MEASURING SERVICE QUALITY: A SYSTEMATIC LITERATURE REVIEW

Research paper

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Abstract

Digital transformation of industries, technologies and society changed the way of service provision and led to changing requirements on service quality. Several models for measuring service quality exist within the literature. Literature reviews on these models mostly focus on the model structure to emphasize differences or commons in e.g. number of dimensions or context of measurement. The following paper will raise this detailed level of investigation to a higher level. The main purpose is to provide an overview about different service quality measurement models within IS literature and emphasize differences between these models compared to traditional measurement scales. A systematic literature review was conducted to structure the literature and reveal further research gaps. Findings were assigned to the service typology matrix of Jaakkola et al. (2017) to gain further research gaps for service quality measurement models directly related to socio-technical change as the two dimensions of the matrix reflect two important attributes of digitization. Beneath these gaps, findings indicate that service quality measurement models are e.g. context-dependent and offer several areas for further research. The results contribute to IS literature as they structure service quality measurement models from literature on the basis of different service forms and emphasize research gaps.

Keywords: Service quality measurement, service quality, service typology, service type.

1 Introduction

In the last decades, several sectors shifted from production to services as global markets and information technology (IT) increase the competitive pressure on companies respectively industries (Seth et al., 2005; Metters, 2010). Production industries like automotive offer product-related services to make their products more attractive or to develop new business models like carsharing (Firnkorn and Shaheen, 2016). Moreover, the growing use of the internet challenged the business models of traditional service industries like retail or banking and led to a further shift from traditional to digital services (Zott et al., 2011). Service quality and especially its measurement gains growing importance for practitioners as well as for researchers. Research on service quality also shifted from traditional services to digital services. For this reason, measurement of service quality is an important research field in Information Systems (IS) as well as in other disciplines like Marketing or Management. Measurement models have been developed in times where service delivery was characterized by physical contact between service provider and customer (e.g. SERVQUAL by Parasuraman et al., 1988). Hence, high service quality was depending on factors like the behaviour of employees or the interior of the service encounter where the service was delivered (Zeithaml et al., 2002). The service encounter is described as the time of direct interaction between the customer and the service provider whereby the service provider can be both, a person or a system (Glushko, 2009; Salvendy and Karwowski, 2010). In the last two decades, service delivery shifted from physical interaction between service provider and customer to digital interaction in form of websites or portals as the mediator between service provider and

customer. As traditional services are provided during a human-to-human interaction and the quality depends on physical and behavioural attributes, digital services are provided during human-to-technology interactions and attributes of the technology become the relevant factor of the service quality. As service quality depends on characteristics of the service provision and therefore on the way of providing the service, a transformation in the way of service provision in turn changes the characteristics of service quality. This digital transformation of the service provision leads to changing requirements for the service provider to guarantee high service quality as well as for the service quality measurement models to measure the quality. The dimensions and underlaying factors that describe the quality of services had to be adapted to the digital transformation. Several new models and scales have been developed with respect to digital interaction in different research areas (Ladhari, 2010). Literature reviews on these models and scales mostly focus on research methods for developing a model or on similarities and differences of the model structure like the number of dimensions or the relating attributes that are relevant for service quality (e.g. Ladhari, 2010). This article extends the literature of IS service quality measurement in two different ways. One the one hand, the plurality of measurement models is structured regarding their goals to carve out differences on the model level and not on dimension or model structure level. On the other hand, results are discussed on the basis of the service typology developed by Jaakkola et al. (2017) to emphasize additional differences. Jaakkola et al. (2017) provided a service typology matrix where services were clustered regarding their technological complexity and their contact intensity (Jaakkola et al., 2017). This 4x4 matrix illustrates the differences of services regarding the extent of physical interaction and usage of IT. The aim of this study is:

- Reviewing and categorizing the literature about service quality measurement models and providing an overview, which models are especially developed respectively used for different service forms.

- Discussing the models on the basis of the service type matrix of Jaakkola et al. (2017).

- Point out gaps for further research.

To introduce the topic and motivate the research questions, some background information about service forms and service quality measurement is provided in chapter two. This is followed by the methodological approach in the third chapter and the presentation of the results in the fourth chapter. Assigning the results to the service typology and the present literature, the discussion follows in chapter five before this study closes with a conclusion and further research. The following study focuses service quality measurement models and therefore will not provide a holistic overview about the whole service quality topic. A selected overview about service quality measurement models and its development is provided in the context of traditional and digital service delivery as well as the introduction to service forms.

2 Theoretical Background

2.1 Service forms

Within the literature, there is no widely accepted definition of services. However, services aim for the benefit of oneself or others in processes, services and actions and can be identified by skills and knowledge (application of competences) (Peters et al., 2016). Services have many facets but "all rely on providers and customers working together for mutual benefit." (Peters et al., 2016). Services are of growing importance for IS research (Peters et al., 2016). Literature on service quality is widely spread into several disciplines with a huge amount of subject areas. Several studies were conducted regarding service quality whereof different perspectives on service quality evolved (Ladhari, 2010). The concept of service quality has been first the issue of Marketing literature and has further been examined from other perspectives like Information Systems (IS) or Psychology in the following years. Mattsson (1992) for example modelled service quality from a psychological perspective as a process of satisfac-

tion which is based on cognitive processes and thus implies more the psychological aspects of perception. Kettinger and Lee (1994) related the concept of the information services function (ISF) to the service quality measurement scale SERVQUAL to enhance knowledge about user satisfaction. In 1995, Kettinger and colleagues introduced a "global information Services Function (ISF) Quality Framework" (Kettinger et al., 1995, p. 569) to better evaluate global IS quality. The connection of IS and service quality exists also within the service encounter.

