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Enablers of Recombinant Digital Innovation in Service Systems from Media

Completed Research

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Abstract

The ability to recombine established digital technologies is a central driver for developing innovative service solutions within service systems. However, factors that enable the application of mechanisms for recombinant digital innovation in service systems are somewhat vague, leading to unwitting recombination efforts. Based on theory from service science and digital innovation literature, we investigate which innovation capabilities are necessary to apply recombination mechanisms by using the example of service solution development in the media industry in a multiple case study. We identify specific enablers for associative and additive recombination mechanisms embedded within an organization's IT application portfolio, structure, culture, capabilities, and partnerships. We contribute to IS literature by providing insights on the prerequisites for recombinant innovation in service systems. Our conceptual framework helps managers focus on implementing appropriate enablers for their respective digital innovation strategy.

Keywords

Recombinant digital innovation, service systems, digital innovation capabilities, media industry.

Introduction

The digitalization places immense pressure on organizations to regularly introduce innovative service solutions (Yoo et al. 2010). Continuous improvements in data transmission and processing and the diffusion of mobile devices lead to rising demands of consumers as they expect to be offered individually tailored services anytime and anywhere on the device of their choice. Consequently, to remain competitive, firms need to enhance the efficiency of their service development processes to generate new digital service solutions that fit swiftly changing customer demands (Gallouj and Weinstein 1997). Based on this premise, companies can approach innovation through recombination, which—in the context of IS—is described as a combination of digital technologies as central resources of digital solutions (Holmström 2018). Such recombination is applied through distinct mechanisms that reconfigure connections between digital technologies to generate new innovative digital solutions. Thereby, in the context of digital innovation in service systems, organizations primarily focus on associative and additive mechanisms since these lead to the development of innovative digital service solutions capable of providing utterly new value propositions (Beverungen et al. 2018). While there is consensus that the ability to recombine existing technologies is a critical driver of innovation performance (Yayavaram and Ahuja 2008), it remains unclear what requirements must be met for recombination to be applicable in the context of service systems. Despite advances in applying recombination theory to digital technologies and the pervasive digitalization (Hund 2020), less attention has been paid to specific enablers for the generation of innovative digital services and why some firms are better at it than others (Carnabuci and Operti 2013). Organizations remain in the dark regarding which conditions must be in place to be able to apply associative and additive recombination for the generation of innovative digital service solutions. Existing works on innovation capabilities are mostly

rather broad and do not specifically address recombinant digital innovation in service systems (Wiesböck and Hess 2020). Following these shortcomings, we propose the following research question:

RQ: Which factors enable recombinant digital innovation in service systems?

To answer the research question, we rely on theory from service science (Beverungen et al. 2018; Maglio et al. 2009; Spohrer et al. 2007) as well as on theory on organizational innovation capabilities representing enablers of digital innovation (Bharadwaj 2000; Carnabuci and Operti 2013; Wiesböck and Hess 2020; Wiesböck et al. 2020). Therefore, we conducted a qualitative-empirical research approach. For our multiple case study, we utilized the scenario of the media industry since the development of digital service solutions in media is particularly affected by the digital transformation (Hess and Constantiou 2018). By analyzing how and under which conditions mechanisms for recombinant digital innovation are conducted among the cases, enablers considered as necessary prerequisites are presented as central findings. Our insights help companies create conditions that facilitate the efficient development of new digital service solutions through recombination. This study contributes to the service science literature by sharpening the understanding of recombination in digital innovation by uncovering its mandatory conditions (Beverungen et al. 2018; Holmström 2018; Lundberg et al. 2020; Lusch and Nambisan 2015). Our conceptual model summarizes the findings and presents them in a practical manner that can help managers to lay the foundations that are necessary to apply mechanisms for recombinant digital innovation in service systems.

