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TOWARDS AN INTEGRATED EVALUATION OF HUMAN-CENTERED SERVICE SYSTEMS AND CORRESPONDING BUSINESS MODELS: A SYSTEMS THEORY PERSPECTIVE

Research in Progress

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Abstract

The design of services and their corresponding business models (BMs) aims at a value creation for customers and service providers. Thus, the outcome is interrelated. However, both – the design service systems and BMs – are evaluated separately because they do not have a common theoretical foundation. Therefore, this design science research aims at the development of an evaluation scheme for the design of services and BMs. Building on a general systems theory, we conceptualize human-centered service systems (HCSSs) and their corresponding BMs as a coherent system. This conceptualization gives the possibility to provide concrete analytical levels that allow an integrated evaluation of this system. We apply this evaluation scheme in a care service context and show that the integrated evaluation allows a more concrete assessment of the combined design of HCSS and the corresponding BMs. With this evaluation scheme, we offer an operationalization of a summative evaluation for the design of HCSSs and BMs as an artifact. Also, this provides a new perspective on theory-rooted knowledge for designing and evaluating service systems. For practitioners, the evaluation results allow the coordination of the value proposition in the service systems and BMs.

Keywords: Service Design, Business Model Design, Human-Centered Service System, General Systems Theory, Evaluation Scheme, Design Science Research

1 Introduction

The design of services and their corresponding business models (BMs) aims at a value creation for customers and service providers (Zomerdijk and Voss, 2010; Zott and Amit, 2010). Here, matching service design and BM design is highly relevant as it enables companies to offer services that is able to deliver a convincing customer experience and affect the company's performance (Barrett et al., 2015; Peters et al., 2015; Vargo and Lusch, 2016). Therefore, the value creation is a critical output parameter for evaluating service system and BM design (Foglieni and Holmlid, 2017). Service and BM innovations in different contexts show that the combination of the value generation logic with the operational customer processes improves the overall value creation of services (Christensen et al., 2016; Peters et al., 2016). This knowledge is interesting for research in areas such as information systems (Veit et al., 2014; Barrett et al., 2015) and service research (Ostrom et al., 2015).

Beyond this insight, the activities of service design (Zomerdijk and Voss, 2010; Patrício et al., 2011) and BM design (Osterwalder and Pigneur, 2010; Zott and Amit, 2010) are usually considered separately. This separation is problematic because service system design and BM design are based on the same customer value proposition (Kleinschmidt, Burkhard, et al., 2016). Further, although the outputs of the activities are interrelated (Al-Debei and Avison, 2010), the BMs (Brea-Solís et al., 2015) and service systems (Foglieni and Holmlid, 2017) are evaluated independently. A real-world problem that results from this separation is the resource-intense coordination of the two development strands

(Kleinschmidt, Burkhard, et al., 2016) and the prevention of direct benefits from the integrated view (Kleinschmidt et al., 2017). On top of that, the connection and coordination of service processes and BMs becomes difficult whenever information and communication technology (ICT) is not the primary operand resource for the service delivery (Breidbach and Maglio, 2015). This non-ICT focus is found in human-centered service systems (HCSSs) that are defined by "human behavior, human cognition, human emotions, and human needs" (Maglio et al., 2015, p. 2; Kleinschmidt, Peters, et al., 2016). Here, personal interaction is essential for the value creation. What is missing is a concept that uses the available findings of service design and BM design and, thus, allows a combined evaluation. The resulting research question is the following:

How to conduct a systematic and joint evaluation of human-centered services and corresponding business models?

This research aims at the development of an evaluation scheme for the design of service systems and BMs. For this purpose, general systems theory (GST) is used to combine the two research strands of HCSSs and BMs. GST has great value for the evaluation of HCSSs and BMs as it has been developed to organize the relationships between different fields and to direct research towards the gaps they reveal (Boulding, 1956). Based on the components of service systems – people, information, organizations, and technologies (Maglio et al., 2015) – and BMs, a further operationalization of the evaluation scheme becomes possible. The application example in a care service setting allows the demonstration of the evaluation scheme in use. Compared to other assessment methods for service systems and BMs, this evaluation scheme provides an opportunity to analyze the design of HCSSs and corresponding BMs more specifically. As a contribution, the evaluation scheme offers an operationalization of a summative evaluation for HCSSs and corresponding BMs as an artifact. Moreover, it provides a new perspective on theory-rooted knowledge for designing service systems. For practitioners, the evaluation results allow the coordination of the value proposition in the service systems and BMs.