Service form	Description	Service quality depends on
1 traditional	Physical contact between service provider and customer	Employee behaviour, interior, etc.
2 digital	Digital contact between service provider and customer	The web-service/portal
3 hybrid	Physical and/or digital contact between service provider and customer	Traditional & digital factors

Table 1:   Three different service forms.

As mentioned above, the service encounter "consists of two actors" (Glushko, 2009, p. 237) whereby the actor can be both, a person or a system (Glushko, 2009). Within the service encounter, information exchange takes place between the two actors so that service quality is perceived during the interaction between service provider and customer (Glushko, 2009). Glushko (2009) distinguished seven forms of service encounters from person-to-person encounters to context-aware services regarding the technology intensity within the service encounter. Based on this, the following study categorizes the interaction between service provider and service recipient respectively the customer into three different service forms, according to the use of IT. Person-to-person service encounters describe the traditional, physical interaction between an employee and the customer without using any kind of IT. In this context, Zeithaml et al. (1988, p. 35) defined that service "quality occurs during service delivery, usually in an interaction between the customer and contact personnel of the service firm." According to this, the quality of a traditional service highly depends on the employees which are directly in contact with customers as for example their behaviour and knowledge as well as the physical environment, where the interaction takes place (Gremler and Gwinner, 2000). According to this, the person-to-person service form is characterized by a physical contact between service provider and customer and is termed in the following as *traditional* service form. The opposite of this traditional service form is the *digital* service form. This form is characterized by a digital interaction between service provider and customer whereby a web service or portal serves as the mediator in the service encounter for the service delivery and solely determines service quality. Examples are the "self-services", "multi-channel services" or the "services on Multiple Devices or Platforms" (Glushko, 2009, pp. 225, 227, 229). The third category comprises services which have a physical as well as a digital component during the interaction. This category requires both, IT as well as a physical contact for the service delivery. As a result, service quality depends on factors like IT functionality and the employee behaviour. In the following study, this category is termed as *hybrid* service form as it comprises IT as well as physical contact. In summary, there are three different types of service forms termed as traditional, digital and hybrid service form (***Table 1***). As service quality occurs during the interaction of service provider and customer, its measurement has to be calculated also at this point. The following section gives an introduction to the topic of service quality measurement and formulates the research questions.

2.2   Service quality measurement

In the 1980`s and 1990`s, several researchers called attention to the missing investigation of service quality. They argued that there is a research gap of describing and measuring the quality of services and emphasized a difference between the well-known quality of goods and the under-investigated service quality (e.g. Parasuraman et al., 1985). Parasuraman et al. (1988, p. 5) defined service quality as "an elusive construct that may be difficult to measure". Zeithaml et al. (1988) added that the quality of services depends on organizational resources which is not be taxable like the quality of goods. The

quality of goods is measured objectively and understandable through different criteria. As mentioned by Parasuraman et al. (1985), which were one of the first researchers on service quality measurement, the quality of goods is measured as for example the "conformance to requirements." (Crosby, 1979) or the counting of internal and external failures (Garvin, 1983), but is "insufficient to understand service quality" (Crosby, 1979 and Garvin, 1983 in Parasuraman et al., 1985, p. 42). The problem to measure the quality of a service lies in its properties: intangibility, heterogeneity, and inseparability (Parasuraman et al., 1985). First, service quality is not countable and is hard to measure before it is used by the customer (Parasuraman et al., 1985). Second, service quality can differ regarding the employees or customers which sell respectively buy the service (Parasuraman et al., 1985). Third, service quality depends on the customer and its assistance (Parasuraman et al., 1985). Parasuraman et al. (1985) concluded from their literature review and exploratory investigation that service quality results from the difference between the customer expectation and customer perception of the service. Customers are satisfied when the expected service is equal to the perceived service (Parasuraman et al., 1985). In the delivery of the service, several gaps can occur which decrease the perception of the service (Parasuraman et al., 1985). Already in 1984, Grönroos has introduced a concept about service quality which is based on the idea of a gap model. The idea of the model is that service quality can be described as the difference between expected and perceived performance of a service (Grönroos, 1984). In 1988, Parasuraman et al. developed SERVQUAL to measure service quality. SERVQUAL is still one of the mostly adapted and used measurement models of service quality in literature (e.g. Barnes and Vidgen, 2001a). Several researchers adapted the model to different environments like retail (Yoo and Donthu, 2001), banking (Dabholkar et al., 1996) or telephone service (Bolton and Drew, 1991). The basis of SERVQUAL is a gap-model which describes the deviation between expected use of a service and experienced use of a service as the perceived quality of that service (Parasuraman, 1988). On the basis of SERVQUAL, research has been conducted on the model, especially on the basic assumptions and the four single gaps. This led, one the one hand, to a deeper understanding of the service provider dimension like the influence of employee behaviour or marketing on service quality (Zeithaml et al., 1988; Hartline and Ferrell, 1996; Parasuraman and Zeithaml, 2002). On the other hand, a debate[1] emerged in the following years between several researchers about the adequacy of SERVQUAL to measure service quality (e.g. Parasuraman et al., 1991; Cronin and Taylor, 1992; Brown et al., 1993; Zeithaml et al., 1993; Teas, 1993; Parasuraman et al., 1994). The criticism focused on the "expectations-performance gap as the basis for measuring service quality" (Cronin and Taylor, 1992, p. 56) and the validity and reliability of the five dimensions (Van Dyke et al., 1999). Dabholkar et al. (2000) described the debate as question "whether service quality should be measured as perceptions or as disconfirmation" (Dabholkar et al., 2000, p. 141). Based on this debate, different researchers distinguished service quality measurement research into two several streams, the Nordic School and the North American School (Brogowicz et al., 1990; Brady and Cronin Jr., 2001; etc.). Brady and Cronin Jr. (2001) described the Nordic School as it "defines the dimensions of service quality in global terms as consisting of functional and technical quality" (Brady and Cronin Jr., 2001, p. 34) and the North American School as it "uses terms that describe service encounter characteristics (i.e., reliability, responsiveness, empathy, assurances, and tangibles)" (Brady and Cronin Jr., 2001, p. 34). In 2007, Carrillat et al. made a major step to finish this debate with their meta-study about the 17 years of debating whether SERVQUAL or SERVPERF is the more adequate model to measure service quality. Their findings showed "that both scales are adequate and equally valid predictors" (Carrillat et al., 2007, p. 485) of overall service quality.