Theoretical Foundation

Recombinant Digital Innovation in Service Systems

Service systems serve as a theoretical abstraction to describe the relationship of diverse resources that can be connected to each other to co-create value (Maglio et al. 2009). These resources can take various shapes, such as organizations, individuals, and digital technologies (Spohrer et al. 2007). By reconfiguring the technical resources within a service system, innovative service solutions can be generated. Consequently, in the context of digital innovation, digital technologies can be seen as central resources forming digital service solutions within service systems. Against this background, an innovative digital service solution embodies the actual artifact that helps entities within service systems to co-create value (Maglio et al. 2009). This approach is rooted in the concept of digital recombination, which focuses on establishing new relationships between components such as hardware and software (Hund 2020). This type of recombination is related to the concept of knowledge recombination since the competencies that are necessary to identify and utilize opportunities for the recombination of digital technologies can be provided through the combination of diverse knowledge from various organizational areas (Hund et al. 2021).

Against this background, the development of innovative digital service solutions is dependent on the concatenation of various digital technologies (Hron et al. 2021; Nambisan 2020). Such a concatenation of digital technologies can be approached as a specific form of recombinant innovation which can be traced back to Schumpeter (1934). In IS research, it has prevailed that innovation is primarily the result of reconfiguring established technologies. The modularity of digital technologies can be seen as the fundamental prerequisite and necessary condition for recombinant innovation. Characteristics of digital technologies, e.g., reprogrammability and data homogenization, lead to a shift from a modular architecture to a layered modular architecture (Yoo et al. 2010), creating countless opportunities for novel recombination. This is possible as the layers of device, network, service, and content are only loosely coupled and allow elements from each layer to be flexibly combined with each other (Henfridsson et al. 2018). Thereby, the concept of product-component substantiality plays a central role. It describes that individual digital technologies can serve as a solution themselves or as a component of a solution (Wang 2022). The latter is the focus of recombinant digital innovation for the generation of innovative digital service solutions. These solutions can be generated through dissociation, association, and addition (Beverungen et al. 2018). Although all three recombination types are generally relevant in the context of service systems following the product-component substantiality, it must be noted that dissociation mechanisms, in particular, are not applicable in the context of this study. Resulting from the value spaces framework by Henfridsson et al. (2018), it can be implied that a valuable digital solution only emerges through connecting multiple technologies. In this context, we follow that isolated digital technologies are individually capable of forming services components but are not individually capable of forming a digital solution (Waltermann 2022; Yoo et al. 2010). Hence, this approach will be factored out for this study, which

puts associative and additive recombination mechanisms into focus. In the context of the generation of new digital service solutions, this means that establishing new relationships between different digital resources serves as the basis for recombinant innovation. Hence, it follows that services are rarely entirely new, but mostly consist of at least one digital resource that is already established within another digital solution.

The process of linking components of existing digital technologies in a novel way within a service system is referred to as association. At the same time, addition describes the process of adding digital technologies to an existing digital solution. Both of these recombination mechanisms rely on a set of assumptions (Beverungen et al. 2018): Firstly, to produce innovation through systematic re-utilization, the resources (i.e., digital technologies) must be clearly demountable so that separate elements or components can be identified (Gallouj and Weinstein 1997). Secondly, organizations must be capable of accessing and using diverse information and knowledge. Being well-connected internally and externally is vital for effective recombination and creating new value propositions (Cecere and Ozman 2014). Thirdly, recombinant digital innovation is based on cumulative value propositions of existing technologies in contrast to radical innovation, which is entirely unconnected to existing resources (Gadrey et al. 1995). We illustrated the mechanisms of recombinant digital innovation in service systems in the middle part of Figure 1: Within a service system, various digital technologies exist, that can be reconfigured through association or addition. Thereby, innovative recombined digital service solutions can be developed.

