



Helping Personal Service Firms to Cope with Digital Transformation: Evaluation of a Digitalization Maturity Model

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Abstract

Background: *Maturity models are strategic and systematic instruments that help firms in the process of digital transformation. They are widely used as tools to display trajectories to guide the progression from an analog to a digital stage. To date, maturity models for industries such as manufacturing, software development, public services, telecommunication, and startup companies have been developed, and also being applicable in real-life practice. However, for the sector of personal services (e.g., education, retail, hospitality, healthcare, arts and entertainment, and craftsmanship), maturity models are missing. To address this gap, this research aims to present a digitalization maturity model for the specific needs of personal service firms, and evaluate its applicability, usefulness, and impact in practice.*

Method: *The research is embedded in a comprehensive Design Science Research cycle. Based on descriptive and prescriptive knowledge, a maturity model has been developed. This paper evaluates the applicability, usefulness, and impact of the maturity model by conducting a mixed-method approach, including a survey with 30 experts from personal service firms and eight semi-structured in-depth expert interviews.*

Results: *Our results indicate that the maturity model serves as a strategic and systematic tool for short-, mid-, or long-term digital transformation projects by guiding personal service firms through consecutive development maturity stages until reaching a so-called stage of "digital maturity". The model has been determined to be applicable, useful, and to potentially impact personal service firms towards the development of a digital business ecosystem.*

Conclusion: *The presented maturity model offers guidance for personal service firms to achieve the transition from analog to digital and serves as a basis for future research in developing effective instruments and strategic tools to cope with challenges from digital transformation.*

Keywords: Digitalization Maturity Model, Business Ecosystems, Personal Services, Digital Maturity, Design Science Research.

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Introduction

In recent years, digital transformations led to automated processes and an increasing number of digitalized products and services (Goodwin, 2009; Robra-Bissantz, 2018). The personal service sector is no exception, as practice shows that this sector can be significantly improved by using and applying information and communication technology (ICT) (Lattemann et al., 2020; Robra-Bissantz et al., 2021). Particularly, the service sector in Asia is underdeveloped, coined by low productivity, and generally hampers overall economic growth. However, Asia's service sector has the potential to become a new engine of economic growth by carrying modern, high-value ICT-based services (Kim & Wood, 2020; Lee & McKibbin, 2014).

Personal services are interactive and often intimate services that serve the personal needs of customers. They follow a human-centered approach and can be found in profit and non-profit sectors such as education (e.g., universities, kindergartens, schools), retail (e.g., supermarkets, fashion and clothing shops), hospitality (e.g., hotels, tourism offices, restaurants), healthcare (e.g., hospitals, elderly houses), arts and entertainment (museums, art shops), and craftsmanship (e.g., repair services) (Mattila & Enz, 2002; Parasuraman et al., 1985). In contrast to industry-related services (e.g., manufacturing, finance, logistics, telecommunication), which have already undergone extensive digitalization advancements, personal services are still in their infant phase of digitalization and heavily rely on analog processes and face-to-face interactions (Guerrero, Michalke, et al., 2022).

According to the Service Dominant Logic (SDL), services aim to provide value for the end-user (Vargo & Akaka, 2009). This is particularly true for personal services. As these values are multifaceted by nature, various actors, including service providers, users, and potentially external third parties, have to work together to co-create value in so-called "business ecosystems" (BEs) (Vargo & Akaka, 2009). However, not only do actors work together, but ICT can also become essential to co-create value in a "digital business ecosystem" (DBE). In this context, DBEs are organizational networks that build upon the application of ICT (Razavi et al., 2010; Senyo et al., 2019) to collaborate more effectively. Unlike traditional BEs, this new form of collaboration emphasizes technology-related aspects, collaboration, value co-creation, and value capture (Hanelt et al., 2021; Lenkenhoff et al., 2018; Senyo et al., 2019). Their primary focus is on exchanging knowledge, competencies, and resources among the involved actors (Cheah, 2007; Suuronen et al., 2022). Orchestrating the development of DBEs in the personal service industry is a complex and challenging task. This is because strategic instruments that allow personal service firms to establish suitable procedures and practices to manage and steer DBEs systematically, successfully, and holistically are missing (Guerrero, Lattemann, Michalke, et al., 2022; Larsson, 2015).

Firms operating in DBEs need to fulfil certain criteria toward digitalization and be ready to collaborate with external partners openly. A strategic instrument that allows firms to improve their organizational and digitalization status systematically and holistically is the so-called "maturity model" (MM) (Becker et al., 2009; Cukier & Kon, 2018; Jansen, 2020; Schäffer et al., 2018). MMs assist in determining a firm's digitalization stage and simultaneously display trajectories to guide the progression from an analog to a digital maturity stage. Since the invention of the MM concept in 1993 due to the so-called "Capability Maturity Model" (Paulk et al., 1993), MMs have become widespread tools used in the field of Information Systems (IS) to assess and measure the extent of digitalization and digital transformation among enterprises (Lasrado et al., 2015; Thordsen et al., 2020). To date, the applicability and impact of MMs towards the development of DBEs have been validated in practice in industries related to manufacturing, software development, public services, telecommunication, and start-ups (Alves et al., 2011; Azevedo & Santiago, 2019; Canetta et al., 2018; Valdez-de-Leon, 2016; Wang et al., 2016). However, for the personal service sector, MMs have not yet been sufficiently developed nor evaluated in real-life practice (Guerrero, Lattemann, Gebbing, et al., 2022; Guerrero, Lattemann, Michalke, et al., 2022).

This study builds on previous research conducted by the authors to address this research gap. It represents the final step toward a complete Design Science Research (DSR) cycle (Guerrero, Michalke, et al., 2022). In previous research, a conceptual design of a digitalization MM for personal services, the so-called “Digitalization Maturity Model for Personal Service Firms”, has been developed. This maturity model has been derived from descriptive knowledge from a structured literature review (Guerrero et al., 2020; Guerrero, Lattemann, Michalke, et al., 2022) and prescriptive knowledge extracted from expert interviews and focus groups in the field of personal services (Guerrero, Lattemann, Gebbing, et al., 2022; Guerrero, Michalke, et al., 2022). Following previously established test criteria (Pöppelbuß & Röglinger, 2011; Sonnenberg & vom Brocke, 2012), a mixed-method approach, consisting of a quantitative survey and qualitative in-depth interviews, has been chosen to assess the applicability and usefulness of the developed MM as well as its impact in practice. Therefore, this study will apply and evaluate the developed conceptual MM in real-life practice. Hence, in this paper, we seek to answer the following research questions:

- 1) Is the “Digitalization Maturity Model for Personal Service Firms” applicable in the personal service industry?
- 2) Does the designed “Digitalization Maturity Model for Personal Service Firms” measure the necessary aspects required to develop DBEs in the personal service industry?
- 3) What is the impact of using the “Digitalization Maturity Model for Personal Service Firms” in real-life practice?

This paper is organized as follows: Firstly, we pinpoint the importance of the personal service sector as a growing part of the world economy, including the Pacific Asia region. Secondly, we outline the theoretical foundations and connections between personal services, DBEs, and the digitalization MM. Thirdly, in the methods section, the DSR approach is introduced. Fourthly, the results section summarizes the findings derived from the survey and semi-structured interviews. Finally, the paper ends with a discussion of the results, limitations, conclusions, and indications for further research.

Theoretical Background

In the following, the relevance of personal services as a worldwide economic income source, and in particular in the Pacific Asia region, is delineated. Further, the theoretical foundations of personal services are explained, and the impact of digitalization on this sector is highlighted. Further, DBE research and its development in the personal service sector is described. Moreover, the concept of MMs is introduced, and the architectural characteristics of the conceptual “Digitalization MM for Personal Service Firms” are characterized. Finally, the importance of the evaluation of MMs in the field of IS is highlighted.

Growing Importance of the Personal Service Sector

Much of the employment creation in the services sector worldwide is attributable to personal services (either profit or non-profit organizations) (Nayyar et al., 2021). The United National Statistics Division (UNCTAD) and the Organization for Economic Co-Operation and Development (OECD) show that the personal service sector has grown worldwide since the 1970s, although at a different pace in different regions (Cuadrado-Roura, 2016; Schettkat & Yocarini, 2003). In Asia, the service industry, particularly the personal service sector, took off in the early 2000s (Anttiroiko, 2009; Eichengreen & Gupta, 2013; Helble & Shepherd, 2019). ICT has become one of the most significant driving forces for service development in the Pacific Asia region, generating many new services, modifying and transforming traditional services and introducing evident changes in the channels of personal service delivery (Lee & McKibbin, 2014). Personal services are considered “an engine for economic growth” (Sharma et al., 2007, p. 272). They foster employment and human life quality because they cover

essential areas of society and everyday life (Sharma et al., 2007; Solomon & Solomon, 1991). Already today, in the developing and emerging economies in Asia, including Korea, China, India, Taiwan, and Thailand, the personal service sector contributes positively to the overall structural change effect due to the increase in service sector employment and due to the improving productivity by applying ICT (Anttiroiko, 2009; Eichengreen & Gupta, 2013; Helble & Shepherd, 2019).