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[1] A review of the debate can be found for example in Robinson (1999).

2.3   Service quality measurement in IS research

The debate regarding SERVQUAL also continued with regard to IS (Van Dyke et al., 1997; Pitt et al., 1997; Jiang et al., 2002, etc.). With the upcoming internet use, service quality measurement was faced with new challenges as customers interact with technical machines instead of employees (Parasuraman et al., 2005). Van Dyke et al. (1997) were one of the first who related the service quality measurement models to information systems (IS) as they adapted SERVQUAL to measure the service quality of an information service provider (van Dyke et al., 1999). New concepts like e-service quality (e-SQ) or IS SERVQUAL emerged (Parasuraman et al., 2005). Kohlmeyer and Blanton (2000) related the two different concepts of the Nordic and North American school to the IS context to enhance service quality in IS management. Zeithaml et al. (2002) provided definitions and a research agenda for the upcoming usage of web sites to deliver service quality in the internet. Their literature review about website service quality found that e-service quality "is a multidimensional construct" with "new sets of attributes unique to the context of Web sites" (Zeithaml et al., 2002, p. 374). Moreover, e-service quality has to be differentiated from service quality as it "lacks interpersonal contact and may pose greater perceived risk and privacy issues for customers" (Blut et al., 2015, p. 679). Santos (2003) defined the e-service quality concept as "the consumer´s overall evaluation and judgement of the excellence and quality of e-service offerings in the virtual marketplace" (Santos, 2003, p. 235). Choi et al. (2004) stated that "the possibility of bi-directional many-to-many communication and (ii) the level of emphasis on intangibles" (Choi et al., 2004, p. 2) are two reasons why web-based and traditional retail services are different. Ladhari (2010) summarized the differences between online and "offline" environment for service quality as "convenience and efficiency", safety and confidentiality, absence of face-to-face contact and the co-production of service quality. Thus, customers in online environments can compare prices more efficiently, have to abandon private information, interact with "a technical interface" (Ladhari, 2010, p. 465) and play a more important role in creating the service (Ladhari, 2010). Several models to measure service quality within the digital environment emerged like SITE-QUAL (Yoo and Donthu, 2001), WebQual (Barnes and Vidgen, 2002) or ES-Qual (Parasuraman et al., 2005). These models consist of different dimensions and underlaying factors to capture the important attributes of service quality and thus, its measurement (Parasuraman et al., 2005). Moreover, these models have been developed for different levels of service quality measurement, for example higher level scales that measure website quality in general (Aladwani and Palvia, 2002) or more specialized scales measuring service quality of retail-websites (Yoo and Donthu, 2001) or online libraries (O´Neill et al., 2001). As a result, many different service quality measurement models exist within the IS literature. Several reviews have been conducted regarding service and e-service quality measurement. In 1999, Robinson reviewed the literature on the service quality measurement debate and identified commons and similarities between the different models which have been developed on the basis of the debate. He found that both concepts agree on the definition of service quality as an attitude and that it has to be separated from customer satisfaction (Robinson, 1999). Other reviews focus the adaptation of SERVQUAL to further develop measurement models for service quality (Asubonteng et al., 1996; Zhang and Prybutok, 2005) or to differentiate from SERVQUAL for the development of new models (Ladhari, 2008). Moreover, the comparison of the different measurement models (Seth et al., 2005), their structure within one service type (Ladhari, 2010), different approaches of measurement (Mukherjee and Nath, 2005) or the underlaying concepts of service quality (Ghobadian et al., 1994) are subjects of investigation. Ladhari (2010) compared several e-service quality measurement models to examine similarities and differences between the dimensions and underlying factors of the models. Cristobal et al. (2007) listed the dimensions of models that measure website design quality and online retailing services to clarify which dimensions are important to customers. Lepmets et al. (2012) reviewew literature on IT measurement to develop a new measurement framework. Blut et al. (2015) provided an overview about the attributes of measurement models as well as context information about their usage.

