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EVALUATING MOBILE BUSINESS APPLICATIONS IN SERVICE AND MAINTENANCE PROCESSES: RESULTS OF A QUANTITATIVE-EMPIRICAL STUDY

Christine Legner

Christoph Nolte

Nils Urbach

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Christine Legner, Institute of Research on Information Systems (IRIS), EBS University of Business and Law, Söhnleinstraße 8D, D-65201 Wiesbaden, Germany, christine.legner@ebs.edu, and Département des Systèmes d'Information, Faculté des Hautes Etudes Commerciales (HEC), Université de Lausanne, CH-1015 Lausanne, Switzerland, christine.legner@unil.ch

Nolte, Christoph, DEKRA Automobil GmbH, Handwerkstraße 15, D-70599 Stuttgart, Germany, christoph.nolte@dekra.com

Urbach, Nils, Institute of Research on Information Systems (IRIS), EBS University of Business and Law, Söhnleinstraße 8D, D-65201 Wiesbaden, Germany, nils.urbach@ebs.edu

Abstract

Mobile technologies offer great opportunities for improving business users' productivity and for running business processes more effectively and efficiently. This particularly applies to service and maintenance processes which are highly information-intensive. Mobile services enable technicians to directly capture information more quickly and more precisely, while they are performing maintenance, inspection or repair tasks. Despite the increasing proliferation of mobile business applications, most of the existing empirical studies still focus on consumer-oriented mobile services. Thus, this study's objective is to gain a better understanding of mobile business applications' success in service and maintenance processes. For this purpose, we adapt the DeLone and McLean IS Success Model to this particular context. The model is validated with survey data from 374 mobile service users. Our results indicate that, besides system quality, the process support quality is the main determinant of individual benefits from using the mobile devices. The study's findings support practitioners in explaining the levers with which mobile business applications can be improved. By empirically validating a success model, the study's results advance theoretical development in the area of mobile service and maintenance systems, and present a basis for further research in this field.

Keywords: mobile business applications, IS adoption, IS success, service and maintenance processes

1 Introduction

The rapid development of mobile information and communication technology (ICT) has broadened computing's traditional application areas. Today, mobile devices, such as Personal Digital Assistants (PDAs) and smart phones, provide users with real-time access to information and services from anywhere, and at any time. As mobile technologies become more widespread, they are increasingly used in m-commerce, mobile banking and entertainment services (Bouwman et al. 2009). The adoption and use of consumer-oriented mobile services, such as mobile phone and data services, has been empirically investigated by many studies. Besides their use in consumer-oriented scenarios, mobile technologies also offer business users many opportunities to perform their tasks while being away from their stationary office (Gebauer et al. 2004; Nah et al. 2005). Most of the existing research in this area focuses on conceptualizing and designing mobile business applications. Despite mobile applications' growing proliferation in companies, there is a dearth of empirical insight into the effectiveness of mobile business applications from the perspective of end-users.

This gap in research motivates our study. We aim to gain a better understanding of mobile business applications' adoption and use in the organizational context. Our study was conducted at DEKRA Automotive, a subsidiary of the German-based company DEKRA AG, which operates worldwide. It focuses on expert service in three main sectors, automotive, industrial, and certification. Maintenance processes are increasingly dependent on high-quality information (Legner and Thiesse 2006; Nah et al. 2005; Thun 2008). These processes generate large amounts of data for documenting maintenance and inspection activities. The data must then often be archived for years to allow for traceability or to comply with safety regulations. Data's digital management can eventually reduce administrative costs significantly. Moreover, mobile applications enable technicians to capture information faster and more precisely when performing maintenance, inspection or repair tasks. Owing to the use of mobile applications, technicians can also complete their work accurately and according to predefined instructions. Despite the obvious benefits, mobile technology's proliferation is lower than expected and many implementations have failed in the past.

