approach covered a wide range of components relevant to academic service management (Table 7).

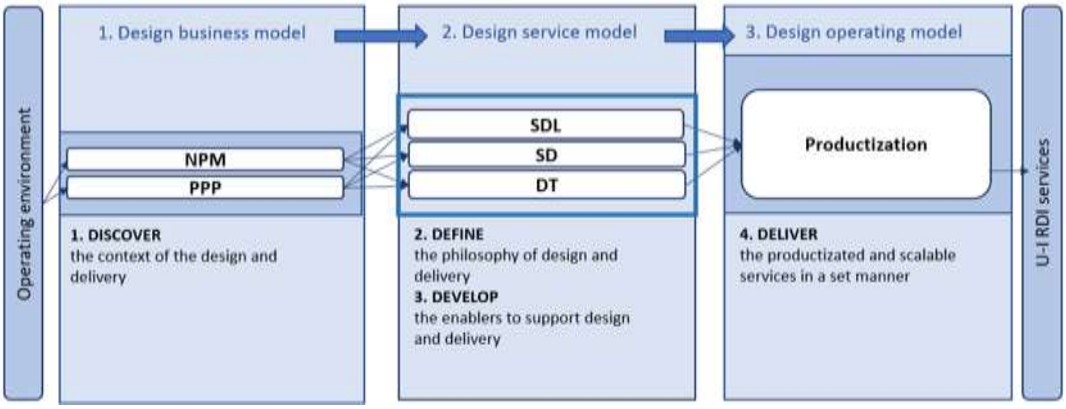
Table 7: Theoretical foundation and key components of academic service model

Relevant Approach	Finding	Key components
New public management (NPM)	Alters the higher education landscape, including shifts in partnerships, resource reform, autonomy, and management models. Encourages transactions between higher education institutions and industry. The partnerships aim at promoting collaboration, resource sharing, and mutual benefit.	Efficiency Accountability Customer Orientation Decentralization Competition Performance measurement
Public-private partnership (PPP)	This contributes to macroeconomic stability by sharing the risk of service creation and delivery between the public and the private sector. Contractility settles down the expectations, responsibilities, and safeguards to ensure that both parties achieve goals with minimal risks and disputes.	Resource sharing Accountability Risk allocation Service delivery standards Funding and revenue strategy (business model)
Service-dominant logic (SDL)	Serves as the cornerstone of academic customer engagement, advocating for a collaborative approach between service providers and customers in the value creation process. Emphasizes the service orientation in the core activities and pinpoints value co-creation, customer-centricity,	Value co-creation Customer-centric approach Flexibility and adaptability Open & transparent networking Continuous learning, innovation Emphasis on quality/metrics

	flexibility, communication, innovation, and quality. Contractual agreements focus on delivering value to Industry.	Mutual trust and communication
Service design (SD)	Recognizes of the importance of stakeholder-centric approaches, where educational services are tailored to meet the diverse needs of industries Focuses on higher quality and productivity by revolving around the designed journey. Service co-creation should have a set, prioritized design, but ability to deliver tailored services to partner-specific needs and expectations.	User-cantered design Experience mapping, prototyping Co-creation Flexibility and iteration Focus on service touchpoints Evidence-based improvement
Design thinking (DT)	Systematizes the co-creational service model. Increases customer orientation and specified targets in outcomes of the partnerships. Emphasizing an emphatic, user-cantered approach that embraces individuals with diverse skills and perspectives once designing innovations.	Collaborative design Multi-disciplinary collaboration Problem-solving attitude Iterative feedback Adaptability, experimentation Fostering an innovative culture
Service productization	Underscores the significance of systematic cooperation between the academic institutions and industry in the delivery of services. Encourages units to productize the key processes of collaboration Formulates a systematic, visible, repeatable, and tangible offering with set management process. Contracts should address these elements to ensure the successful development, delivery, and improvement of joint service offerings.	Standardized operating model Modularization, Systematization, standardization Quality assurance Scalability, efficiency Structured innovation process Feedback mechanisms Defined performance metrics Ownership considerations Service packaging Data and analytics

With productization, academic institutions can discover a business model, service model, and operating model (Figure 6) to enhance U–I collaboration. First, the path of service production requires a deep understanding of the prevailing context of design and delivery. A well-designed business model recognizes the challenges and cornerstones of NPM and PPP ideologies. A well-designed service model with relevant performance indicators empowers partners to reduce resource needs through synergy. Therefore, recognition of SDL, SD, and DT ideologies is necessary to define and develop the service model in the second stage. Last, a well-productized and systematized operating model must be designed to deliver services to the industry effectively and at scale.