The previous information has shown that service quality measurement plays a significant role especially in IS research. The digital age has influenced traditional measurement models and led to the de-

velopment of new measurement models. The present study focuses on these different measurement models of service quality and answers the following research questions: Which measurement models and procedures can be found within the literature against the background of traditional, digital or hybrid service forms? Which differences exist between models to measure traditional, digital and hybrid service quality? As there have been conducted several studies about service quality models and scales which focus on the structure of the measurement models like dimensions, attributes and their weaknesses (e.g. Ladhari, 2010; Blut et al., 2015), this study will not examine the methods or procedures to develop such measurement models and scales but emphasize the differences between the models regarding the different forms of service. The differences will be categorized on the basis of the service typology developed by Jaakkola et al. (2017) which will be introduced in section five.

3 Method

The research questions should be answered by doing a systematic literature review because of two reasons. First, there is a huge body of literature regarding measurement models of service quality and online service quality in different research areas which has to be structured. Second, literature reviews are seen as adequate methods to identify research gaps within the literature (vom Brocke et al., 2015). The procedure follows the three phases of systematic literature reviews described by vom Brocke et al. (2015) as "search, selection, and synthesis" (vom Brocke et al., 2015, p. 208). As there is a large number of papers regarding service quality, the search has to be created with respect to only comprising the necessary papers to answer the research question. The search procedure, based on vom Brocke et al. (2015), contains four steps which have to be determined before starting the review to guarantee a systematic search process (*Figure 1*). First, the search process has to be defined. The following paper uses a sequential search process which is described as "a defined step at the beginning of the reviewing process, although it often has to be refined and updated during the course of the review" (vom Brocke et al., 2015, p. 214). Second, the sources for the search have to be defined which can be citation indexing services like google scholar or different databases. Third, the level of coverage, that should be covered by the literature review, has to be determined. As it is "even impossible to collect all publications on a subject area" (vom Brocke et al., 2015, p. 214), the search of the present study starts with collecting papers from top IS journals. In a second step, backward and forward search are conducted to enhance the sample base to comprise the relevant papers from other disciplines as well.

1	Process	Sequential		Iterative	
2	Sources	Citation indexing services	Bibliographic databases	Publications	
3	Coverage	Comprehensive	Representative	Seminal works	
4	Techniques	Keyword search	Backward search	Forward search	

Figure 1:   Search procedure (based on vom Brocke et al., 2015: 214).

Fourth, the search technique has to be chosen. Vom Brocke et al. (2015) differentiate between keyword, backward and forward search. Backward search reviews all references from the papers that yield from keyword search whereas forward search reviews the papers that have cited the papers from keyword search (vom Brocke et al., 2015). The four steps of search are processed with the meta search-tool *litsonar*[2] and are summarized in phase one of *Figure 2.* The following study will start with a keyword search. The search term for the keyword search should provide relevant results and not exclude

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[2] Litsonar is a meta search tool for academic literature. For more information see http://litsonar.com/.

necessary papers. Therefore, the search term was broadly defined with several synonyms for both, the buzzword "service quality" as well as for the measurement model. Although the search term should provide a high number of results, the complexity has to be reduced by making further limitations.

Phase 1: Keyword search LitSonar

Search term	**Publication filter**	**Select database**	**Search options**
Abstract search	Senior Scholar´s Basket of IS Journals	EBSCO, ProQuest, AISel, ScienceDirect	No further limitations

Searchstring: ABSTR:("service quality" OR "quality of service" OR "quality of services" OR "service performance" OR "service level" OR "Dienstleistungsqualität") AND ABSTR:(measurement OR measures OR measure OR method OR methods OR approach OR improvement OR model)

Phase 2: Selection

Abstract check	**Paper check**

Criteria: Service quality is explicitly measured or enhanced through a model or a procedure (and not only a side effect), e.g. the measure or enhancement of service quality is the goal or aim of the paper.
1. Abstract check→ If abstract does not provide clarification or is not existing, the paper has to be further checked
2. Paper check

Phase 3: Backward and Forward search of selected articles (Selection process analogue phase 2)

Figure 2:   *Search procedure (based on litsonar and vom Brocke et al., 2009, 2015).*