Personal Services and the Effect of Digitalization on the Sector

Personal services are about the fulfillment of individual human needs in the context of “using” the particular service (Vargo & Akaka, 2009) and the fulfillment of user experiences in the form of valuable interactions (Geiger et al., 2020). They require “high-contact levels of interaction between customers and employees” (Kellogg & Chase, 1995, p. 1737) and are developed based on co-creation (Lattermann et al., 2020). They are characterized by aspects related to intimacy, the exchange of content-rich information, long interaction times, and at the same time, encompass feelings and emotional states as well as individual attributes such as friendliness, helpfulness and kindness (King & Garey, 1997; Parasuraman et al., 1985).

ICT can significantly transform the nature of personal services (Robra-Bissantz et al., 2021) as ICT allows to adapt personal services more closely to the needs and values of the customer (Hillebrand et al., 2011). Furthermore, innovative intelligent systems can transform traditional personal services toward becoming more competitive by supporting human interaction touchpoints, improving customer relationships and leading to new forms of co-creation for developing innovative and value-oriented services (Lattermann et al., 2020).

Innovative firms with ICT-based business models, such as MyHammer, VR-All-Art, AirBnB, and research projects (e.g., Billert et al., 2020; Blunk et al., 2020; Fischer et al., 2020; Hofmann, 2020; Vladova et al., 2020) demonstrate how new technologies such as digital platforms, mobile applications, artificial intelligence (AI), augmented reality (AR), or cloud computing, can lead to new user-centered and individualized digital personal services. Yet, the application of ICT in the personal service industry is still relatively uncommon, which might cause negative consequences for these types of services (Lattermann et al., 2020). For example, Bartik et al. (2020) analyzed the effects of the COVID-19 outbreak on several personal service firms (e.g., retailers, arts and entertainment, and hospitality) and showed their vulnerability toward these kinds of external shocks. As a result, Bartik et al. (2020) claim that - given the magnitude of the COVID-19 impact on the economy and society - sustainable personal service firms must find a way to make use of ICT when designing their services.

Digital Business Ecosystems (DBEs) in the Personal Service Sector

DBEs are integrated, distributed, and far-reaching networks of internal and external partners who collaborate and dynamically share resources, skills, services, and knowledge to co-create value for customers (Nachira et al., 2007). The concept of DBEs dissolves traditional industry boundaries allowing companies to collaborate and compete through digital technologies (Ehrensperger et al., 2021; Razavi et al., 2010). A DBE works just like a natural ecosystem: it is self-contained and able to learn to become more efficient (Moore, 1993; Razavi et al., 2010). Additionally, the aim of DBEs is to overcome existing barriers and to promote innovative forms of value creation and value capture, knowledge sharing and community building, thereby enabling long-term growth and competitiveness (Cheah, 2007; Herdon et al., 2010). Empathy and perspective-taking are important to build an understanding of the needs and values of other actors in the DBE (Gebbing et al., 2022).

Over the past years, many research perspectives and different definitions and interpretations of the concept of DBEs have come to light (Camarinha-Matos & Afsarmanesh, 2008; Nachira et al., 2007; Razavi et al., 2010; Senyo et al., 2019). From a technical point of view, DBEs can

be described as “virtual environment(s) populated by digital entities such as software applications, hardware and processes” (Nachira et al., 2007, p. 9). A broader perspective encompasses network effects, which assesses the basic challenges of exchange processes that occur via the interaction of entities and a number of actors within a digital ecosystem (Camarinha-Matos & Afsarmanesh, 2008). In this context, Camarinha-Matos and Afsarmanesh (2008) define DBEs as a “class of collaborative networks with a wider alliance of heterogeneous and geographically dispersed entities that collaborate via the Internet to achieve common outcomes” (Camarinha-Matos & Afsarmanesh, 2008, p. 62). An even broader perspective focuses on a service-oriented view and value co-creation (Senyo et al., 2019). Here, Senyo et al. (2019) define DBEs as “socio-technical environments made up of different individuals and organizations with collaborative and competitive relationships to collectively co-create value through ICT and the coordination of superb management practices” (Senyo et al., 2019, p. 125). As the latter perspective reflects the objective of accentuating the role of ICT, collaboration, service as value, and co-creation in the digitalization of the personal service industry, we chose this definition as the basis for our research.

Even though research focusing on DBEs for personal services has grown modestly over the past five years (Carvalho et al., 2019; Hermes et al., 2020; Reci & Bollin, 2019; Valdez-de-Leon, 2016), findings are generally provided only on narrowly defined sectors of the personal service industry, which limits their informative value. For instance, Carvalho et al. (2019) focus on the healthcare industry (e.g., hospitals), Valdez-de-Leon (2016) concentrate on the telecommunication industry (e.g., telephone carriers), Reci and Bollin (2019) are concerned with the education sector (e.g., universities). The present study addresses this research gap and includes a broader range of personal service sectors (e.g., retail, consulting, and hospitality).

Digitalization Maturity Model for the Personal Service Industry

As mentioned above, MMs are strategic instruments that help businesses analyze internal and external improvement processes, business functions and capabilities, thereby assisting in the transformation from ad hoc to decisive and disciplined processes (Becker et al., 2009; Bruin et al., 2005), and providing accurate and targeted indications for their improvements (Pöppelbuß & Röglinger, 2011). Especially for the transition from an analog BE to a DBE, MMs help determine an organization's current status and the capacity for managing and coordinating digitalization initiatives holistically and systematically (Becker et al., 2009; Schäffer et al., 2018). Through the use and application of MMs, firms can visualize different digitalization paths based on predefined parameters and reach an appropriate stage of digital maturity, which goes beyond a mere technology aspects and reflects managerial changes (Teichert, 2019).

This paper refers to a digitalization MM for the personal service industry (see. Appendix A), which has been developed by the authors on the basis of descriptive knowledge through the conduction of a structured literature review (Guerrero et al., 2020; Guerrero, Lattemann, Michalke, et al., 2022), and prescriptive knowledge derived through the execution of semi-structured interviews and focus groups with experts from the field of personal services and digitalization (Guerrero, Lattemann, Gebbing, et al., 2022; Guerrero, Michalke, et al., 2022). The architectural structure of our MM follows the same logic as the architectural structure of any other model (e.g., Azevedo & Santiago, 2019; Canetta et al., 2018; Schäffer et al., 2018): First, important capabilities for a given area of action and/or dimension are identified. Second, improvement initiatives are proposed for the capabilities defined at each maturity stage. The lowest stage of maturity describes an organization with little capabilities in the domain. In contrast, the highest stage reflects a high-maturity conception (Becker et al., 2009). Third, specific maturity stages are defined, usually five or six stages at most, which are defined progressively (Schäffer et al., 2018). Finally, a maturity level is determined for an organization based on how many conditions have been met. Companies can assess their firm's

digitalization level by agreeing or disagreeing with the statements in the five stages (Schäffer et al., 2018). The architectural structure of our MM is presented in Table 1.

Table 1 – The Digitalization Maturity Model for the Personal Service Industry (Guerrero, Michalke, et al., 2022)			
Stages	Dimensions	Capabilities	Improvement Initiatives
Stage 1 - Infancy	Customer Centricity	Customer Satisfaction	Different degrees of customer satisfaction (Stage 1 – 5)
Stage 2 - Developing		Customer Interaction	Different degrees of customer interaction (Stage 1 – 5)
Stage 3 - Transforming		Customer Empathy	Different degrees of customer empathy (Stage 1 – 5)
Stage 4 - Optimized	Strategy & Leadership	Strategy and Vision	Different degrees of strategy and vision (Stage 1 – 5)
Stage 5 - Digital Maturity (Guerrero, Michalke, et al., 2022)		Business Model	Different degrees of business model (Stage 1 – 5)
		Digital Culture	Different degrees of digital culture (Stage 1 – 5)
	Products & Services	Product/Service Individualization	Different degrees of product/service individualization (Stage 1 – 5)
	Process & Organization	Knowledge Management	Different degrees of knowledge management (Stage 1 – 5)
		Collaboration	Different degrees of collaboration (Stage 1 – 5)
		Agility and Flexibility	Different degrees of agility and flexibility (Stage 1 – 5)
Technology	ICT-Infrastructure	Different degrees of ICT-Infrastructure (Stage 1 – 5)	
	ICT-System Application	Different degrees of ICT-System Application (Stage 1 – 5)	

Each dimension reflects a crucial aspect for personal service firms to embark on the transition from analog to digital. The dimensions are described in the following:

- (1) Customer Centricity – measures the company’s ability to use ICT to collaborate with their customers and other actors in the BE. It includes concepts such as co-design and co-creation. Here, customers are considered resources for value creation. It is analyzed through the following capabilities: *customer satisfaction*, *customer interaction*, and *customer empathy* (Guerrero, Lattemann, Michalke, et al., 2022).
- (2) Strategy & Leadership – measures the company’s ability to develop a strategic/business ICT alignment plan and effectively implement it across all levels of the organization so that a DBE can be guaranteed. This dimension is analyzed by means of the following capabilities: *strategy and vision*, *business model*, and *digital culture* (Guerrero, Lattemann, Michalke, et al., 2022).