Digital Innovation Capabilities

Coping with the pervasive impact of digital technologies, companies need to develop dedicated digital capabilities that mainly focus on conditions enabling digital innovation (Lyytinen et al. 2016). Research on such digital innovation capabilities (DIC) within the IS research discipline has previously focused on the IT capability concept, which broadly refers to an organization's ability to manage IT. In general, DIC are defined as an organization's ability to transform digital resources into new organizational solutions that fundamentally differ from already existing ones (Lawson and Samson 2001). Such capabilities are required for organizations to handle the process of digitalization as well as their digital transformation and ultimately define how successful firms create and run digital innovations (Wiesböck et al. 2020). Since recombination is seen as a specific approach to digital innovation, such DIC are applicable in the context of developing recombined digital service solutions. Thus, it can be stated that service innovation requires specific digital capabilities to be able to exploit digital resources (Lyytinen et al. 2016; Wiesböck et al. 2020). The framework by Wiesböck and Hess (2020) presents enabling elements of digital innovation as a central element of digital transformation by clustering DIC along four organizational dimensions. This framework is particularly interesting for the targeted research question as the full impact of innovative digital service solutions only comes into effect once they are embedded into an organization's digital transformation process. Firstly, a firm's IT application portfolio is largely responsible for properties and functionalities that characterize digital innovation (Wiesböck et al. 2020; Yoo et al. 2010). In order to adapt the IT landscapes to the requirements of digital innovations, the systems in place need to balance centralization and flexibility while providing open interfaces for further growth (Wiesböck and Hess 2020). The second enabling dimension of digital innovations is the organizational structure as a central determinant for internal knowledge exchange, which, in turn, affects recombinant innovation capabilities (Wiesböck and Hess 2020). Shifts in the organizational structure can manifest in changing governance structures, emerging management roles, and new business units such as a dedicated digital business unit or the implementation of organization-wide digital innovation practices (Chaniyas et al. 2018). Thirdly, companies need to adapt their organizational culture to promote innovation since culture is often described as a critical factor in sustaining competitiveness in swiftly changing markets. Organizational values and practices dictate the general attitude towards digital technologies and risk-seeking and thus determine how the development of digital innovations is perceived by employees (Hartl and Hess 2017). The fourth DIC dimension is organizational capabilities, meaning how to effectively organize resources to achieve strategic goals and optimize corporate performance (Lyytinen et al. 2016). IT capability, such as acquiring, deploying, combining, and reconfiguring IT resources, has been recognized as essential for superior performance (Bharadwaj 2000). Moreover, firms' recombinant capabilities are embedded within an organization's ability to recombine existing technologies to generate innovative digital solutions (Cecere and Ozman 2014). Carnabuci and Operti (2013) distinguish between recombinant creation and recombinant reuse, which require different capabilities within this domain. While the latter is described as a capability deepening since known technological combinations are applied, recombinant creation involves completely

novel technologies and requires firms to broaden their capabilities by exploring and experimenting with them. Fifthly, the ability to foster IT partnerships characterizes an organization's DIC: Innovative competencies of firms are jointly shaped by their recombination capabilities and the nature of their alliance portfolios (Cecere and Ozman 2014). This is based on the assumption that internal and external know-how drives the performance of recombinant innovation (Beverungen et al. 2018). Thus, infrastructures focusing on digital innovation must allow for the integration of external parties. However, as outlined before, it is unclear how these various types of DIC are related to and enable the different mechanisms for recombinant digital innovation. Therefore, we extended Figure 1 by positioning the DIC for associative and additive recombination mechanisms as enabling conditions.