To reduce complexity, the sources of the keyword search were limited on the IS senior scholar´s basket and thus follow a comprehensive review. In a second round and based on the results of the keyword search, backward and forward search were further considered for two reasons: One the one hand, papers from other disciplines like business or marketing research were also comprised to extend the scope and on the other hand, traditional service quality does not imply IT as the respective measurement models will be found in other disciplines. After the search, the selection of relevant papers has to be made. Avoiding the use of irrelevant papers require clearly defined rules for selection and a strict compliance to this rules during the whole selection process. The selection process consists of two sequentially proceeded steps, the abstract check and the paper check (see *Figure 2*, phase two). Main criteria to select a paper is that service quality is explicitly measured or enhanced through a model or a procedure and not only a side effect. This is the case, for example, if the measure or enhancement of service quality is the goal or aim of the paper. Further indicator is that the paper contains literature or explanations about service quality. If the abstract does not provide clarification or is not existing, the paper has to be further checked. After selecting the relevant papers, they have to be classified regarding several criteria to answer the research questions. First, information about the papers is provided like publicizing journal, year or if it has been identified on keyword, backward or forward search. Second, the measurement models have to be identified as well as its applications against the background of traditional, mechanical, digital and hybrid service delivery. To enhance the quality of classification, the coding was pre-checked by the second author. The literature review made 45 relevant paper in total from 28 different journals, especially in the fields of Marketing (Mark), Information Systems (IS) and Services (*Figure 3*).
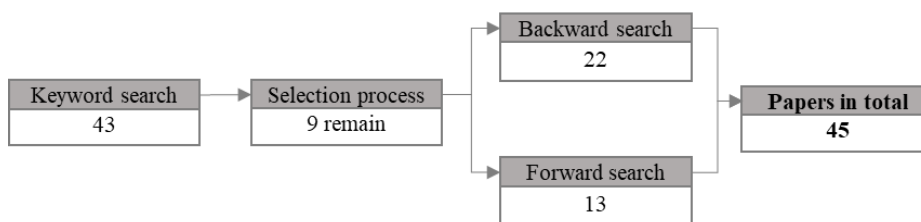
Figure 3:   *Search results distinguished by search types.*

4 Results

The papers were clustered regarding the goal of the respective measurement model into three different types of service quality: 1) service quality, 2) e-service quality and 3) IT/IS service quality. The first type can be found mostly in Marketing Literature whereby the second type is rife in Marketing, IS and Services. The third type is usually represented in the IS Literature. **Table 2** provides an overview about the three service types with the respective models, their goals and the form of service delivery for which they are used.

Service quality

The first type comprises service quality measurement models which are characterized by a physical interaction between service encounter and customer. They can be described as traditional measurement models. These models were the first that have been developed to measure human-to-human service quality, especially in retail and banking industry in the 1980´s and 1990´s. They built the basis for the other models of the two following service types. Particularly SERVQUAL has been adapted, further developed or tested in several studies. The measurement models are developed from an external perspective or "customer-orientated view" (Jia et al., 2008) which measures service quality on the basis of customers perception or requirements.

E-service quality

At the beginning of the twenty first century, the focus has shifted to e-service and the traditional models have been adapted to the upcoming use of the internet. E-service quality measurement models are developed to measure the highest degree of the digital transformation as they focus on digitally provided services where no influence of human interaction influences the quality of the service. The quality only depends on attributes of the used technology. Thus, they are characterized by a digital interaction between service encounter and customer. The interaction takes place over online websites or portals without any physical contact. All studies take an external perspective as developing their models on the basis of customer perceived service quality. The e-service models can be categorized into four further subcategories based on their measurement focus. The first category describes measurement models of *website quality*. The related studies are characterized by a model which focuses explicitly on the measurement of website quality, especially on the design of websites. Subjects of investigation are for example online shopping websites (SITEQUAL), online bookstores (WebQual), web portals (Yang et al., 2005) or the measurement of institutional service quality (Tan et al., 2013). The second category comprises models that measure *online service quality* in general without focusing on design elements of websites or other specific issues. These studies range from cross-country (Gounaris and Dimitriadis, 2003) over country-specific (Rolland and Freeman, 2010) to general measurements with a main focus of investigation on online retailer. The third category examines especially measurement models within the context of *online banking service quality* (Yang et al., 2004; Ho and Lin, 2010; Wu et al., 2012) whereby the fourth category focuses on *mobile service quality* (Lu et al., 2009; Huang et al., 2015). Ho and Lin (2010) adopted the PeSQ model from e-service quality to the online banking context in Taiwan. Wu et al. (2012) developed their measurement model especially for the Taiwanese banking context on the basis of seven cross-country studies on e-banking service quality management

to imply cultural factors and thus a more holistic view. Mobile service quality describes "mobile commerce (m-commerce) applications, including location-based services, mobile reading services, electronic books, mobile TV, and mobile music." (Huang et al., 2015, p. 126). M-S-Qual (Huang et al., 2015) and the m-service quality model (Lu et al., 2009) have been developed to measure such m-services.

IT/IS service quality

Within the IT/IS service quality type, three subcategories of measurement models could be identified. The first category comprises the *web- based application providers* like Application Service Provider (ASP´s) (Sigala et al., 2004; Ma et al., 2005) and Software as a Service (SaaS) provider (Benlian et al., 2011). ASP´s provide a combination of physical (e.g. consulting, training) and digital services (web-based applications) that are both focus of the measurement models. Thus, interaction between service encounter and customer respectively clients is hybrid. ASP-Qual and ASP model were both developed for the specific measurement of service quality in the ASP industry, whereby the latter is country-specific.