Based on empirical data gathered at DEKRA Automotive, this article investigates mobile business application's success in service and maintenance processes. For this purpose, we adapt a well-known IS success model (the "DeLone and McLean model") (DeLone and McLean 1992; DeLone and McLean 2003) to the mobile service processes' context, and articulate specific propositions that may be discerned from the literature. To test our propositions, we collected data of 374 mobile service users in periodical technical vehicle inspection (PTI).

This paper is structured as follows: The next section describes mobile business applications' characteristics and design, and offers a brief review of the literature on the measurement of IS success. Thereafter, we explain how we developed our theoretical model, discuss the characteristics of its constructs, and present our hypotheses. In the method section, we outline our approach to operationalizing the constructs, the particular research setting, as well as our data collection procedure. In the analysis and results section, we report on the model's assessment by means of structural equation modeling. In the discussion section, we summarize the results and outline this research implications, limitations, and contribution.

2 Prior Research

2.1 Studies on mobile services

Mobile computing denotes all activities, processes and applications that are conducted via wireless and mobile communication networks. Mobile technology is associated with unique value factors, such as ubiquity, instant connectivity, personalization and timeliness (Lee et al. 2010). Exploring its use and requirements has consequently attracted much interest from researchers. Most of the existing studies investigate consumer-oriented mobile services, notably mobile phone and data services (Lee et al. 2010), m-commerce (Benou and Vassilakis 2010; Lee et al. 2007; Lee and Benbasat 2003; Tarasewich 2003), and mobile banking (Luarn and Lin 2005). They focus mostly on services that were introduced relatively early on and therefore have an established tradition. From multiple surveys conducted in Finland, Bouwman et al. (2009) observe a move from talk-based services towards content-based services. They classify mobile services in three categories: content (or information) services, messaging (or communication) services, and a broad set of advanced mobile services that enable transactions or specific applications and that are provided via high capacity networks. Given the many types and facets of mobile services, Bouwman et al. (2009) argue that mobility in itself needs further conceptualization. Therefore, they suggest that a deeper understanding of the differences between the various types of services and applications, and the kind of value they offer, is needed.

While consumer-oriented mobile services have been studied extensively by means of quantitative-empirical surveys, their results cannot be directly applied to mobile business applications (Gebauer and Shaw 2004): Whereas consumers decide on using mobile services based on their individual preferences, businesses implement mobile technologies to automate and streamline business processes and increase the productivity of their employees. A small number of studies are dedicated to mobile business applications that support business users in performing their tasks while they are away from the office. Gebauer and Shaw (2004) and Gebauer (2008) combine the concept of task-technology fit and the technology acceptance model for explaining the adoption and use of mobile technologies in business settings. Nah et al. (2005) demonstrate mobile business applications' impact and value for improving the business users' productivity, as well as increasing process efficiency and effectiveness in a utility company. Mobile services are considered an important lever for improving service and maintenance processes (Thun 2008). This has been confirmed by in-depth case studies (Legner and Thiesse 2006; Nah et al. 2005): First, these processes are highly information-intensive. Mobile services enable technicians to directly capture information more quickly and more precisely, while they are performing maintenance, inspection or repair tasks. Second, service and maintenance activities generate tremendous amounts of paper for documenting maintenance and inspection results. In many areas, these documents must be archived for years to allow for traceability or to comply with safety regulations. Data's digital management can eventually reduce administrative costs significantly. Mobile technologies also impose specific work processes, and thereby they ensure that technicians complete their work accurately and according to predefined instructions.