- (3) Products & Services – measures the company’s ability to design products and/or services through collective efforts by a collaborative network and integrate different ICT in the development process. This dimension is analyzed by the following capability: *product/service individualization* (Guerrero, Lattemann, Michalke, et al., 2022).
- (4) Process & Organization – measures the company’s ability to implement technological, management, and agile management practices to improve the BE. This dimension is analyzed by the following capabilities: *knowledge management, collaboration, and agility and flexibility* (Guerrero, Lattemann, Michalke, et al., 2022).
- (5) Technology – measures the company’s ability to understand which technologies are becoming relevant and could influence the BE. Here, companies determine which suitable ICT are needed to support their employees in their tasks. This dimension is analyzed by the following capabilities: *ICT-Infrastructure and ICT-Systems Application* (Guerrero, Lattemann, Michalke, et al., 2022).

Similarly, each maturity stage is necessary for personal service firms to reach digitalization and, thus, achieve a DBE. In the following, the maturity stages and their descriptions are described:

- Stage 1 – Infancy: A personal service firm relies purely on analog and undisciplined processes. Business-ICT alignment is not achieved or aimed to improve BE, but instead, the firm tries to reduce costs as much as possible and sees ICT as a high-cost unit center. Ineffective management decisions are taken, the firm is short-term focused and co-creation is unknown (Guerrero, Lattemann, Michalke, et al., 2022).
- Stage 2 – Developing: A personal service firm begins to understand the application and use of ICT as a necessity to improve BE. Nonetheless, most firm’s operations processes are still analog. Business-ICT alignment is not achieved but rather characterized by informal and limited employee actions. Outputs and customer involvement are inconsistent, but the firms have begun recognizing that focusing on the customer might enhance the BE and develop innovative service/product outputs (Guerrero, Lattemann, Michalke, et al., 2022).
- Stage 3 – Transforming: A personal service firm has understood the application and use of ICT as a necessity to improve BE. The firm has defined plans and strategies for achieving business-ICT alignment so that it has formal and omnipresent relationships. Management is more sophisticated, open, and engaged towards applying trend technologies (e.g., AI, AR, virtual agents, and digital platforms). The firm shows co-creative efforts to improve collaboration and interaction among different BE actors (Guerrero, Lattemann, Michalke, et al., 2022).
- Stage 4 – Optimized: The application and use of ICT are reflected in the firm’s strategy. A personal service applies trend technologies (see. stage 3) to improve aspects related to interaction, collaboration, co-creation, and thus, enabling new relationship settings among all different actors involved in the BE. Business-ICT alignment is achieved, leading to well-prioritized digital projects and engagement in the strategy development process. Customers and all other BE actors are considered big sources of value contribution. Innovative outputs are visible and acknowledged due to co-creation and co-design practices (Guerrero, Lattemann, Michalke, et al., 2022).
- Stage 5 – Digital Maturity: A personal service firm goes beyond business-ICT alignments and formulates and executes an organization strategy by leveraging digital resources to create differential value. The firm relies mainly on using and applying trend technologies to improve aspects related to interaction, collaboration, and co-creation, leading to extraordinary relationships among all different actors involved in the BE. The firm has a coherent digital business strategy, which is well communicated throughout the organization and should be treated as a business strategy in the digital landscape. Co-creation is embedded in a firm’s mindset and culture (Guerrero, Lattemann, Michalke, et al., 2022).

Finally, the logical functioning of the MM is presented through an example based on the “customer empathy” capability (see. Table 2).

Table 2 – Example of the Description of Maturity Stages for Capability “Customer Empathy”	
Stage 1 – Infancy	The firm problems are only faced from the firm's perspective ignoring the customer's perspective.
Stage 2 – Developing	The firm starts approaching the customer, and curiosity starts to rise, resulting in the firm's willingness to explore and discover the customer's situation and experience.
Stage 3 – Transforming	The firm takes an active role and starts to wander in the customer's world. The firm starts to acquire a customer-centered mindset by focusing on the customer as its biggest source of value.
Stage 4 – Optimized	The firm connects with the customer by recalling his/her ideas, needs, and experiences explicitly in order to reflect and be able to create an understanding of what it is that the customer wants. The firm manages to connect emotionally with the customer by recalling his/her feelings and resonating with the customer's experience.
Stage 5 – Digital Maturity	The firm creates an emotional connection with the customers, and adopts, at any time, a customer-centered perspective.

Evaluation of Maturity Models in the field of Information Systems

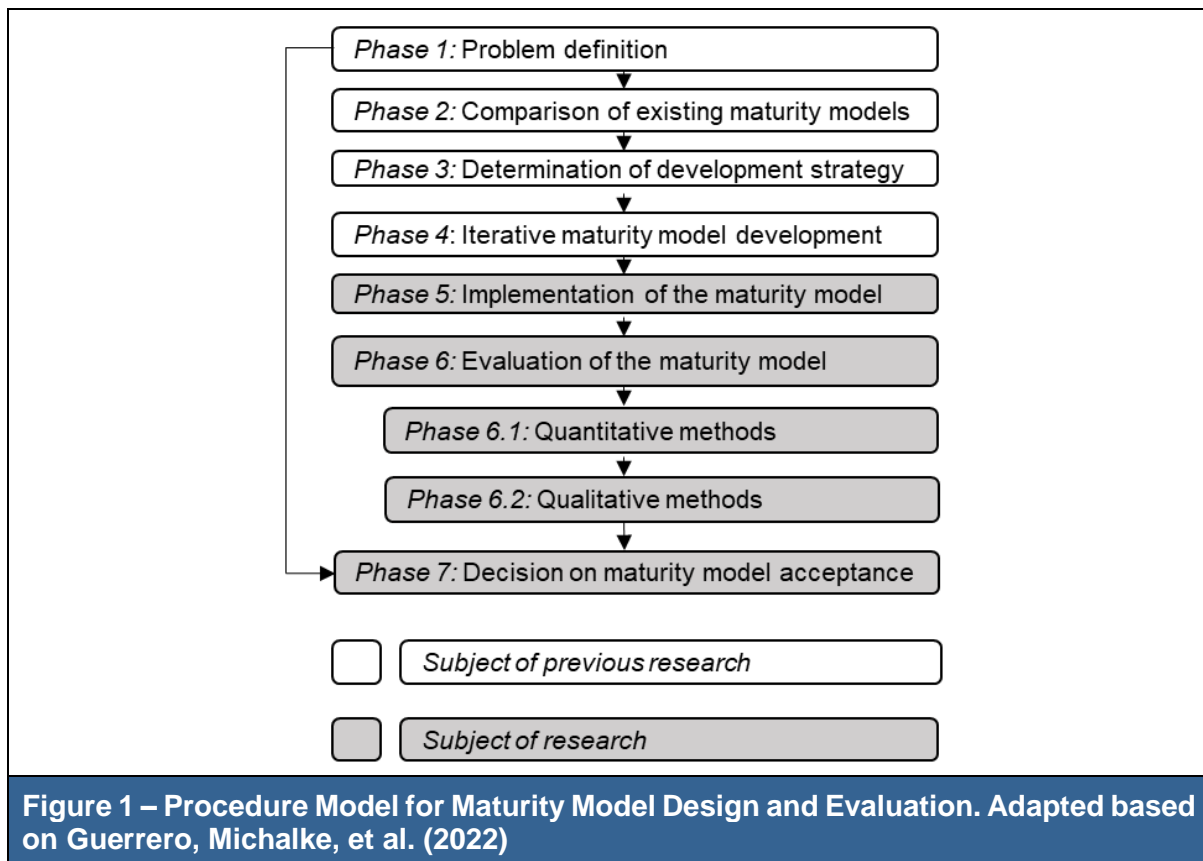
The concept of MMs is increasingly applied in the field of IS, both as an approach for continuous improvement (Paulk et al., 1993) and for its evaluation (Fraser et al., 2002). Despite their widespread popularity, MMs are controversial concerning their scientific development and practical usefulness. From a scientific point of view, Pöppelbuß and Röglinger (2011) criticize a lack of empirical research foundation during the design and development process. This, in turn, often results in a straightforward replication of existing model structures (i.e., five or six-staged models) without considering the conceptual suitability for the given context. Furthermore, Lasrado et al. (2015) also mention the lack of validation when choosing factors or dimensions for the model as well as the linear course of maturation. Similarly, Jugdev and Thomas (2002) highlight the drawbacks of MMs from a practical standpoint. They claim that MMs are often rigid, even though flexibility is necessary. Furthermore, they argue that MMs are often industry specific, unrealistic, and burdensome for many businesses, particularly for small and medium-sized enterprises (SMEs) where a corresponding executive management level is missing. However, not only is the design and overall structure of MMs criticized. Issues related to applicability, usefulness, and impact plays a major role in MM research. Although there exists a great plethora of MMs from different domains (e.g., public services, manufacturing, software development, start-ups) (Alves et al., 2011; Azevedo & Santiago, 2019; Canetta et al., 2018; Valdez-de-Leon, 2016; Wang et al., 2016), only a few of them are tested in practice (Ahlemann et al., 2005; Lasrado et al., 2015; Thordsen et al., 2020). The “Digitalization Maturity Model for Personal Service Firms” is the first comprehensive conceptual model for personal services. However, it has not been implemented and evaluated in practice yet. To address these shortcomings, the application of a DSR approach, as presented in this paper, explicitly emphasizes a scientifically rigorous development of the artifact, i.e., the MM and its practical validation.