Article	Measuring…									Model		
	SQ			E-SQ			IT/IS SQ					
Uni of analysis	T	D	H	T	D	H	T	D	H	Developed/adapted model (a/d)	Goal	(Sub-)Categories
Cronin and Taylor (1992)	X									SERVPERF (d)		
Dabholkar et al. (1996)	X									Retail Service Quality Scale (d)		
Grönroos (1984)	X									Service quality model (d)	**Measuring service quality**	
Parasuraman et al. (1985)	X									P-E- SQ gap concept (d)		
Parasuraman et al. (1988)	X									SERVQUAL (d)		
Teas (1993)	X									SERVQUAL NQ and EP (d)		
Aladwani and Palvia (2002)					X					Measurement Model		
Barnes and Vidgen (2000; 2001a, 2001b, 2002)					X					WebQual 1.0 - 4.0 (d)		
Hidayanto et al. (2013)					X					Measurement Model		
Loiacono et al. (2002, 2007)					X					WebQualTM (d)	Website quality	**Measuring e-service quality**
Webb and Webb (2001, 2004)					X					SITEQUAL (d)		
Yoo and Donthu (2001)					X					SiteQual (d)		
Gounaris and Dimitriadis (2003)					X					Measurement Model		
Tan et al. (2013)					X					Measurement Model (d)		
Yang et al. (2005)					X					Measurement Model (d)		
Cristobal et al. (2007)					X					PeSQ (a)		
Collier and Bienstock (2006)					X					Measurement model (d)		
Janda et al. (2002)					X					IRSQ scale (d)	Online services	
Parasuraman et al. (2005)					X					E-S-Qual / E-RecS-Qual (d)		
Rolland and Freeman (2010)					X					E-tail SQ (d)		
Santos (2003)					X					Measurement Model (d)		
Swaid and Wigand (2009)					X					Measurement Model (d)		

Study									Model	Service category	
Wolfinbarger and Gilly (2003)				X					etailQ (d)		
Zeithaml et al. (2002)				X					e-SQ (d)	Online banking services	
Ho and Lin (2010)				X					PeSQ (d)		
Wu et al. (2012)				X					Measurement Model (d)		
Yang et al. (2004)				X					Measurement Model (d)		
Huang et al. (2015)				X					M-S-Qual (d)	Mobile services	
Lu et al. (2009)				X					Measurement Model (d)		
Ma et al. (2005)							X		ASP model (d)	Web-based application services	**Measuring IT/IS service quality**
Sigala (2004)							X		ASP-Qual (d)		
Benlian et al. (2011)						X			Saas-Qual (d)		
Jia et al. (2008)							X		IT service climate (d)	IT/IS Department as service provider	
Jia and Reich (2013)							X		IT service climate (a)		
Jiang et al. (2002)						X			IS SERVQUAL (a)		
Kettinger and Lee (2005)							X		IS ZOT SERVQUAL (d)		
Pitt et al. (1995)						X			SERVQUAL (a)		
Pitt and Watson (1994)						X			SERVQUAL (a)		
Watson et al. (1998)						X			IS SERVQUAL (d)		
Lin and Hsieh (2011)							X		SSTQUAL (d)	Self-Service	

Table 2:   Classification of search results.   *SQ=service quality
                                                          *T,D,H=traditional, digital, hybrid

SaaS-Qual was specifically developed for service quality measurement of Software as a Service provider which are a specific group of ASPs providing predominantly digital services. The contact between service encounter and customer respectively clients is primary of digital nature, taking not into account possible service hotlines. All three studies within this first category of web-based application providers took an external perspective. The second category deals with *IT/IS Departments as service provider* like the services of IT or IS Departments in industry or institutions. The services of IT or IS Departments measured in the examined studies are mostly based on physical contact between service encounter (Department) and the customers respectively the clients. The physical contact is supported by technology and comprises tasks like trouble-shooting (Jiang et al., 2002), hardware/software selection, installation or product training (Pitt et al., 1995) and online access to records and accounts (Kettinger and Lee, 2005). The studies are cross-industry-specific (Watson et al., 1998; Jia et al., 2008) and/or cross-country-specific (Pitt et al., 1995), industry-specific (Pitt/Watson, 1994) or country-specific (Jiang et al., 2002) investigations. Some studies are based on SERVQUAL. Kettinger and Lee (1994) and Pitt et al. (1995) were the first who used SERVQUAL within the IS context, whereby Watson et al. (1998) adapted SERVQUAL to develop a specific IS service quality measurement model (IS SERVQUAL). Pitt and Watson (1994) and Watson et al. (1998) conducted longitudinal studies were service quality was measured over time. All studies within this category also take an external perspective with the exception of Jia et al. (2008) and Jia and Reich (2013) which took an internal perspective on service quality. Their IT service climate measurement model is based on organizational and psychological aspects and measures the organizational functionality of IT Departments. The third category describes the model SSTQUAL from Lin and Hsieh (2011) to measure *Self-Service Technologies* (SST). The authors described SST as "technological interfaces that enable customers to produce a service independent of direct service employee involvement" (Meuter et al., 2000, p. 50 in Lin and Hsieh, 2011, p. 194). The contact between service encounter and customer is physical but the service encounter is a technical machine. Examples are the usage of ATM´s or self-service checkouts in the supermarket (Lin and Hsieh, 2011). SSTQual was developed on the basis of consumers and therefore takes an external perspective as well. In summary, this study identified three different service types for measurement models which were further categorized into different subcategories. Three different service forms were found within these categories. The results will be discussed in the following section.