2.2 Design of mobile applications

The process of designing and developing mobile applications is inherently more complex and demanding than the development of traditional applications (Tarasewich 2003). While all applications need usable interfaces, good interface design of mobile applications is particularly difficult to achieve. This is the result of the diverse environments in which mobile applications are executed (see Table 1), as opposed to "traditional applications" that are executed on the relatively stable desktop PC. To reflect the diverse circumstances in which mobile devices are used, the "context" concept has been introduced (Benou and Vassilakis 2010; Tarasewich 2003). One dimension of context is the *computing environment's* characteristics, which include (a) the properties of the networking infrastructure (latency, bandwidth, disconnections, and cost), (b) the properties of the individual devices (memory capacity, battery lifetime, processing power, input/output, and communication capabilities), and (c) the properties of the operating systems (user interface, security, and program execution). The computing context's characteristics and restrictions should be taken into account while designing mobile applications. For instance, limited input capabilities dictate the need for less typing on the keyboard, or image download and display may be omitted to save battery and/or communication costs. Besides the computing context, user mobility demands that the *operational environment's* properties are taken into account when designing mobile applications. On the one hand, the outside environment (noise level, brightness, and temperature) imposes restrictions when using mobile applications. On the other hand, the parameters that comprise an application's operational environment, such as the location, may enhance the mobile application with information that might benefit the user. As a third domain, the *user context* impacts the mobile applications' design in terms of user interface, functionality and content. Users of mobile business applications vary vastly regarding qualities such as computer literacy, preferences and skills, which must be taken into account. Finally, user activities drive the need for mobile support.

Computing Domain			**Environment D.**	**User Domain**	
Communica-tion network	**Mobile device**	**Operating system**	**Operational Environment**	**User Skills and Preferences**	**User Activities**
WLAN UMTS Bluetooth Mobile ad hoc network …	Smartphone Personal Digital Assistant (PDA) Mobile Internet Device (MID) Ultra Mobile PC (UMPC) Tablet PC …	Windows Mobile Windows 7 Phone ANDROID iOS …	Brightness Noise levels Temperature Wet conditions Vibration …	Age Gender Computer literacy User preferences …	Tasks and goals of mobile users Information requirements Work processes Events …

Table 1. Context domains, derived from Benou and Vassilakis (2010), and Tarasewich (2003)

While mobile business applications' design has been extensively researched from a conceptual point of view, there is very little empirical insight on which we can draw regarding mobile business applications' success from the perspective of the end-user. Thus, our research process comprised reviewing the literature on information systems success in general to find a suitable theoretical foundation for our research endeavor.

2.3 IS success measurement

IS success measurement is a popular stream of research in the IS research community. During the last decades, IS literature has provided a plethora of definitions and measures of IS success. As DeLone and McLean stated, there were nearly as many measures as there were studies, with no ultimate definition of IS success (1992). In order to provide a general and comprehensive definition that covers the different perspectives, DeLone and McLean (1992) reviewed the existing understandings of IS success and their corresponding measures, and classified them into six major categories. They then created a multidimensional measuring model with interdependencies between the different success categories. Ten years after their first model's publication , and based on the evaluation of the many contributions to it (e.g., Rai et al. 2002; Seddon 1997; Seddon and Kiew 1994), DeLone and McLean proposed an updated IS Success Model (DeLone and McLean 2003) that coped with the growing e-commerce world's measurement challenges. The updated model consists of six interrelated dimensions of IS success: information quality, system quality, service quality, (intention to) use, user satisfaction, and net benefits. This model can be interpreted as follows: A system can be evaluated in terms of the information, system and service quality; these characteristics affect subsequent use or intention to use, as well as user satisfaction. As a result of using the system, certain benefits will accrue. The net benefits will (positively or negatively) influence user satisfaction, as well as further information system use.

In the meantime, several success models for evaluating specific types of IS – for example, knowledge management systems (Kulkarni et al. 2007) or enterprise systems (Gable et al. 2003) – have been developed from this theory. In the context of mobile technologies, Chatterjee et al. (2009) adapted the D&M IS Success Model for mobile work in healthcare.