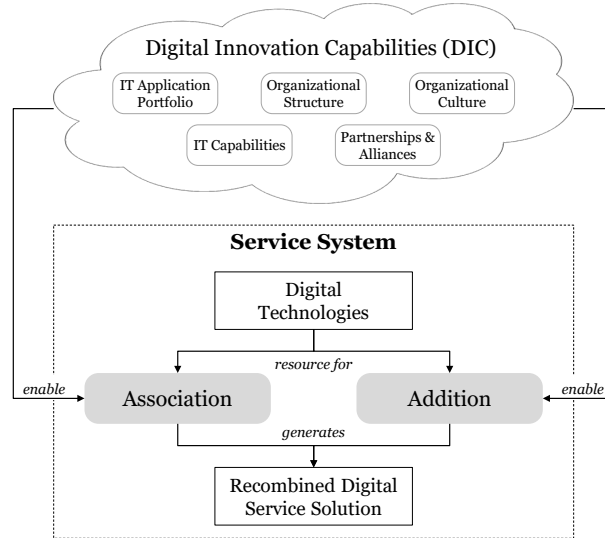


Figure 1. Conceptual Framework for Enablers of Recombinant Digital Innovation

Methodology

We conducted positivist, exploratory case study research to identify the enablers for associative and additive recombinant digital innovation in service systems. To ensure a sound, systematic, and rigorous approach for our study, we followed established scientific guidelines and recommendations for qualitative research (e.g., Myers 2009; Yin 2013). Selected cases must engage in recombination to generate new digital service solutions holding novel value propositions. "Media companies as organizers of public, media-based communication which today operate as content providers, as platform operators, or in hybrid forms" (Hess 2014, p. 6) offer various services to their customers. Consequently, they are an appropriate example for the following reasons: Being one of the first industries to be fundamentally affected by the digitization, the media industry is considered a pioneer in adapting to digital developments (Hess and Constantiou 2018). Additionally, the business models of media companies are deeply rooted in the provision of services, such as informing, entertaining, or supporting the user in a purchase decision. The increase in computing power and bandwidth requires media companies to respond to these dynamic changes at the same speed. Thus, media companies are under immense pressure to efficiently introduce innovative service solutions that satisfy the constantly changing user expectations. The fit between the research question and the multiple case study research design is ensured since requirements by Benbasat et al. (1987) are met. Firstly, enablers for recombinant digital innovation in service systems cannot be studied outside their natural settings because the interplay of the organizational setting, the actors, and the innovation approach are of interest. Secondly, constant technological change pressures the media industry to introduce new digital service solutions, demonstrating the need for a contemporary study focus. Thirdly, there is no need for the manipulation or control of events. Lastly, there is no clear theoretical basis on concrete factors that enable associative and additive recombination of innovative digital service solutions. Hence, three internationally operating media houses were selected following a criterion sampling logic. All three organizations are currently in digital transformation processes and differ regarding ownership, revenue, employees, and media focus to ensure heterogeneity of data sources and enhance external validity. Table 1 presents an overview of the cases. The companies are made unrecognizable as acronyms to ensure data protection.

	MultiCo	PrintCo	VideoCo
Ownership	Private	Private	Public
Revenue (2020)	2.24 bn	2.78 bn	0.41 bn
Employees	>15.000	>10.900	>3.000
Media Focus	Multimedia	Print	TV

Table 1. Overview of Case Sites

Between May and July 2021, we conducted ten interviews per case because, at this point, theoretical saturation was reached, meaning that additional qualitative data had no added value to the constructs (Fusch and Ness 2015). Due to the current Covid-19 pandemic, the interviews were recorded via an online video conferencing tool and lasted between 30 and 45 minutes. A semi-structured interview guideline ensured consistency while allowing flexibility to let a conversation arise. The interview partners were selected from different hierarchical levels and functional areas with either a technical or a strategic focus. At first, each interviewee was given a definition of associative and additive recombination mechanisms along with company-specific examples to ensure comprehensibility. After introducing themselves, we asked the interviewees to name examples of how the association mechanism has been applied in their company. Thereupon, five question blocks followed, holding open-ended questions with optional subquestions evolving around the framework illustrated in Figure 1. Afterward, the same procedure was applied for the addition mechanism. Eventually, the interviewees had the chance to make concluding remarks. For data triangulation purposes, annual reports and press releases published on the companies' websites were also analyzed. We used ATLAS.ti to code and analyze our data. Codes were assigned deductively based on our conceptual framework. To simplify the framework, we used codes for the five dimensions of organizational enablers, namely *IT application portfolio* (ITAP), *organizational structure* (STRU), *organizational culture* (CULT), *IT capabilities* (CAPA), and *partnerships and alliances* (PAAL). Sections in which association and addition activities are mentioned were marked accordingly. This allowed filtering for specific relationships to identify enablers for each mechanism. In an iterating process of comparing data and theory, themes and relationships emerged, which were constantly refined to establish construct validity (Eisenhardt 1989).