This paper is structured following a publication scheme for design science research (DSR) (Gregor and Hevner, 2013). Following this introduction, the next section provides a summary of HCSSs, BMs, and GST, building the theoretical background for the evaluation scheme. The third section describes the DSR methodology, which is the basis for the evaluation scheme in this paper. We then conceptualize the evaluation scheme in the fourth section by including the analytical levels, and then applying it to our research setting of a care service provider in the fifth section in order to demonstrate its use and utility. In the last section, we summarize the findings and give an outlook of the expected contribution for the future. Also, we specify how the further development might take place.

2 Theoretical Background

2.1 Evaluation of Services and their Corresponding Business Models

Service design is the "systematic application of design methods and principles to the creation of service concepts for new or improved services" (Holmlid and Evenson, 2008, p. 341). This service design is mostly customer- and experience-centric (Zomerdijk and Voss, 2010; Teixeira et al., 2012) and focuses on the integration of the customer into a service system. Outcomes are service systems that include people, technology, organizations, and shared information (Maglio et al., 2015). HCSSs are service systems with a focus on human behavior, cognition, emotions, and needs (Maglio et al., 2015). Personal interaction is, thus, essential for the value creation (Breidbach et al., 2016) but impedes advantages of ICT-enabled service provision such as scalability (Kleinschmidt et al., 2017). There are strategies such as service engineering that aim at overcoming this problem and strive for a systematization of the design (Böhmann et al., 2014; Peters, 2016). However, there is no definite service design approach because service systems need to be adapted to the particular context and customer problem (Edvardsson et al., 2011). The results for companies and customers are artifacts such as prototypes that show a detailed representation of the respective value proposition and value creation (Grenha Teixeira

et al., 2016). First attempts have been made to include BMs in service design (Chew, 2016) but the commercialization of the service is usually not a part of the service design (Witell et al., 2016).

BMs and their components cover the essential functions of service systems (Al-Debei and Avison, 2010). A BM is a "simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component" (Wirtz et al., 2016, p. 41). The main component is the customer value proposition that describes the promised benefits for the customers (Chew, 2016). The other parts explain how this value is created and delivered to the customer and why this is profitable (Teece, 2010). In practice, only a few models such as the BM canvas (Osterwalder and Pigneur, 2010) are used to define these relationships (Kleinschmidt and Peters, 2017). The objective of BM design is to expose business opportunities by defining the value for the participants (Zott and Amit, 2010). The result of BM design is a set of relevant and interrelated activities that represents the positioning of the company (Christensen et al., 2016). These activities enable the service providers and other participants of the service system to create value. This approach is related to how a service is designed and, therefore, cannot be considered separately (Osterwalder and Pigneur, 2010). What is challenging to BM design is that, contrary to partial optimization, system-level design is important (Zott and Amit, 2010).

Due to the separate design of services and BMs, the evaluation of the outcomes is also carried out separately. An evaluation of the BMs can be done by looking at the quantitative business impact (Brea-Solís et al., 2015). Here, different levers such as pricing, competition, technology, human resources, operations, service variants, costs, and customer service are indicators of changes in price or quantity. Other than that, the BM evaluations are qualitative assessments of the individual components (Osterwalder and Pigneur, 2010). Service systems are evaluated by the impact on the value creation in use (Foglieni and Holmlid, 2017). This approach includes the examination of the integration of resources in a particular context. It is important to observe timing and perspective (Foglieni and Holmlid, 2017). On the other hand, some approaches are more quantitative (Hogreve et al., 2016). Here, the influence of the internal and external service quality on the firm's financial performance is being proved. Unfortunately, an alignment of the value proposition of the BM and the service system does not happen (Maglio and Spohrer, 2013). This separation implies deficits in the design and assessment of service systems and corresponding BMs.