3 Research Model

Our main goal is to empirically assess mobile business applications' success in service and maintenance processes. Since there is no established model for investigating mobile business applications' success in this domain, we base our analysis on the DeLone and McLean Success Model(DeLone and McLean 2003). As a comprehensive evaluation framework, the D&M IS Success Model provides a sound basis for application in this particular context. Furthermore, its proposed associations have been validated by a large number of empirical studies. There are also many validated measures that can be reused to assess the proposed success dimensions. In contrast to other models, such as TAM (Davis 1989), the IS success model offers a relatively broad and comprehensive evaluation approach, and is fairly parsimonious at the same time. We considered some of the extensions to the model that Urbach et al. (2010) recently made in the context of employee portals, because mobile applications share many commonalities with portals. We also reviewed existing studies on consumer-oriented mobile applications that identify system quality and information quality as two key dimensions with high impact on mobile data services' usage (Lee et al. 2010). As an additional independent variable, we considered *process quality*, since the main intention of mobile business application in maintenance and service is to support technicians in performing their daily activities.

In total, we considered the following seven constructs for the development of our research model:

- *System quality*, which can be regarded as the degree to which the mobile business application is easy to use to accomplish tasks. For mobile business applications, system quality relates to system performance, as well as design issues such as interface design and navigation, among others.
- *Information quality*, which focuses on the quality of the information provided by the mobile application for its users. Information quality has been shown to be a prominent success factor when investigating IS success (McKinney et al. 2002). In the mobile business applications context, we considered the aspects of usefulness, understandability, and timeliness.
- *Process quality*, which summarizes the measures that capture the quality of the mobile business application's support of the service and maintenance processes. It is an additional construct that has been added in line with Urbach et al.'s (2010) work. In this context, it relates to the efficiency, reliability, comprehensibility, and traceability of the supported processes. In contrast to information quality, which measures the quality of the provided information, this construct measures how the system, together with the information presented, supports the user's work routines.
- *Service quality*, which includes overall support measures related to the mobile business application that are delivered by the service provider. It considers the measures of responsiveness, empathy, reliability, and competence of the responsible support personnel.
- *Use*, which measures the mobile business application's perceived actual use by the service workers. It will be assessed by the extent to which the main functionalities that the mobile business application provides are used.
- *User satisfaction*, which is the employee's affective attitude to the mobile business application when he or she interacts directly with it. The proposed success dimension evaluates adequacy, efficiency, effectiveness, and overall satisfaction with the mobile business application.
- *Individual benefits*, which subsumes perceived individual benefits' measures that the service workers gain through the mobile business application's use. These benefits cover the aspects of willingness to use, helpfulness, and usefulness.

The model we used for our analysis is shown in Figure 1. It assumes that system, information quality, process quality and service quality are linked to user satisfaction and the mobile business application's use, and that these, in turn, influence the individual benefits of using the application. In order to keep the model parsimonious, we omitted the feedback about individual benefits to user satisfaction and use, which were proposed in the original model. Each of the arrows represents a hypothesized positive relationship between two success dimensions that should be tested in this study. In order to control for the management support mobile service that users receive, which is considered a main factor in IS use and adoption in organizational contexts, we defined *management support* as a control variable. It represents the leadership team's encouragement of and support for the mobile application's usage. With this model, we focus on individual performance impacts, rather than organizational performance impacts, as the final dependent variable of interest. Measuring the organizational impact of individual IS initiatives has proven to be difficult (e.g., Gelderman 1998; Goodhue and Thompson 1995). Thus, we do not include the organizational impact in our model, although we believe that this impact is generally an important part of a comprehensive analysis.

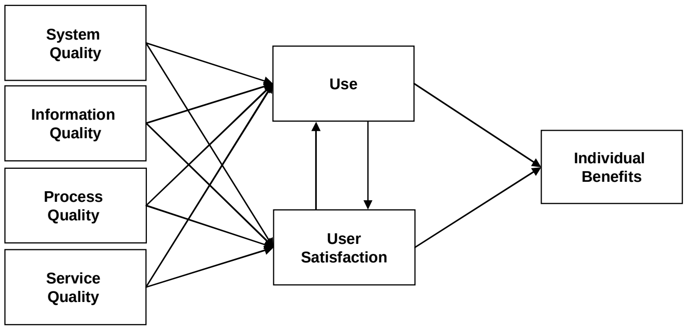


Figure 1. Research model

4 Research Methodology

We used a survey to collect data for our research model's empirical assessment. Thus, we are in line with the majority of IS success research studies, which apply survey-based research to test hypothesized relationships (Urbach et al. 2009).