Results

Case Descriptions

MultiCo is a German multimedia corporation. The company provides digital services in the four business areas of publishing, audio, online comparison platforms, and management advice for small businesses. Publishing and broadcasting can be seen as the heart of the organization. Known as a cost-minimizing and efficiency-driven company, the company is an ideal case as the likelihood of applying recombinant digital innovation to create new service solutions is high. This has proven true, especially in the digital division. Concerning recombinant digital innovation, they connected their content technologies to their website infrastructure. To further ease future associations, the company currently introduces new standardized technologies and upgrades existing ones to increase visibility and transparency of digital resources. Concerning the audio segment, MultiCo introduced a live radio offer. By associating the digital technologies of its broadcasting with its existing live radio solution, the company created an entirely new digital service solution: A premium subscription online radio service offering on-demand content along with premium functionalities and an increased user experience. Service additions have mainly taken place through further distribution channels providing access to contents for all possible user scenarios. The enrichment of existing online platforms by adding an external software also enhances the user value.

PrintCo is an internationally active German media and technology company. In addition to more than 150 regularly published print magazine titles, the company's online services are experiencing strong growth and account for the most significant part of the profit. PrintCo was one of the first to establish a website infrastructure, which offered content online by associating digitally stored content of their analog publishing solution with the technologies of their online portal offer. The company's wide range of services and its first-mover aspect made it a thoroughly suitable case. The launch of further platforms offering digital services followed to create synergies from their content expertise and know-how as platform operators.

Even though all their platforms operate online, the provided services and value propositions range from news, entertainment, and advice on specific topics such as medical issues. The jobs-to-be-done method enhances associative recombinant digital innovation in their service system. This user-centric approach focuses on interdisciplinary teams recombining know-how of different areas. To add value to existing online services, additive technical features and connections to external portals were implemented ancillary.

VideoCo is a tax-funded public broadcaster based in Germany but operating internationally. Resources in their service system evolve around their TV offerings, radio channels, website, and mobile app. Content production for their service offerings shifted to an on-demand focus. As this case allows for a different perspective regarding company size, revenue model, media focus, ownership, and target group, it makes up for the perfect third complementary case in addition to the other two cases. The first online presence of VideoCo was intended to accompany the linear offer with additional information about the program. Later, an online media library was integrated into the website's existing infrastructure. With the launch of an online streaming portal, VideoCo has applied recombinant digital innovation by associating the existing content of their linear television solution with the infrastructure of their complementary website. The ongoing relaunch targets page responsiveness and automatic page configuration to increase usability. VideoCo added several technologies to their existing digital services to increase the value for the user. For example, advancements to its website were made to make it barrier-free for users worldwide. Furthermore, mobile apps and TV apps were developed to achieve better convenience for the user. Being present on many social media platforms can also be classified as an additional service by following the user and prioritizing their needs. For both mechanisms, partnerships with infrastructure and platform operators as well as content producers play a significant role in developing innovative digital service solutions.

Case Analysis

Across the three cases, enabling aspects from all dimensions of our conceptual framework emerged from the data. Generally, additions were perceived as less risky, easier to envision, and simpler to reverse if the addition turned out to be unsuccessful. However, during associative recombination, only parts of existing solutions were used. This is challenging, as one must be capable of imagining the individual components detached from the purpose of the established digital service solution. Even if an association seemed evident in retrospect, breaking out of previous patterns was a significant challenge.

Adapting a firm's **IT application portfolio** (ITAP) to the new requirements of digital technologies and preparing it for further changes was a special concern among all cases. A particular challenge was finding the right balance of centralized and decentralized processes. The firms had to dismantle existing service solutions into their individual parts to pursue association, which required a modular design. Moreover, having a range of diverse digital solutions was needed to associate new connections between them. The use of application programming interfaces (APIs) was also significant, as *"the key development [...] is that any service that is competitive in the market today is starting to open up implicit programmatic interfaces for others to participate accordingly"* (Interviewee 2, PrintCo). This enabled the organizations to engage in association by establishing connections between digital resources for seamless integration of digital service solutions. However, APIs were intensively used for addition as well. They must be used carefully as numerous connected services can negatively affect the response time of a service, which lowers the value for the customer. As Interviewee 4 of PrintCo elucidates: *"An interface [...] can open doors on the one hand, but on the other hand it increases dependencies and is of course always a huge pressure on performance. [...] From a developer's point of view, the approach is definitely to have as few interfaces as possible."*