2.2 Integration with General Systems Theory

GST is concerned with developing a systematic, theoretical framework for describing general relationships of the world (von Bertalanffy, 1968). Hereby, a system is a set of interacting or interrelated components or elements of an interrelationship forming a complex whole (Ackoff, 1971). The objective is to develop a system of any kind or complexity based on the identification of general patterns, relationships, and common principles useful in making sense of real-world wholes. This approach itself is interdisciplinary as it makes use of the different existing explanations and models and draws on numerous disciplines to show the connections (von Bertalanffy, 1972). The advantages of this approach are the reduction of the complexity and understanding of the parts (Johnson et al., 1964). The system theory approach has been used to explain the phenomena in BM research (Zott and Amit, 2010) and service research (Spohrer et al., 2008). The GST is seen as a "logico-mathematical discipline" that is formal but applicable to different fields concerned with systems (von Bertalanffy, 1950). That includes a mathematical hypothetico-deductive system. Nonetheless, only a few contributions analyse systems on the basis of mathematical formulas. A large part of the papers are based on the theoretical assumptions about the theory and its components. The analysis stages that are given are the most concrete operationalization in theoretical contributions (Boulding, 1956). In addition, there are some contributions that attempt a direct application of GST in case studies (Bell, 1974; Porra et al., 2005; Smith and Weistroffer, 2016).

The representation and also the evaluation with the help of GST can take place in two different ways that are complementary - based on a phenomenon ("general field theory") and on hierarchies

(Boulding, 1956). In the first case, a phenomenon is examined in various disciplines to achieve a generalization of the description. Concerning this, there is no need for an exhaustive consideration when it is recognizable that the rules, structures, or the interactions between the components of the system are repeatable. In the second case, theoretical systems and constructs allow a structuring in different hierarchies of complexity. Concretely, nine different levels of the system are structured to capture the whole system. These levels consist of its static as well as dynamic structure, its control mechanisms, its self-maintaining structure, the genetic-societal level of the system, the information intake and structuring, its reflective possibility, the connection with other systems, and the meta level as a connection.

3 Research Approach

IS artifacts (Lee et al., 2015) such as service systems and their BMs have to show that their utility, quality, and efficacy meet the customer and business requirements (Venable et al., 2016). The IS artifact an interplay of technology, information, and social components. The goal of our research is to develop an evaluation scheme for the design of service systems and the corresponding BMs. Therefore, we base our research approach on the guidelines for DSR provided by Hevner et al. (2004) and Hevner (2007). In this research-in-progress paper, the focus is on the design evaluation. Overall, our completed research should provide a contribution to the theory of design and action (Gregor, 2006; Gregor and Hevner, 2013) for evaluating service design and BM design of IS artifacts.

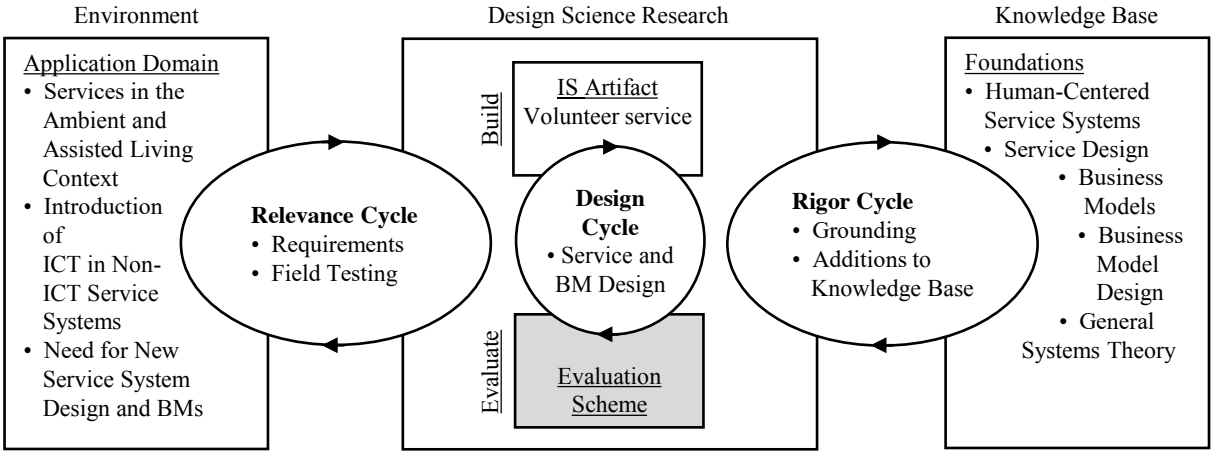

Figure 1. Design Science Research Cycles (Adapted from Hevner (2007)).