4.1 Construct operationalization

Following various author's recommendations (e.g., Bharati and Chaudhury 2004; DeLone and McLean 2003; Kankanhalli et al. 2005), we used tested and proven measures, where available, for the operationalization of the research model's constructs to enhance validity. Thus, we adapted items identified in previous studies and modified them for use in the mobile applications' context, where required. Table 2 shows the items that we finally used for the field test. All eight constructs used within this study were measured with a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). We pre-tested after combining the items in a draft survey instrument. In order to ensure the questionnaire design and presentation's quality, we discussed the draft in our research team and modified it according to the group's feedback. Finally, the draft questionnaire was trialed with a group of eight experts in mobile service and maintenance processes. Based on their feedback, we finalized the questionnaire's appearance and instructions.

Construct	**Items**	**No. of items**	**References**
System quality	Navigation, interface design, structure, usability, functionality, accessibility	6	Items adapted from Ahn et al. (2004), Lee et al. (2010), McKinney et al. (2002)
Information quality	Information usefulness, understandability, timeliness	3	Items adapted from Lee et al. (2010), Lin and Lee (2006), McKinney et al. (2002), Yang et al. (2005)
Process quality	Efficiency, reliability, comprehensibility, traceability	4	New items derived from Puschmann and Alt (2005), Martini et al. (2009)
Service quality	Responsiveness, empathy, reliability, competence	4	Items adapted from Chang and King (2005), Pitt et al. (1995)

Use	Extent of using different features	8	New items derived from Almutairi and Subramanian (2005), Chatterjee et al. (2009)
User satisfaction	Adequacy, efficiency, effectiveness, overall satisfaction	4	Items adapted from Chatterjee et al. (2009), Seddon and Kiew (1994)
Individual impact	Willingness to use, helpfulness, overall usefulness	3	New items derived from Davis (1989)
Management support	Encouragement, leadership support	2	New items derived from Sharma and Yetton (2003), Kulkarni et al. (2007)

Table 2. Construct operationalization

4.2 Research setting

This study was conducted at DEKRA Automotive, a subsidiary of the German company DEKRA AG, which operates worldwide. One of the core business areas of DEKRA Automotive is the periodical technical vehicle inspection (PTI) in Europe, which is a state-prescribed regular roadworthiness service for road vehicles. PTI is regulated nationally and internationally and particularly depends on high-quality information. German legislation prescribes that each vehicle be checked for electronically regulated safety systems like air bags, ESP, and ABS; therefore, specific information needs to be available during the vehicle test. In order to cover these legislative demands, inspections had to change fundamentally and required comprehensive access to information, for example, about the applicable procedures. Accordingly, mobile technology's rapid development opens up opportunities for both the automotive service industry in general and for inspection services in particular.

DEKRA Automotive has been evaluating mobile solutions that can improve work processes during inspection, since 2004. During a two years project, hardware and software have been chosen and evaluated. Then, work tasks were transformed into support tasks for the use on ultra-mobile devices. When DEKRA was faced with implementing the directive for PTI's update in Germany, it recognized the need to use vehicle specific information in inspections. So DEKRA IT developers added the demands of information support to their mobile project. After a development phase of four years, hardware from the consumer market and proprietary PTI software fitted well together. The first set of mobile devices called "DEKRA Pocket Computers (DPC)" were rolled out to the DEKRA inspection engineers in mid-2008. At the end of 2008, more than 2,000 DEKRA employees were equipped with the DPC. After the establishing phase of about one year, DEKRA decided to evaluate the success of the DPC, based on this study. At that stage, the DPC's use was still non-mandatory for all users.