The three cases also tried to set up favorable **organizational structures** (STRU) to enhance their efforts regarding recombinant digital innovation. Although formal structures and forms of collaboration varied, the common feature at MultiCo and PrintCo was establishing a digital innovation unit (DIU). This structure aims to build an appropriate level of agility and develop the necessary digital innovation capabilities to generate recombined digital service solutions. At PrintCo and VideoCo, cross-functional matrix structures with interdisciplinary teams were tested to approach associative service innovation with a user-oriented perspective. This importance is emphasized by Interviewee 8 of PrintCo: *"Especially in the area of innovation, where you go out of a comfort zone, it only works if as many perspectives as possible come in, especially to recognize the opportunity and importance in the first place. You have wild ideas and lots of them, but what is actually relevant for many people?"* The cases aimed for loose structural policies to create flexibility concerning internal cooperation and establish access to other intraorganizational digital

service solutions to combine different competencies. As outlined by Interviewee 7 of VideoCo: *"The right mindset is actually there, but it gets buried by rigid rules and structures that you have to break free from."* For addition, it became apparent that the inventor roles were clustered around the digital service solution. Such DIU are well suited to acquire deep, detailed knowledge needed to perform an impactful addition.

Efforts towards building sufficient levels of **IT capabilities** (CAPA) and developing dedicated digital skills were vital. Profound knowledge of the respective digital resources as well as creativity and a proactive mentality were regarded as essential conditions that enable recombinant digital innovation. The focus was less on specific knowledge but instead on the ability to try out new things. As Interviewee 4 of PrintCo describes: *"We also experience that if you combine different technologies in a new way, there are a lot of opinions and gut feelings, but few facts. So, not knowledge is the decisive factor, but rather setting up the right theses and trying them out. If they are wrong, quickly discard them and find new creative solutions"*. For association, the ability to systematically refine and reuse known technologies to apply them in new contexts was identified as enablers, which can be regarded as capability deepening is needed. For example, PrintCo and VideoCo repurposed their digital infrastructure and content to launch an in-vehicle infotainment service. Moreover, communication and mediation of concerns with the help of a boundary-spanning role are also referred to as being essential for addition. An architectural competency, described as the ability to abstract and separate digital technologies from their original digital service solutions, was mentioned as crucial for identifying new opportunities for association. As new technologies are involved in addition, firms must explore and experiment with digital components that have not yet been combined before. The willingness to engage with unfamiliar topics through learning-by-doing increased the success of additive innovation. Innovators are expected to broaden their capabilities by staying informed about trends and thinking outside the box regarding current service solutions.

The importance of **organizational culture** (CULT) was mentioned congruently as it determines the general attitude toward digital technologies and how they are used for recombination. Propagating transparency and cooperative values were crucial aspects in all cases to enable knowledge of potentially entirely different technologies, which is indispensable for recombination through the association mechanism. A risk-seeking culture that is open to failure compensated for the high associated degree of uncertainty in applying the association mechanism. Thus, the companies set appropriate incentives to motivate employees to engage in explorative activities that identify possibilities for recombinant digital innovation outside of established patterns. The focus on one digital service solution showed that additive recombination is quite close to traditional product development in IT, where agile frameworks became the predominant way of working. Thus, agile values must also be reflected in the corporate culture for addition to occur, as outlined by Interviewee 1 of MultiCo: *"Shifting the mindset of employees and make them understand that success can only happen in a collaborative, agile way is what really matters."*

All cases also took advantage of **partnerships and alliances** (PAAL) to extend the scope for potential opportunities for recombinant digital innovation to develop innovative digital service solutions. In all cases, being well-connected internally and having close partnerships with related industries were mentioned as necessary conditions. This fosters the generation of diverse knowledge, which broadens possibilities for associative recombination. Moreover, as Interviewee 2 of VideoCo describes, *"[...] creating connections between services can also be the lever from which valuable partnerships arise."* However, to create new value propositions different from existing ones, external partnerships with foreign companies were mentioned to be essential for addition since new external technologies are set into focus here. They tend to result in solutions that are even more different from the original service solution of the organization.