The DSR approach, in which this research is embedded, consists of three main activities (Figure 1) that include the design, relevance, and rigor cycle (Hevner, 2007). In this research-in-progress paper, we present activities not only connected to the design cycle but also representing the core of DSR. Here, we mainly focus on the evaluation of the IS artifact (Gray in Figure 1).

Although the evaluation of artifacts "typically uses methodologies available in the knowledge base" (Hevner et al., 2004, p. 86), they are not always immediately usable. The theoretical background has shown that there are overlaps in the design of services and BMs, but these are practically not used or described in existing literature. To operationalize the existing approaches in the evaluation of service design and BM design, we are developing an evaluation scheme. For the conceptualization, GST is used to bring the service system and the BM together and to enable a differentiated approach. Based on its functionality, this evaluation scheme is intended to allow scholars and practitioners to evaluate the outcomes of the service system and BM design and to improve the coordination.

Furthermore, we also ensure relevance and rigor for the evaluation scheme. Within the relevance cycle, the contextual environment of the research project is connected to the design science activities. Here, the environment of the presented research consists of a larger research project that aims at the

development and introduction of online matchmaking platforms for volunteers. The research project consists of a technical part including the development and testing of the matchmaking software and a business part including the design and implementation of the service systems and BMs. The service design and BM design have to be adapted accordingly to the new structure. For the presented application we have adapted the developed conceptualization (section 4) to the circumstances and activities of a project partner and have validated the results in workshops with different internal and external stakeholders. Within these workshops, we discussed the connections as well as the components of the application. The rigor cycle connects the DSR activities with the knowledge base of scientific foundations, experiences, and expertise and thereby provides the information for the research project. Now, as a knowledge base for the design and evaluation, we use the foundations that are presented in the theoretical background section.

4 Conceptualization

The theoretical background shows that the outcome and evaluation of HCSSs and BMs are not combined (Maglio and Spohrer, 2013). It does show, however, that there are overlapping components (Zott and Amit, 2010). Therefore, a conceptualization of the components and their relationships is quite useful in order to show the overlapping elements. In doing so, we want to move away from concrete methods that are established in companies, and rather work towards a meta-level of contained components and relationships. We will proceed in such a way that we combine the basic elements of the two outcomes of service design and BM design mentioned in the theoretical background. The GST allows you to display both parts in one system including the service and the business model from a holistic standpoint. The representation in Figure 2 is based on the conceptualizations of von Bertalanffy (1968). In addition to the input and output within the system, the components and their connections are included. The goal of the conceptualization is to summarize the findings from the HCSSs, the service design, the BMs, and the BM design and to build a basis for the evaluation scheme. We briefly explain and justify the conceptualization and then introduce the different levels of the analysis.