5   Discussion and Limitations

In the following, the results will be first discussed with regard to the four clusters of services identified by Jaakkola et al. (2017). The authors developed a service type matrix to cluster services regarding the contact intensity between service encounter and customer and the technological complexity of services (Jaakkola et al., 2017). They identified four different service typologies. The first cluster is labelled as routine-intensive services with a low degree of contact intensity and technological complexity whereby the second cluster comprises technology-intensive services that arecharacterized by a high technological complexity but a low contact intensity (Jaakkola et al., 2017). Examples of the first cluster are wholesale trade and banking and for the second cluster IT, mobile as well as web-based services (Jaakkola, 2017). The third cluster is described as contact-intensive services which have a low degree of technological complexity but a high degree of contact intensity and "where the personal interaction between employees and customers is a key to provide excellent service" (Jaakkola et al., 2017, p. 11). Examples are hospitality or call centres (Jaakkola et al., 2017). The fourth cluster summarizes knowledge-intensive services with a high degree of both, technological complexity as well as contact intensity like consulting or legal services (Jaakkola et al., 2017). ***Figure 4*** shows the classification of the service types that were identified in this study, and the respective subcategories. The type of traditional service quality can be allocated to routine- and contact intensive services. The respective models measure service quality of e.g. retailing or banking services where the technological complexity is relatively low and the contact intensity varies between high (retail) and low (banking) (Jaakkola, 2017). The e-service type can be assigned to the technology-intensive cluster. Websites and online services as well as mobile services require highly complex technologies to provide services but low contact intensity as there is only digital interaction between service encounter and customer. The IT/IS service type can be assigned to the knowledge-intensive as well as to the technology intensive service cluster. The web-based application services and the Self-Service Technologies have a high-degree of technological complexity and a low degree of contact intensity whereby the IT/IS as service providers are characterized by a high degree of both, technological complexity as well as contact intensity. Hence, the measurement models of the IT/IS service type measure service quality of technology- and contact-intensive services. The assignment of the results into this framework shows possibilities for further research on service quality measurement models on the basis of their assigned service cluster. There might be some more differences or similarities between these clusters on different levels of the measurement models. The integration of the measurement model categories into the service type matrix discloses additional differences between the categories and offers a structuring of the models regarding the variation of services. Moreover, the dimensions of the matrix reflect two important attributes of service quality measurement regarding the socio-technical transformation. Contact intensity consists of "customer interaction, labor intensity and customization" (Jaakkola, 2017, p.11) whereby technological complexity "involves technology intensity and complexity" (Jaakkola, 2017, p.11). Both, contact intensity and technological complexity have changed through digitization. Future research may investigate measurement models regarding the change of the two dimensions in a more detailed way.

Beneath these differences, several further distinctions can be made between the three service types. First, some researchers argue that measurement models are culture or context specific. Rolland and Freeman (2010) examined e-service quality especially for the case of France. Wu et al. (2012) used studies about internet banking service quality from seven different countries to imply a holistic view into their measurement model. Consequently, service quality measurement models are context-specific. This is also in line with other studies which examined the influence of e.g. country- or industry-specific factors on service quality. Blut et al. (2015) found in their review of e-service measurement models that the model attributes are moderated by country-, regulatory environment- and industry-specific factors (Blut et al., 2015). Second, many service quality measurement models are in some way related to the SERVQUAL model from Parasumaran et al. (1988) as it is used as questionnaire or builds the basis for argumentation. Third, most studies are based on the external perspective and so on the view of the customer. Silvestro et al. (1990) examined service quality measurement from the organisational perspective and investigated measurement systems of service organizations to analyse