Discussion

Our results indicate that an enabler in one category can also benefit the other mechanism, which means that they cannot be separated dichotomously. They can benefit each other, whereas this is not a prerequisite for their emergence. Although modularity is only identified as an enabler for association, it can be regarded as an upstream condition to ensure the performance under load for additive innovation. Only through such an architecture can possible bottlenecks be corrected in retrospect. The results allow us to deduce that most enablers are not mutually exclusive. For example, transparency and cooperation, identified as enablers for association, are generally also associated with agile values. The fact that, collectively, more specific preconditions are necessary for association than addition can be explained by the higher complexity of associative processes. As outlined before, a digital service solution created through association is composed

of subcomponents of established digital service solutions. These solutions are decomposed into their individual digital technologies in a primary step to be reassembled in a subsequent step. As an enabler for association, portfolio diversification requires sufficient personnel and professional expertise to be set up and maintained. Hence, companies that strive for association must pay more attention to forming company-wide and cross-departmental networks.

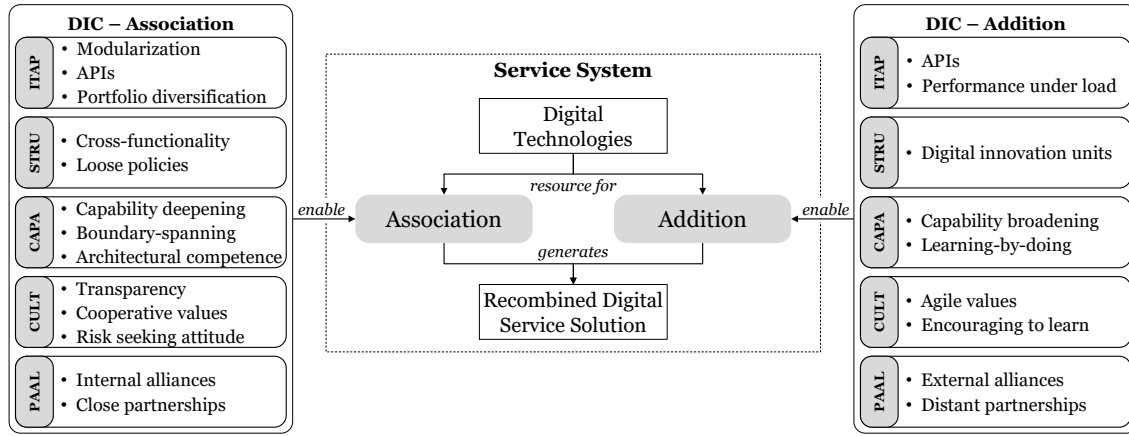


Figure 2. Enablers of Associative and Additive Recombinant Digital Innovation

In contrast, distant external alliances and sustainable relationships with suppliers are essential for addition and allow the development of new value propositions that significantly differ. The importance of clear documentation must be particularly emphasized for addition, as otherwise, constant add-ons could lead to unwanted dependencies and hamper the enabler of performance under load. Structurally, the focus is more concentrated on the composition of the teams within the targeted DIU, which are concerned with the further development of a solution. The profile of the employees should be matched precisely to the respective innovation role. Hence, risk-seeking employees skilled in networking and an abstraction capability should primarily be involved in association. In contrast, inventors for addition must be characterized by their hands-on mentality and willingness to broaden their knowledge. This required learning-by-doing mentality indicates that knowledge recombination is a necessary precondition for component recombination as a diverse knowledge base is needed. This means that the innovative value of a newly combined digital recombination is only unleashed if knowledge recombination has happened in the first place. Although this work does not quantify the importance of individual enablers, APIs can be assigned a special significance as the sole enabler of both mechanisms. Without this technical interface for combining technologies, all other enablers would become obsolete. In Figure 2, we illustrated these findings by juxtaposing the DIC that enable associative and additive recombinant digital innovation.