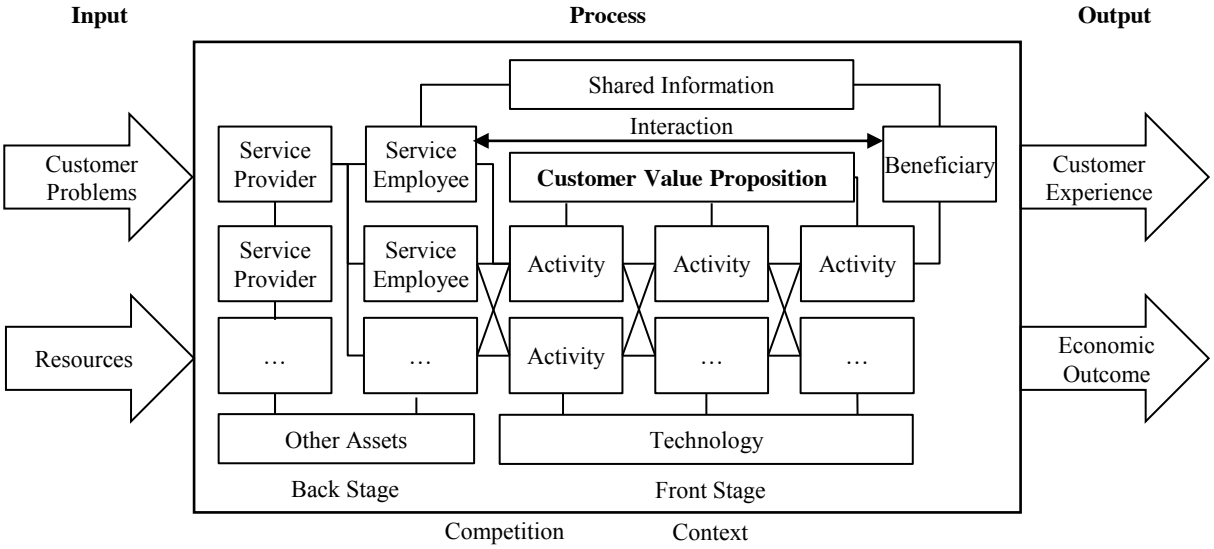

Figure 2. Systems Theory Conceptualization.

The conceptualization has several components (Figure 2). Basically, HCSSs and BMs are purposeful systems (Ackoff, 1971) with an input-process-output relationship (von Bertalanffy, 1968). The inputs are the individual customer problems (Osterwalder and Pigneur, 2010) and the company-internal as well as external resources and assets (Wirtz et al., 2016). The outputs are the customer experiences (Teixeira et al., 2012) and the economic outcome in the form of its revenue and profitability (Hogreve

et al., 2016). The value-creating process is embedded within a defined context (Vargo and Lusch, 2016) and competition (Wirtz et al., 2016) environment. In the value creation process - people, organizations, technology, and shared information are aligned with the customer value proposition through various activities or relationships (Maglio et al., 2015). The service is usually offered by a network of service providers (Wirtz et al., 2016), with the beneficiary being part of the network. Here, the value creation process is integrated into the direct interaction between the customer and the service personnel (Double-sided arrow in Figure 2). To create value, interdependent activities are being performed that are linked to each other and the value proposition in a unique form describing the structure of the service system (Zott and Amit, 2010). The process is composed of several different forms of visibility to the customer (in the various activities). (Teixeira et al., 2012) The static structure of the service system supports the value creation. Some activities may be invisible to the customer (back stage) while others remain visible (front stage). Information, technology, and other assets are part of this service delivery used to support the activities, service employees, or the customers.

Hierarchy Level	Definition Needed	Connection to the System Evaluation
1. Static Structure	Input, Process, Output	Definition of Boundaries of HCSSs and BMs
2. Simple Dynamic System	Process Types and Changes	Consideration of Process Variations
3. Control Mechanism	Value Indicator	Transmission and Interpretation of Value
4. Self-Maintaining Structure	Input Needed for the Process	Minimum Resources to Maintain Offer
5. Genetic-Societal Level	Front Stage, Back Stage, Division of Labor	Value Creation Mechanisms and Stages
6. Information Intake and Knowledge Structuring	Information and Interaction Needed for the Process	Linking Information to the Value Generation
7. Reflective Possibility	Quality and Standards	Changes in Quality over Time
8. Interrelationships with Other Systems	Overlaps with Other Systems	Assessment of Synergy Effects
9. Meta Level	Not Explicable in Value Creation	Quantification

Table 1. Hierarchical Levels for the Evaluation (Adapted from Boulding (1956)).