4.3 Data collection

The questionnaire was distributed to 900 DEKRA employees who had used the mobile application at least once during the last month. The participants were invited by email and directed to the online survey. To ensure independent and reliable results, no incentives were offered when calling for participation. After a survey period of seventeen days, we closed the online survey. In total, 374 DPC users completed the online survey. Thus, a response rate of 41.6 % was achieved, which is conside-rably above the minimum of 20% recommended by Malhotra and Grover (1998). The average period of time that participants took to work through the 42 questions (including 8 demographic questions) was 15 minutes, which equals the designated amount of time suggested in the invitation email.

5 Analysis and Results

We employed the partial least squares (PLS) approach (Chin 1998; Wold 1985) to test our research model, using the empirical data from the survey. We chose PLS for the data analysis since, compared to covariance-based approaches, it is advantageous when the research model is relatively complex and has a large numbers of indicators, the measures are not well established, and/or the relationships between the indicators and latent variables have to be modeled in different modes (i.e. formative and reflective measures) (Chin and Newsted 1999; Fornell and Bookstein 1982). Furthermore, the PLS approach is best suited for management-oriented problems with decision relevance that focus on prediction (Fornell and Bookstein 1982; Huber et al. 2007). We used the software package SmartPLS (Ringle et al. 2005) for the statistical calculations.

5.1 Assessment of measurement models

We mainly used reflective indicators for the model's constructs' operationalization. Only *use* was measured formatively. Following the validation guidelines of Straub et al. (2004) and Lewis et al. (2005), we tested the reflective measurement models for internal consistency reliability, indicator reliability, convergent validity, and discriminant validity by applying standard decision rules. We assessed *internal consistency reliability* with Cronbach's alpha (CA) (Cronbach 1951) and composite reliability (CR) (Werts et al. 1974). The CA and CR values of most constructs in our model are, as presented in Table 3, above the generally recommended minimum of .700 (Nunnally and Bernstein 1994). Only the CA value of management support is slightly below this threshold. However, since CR is recommended as the preferred measure (Chin 1998), we kept the construct in our model and did not alter its operationalization.

Construct	**CA**	**CR**	**AVE**
System quality	.894	.919	.654
Information quality	.849	.909	.771
Process quality	.806	.871	.628
Service quality	.866	.909	.714
Management support	.650	.851	.740
User satisfaction	.892	.926	.758
Individual benefits	.851	.910	.771

Table 3. Internal consistency and convergent validity

We determined indicator reliability, using a confirmatory factor analysis (CFA) within PLS. Items with a loading below .700 are usually considered unreliable (Chin 1998). In our model, all loadings are above this threshold with significance at the .001 level. We further tested for convergent validity, with the average variance extracted (AVE), a commonly applied criterion proposed by Fornell and Larcker (1981). As indicated in Table 2, all the reflective constructs in our model have AVE indicators above .500, demonstrating that all constructs possess adequate reliability (Segars 1997).

In order to assess the constructs' *discriminant validity*, we compared the items' cross-loadings. Each indicator's loading is higher for its respective construct than for any of the others. Furthermore, each of the constructs loads highest with its assigned items. Consequently, we infer that the different constructs' indicators are not interchangeable (Chin 1998). Furthermore, the square root of the AVE of each construct is greater than their interconstruct correlations (Table 4). This result provides more evidence of all the constructs being sufficiently dissimilar (Fornell and Larcker 1981).

	1	2	3	4	5	6	7
1. Management support	**.860**						
2. Individual benefits	.078	**.878**					
3. Information quality	.164	.416	**.878**				
4. Process quality	.041	.677	.536	**.792**			
5. Service quality	.156	.264	.276	.331	**.845**		
6. System quality	.056	.614	.464	.721	.245	**.809**	
7. User Satisfaction	.081	.813	.414	.743	.278	.686	**.870**
Notes: Diagonal elements represent the square root of the average variance extracted							