Contribution, Limitations, and Conclusion

Our study contributes to literature on service science by sharpening the understanding of recombinant digital innovation. It addresses previous calls for new theory development of value creation through recombination (Holmström 2018) by developing a conceptual framework highlighting the importance of digital innovation capabilities as enablers of associative and additive recombinant digital innovation. Our study shows that the different types of recombination cannot be viewed individually but are mutually dependent, as knowledge recombination appears to be a prerequisite of component recombination. Even if it was stated before that the delineation between different types of recombination is not clear-cut, this consideration gives evidence for this relationship and therefore provides avenues for future research. While the concrete processes of recombination and their prerequisites are often neglected and vague (Hund 2020), our findings unearth underlying dynamics for the emergence of recombination. Extant literature from IS often solely focuses on value co-creation and capturing without considering the starting point of the basic requirements (i.e., the digital solution a service is based on). Hence, this study makes an essential contribution to current research in the service science domain by providing insights into the respective enablers of recombination mechanisms (Lundberg et al. 2020; Maglio et al. 2009). We address the need for conceptualizations and frameworks that explain the potential impact of IT capabilities on how organizations develop innovative digital services (Lusch and Nambisan 2015).

Moreover, the developed conceptual framework of our study can serve as a starting point for practitioners to derive concrete measures to implement actions that enhance the implementation and application of associative and additive recombination mechanisms. This work enables firms to establish a competitive advantage by generating less costly and risky innovative digital service solutions based on resources that are already established within their respective service systems. With the help of our framework, firms can better respond to the pressure for innovation by efficiently introducing innovative service solutions that satisfy customer demands. Thus, using the identified enablers can prevent established firms from losing their technological leadership due to their inability to link well-understood technologies within established service systems. However, managers should be conscious that setting up enablers for both mechanisms simultaneously is challenging due to the complexity of the requirements that must be met. The findings have not revealed whether each identified enabler is equally relevant or if different importance can be attributed to them. Conducting further research in this area would help managers derive concrete measures and provide guidance if a specific order of implementation eases the process. This leads to the research question of what concrete measures are needed to implement the enablers. As it was suggested that managers might decide to focus on the enablers of just one mechanism depending on their aspirations, the question under which exact conditions association and addition are most beneficial deserves further consideration. Once the enablers of recombination mechanisms have a profound scientific basis, further research on additional drivers which can accelerate recombination would be valuable.

A few limitations of this paper must be acknowledged. First, it has to be mentioned that the results are based on large media companies. Being one of the first industries to be fundamentally affected by the digitization, media organizations are considered pioneers in applying mechanisms for digital innovation (Hess and Constantiou 2018). However, all types of digital services transmit information in various forms (e.g., videos, texts, skills). Therefore, it can be argued that our findings are likely to find application in other industries as well since recombinant digital innovation can be promising for diverse innovation agendas (Nambisan 2020). However, the generalizability of our findings must be limited concerning companies that focus on manufacturing or are relatively small and therefore lack of financial power and skills necessary for applying recombination. Hence, further investigations on the transferability of our results would be promising. Second, the terms associative and additive recombinant digital innovation are not commonly used in practice, potentially leading to a misconception for the interviewees. However, we soundly addressed this issue by giving explanations of additive and associative mechanisms at the beginning of each interview to convey a common understanding of these concepts. Moreover, we also used appropriate examples to avoid potential biases referred to this issue. Third, it must be noted that association and addition mechanisms can only be theoretically delimited from each other. In a practical context, the boundaries between these two mechanisms can become blurred, and they can even be connected with each other. Managers must consider this circumstance if they want to establish the necessary DIC in their organization. Therefore, further research on this concatenation is promising.

Overall, this study addressed relevant literature to conceptualize which factors enable the application of recombinant digital innovation in service systems. Utilizing an exploratory positivist multiple case study, innovation processes in three German media houses were investigated to answer the research question. Results showed that service innovations derive from associative and additive recombination. While confirming that both mechanisms determine a firm's innovativeness, different enablers became visible. We identified DIC enablers of association and addition, whereas previous literature provided only vague prerequisites for recombination. We hope this study incentivizes further research in this research area.

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