To allow a systematic evaluation of the conceptualization, we adapted the analytical hierarchies of Boulding (1956) to specify the connection to the value creation process. For the evaluation, it is necessary to add a description of a concrete service system at the different levels in order to create insights into the value creation process and apply the GST to a specific context. An exact assessment in the lower levels is quite difficult though, (Smith and Weistroffer, 2016) however can find application in most businesses and organizations (Johnson et al., 1964). (1) At the first level, the input, the process, and the outcome have to be defined as boundaries of the HCSSs and their corresponding BMs. (2) At the second level, the process types and its changes are fixed to demonstrate possible variations in the process. Here, an equilibrium means that there are no changes possible in the process. (3) At the third level, the control mechanism is defined. This measurement allows an assessment of the value and enables the transmission and interpretation of the "ideal" value. (4) At the fourth level, the minimally needed input for the value creation is determined so that a value offer can be maintained. For HCSSs and their BMs, this includes fixed as well as variable variables such as the service employees. (5) At the fifth level, the processes visible to the customers and the work division in the background are defined. Here, we define a distinction between front stage and back stage activities. Further, the division of labor is described at this level. (6) At the sixth level, the necessary information and the interaction for the creation of the value are abstracted. (7) At the seventh level, the company's positioning is questioned by testing the quality and standards of the service process. For this purpose, the critical variables for the customer must be examined. (8) The eighth level includes an assessment of synergy effects that results from the use of resources and activities with other service systems. (9) Finally, at the

ninth level, there is the possibility to define facts, which cannot be explained based on the other levels. Table 1 provides an overview of the hierarchical levels that require descriptions, the input needed, and their connection to the evaluation of the system.

5 Application

We applied the evaluation scheme to a care service provider that helps older people or persons in other difficult situations to cope with everyday life. Due to the limitations of public and private funding, the provision of care services for the people in need is restricted. When there is little help needed or the need for assistance is at an early stage, it is not possible to take advantage of these services. To cover this gap and to identify any further demand, the care service company and a housing association started organizing neighborhood assistance in one of their residential properties. For this purpose, an online matchmaking service was implemented.

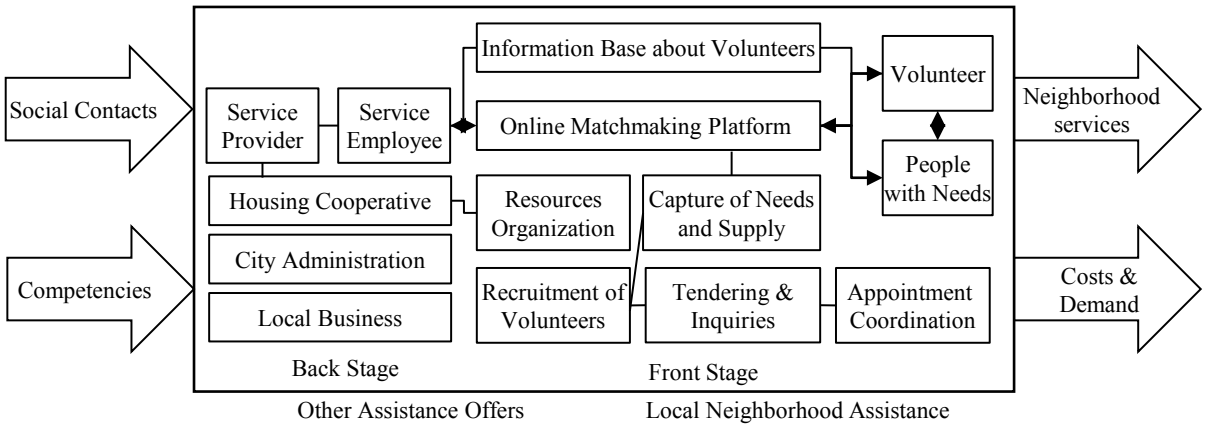

Figure 3. Conceptualization of the Service System in the Care Service Setting.

In the conceptualization of the service system, the different components that have emerged from the analysis are defined (Figure 3). Also, the individual hierarchy levels are defined to enable a combined evaluation of the service system and the BM. (1) The value of this service is "bringing together supply and demand of neighborhood assistance." For this purpose, input in the form of persons who are seeking for social contact and having proper competencies is needed. The process is organized around a platform to enable a meeting between volunteers and people with needs in the real world. For doing this, there are five main activities. Outputs of the system are the neighborhood services for the customers and cost-neutral access to customers for the service provider. (2) The decisive value indicators are the number of assignments of the helpers and the price paid by the strategic partners that are interested in the outcome of the service system. (3) The matchmaking process is intended to run as independently as possible on the platform but can also be supplemented by personal interviews. (4) For this purpose and the basic setup of the service, an employee of the service provider is needed for the coordination. (5) This coordination is usually organized in the back office. Customers are required for the tendering and appointment coordination process. (6) Necessary for this are: on the one hand, information and interaction as well as skills and the volunteers' willingness to help and, on the other hand, the demand of people with needs. Other than that, the process then runs independently. (7) What has to be checked regarding the quality is that no offenses are imposed on the platform. (8) The spontaneous help should be an addition to the existing care offers and not cannibalize or substitute the professional services. It is supplemented by other local offers of help. (9) Other players that are involved in the service are the housing cooperative, the city administration, as well as local businesses that have varied interests in people with needs.