their occurring problems. This offers another perspective on service quality measurement and provides answers on how to overcome the problems of measurement. Another difference that can be found is that most studies of service quality and e-service quality focus on B2C relationships between firm and customer. In contrast to that, the IT/IS service quality studies rather refer to B2B relationships between firm and client. Further research might examine for example e-service quality models on the level of B2B relationships or on outsourcing relationships. Several researchers conducted reviews on the scales of measurement models by examining its dimensions and relating factors to find similarities or limitations (Wolfinbarger and Gilly 2003; Collier and Bienstock, 2006; Ladhari, 2010). Wolfinbarger and Gilly (2003) found in their review that many different variables of service quality have been examined which resulted in many different measurement scales for website quality. The present study also found that there are different scales within the three service quality types. Glynn Mangold and Babakus (1991) were the first who differentiated between two perspectives on service quality, the front-stage and the back-stage perspective. The former is denoted as the customer perceived service quality and the latter as the employee perceived service quality. The authors argued that these different views on service quality can result in "a lack of agreement" on how to deliver service quality (Glynn Mangold and Babakus, 1991). This study found that some of the IT/IS papers use both, a front-stage and a back-stage perspective when adapting or developing service quality measurement models. On the one hand, this provides managerial actions to support the internal processes and structures to enhance service quality. On the other hand, this implies the customers view on service quality (e.g. Jiang et al., 2002; Ma et al., 2005). The e-service quality investigations in this study mostly focus on the customer perspective and their picture of service quality which has also been found for example by Yoo and Donthu (2001) and Santos (2003).
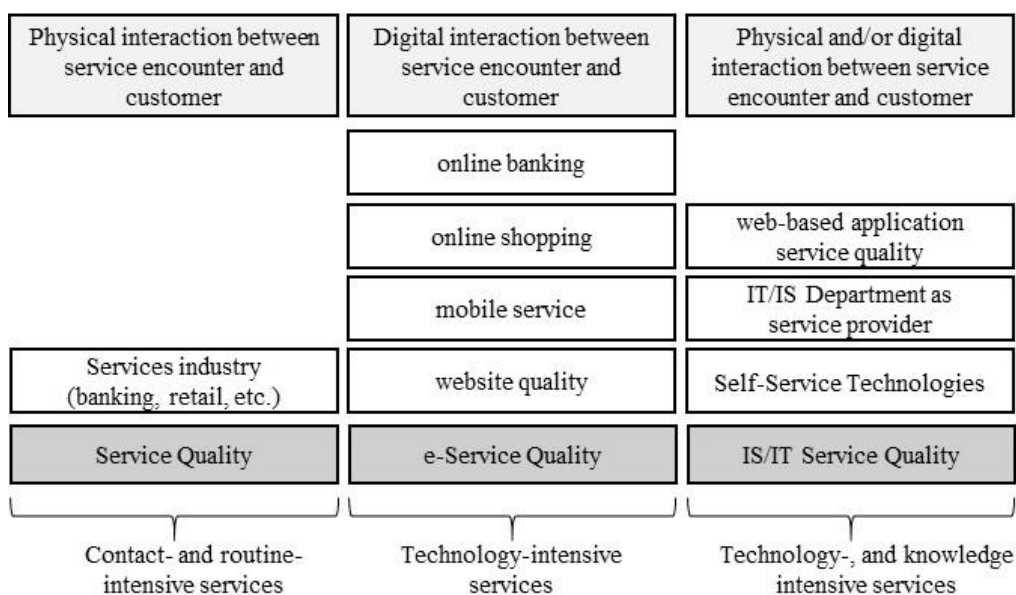
Physical interaction between service encounter and customer	Digital interaction between service encounter and customer	Physical and/or digital interaction between service encounter and customer
	online banking	
	online shopping	web-based application service quality
	mobile service	IT/IS Department as service provider
Services industry (banking, retail, etc.)	website quality	Self-Service Technologies
Service Quality	e-Service Quality	IS/IT Service Quality
Contact- and routine-intensive services	Technology-intensive services	Technology-, and knowledge intensive services

Figure 4:   Integration of search results into service typology.

In times of online access to a huge number of scientific publications, this study cannot comprise all papers regarding service quality measurement models. An extract from the literature on service quality measurement was drawn to get first insights into differences between the three identified service types. The selection process of relevant papers has been conducted by a structured proceeding, the subjective influence of the authors on the choice and categorization of papers cannot be totally avoided.

6   Conclusion and Future Research

The systematic literature review conducted in this study made 45 papers in total which were used for analysis. The papers were analysed regarding their service form of delivery whereby three forms were

identified (traditional, digital, hybrid). Three different service types, addressed by the models, were identified: service quality, e-service quality and IT/IS service quality. Moreover, subcategories of the service types were built. As several reviews focused on attributes and factors of the measurement model structure, this study had the intention to:

- Provide an overview about the different e-service quality and IT/IS service quality measurement models regarding purpose of the model, context and service form.

- Emphasize differences between the digital and hybrid models and compared to traditional models regarding the type of services (Jaakkola, 2017).

- Offer new research gaps for further research on e-service quality and IT/IS measurement models.

The discussion shows that the three identified service types can be further distinguished by the help of Jaakkola`s (2017) four identified types of service which were categorized by technological complexity and contact-intensity. Service quality measurement models are used specifically for contact- and routine-intensive services, e-service quality measurement models only focus on technology-intensive services whereby IT/IS service quality measurement models are used in technology- and knowledge-intensive services. Beneath this differentiation, several further differences between the three service types could be identified. In summary, this study found that measurement models are 1) context-specific, 2) related to SERVQUAL, 3) use an external perspective and 4) focus on B2C relationships. As outlined in chapter five, this, provides some new opportunities for further research:

- Research on measurement models regarding the two dimensions of the service type matrix in a more detailed way.

- Research on context-independent measurement models which could be used to measure service quality across different industries or different countries.

- Research with focus on organisational and behavioural factors to measure service quality that can be influenced within the information systems function or the IT Department.

- Research on the differences of the three service quality models regarding the level of their dimensions and the underlaying factors.

- Research with focus on measurement scales in B2B relationships where service quality requirements differ to that of B2C like the outsourcing industry.

Moreover, most studies dealing with the development or further debates on measurement models, focus on the model dimensions and attributes. As this study did, more studies should examine the models regarding other characteristics. Most studies are based on the external perspective and thus on the view of the customer. Moreover, the measurement models result from scientific investigations. Therefore, further research on practical models which are used by firms to measure service quality would be necessary to enhance current models and provide other perspectives. Therefore, this study contributes to IS literature in 1) providing an overview about IS service quality measurement models and their measurement goal and thus raises the level of investigation, 2) identifying e-service quality and IT/IS service quality as IS service quality measurement types and thus structuring the literature on the basis of digital and hybrid service forms and 3) illustrating new research gaps by discussing the results on the service typology of Jaakkola et al. (2017). There are further research gaps for service quality measurement models directly related to socio-technical change as the two dimensions of the matrix reflect two important attributes of digitization. Moreover, the present study provides some practical implications. On the one hand, measurement scales play an important role for IT/IS service quality. On the other hand, measurement scales have been structured regarding different measurement goals which provide a better understanding of how to use measurement scales in practice.

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