Method – Design Science Research (DSR)

Our study follows the DSR paradigm proposed by Hevner et al. (2004). DSR aims to derive design knowledge by creating and evaluating artifacts that help solve organizational

challenges (Baskerville & Myers, 2009). In the context of DSR, MMs are seen as reference models and, hence, as artifacts that show “an anticipated, desired, or typical evolution path” (Becker et al., 2009, p. 213).

This paper aims to evaluate the digitalization of MM for personal services as this is a substantial phase for the design and development of MMs (Pöppelbuß & Röglinger, 2011). Our chosen DSR approach for designing a digitalization MM for the personal service industry differentiates between the definition of the problem, the design and development of the artifact, and its evaluation in practice (see. Figure 1). The definition of the problem and the extraction of the design parameters of the digitalization MM, i.e., dimensions for digitalization and maturity phases, was part of previous research (Guerrero, Lattemann, Gebbing, et al., 2022; Guerrero, Lattemann, Michalke, et al., 2022; Guerrero, Michalke, et al., 2022). To demonstrate their applicability, usefulness, and impact, we followed an explanatory sequential mixed-method research approach, starting with implementing the MM assessment in the form of a quantitative survey, followed by eight in-depth interviews to gather detailed insights. Hereby, we followed the approach established by De Bruin et al. (2005), who claim that a MM evaluation process is finished when quantitative methodologies back qualitative analysis.



In a first step, an online survey was conducted using the so-called “LimeSurvey” tool. Hereby, personal service experts rated their firm’s digital maturity on each of the five dimensions and twelve capabilities of the digitalization MM. Between June and July 2022, over one hundred experts from South America, North America, and Europe (e.g., chief executive officers, company managers, service designers, and digital transformation officers) from the personal service industry (e.g., retailers, healthcare, art and entertainment, craftsmanship, hospitality, consultancy agencies) were invited to participate in the survey via email and social media platforms (e.g., LinkedIn and Xing). These companies were selected based on a convenience sampling strategy (Creswell, 2014; Mack et al., 2005). Although convenience sampling is the most popularly used sampling method in research, it can be prone to selection biases because

the sample may not be representative of the population (Stratton, 2021). As a result of this, to avoid biased results, we paid considerable attention to aspects related to: (a) population, (b) randomization, (c) sample size, and (d) data analysis, to elaborate our results and further conclusions.

The survey consisted of eighteen questions. The first five questions were about the profiles and demographics of the participants. The questions were asked in the form of a 5-point scale, where the 5 points represented the five stages of maturity from the digitalization MM: 1 - infancy, 2 - developing, 3 - transforming, 4 - optimized, and 5 - digital maturity (see. Appendix A). Subsequently, the survey participants had to rate their current firm's digitalization maturity degree on each of the five dimensions and twelve capabilities of the digitalization MM by referring to the pre-described stages. Figure 2 shows an example of the questions asked for the capability of "customer empathy". IBM SPSS Statistics was used to analyze the responses regarding the overall maturity of all twelve capabilities across the five dimensions and their means and standard deviations.

Empathy is seeing with the eyes of another, listening with the ears of another and feeling with the heart of another. What do customers want from us? What problems and needs do our customers have? Do we care for our customers? How do customers integrate our offer into their lives or work?

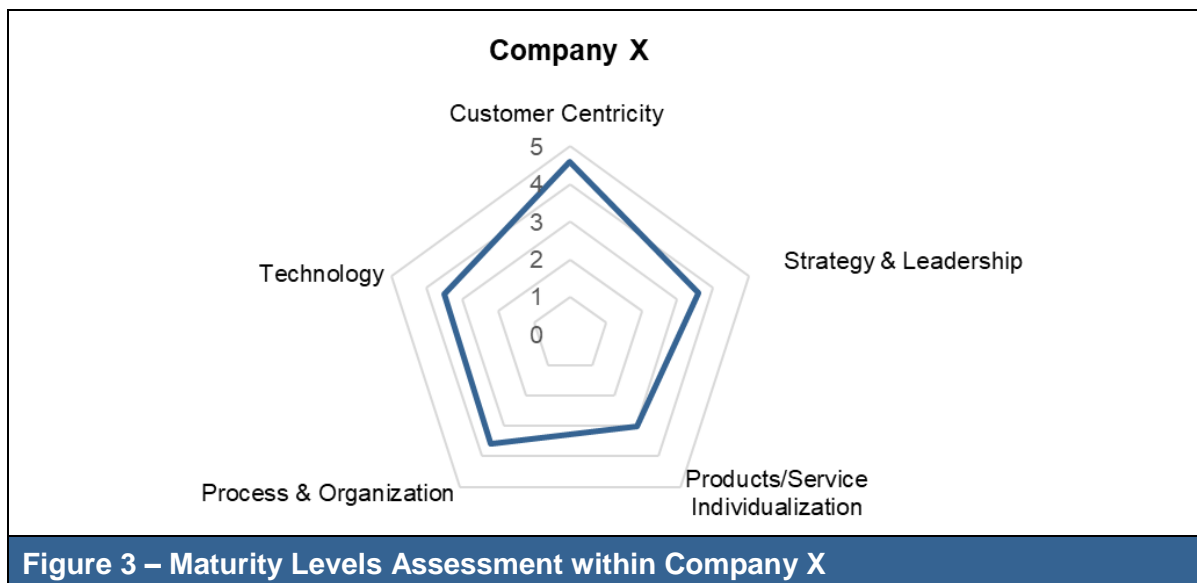
Please assess your company concerning "customer empathy". The questions listed above should help you to have an idea of what is meant by "customer empathy".

Choose one of the following answers:

- The firm problems are only faced from the firm's perspective, ignoring the customer's perspective.
- The firm starts approaching the customer, and curiosity rises, resulting in the firm's willingness to explore and discover the customer's situation and experience.
- The firm takes an active role and starts to wonder in the customer's world. The firm starts to acquire a customer-centered mindset by focusing on the customer as its biggest source of value.
- The firm connects with the customer by recalling explicitly his/her ideas, needs, and experiences in order to reflect and be able to create an understanding of what it is that the customer wants. The firm manages to even get a connection on an emotional level with the customer by recalling his/her feelings and resonates with the customer's experience.
- The firm creates an emotional connection with the customers, and adopts, and any time, a customer-centered perspective.

Figure 2 – Exemplary Question for Maturity Item's Assessment – "Customer Empathy"

To create an automatized firm-specific report for the thirty experts, the survey results and the descriptive data were analyzed with the help of the online tool "BrilliantAssessment" (<https://www.brilliantassessments.com/>). This report included standardized results sections for a comparison with other firms and firm-specific results based on the experts' responses. The degree of maturity for the five dimensions was presented as a radar chart (see. Figure 3). Hereby, radar charts are helpful, in particular, for comparing performance on multiple dimensions simultaneously or for comparing cases with multiple performance dimensions (Mosley & Mayer, 1999).



In a second step, semi-structured interviews complemented the initial survey to evaluate the digitalization MM and to collect further insights on its applicability, usefulness, and impact. Semi-structured interviews are a commonly used technique to evaluate MMs (Rosemann & De Bruin, 2005). Each survey participant was asked to participate in an in-depth interview. Eight experts agreed to take part. We decided to choose only experts who participated in our survey to be part of our interviewees' pool group because several interview questions were related to the survey, and these questions served as an initial discussion point in the interview process. In this context, we followed a purposive sampling strategy and thus, interviewees were selected because they could provide rich information relevant to the phenomenon in the investigation (Creswell, 2014; Mack et al., 2005).

A semi-structured interview guideline (see. Appendix B) was developed (Creswell, 2014). Each interview lasted between 30 to 45 minutes. The interviews began with a general introduction to the purpose and functionality of the digitalization MM for the personal service industry. The participants were asked about their opinion of the model, followed by a discussion. A second set of questions was posed as to whether it was applicable to the personal service industry, and if applicable, whether it applied to all sub-industries equally (e.g., retailers, consultancy agencies, arts and entertainment, education, craftsmanship) or whether it could benefit one industry more than others. A third set of questions asked whether all employees within an organization could understand and use the MM or if this might be a managerial task. Subsequently, a fourth round of questions was asked about the ideal application timing. Finally, the interviewees were invited to further comment on the pros, cons, and missing attributes.