Looking back at how HCSSs and BMs have been evaluated so far, this can be used as criteria for assessing the contribution of the evaluation scheme. First, the impact on the value creation in use

(Foglieni and Holmlid, 2017) is included in the value indicator. With the number of assignments and the price, it is well-defined how value is created. Moreover, all required resources and the context are defined. Second, the internal service quality (Hogreve et al., 2016) is taken into account by showing the information and interaction flow that constitutes the core of HCSSs. At this, the support structure is given by the technology and shared information. Thirdly, concerning the external service quality (Hogreve et al., 2016), the outcome of the service system for the customers is clearly defined. The quality standards as a fraud protection ensure that only services that are desired will be created. Fourthly, the different levers, which are indicators of changes in price or quantity (Brea-Solís et al., 2015), are defined. This definition allows an assessment of the impact of changes in the design of the service and the BM. Fifthly, due to the conceptualization, the individual components are clearly defined and allow a qualitative assessment (Osterwalder and Pigneur, 2010). Overall, this definition allows a more concrete evaluation because all elements of the joint system of the HCSSs and BMs are taken into account. Contrary to an individual view, the objective one of the system is clearly the focus of the value creation. In recognition to the care service, this allows an improved coordination of the components of the service system and the BM.

6 Conclusion and Further Work

This research aimed at the development of an evaluation scheme for the design of service and the BMs. Therefore, we used GST for combining the knowledge of service and BM design. The result is a conceptualization that includes the most relevant elements and relationships in an integrated view. Further, with this conceptualization, we present a concrete application of the GST analysis levels that allows carrying out a structured evaluation. The application of this evaluation scheme shows that it is possible to have a more concrete assessment of the design of HCSSs and BMs. The combination of the two research areas ensures a proper coordination between the operational service system and BM.

To complete the research on the evaluation scheme, we have planned three more steps. First, we plan to verify the conceptualization in interviews with practitioners from the field of service design and BM design. This verification allows an evaluation of whether the included elements and their relationships represent the real world, as intended by GST. Secondly, we will validate the conceptualization in the project context by a further operationalization. This validation includes an allocation of qualitative and quantitative variables to the different analysis levels for all cases of the projects context. These different levels allow a concrete measurement of the value contribution of the components. Due to the good contact with partners of the project, in-depth evaluation could be achieved by comparing a separate consideration of service and business model and the integrated consideration. To allow a generalization of the evaluation knowledge, in the third step, we will define the variables of the context by the abstraction of the various cases, which, thus, enables a transfer for further research or practice.

The fully developed evaluation scheme has the potential to make theoretical and practical contributions as follows: First, it offers an operationalization of the GST and a summative evaluation for HCSSs and BMs as an artifact. This operationalization proposes a theory for design and action (Gregor, 2006) as it includes the specification of how to perform the evaluation. Moreover, as the evaluation of design artifacts is an essential activity in DSR, the utility of the design can be proven compared to the separated evaluation of the service systems and BMs (Venable et al., 2016). Second, GST has been used in the combination of service design and BM design in order to bring together the research fields. Thus, the evaluation scheme provides a new perspective on theory-rooted knowledge for designing service systems. This challenges the value creation in service systems and BMs and answers a call for research (Ostrom et al., 2015). Thirdly, the evaluation results allow the coordination of the value proposition of the service systems and the BMs for practitioners. Hereby, the value contribution of the individual components of the HCSSs and the BMs offer guidance for improvements. Thus, the evaluation helps to implement artifacts and improve service system development (Gregor and Hevner, 2013).

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