Figure 6: Academic service productization path



The research question of this article was: w*hat are the fundamental components of development in academic service productization (SP) as a response to new public management*. Upon reviewing the literature, the answer to the research question is as follows:

> **Main finding:** SP requires an NPM-oriented business model that recognizes private partners as service co-creators. By defining and developing key processes of the service model, universities can address most challenges of U–I collaboration. The productized operating model, with scalable delivery of service items, aligns with NPM objectives.

DISCUSSION

This article investigates existing literature on academic RDI services and offers a practical path to developing a value-driven research service co-creation model. It lists numerous studies with examples of SP within the public sector and contributes to previous literature with a productized, NPM-derived path. The categorization highlights the multidisciplinary nature of the approach (Table 8).

Table 8: Service model co-creational path aligned with theoretical approaches

Theoretical approach	Practical implementation in the research institution
New Public Management (NPM)	Identifying clear objectives for the collaboration, focusing on efficiency, quality, and measurable outcomes. Specifying performance measurement criteria and metrics, aligned with NPM goals. Aligning the strategy with NPM principles, with a focus on efficiency, accountability, and goal achievement.
Public Private Partnership (PPP)	Designing the path to service model, covering education and research or innovation. Systematizing service delivery to make it repeatable and predictable, incorporating SDL and DT principles. Fostering a culture of collaboration and trust between UAS and industry partners through consistent dialogue.
Service Dominant Logic (SDL)	Standardizing service components and aligning service touchpoints with efficiency and accountability. Adapting a customer cantered approach during contract renewals. Utilizing service blueprinting to see each stakeholder's contribution.
Service Design (SD)	Specifying performance measurement criteria and metrics, aligned with NPM goals.
Design Thinking (DT)	An iterative development approach, being open to experimentation and self-evaluation.
Service Productization (SP)	Strengthening the legal framework for partnerships, standardizing agreements to dispute resolution. Emphasizing continuous improvement by gathering feedback.

In summary, designing a service model productization strategy within the NPM context necessitates a comprehensive and scholarly approach. In an academic context, the development of such a strategy should consider all the facets listed in Table 8. Through meticulous adherence to the outlined path, a university RDI SP strategy can be designed to foster collaboration while meeting the academic exigencies of NPM.

CONCLUSIONS

This article offers a comprehensive overview of the intersection between SP and NPM in the academic sector. In a public research context, SP requires an NPM-oriented business model that delineates private partners as co-creators in research. The described, optimized process is at the heart of efficiency, resulting in the service model. For a shared understanding of the requirements and results of the research service deliverables, the productized operating model with scalable delivery of service items meets the objectives of industry-oriented research. However, further discussion on the limitations and potential challenges in implementing the framework in diverse academic and cultural settings would provide a more comprehensive understanding of the framework's applicability.

Our qualitative review of this article was purely conceptual, following the integrative literature review. However, in our work, we found elements of our analysis surprisingly cohesive. While the research highlights the promise of service productization in improving U–I collaboration, it acknowledges the need for continued exploration and practical implementations in this evolving field. The authors are committed to further investigating research services, both within their institutions and across other organizations. As the saying goes, "The devil lies in the details." By delving deeper into the processes, we anticipate uncovering more nuanced issues and identifying specific units of analysis in forthcoming studies.

By addressing the productization of academic research, the manuscript contributes to a critical area in public administration—enhancing the economic impact of public universities and research institutions. This study provides valuable insights into how academic research can be systematically transformed into structured services that meet market needs. The proposed framework is novel in its systematic approach to transforming academic research into structured services, filling a gap in the current literature on academic research commercialization. The conceptual framework offers a fresh perspective on knowledge transfer and commercialization in academia.

The manuscript suggests actionable strategies for universities and research institutions to align their research activities with market opportunities, which is crucial for policymakers aiming to boost economic returns on public investment in research. The conceptual framework is designed to provide a new perspective on knowledge transfer and commercialization in academia.

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