All interviews were audio recorded and transcribed. The interviews were coded using the computer-based qualitative analysis tool "MAXQDA", and the codes were used as a data-labeling and data-retrieval method (Mack et al., 2005). The coding procedure required an approach that provided high transparency and consistency. Therefore, a standardized process was applied based on the coding categories' and the transcriptions derived from the interview audio files. The paper's lead author manually examined all interviews for statements regarding particular attributes to answer the three research questions (see. Introduction section). In this context, every meaningful text passage was coded accordingly. Once the manuscript lead author completed the manual coding assessment process, all paper authors met to discuss the coding results and resolve disagreements. This procedure was necessary as textual data interpretation can cause researchers to disagree (Fastoso & Whitelock, 2010). Finally, the coding resulted in a repository of 97 codes, whereby an intercoder reliability (ICR) agreement rate of 91.66% was reached.

Results and Evaluation

Survey-Based Approach

The survey was conducted between June 18th and July 17th, 2022. Forty-seven experts took part in the survey. Thirty experts successfully completed the same one. Considering the participation rates obtained in similar studies, a completion rate of 63% can be considered reasonable (Memon et al., 2020). The survey consisted of eighteen questions. The first five questions were related to the profile and demographics of the participants. Once these questions were asked, thirteen assessment questions related to the different dimensions and capabilities of the model were further asked, one by one.

Demographic information was collected about gender (19 male, 11 female), age (max = 66 years old, min = 21 years old), and expertise (on average, eight years of experience). The experts represented six different professional sectors and industries: consultancy (11), education (7), retail (5), healthcare (5), hospitality (1), and craftsmanship (1). Twenty-six out of the thirty experts expressed a strong desire for their firms to achieve the transition from analog to digital.

Table 3 summarizes the descriptive statistics of the ratings concerning the overall digital maturity of the respective firms, including their means and standard deviations. Due to the small sample size, no further significant statistical inferences were made. Each dimension with a maturity level ≤ 2 indicates that a firm should foster its activities toward digitalization in this area with high priority. Each dimension with a maturity level ≥ 3 indicates that the firm's maturity level is satisfying. Nevertheless, there might be room for improvement. The firms' standardized reports served companies as specific roadmaps toward digitalization as well as strategic action plans to continue the transition toward digitalization. Despite a lack of statistical evidence, the standard deviations indicate that the full range of maturity stages has been covered, indicating that the identified capabilities are appropriate to differentiate between companies in weak and strong digitalization stages.

Table 3 – Firm Comparison of Maturity Stages of Dimensions and Capabilities					
	N	Minimum	Maximum	Mean	Std. Deviation
Dimension: Customer Centricity					
Customer Satisfaction	30	2	5	3.57	.728
Customer Interaction	30	2	5	3.80	.993
Customer Empathy	30	1	5	3.57	1.073
Dimension: Strategy & Leadership					
Strategy and Vision	30	2	5	3.93	.785
Business Model	30	2	5	3.50	1.137
Digital Culture	30	2	5	3.80	1.064
Dimension: Products & Services					
Product/Service Individualization	30	1	4	2.73	.687
Dimension: Process & Organization					
Knowledge Management	30	2	5	3.63	.850
Collaboration	30	2	5	3.37	1.198
Agility and Flexibility	30	2	5	3.40	1.102
Dimension: Technology					
ICT-Infrastructure	30	2	5	3.30	.837
ICT-System Application	30	1	5	3.20	1.126

Semi-Structured Interviews

To evaluate the MM's applicability, usefulness, and impact, qualitative semi-structured interviews gave further explanatory insights. Eight firm representatives from the survey pool were interviewed (see. Table 4).

Table 4 – Interviewees			
Company (Focus)	Position	Years of Experience	Size of Company
Company A (Retailing)	Founder and CEO	> 20 years	~ 20 Employees
Company B (Retailing)	Managing Director	> 5 years	~ 30 Employees
Company C (Consultancy Agency)	Founder and CEO	> 15 years	~ 50 Employees
Company D (Consultancy Agency)	Founder and CEO	> 10 years	~ 90 Employees
Company E (Hospitality)	Founder and CEO	> 10 years	~ 10.000 Employees
Company F (Retailing)	Experience Designer	> 3 years	~ 15 Employees
Company G (Consultancy Agency)	Manager	> 10 years	~ 160.000 Employees
Company H (Retailing)	Chief Innovation Officer	> 15 years	~ 40 Employees

With the interviews, we evaluated the MM's applicability, usefulness, and impact as suggested by Pöppelbuß and Röglinger (2011) and Sonnenberg and vom Brocke (2012). We assessed the applicability through the executives' perception of the MM in terms of (1) ease of use, (2) operationality, and (3) robustness. We assessed the usefulness through the perceived (1) fidelity as a real-world phenomenon. The impact on DBEs was assessed through the perceived (1) novelty and (2) suitability of the MM, their dimensions and capabilities. In the following, the results of the interviews are described.

Applicability – Ease of Use, Operationality, and Robustness

All interviewees mentioned that the MM is easy to use and provides valuable information to develop future strategic action plans toward digitalization. However, the interviewees also indicate that the model is a decision support system for executives and senior managers rather than a system for junior managers or low-levels workers. In this regard, expert 2 commented,

[...] I would know how to use the model because it involves aspects of the business, which I have to deal with on a daily basis. However, I can imagine that an employee who has a role within the company, which is not so closely linked to the management level itself, might find it difficult to understand and apply such a model since he/she does not have as much knowledge of the firm, especially when it comes to an assessment procedure, as someone at a high management level [...].

In the same vein, expert 6 commented,

[...] The model is undoubtedly a great tool to know where you are today as a company and where you want to go. Nonetheless, the actual execution of the model itself will depend on the top management of the company as the different levels of maturity suggest many changes on a business level [...].

Consequently, all interviewees stated that the dimensions and capabilities specified in the MM are described logically and accurately and can be operationalized as they encompass relevant fields of action for a digital transformation. Nonetheless, two respondents highlighted the absence of two technological aspects perceived as crucial in managing a company's technological security infrastructure and data protection policies. These aspects are cybersecurity and data protection. In this regard, expert 7 commented:

[...] The model is very complete [...] However, from a technological point of view, nowadays the aspect of "cybersecurity" is extremely important. This has to do with the company's capacity of having an ICT-Infrastructure to protect itself from external attacks (e.g., viruses, trojans) in such a way that they can guarantee that the information shared across the BE is 100% secure [...]. In the same way, expert 8 commented, "[...] I do agree that the model is very complete [...]. But what about data protection? This aspect is extremely important these days, since there must be data protection policies in every company and I do not see this aspect mentioned anywhere in your model [...].

Similarly, when discussing aspects related to the robustness of the MM (i.e., the ability of the model to respond to environmental fluctuations), all interviewees agreed that the model fits the adversities and challenges in the personal service industry. They also mention that the MM represents a good example of a tool that firms require when planning their path towards digitalization. Expert 5 commented:

[...] What I like about the model is that it helps us to get a clear picture of where the company stands on any of these aspects. This allows us not only to know what we can improve, but also to analyze based on the needs of our market, what things we have to focus first and what not [...].

Usefulness – Fidelity as a Real-World Phenomenon

All interviewees agreed on the need to develop DBEs in the personal service industry and that a strategic and systematic instrument such as the digitalization MM is critical. Expert 1 commented:

[...] It is no lie to anyone that since COVID-19 occurred, we have had a lot of problems on how to digitalize our businesses. In many cases, we did not know where to start because there is just too much we have to deal with on a daily basis. However, this tool has it all in one picture, and that is what I like about it [...].

Nonetheless, some respondents also highlighted the aspect of "dehumanization" through digitalization. These interviewees did not consider the necessity of reaching the final stage of digital maturity in all five dimensions. They express that instead of moving further towards digitalization, lower ICT might be necessary to keep a "human" touch in a firm. Yet, this sentiment was very controversial to others.

Experts 1 and 2 mentioned their hesitation to reach a complete digital maturity stage. Expert 1 commented:

[...] In my company, we are in almost all dimensions - with one or two exceptions - at level 3, and if I am honest I have no aspirations to reach level 5 for two major reasons. Firstly, because we do not simply have the resources to do so, since the presence of ICT necessitates investment and, secondly, due the intimately human nature of our business. Therefore, it is difficult for us to express this "human" feeling to our customers if a digital component is introduced within every interaction. In this regard, I believe my firm would be dehumanized [...].

In the same way, expert 2 commented:

[...] We have actually been at level 5. We have set up a platform to interact more with our customers. We have set up a virtual assistant and intelligent voice systems to streamline communication processes. Nonetheless, I can honestly tell you that the impact is not the same. I do not know if it is because we are not doing it right or not, but what I can tell you is that the impact of a human interaction with another human is not the same as the impact of a human with a machine. And the question is how do we reach that level? [...].

Expert 3 is more in favor of reaching a full digital maturity stage:

[...] Imagine structuring your business in such a way that with every interaction you design, you are able to learn more about a customer or even to collect additional information from him/her. You may utilize this information to your advantage to create future customized experiences depending on his/her requirements and aspirations. Many would see this as “dehumanizing”, yet on the contrary, this brings you closer to the customer than ever before, making the firm more human instead [...].

Impact – Novelty and Suitability

In terms of novelty, all interviewees stated that they had not come across a model of such scale and a maturity model designed exclusively for the personal service sector. In this regard, some participants mentioned that finding digitalization MMs for a specific sector or industries (e.g., telecommunications) was common. However, they also mentioned that these models were typically very specific and could not be applied to the entire personal service industry and that the suggested MM was the first time they had encountered a model from which the entire industry could benefit in one way or another. Expert 8 commented: “[...]The model is new, different, and undoubtedly encompasses the important characteristics and aspects of this sector. The good thing about it is that I can imagine that any type of company in this sector can learn something from it [...]” Likewise, expert 6 commented:

[...] The model is logical and covers a topic that is nowadays considered a trend for any business, which is DBEs. About 2-3 years ago, people in this industry had no idea what a DBE is. As a matter of fact, I would say that most of them still do not. The value of this tool is that it not only helps those people understand what a DBE is, but it also gives them directions on how to get there [...].

All interviewees agreed that the model is generally suitable for the personal service industry. However, some respondents expressed shortcomings. The first mentioned drawback is whether reaching a high degree of digital maturity is optimal for any organization, which might be misconstrued. The second mentioned drawback is the extensive length of the descriptions of the various dimensions for each maturity stage. Expert 3 commented:

[...] When presenting the model to a corporation, a set of guidelines should be provided on how to properly utilize the model, who should be responsible for handling the model, and it should be underlined that a stage of digital maturity is not always required. So far, I have not yet seen such guidelines in your model. Doing so would make it more suitable [...].

In the same vein, expert 8 commented:

[...] Although your model is appropriate for the personal service sector, the descriptions of the various maturity levels are lengthy, and, in some situations, there is an overlap between the levels, making it difficult for companies to make a proper assessment. If

you want to make your tool entirely relevant for an organization, the descriptions must be simplified, shortened, and made more uniform. I feel that if you do so, your tool would have a stronger impact in practice [...].

Discussion of Results

This research manuscript aims to apply and evaluate the conceptual design of the digitalization MM for the personal service industry as previously developed by (see. Guerrero, Lattemann, Michalke, et al., 2022; Guerrero, Michalke, et al., 2022), and to assess its (1) applicability, (2) usefulness, and (3) impact in practice. A DSR approach was chosen to address concerns about the overall structure of MMs, as most of these models are developed based on pure theoretical foundations, and little is done concerning the evaluation of the applicability, usefulness, and impact in practice (Bley et al., 2020; Jugdev & Thomas, 2002; Pöppelbuß & Röglinger, 2011; Sonnenberg & vom Brocke, 2012). The evaluation was conducted with thirty experts in a quantitative survey and eight in-depth interviews.

Overall, the results complement and confirm previous findings that digital maturity is beneficial for personal service firms. With this, we support the research findings stating that through the use and application of ICT, these firms can develop more innovative and value-oriented services as well as more customized services that are tailored to specific customers' needs and desires (Hillebrand et al., 2011; Lattemann et al., 2020).

The practical significance of this research was demonstrated in implementing the digitalization MM for personal firms, which was operationalized as a quick and easy-to-use tool for assessing the digital maturity of firms at various organizational levels. A common constraint for the applicability and impact of MMs is the need to be accompanied by concrete recommendations for actions (Jugdev & Thomas, 2002). The presented research design provides a set of concrete action guidelines to have a greater impact and to be more applicable in practice. The survey instrument displays the results in the form of a maturity level radar and a standardize written report for the companies. The users indicated that this implementation is perceived as applicable and effective. In addition, the qualitative interviews confirm that the results have helped companies prioritize areas of action for improving digitization. Through a differentiated maturity assessment of each capability at each dimension, the model enables a more accurate maturity determination, whereby specific problem areas become transparent. Further, it emerged that information needs to be provided on who should use the MM. Based on our findings, the maturity model seems to be most beneficial for senior management, who have the required knowledge to assess the status quo of the company and the competence to initiate the needed changes suggested by the model in the short, medium or long term.

The survey results are somewhat controversial regarding the usefulness of the MM in terms of users' fidelity to the tool and intention to use it again. All respondents seemed to agree that the current model covers many valid dimensions of digital maturity. At the same time, however, they need to update and revise the MM to include cybersecurity and privacy. Since personal services particularly require collecting and processing sensitive personal data (Nayyar et al., 2021), interviewees pointed to the importance of data protection in developing DBEs. As a result, a MM can only exist in the long term if it is continuously reviewed and updated. Therefore, it would be essential to investigate the importance of new developments and how these aspects could be defined in incremental maturity levels.

Despite the interesting results, the study also has its limitations, especially with regard to the quantitative sample. First and foremost, we could not evaluate the model on a large scale despite our efforts to reach out to over a hundred experts. The survey was completed by thirty experts, and thus, statistical analyses have little predictive power. The experts were recruited following a purposive and convenience sampling approach. Nonetheless, aspects related to

the executive level of companies with knowledge and practical experience in personal service firms, digitalization, and BEs, were considered to avoid biased results. Our survey covers six different personal service sectors. Future research could sample a more significant number of firms and conduct an industry-based analysis, looking at the different types of sectors individually to see how the different maturity levels vary by sector. As the quantitative survey served mainly as an instantiation of the MM, we based the analysis of our results mainly on the qualitative interviews. Here, one disadvantage is the dependence on interviews for data collection, which may result in retrogressive and incorrect findings (Mack et al., 2005).

Nevertheless, the results are of theoretical importance as they contributed to ongoing research discussions: For instance, some interviewees argued that the MM itself might lead personal service firms to develop a sense of dehumanization associated with a high stage of digital maturity. This is consistent with previous findings regarding the risk of organizations developing a sense of dehumanization due to high dependence on ICT applications (Lenkenhoff et al., 2018). However, the current MM counteracts these notions as it covers not only technical dimensions but also emphasizes human factors such as customer centricity with empathy and satisfaction, strategy and leadership, and an appropriate digital culture. In agreement, some interviewees saw the importance of reaching a balanced digital maturity stage on many or even all dimensions. This argument is more in line with findings from Robra-Bissantz et al. (2021) and Lattemann et al. (2020), who claim that the appropriate use of ICT does not necessarily make companies less human but rather helps them to identify better and address human needs and desires.

A second practical and scientific discourse revolves around how much digitalization is necessary and whether it is always ideal for reaching full digital maturity. On the practical side, cost-benefit considerations are often decisive, depending on the size and resources available (money, personnel). Differences are to be expected with regard to reaching a digital or rather technological maturity level. Especially in SMEs, the costs often inhibit the implementation of advanced technologies. Here, targeting the next maturity level seems more achievable and desirable. Nevertheless, most dimensions included in the digitalization MM for personal services are primarily independent of the technology: customer centricity, strategy and leadership style, or process and organization are all about human know-how. Here, a high degree of digital maturity might be achievable regardless of the size and monetary resources of the company.

Conclusion

Many product-focused industries have already undergone a fierce digital transformation, particularly in developed countries. Recent research shows that the service sector in Asia lags behind the digital transformation and is coined by low productivity, in general, hampering overall economic growth. However, Asia has the potential to become a new engine of economic growth by introducing modern, high-valued ICT-based services. For this, service firms must be enabled for digital transformation to reach a stage of digital maturity.

The digital maturity of firms enables engagement in DBEs, in which collaboration and exchange of resources and competencies are becoming more effective in the process of co-creating values for the user. Yet, many personal service firms struggle with the digitalization of their human-centered processes and engagement in DBEs. To support this digital transformation, strategic planning tools are needed. MMs are strategic tools to guide and support decision-makers in transitioning from analog to digital in the short, mid-, and long-term. These models exist for various application contexts and have proven themselves valuable in the context of digital transformation. However, MMs are often tailored to specific sectors and cannot be generalized for the whole personal service industry. Therefore, this paper describes and applies a digitalization MM for personal services and evaluates its applicability, usefulness,

and impact in practice. To ensure scientific rigor and practical relevance, a predefined DSR approach was applied, including a mixed-method evaluation in which insights from semi-structured interviews complemented quantitative results from a survey.

This paper makes an important contribution to practice as a functional tool has been developed that can be applied outside the research context. The results suggest that the proposed digital MM for personal services is applicable and impactful for various personal service industries, such as consultancy, education, retail, healthcare, hospitality, and craftsmanship. It further covers valid aspects of the digital transformation process. At the same time, there is a need to continuously update the MM to include further emerging aspects, such as cybersecurity and data protection. Herewith, further research on the basis of explorative analysis (e.g., semi-structured interviews) is planned to explore how these aspects are represented within personal service firms and in this manner, be able to describe them on the basis of the different maturity stages from our digitalization MM.

Our findings help firms improve their services and foster the development of new digitalized services. With this, the development of the service industry will be fostered, particularly in countries lacking behind the digital transformation, such as in the Asian-Pacific region.

Further, this research makes a scientific contribution to current research discussions. First, there is a need to understand better and counteract the risks of "dehumanization" through digitalization. We argue that technologies often cannot develop their full potential because managerial and personal factors are underdeveloped. Therefore, the digitalization MM for personal services addresses this issue by highlighting factors that go beyond purely technical dimensions, making the digitalization of personal services more human-centered.

Second, the question arises as to whether achieving 100% maturity should be the ultimate goal. Some experts argue against this in view of practical cost-benefit analysis. Our model makes concrete suggestions for incremental improvements at various levels so that each service provider can decide what level of digital maturity is appropriate in the context of the company. Overall, we can conclude that the digitization MM seems to be a suitable tool to support personal services in their transition towards digital transformation

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Appendix A – Digitalization Maturity Model for Personal Service Firms

Table A. Digitalization Maturity Model for Personal Service Firms						
Dimension	Capability Area	1. Infancy	2. Developing	3. Transforming	4. Optimized	5. Digital Maturity
Customer-Centricity	Customer Satisfaction	Customers' satisfaction is not a priority for the firm and management has little to no interest in finding ways to achieve it.	Customers' satisfaction is becoming important but it depends, purely, on heroics front-line employees' practices.	Customers' satisfaction is recognized as important and it increases through the application of ICT-Systems (e.g. intelligent call routing, interactive voice responses, virtual receptionist, etc.) to support front-line employees' practices.	Customers' satisfaction is part of the firm's culture and it increases through the application of trend technologies (e.g. AI, AR, chatbots, etc.) to allow faster and more optimized solutions for customers' problems.	Customers are always satisfied because of not only the use of trend technologies (e.g. AI, AR, chatbots, etc.) but also because of the firm's capacity to dispose a digital platform, where customers and other users can co-create and assist in the creation of customers' solutions at all times.
	Customer Interaction	Customers' interaction rely, purely, on front-desk (e.g. face-to-face) as well as telephone encounters.	Customers' interaction relies mainly, on front-desk as well as telephone encounters. Interaction takes place by using only text-technologies (e.g. E-Mail) as well basic ICT-applications (e.g. Internet website).	Customers' interaction is extended through the application of Internet-based applications (e.g. social media platforms) allowing customers and other users to interact by creating, sharing, or exchanging information anytime.	Customers' interaction increases through the application of trend technologies (e.g. real-time messaging, artificial intelligence, chatbots, etc.) as well as by having presence of omni-channel services.	Customers' interaction is achieved at all scales through presence of trend technologies (e.g. real-time messaging, AI, chatbots, etc.) as well omni-channel services to optimize user experience. Firm disposes a digital platform for customers and other users to co-create and interact with each other evading aspects such as time and space.
	Customer Empathy	Firm problems are only faced from the firm's perspective, ignoring the customer perspective.	Firm starts approaching the customer and curiosity starts to raise, resulting in the firm's willingness to explore and discover the customer situation and experience.	Firm takes an active role and starts to wonder in the customer's world. Firm starts to acquire a customer-centered mindset by focusing on the customer as their biggest source of value.	Firm connects with the customer by recalling explicitly upon his/her own ideas, needs, and experiences, in order to reflect and be able to create an understanding of what is it that the customer wants. Firm manages to even get a connection on an emotional level with the customer by recalling upon his/her own feelings and resonates with the customer's experience.	Firm creates an emotional connection with the customers and make sense, at any time, use of the customer's perspective.

Table A. Digitalization Maturity Model for Personal Service Firms						
Dimension	Capability Area	1. Infancy	2. Developing	3. Transforming	4. Optimized	5. Digital Maturity
Strategy & Leadership	Strategy and Vision	<p>No formal strategy nor a clear and defined vision on how to assess issues related to digitalization.</p> <p>The urgency to transite from analog to digital for firm's own survival is not recognized.</p>	<p>Urgency of achieving a transition from analog to digital is not sufficiently recognized and consciously ignored.</p> <p>Development plans have, mostly, silos and static structures.</p>	<p>Urgency of achieving a transition from analog to digital is recognized as important.</p> <p>Business sees ICT as interdependent (i.e. operant resource) and acknowledges that business processes have to be revised to take advantages of ICT.</p>	<p>Urgency of achieving a transition from analog to digital is fully recognized at all levels of the firm. Firm relies on different types of ICT-Systems to support strategic goals.</p> <p>Firm's focus is aimed on achieving a business/IT alignment to assess issues of efficiency and effectivity.</p>	<p>Strategy is fully supported with the implementation of ICT-Systems and it, mostly, aims to create competitive advantages and strategic differentiations.</p> <p>Business/IT alignment is fully achieved and it shows positive results when handling organizational functions and processes.</p> <p>Digitalization becomes a central component of firm's vision, mission, and strategy.</p>
	Business Model	<p>Business model is either completely unknown or, predominantly, analog.</p> <p>Digitalization has no significance for the business idea.</p>	<p>Firm recognizes the importance of digitalization as well as making use and application of ICT to improve the business model.</p> <p>Firm lacks on ICT resources.</p>	<p>First digital initiatives are launch through the use and application of ICT-Systems (e.g. enterprise resource management systems such as SAP or Oracle, social media platforms, marketing channels, etc.) to manage day-to-day business operations and activities.</p>	<p>Business model is based on the application and use of trend technologies (e.g. integrated platforms, AI, cloud-based services, chatbots, etc.) that enable the firm to achieve new ways of interaction as well as to optimize collaboration.</p>	<p>Business model is completely digitalized through the application and use of trend technologies (e.g. integrated platforms, AI, cloud-based services, chatbots, etc.).</p> <p>Firm, constantly, searches for ways on re-designing and empower new forms of interaction and collaboration.</p>
	Digital Culture	<p>Firm neglects the importance of aspects related to innovation, collaboration, openness, etc. Firm considers that it can survive on the basis of individual efforts.</p>	<p>Digital Culture recognizes the importance of investing on ICT-Infrastructure acquiring the respective licenses as well as necessary ICT-Systems to assess the firm's processes.</p>	<p>Digital Culture starts to acquire a mindset based on inclusion and implement basic ICT-Systems to create digital solutions to expand the customer base, transform the customer experience, and achieve new forms of collaboration.</p>	<p>Digital culture is embedded in firm's strategy and mindset and the firm promotes the use and application of ICT-Systems at all levels of the firm.</p> <p>The implementation of ICT-Systems led to new forms of collaboration (e.g. co-creation) and interaction.</p>	<p>Firm encourages employees to look outward and engage with customers and partners through the use of ICT-Systems to create new solutions (e.g. co-creation).</p> <p>Firm encourages boldness over caution. Employees are encouraged to take risks, fail fast, and learn. Firm supports the need for speed and promotes continuous iterations (i.e. prototyping) rather than perfecting a product or idea before launching it.</p>

Table A. Digitalization Maturity Model for Personal Service Firms						
Dimension	Capability Area	1. Infancy	2. Developing	3. Transforming	4. Optimized	5. Digital Maturity
Products & Services	Product/ Service Individualization on	<p>Firm considers product/service individualization to be of not priority and management sees no need on finding ways to achieve it.</p> <p>Firms earns no income from the sale of individualized products/services.</p>	<p>Small initiatives towards individualized products/services start to appear. In this context, the firm, in an analog manner, inspects aspects related to the customers buying record, conduct surveys to determine customer behavior and needs, etc.</p> <p>Firm recognizes the importance of investing on ICT to better develop individualized products/services but has neither the financial resources nor the know-how to put them into practice.</p>	<p>Groups of individualized products/services become more visible due to high efforts on analog practices as well as by implementing customer- relationship management (CRM) tools (i.e. GoogleTrends, Google Analytics, Social Media Analytics, etc.) and visual configuration softwares (i.e. Axonom, Powertrak, etc.).</p> <p>Firms' income starts to become tangible due to the sale of individualized products/services.</p>	<p>Ability to design and develop individualized products/services is enhanced through the application of trend technologies (e.g. ML, AI, programmable robotic systems, crowdsourcing, 3- D printing, etc.).</p> <p>High amount of firms' income is achieved through the development of individualized products/services.</p>	<p>Firm is an expert on designing and developing individualized products/services and relies on the application and use of trend technologies such as (i.e. ML, AI, programmable robotic systems, crowdsourcing, 3-D printing, etc.).</p> <p>Majority of firms' income is achieved through the development of individualized products/services.</p>
Process & Organization	Knowledge Management	<p>No proper knowledge transfer, creation, sharing, and application. Firm has no intention to manage organizational knowledge.</p>	<p>Management recognizes that knowledge management may be of value but is not willing to search for ways to improve it. Exchange of knowledge remains, purely, on analog practices and it happens within the organization but has no power to reach external actors.</p>	<p>Management is aware of the influence of the use and application of ICT on knowledge sharing. Firm starts to adopt internet-based applications (i.e. social media platforms), enterprise resource management systems (SAP, Oracle), and document management softwares (i.e. Google Drive, Dropbox, etc.) to foster the exchange of knowledge at all times.</p>	<p>Knowledge management is deeply combined through the application of ICT-tools to foster knowledge sharing at all times inside and outside of the organization.</p> <p>ICT-tools for knowledge management and knowledge sharing are utterly established and acceptably used by the organization.</p>	<p>Knowledge management processes are reviewed and improved regularly.</p> <p>Knowledge management can be easily adapted to new organization's needs.</p> <p>Integrated platforms (i.e. digital platforms) are used for customers and others users to co-create and exchange knowledge at all times.</p>

Table A. Digitalization Maturity Model for Personal Service Firms

Dimension	Capability Area	1. Infancy	2. Developing	3. Transforming	4. Optimized	5. Digital Maturity
	Collaboration	<p>Collaboration takes place, purely, within functional silos.</p> <p>Departmental thinking is pronounced within the firm.</p>	<p>Collaboration still takes place, mostly, in functional silos.</p> <p>However, firm recognizes the importance of investing on ICT-Tools to improve communications as well as on finding better ways of collaboration.</p>	<p>Internet-based applications (i.e. social media platforms), document management softwares (i.e. Google Drive, DropBox, etc.) as well as well as interactive whiteboards (i.e. Mural) are used to optimize internal as well as external collaboration.</p>	<p>Collaboration is mastered by the application and use of trend technologies (i.e. integrated platforms, cloud-based services, chatbots, etc.) leading the firm to have co-created outputs.</p>	<p>Collaboration is fully digitalized through the application and used of trend technologies (i.e. integrated platforms, cloud-based services, chatbots, etc) and the firm remains proactive on finding new ways for improvements.</p>
	Agility and Flexibility	<p>Agile actions are principally unknown and the technological basis is fragmented and unable to support agile processes effectively.</p> <p>Organizational activities for improving collaboration and cooperation do not take place.</p>	<p>Agility and Flexibility and technological implementation are, partly, implemented in some but not the majority of departments, business areas, teams, or structural levels of the organization.</p> <p>Minority of employees share agile capabilities regarding communication, learning, responsibility, and customer orientation, and only some managers are able to manage change in an appropriate way.</p>	<p>Operational changes as well as technological changes are mostly welcomed and handled accordingly.</p> <p>In many instances, the firm carries out activities to support and promote teamwork and establishes organizational structures that are flexible enough to cope with upcoming changes.</p>	<p>Firm invests on executive training for employees and managers to learn agile practices (i.e. SCRUM and Design Thinking).</p> <p>Firm manages to establish a sufficient technological basis throughout the complete organization, and agile values (i.e. user- centeredness, openness to collaboration, acceptance to uncertainty and open to risks, etc.) are shared and accepted completely.</p>	<p>Firm applies practices of agile methods (i.e. SCRUM and DT) on a digital scale by making use of ICT tools (e.g. interactive whiteboards), to achieve firm's innovations as well as to improve management practices (i.e. collaboration, co-creation).</p> <p>All employees and managers have the capabilities to successfully work in an agile and changing environment.</p> <p>Collaboration and cooperation are important aspects of everyday work.</p> <p>Operational as well as ICT-Infrastructure is flexible enough to quickly react to upcoming changes.</p>

Table A. Digitalization Maturity Model for Personal Service Firms						
Dimension	Capability Area	1. Infancy	2. Developing	3. Transforming	4. Optimized	5. Digital Maturity
Technology	ICT-Infrastructure	Firm relies on paper-based systems. Communication and collaboration take place by using only text- technologies (i.e. fax, e-mails) as well as via telephone.	Infrastructure starts to use basic ICT-Softwares (i.e. document-management softwares (Microsoft 365), enterprise resource management systems (SAP, Oracle), communication and messaging softwares (Slack, Skype) to handle operational purposes and get rid of paper- based systems.	Infrastructure extends basic ICT-Softwares through the application of Internet-based applications (i.e. social media platforms) as well as by including video-conference services (i.e. Zoom, Microsoft Teams, etc.).	Infrastructure extends ICT-Infrastructure through the use and application of ICT-Systems (i.e. intelligent call routing, interactive voice responses, virtual receptionist, etc.).	ICT-Infrastructure is fully supported through the implementation of trend technologies (i.e. real-time messaging, artificial intelligence, chatbots, machine learning, integrated platforms, etc) and firm searches for continuous ways of improvement towards its business operations.
	ICT-System Application	Firm's employees lack of knowledge as well as expertise to make use of ICT-systems (i.e. computer programs, hardwares, softwares, etc.)	Initiatives to set up ICT-Systems depend, purely, on few heroics employees practices due to lack of know-how from the majority of employees.	Firm's employees act proactively and are actively encourage through the management levels to learn and make use of such ICT-Systems	ICT-Systems become tangible and well-integrated in the ICT-Infrastructure. Firm's employees are almost experts on handling such tools and thus, face little to almost no complications when making use of them.	ICT-Systems are fully implemented over the firm. Firm's employees become experts, in ways that they are able to handle such tools without facing any complications. ICT-Systems are constantly evaluated and improved accordingly.

Appendix B – Interview Guideline

Request for an interview for a research study in the field of digitalization within personal services.

Dear Sir or Madam,

Given the profound changes in the demand for new innovative ways of developing and delivering services, the so-called “personal services” are responding to the digital challenge by using different approaches and at varying speed. Personal services are those services that can be found in sectors such as education, retail, hospitality (hotels, restaurants), craftsmanship, art and entertainment. These are services that have been for so long designed around the idea that they only require “high-touch” personal encounters. However, due to the fact that the world today is becoming more digitalized and is heading towards what is known as a “digital revolution”, firms from this industry must look for new and alternative ways on how to adapt their business models, organizational structures, and service offerings, especially by taking advantage of the use and application of digital technologies. Thus, leading these firms to avoid what could be a long-term business collapse. To fill out this gap, this research aims at introducing a maturity model as a strategic and systematic instrument that help personal service firms to assess their current developmental digitalization stage and show trajectories for improvements to guide the transition from an analog towards a stage of “digital maturity” in a well-structured way.

In order to conduct research that is as practice-oriented as possible in the field of personal services and digitalization, we are looking for successful service providers or experts in the field of digital transformation in the field of personal services. Through a search process from experts in these fields, we have become aware of your company. In this regard, it would be a pleasure for us to be able to have an interview with you about the importance of digital business ecosystems within personal service firms, for at least, 30 – 45 minutes (especially in English or Spanish language). For this, we will use a video conferencing tool or the telephone.

Our results will be made anonymously available in national and international journals, conference publications, and even books, or if permitted, we will publicly acknowledge your collaboration in such.

We would be very pleased if you, as a representative from the field, could support us in broadening our view in this current research and allow us to gain an insight into your company during the interview.

For further information in this regard, please do not hesitate to contact me via e-mail: rguerrero@constructor.university

Sincerely,

Dr. Ricardo Guerrero

Interview Guide

Interview Questions (Towards Digital Business Ecosystems within Personal Service Firms)

Personal Information:

Name (Optional)

Sex: M F Age:

First Step. Introduction of the Maturity Model (Show the Model to the Interviewee) (Screen-Sharing)

Second Step. Meta evaluation of the Model

1. How accurate do you consider our Maturity Model in the context of digitalization and digital business ecosystems?
2. How accurate do you consider our Maturity Model in the context of digitalization and digital business ecosystems within Personal Service Firms?
3. Do you think that the Maturity Model applies for all personal service firms equally? Meaning, is it equally applicable for a kindergarten as for a small consultancy business? If not, please elaborate on your answer.
4. Do you consider the purpose of the Maturity Model clear to the users? Would you know what to do with it if it would be available for your organization? Who would be the people responsible for executing the model and managing the change occurred within the company?
5. Do you consider the Maturity Model to be applicable in practice? Can you learn something from it? Is the information here provided of any help to your company to become, somehow, more digital?
6. When do you consider the model to be best applicable?
7. Would you add any other aspect to the following Maturity Model?

Third Step. Future Assessment of the Company - (Show the Model to the Interviewee)

1. How digital do you want to become in each of the different dimensions?

Please feel free to add any comments that are not included on the questions!!

About the Authors

Ricardo Guerrero is a Guest Researcher at the Constructor University in Bremen. His field of research focuses on aspects related to the digitalization of personal services, service innovation, human-centeredness, and maturity models. Dr. Ricardo Guerrero published articles in renowned information systems (IS) conferences such as “Internationale Tagung Wirtschaftsinformatik (WI)”, “Pacific Asia Conference on Information Systems (PACIS)” as well as in several service- and business-oriented books. He also holds a Consultant position in the field of “Customer Experience (CX)” at the company “GHM Gesellschaft für Handwerksmessen mbH” in Munich, Germany.

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