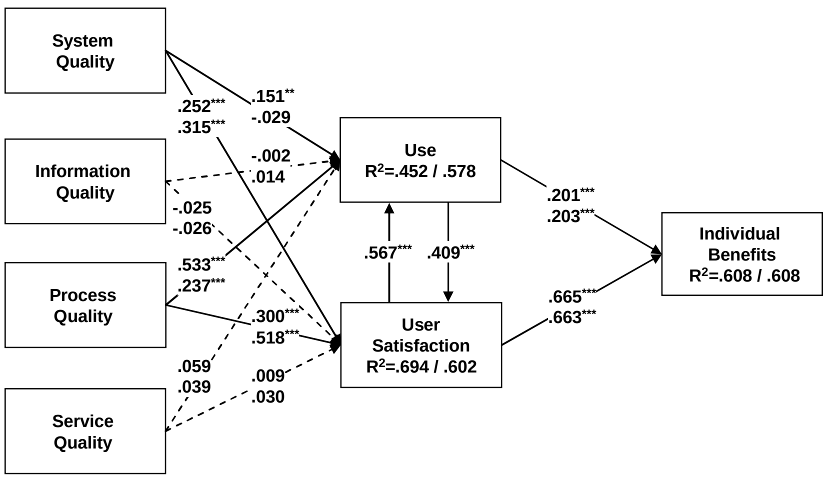
Table 4. Interconstruct correlations

The construct *use* was measured with a formative measurement model. All items show weights higher than .100, with significance at the .050 level, which demonstrates a sufficient level of reliability (Lohmöller 1989). We also checked the measurement model for multicollinearity, with the variance inflation factor (VIF). Since the value is below the threshold of 10 (Diamantopoulos and Siguaw 2006; Gujarati 2003), we conclude that multicollinearity is not an issue in our study.

5.2 Assessment of the structural model

Once we had validated the measurement model, we analyzed the structural model and tested the hypothesized relationships between the constructs (Figure 2). Since the research model includes a mutual influence between use and user satisfaction that cannot be simultaneously tested, we tested two different models, as proposed by Iivari (2005). Model 1 assumes the influence is from use to user satisfaction, whereas model 2 works from user satisfaction to use. We used bootstrapping with 1,000 resamples to determine the paths' significance within the structural models.

The structural models' quality was evaluated on squared multiple correlations (R^2) and cross-validated redundancy measures (Q^2). Overall, both models explain a considerable portion of the latent variables' variance. More than half of the variance of the endogenous dependent variables user satisfaction (R^2 = .694 in model 1 and R^2 = .602 in model 2) and individual benefits (R^2 = .680 in both models) is explained, which can be considered substantial. The use variable's variance (R^2 = .452 in model 1 and R^2 = .578 in model 2) is explained to a slightly lesser extent, but is still at a moderate level (Chin 1998). The model's predictive relevance was tested with a nonparametric Stone-Geisser test (Geisser 1975; Stone 1974). According to this test, positive Q^2 values confirm the model's predictive relevance in respect of a particular construct. Furthermore, the better the tested model's predictive relevance, the greater Q^2 becomes (Fornell and Cha 1994). The test results show positive values for all endogenous latent variables.



* significant at p<.050; ** significant at p<.010; *** significant at p<.001

Figure 2. Results of the structural analysis

Having established the the measurement's validity and having confirmed that the structural model's quality is acceptable, the structural paths were evaluated to test the hypothesized linkages. These were considered to be supported by the data if the corresponding path coefficients had the predicted sign and were significant at the p<.050 level (see Table 5). The control variable management support had no significant influence on our results.

Our study's empirical results revealed mixed support for the previously formulated hypotheses. The paths from system quality to use and user satisfaction, from process quality to use and user satisfaction, between use and user satisfaction, as well as from use and user satisfaction to individual benefits emerged as hypothesized. However, the links from information quality to use and user satisfaction, as well as from service quality to use and user satisfaction are not supported.

Hypothesized Relationship		ß (Model 1)	Support	ß (Model 2)	Support
H1a	System quality → Use	.151**	Yes	-.029	No
H1b	System quality → User satisfaction	.252***	Yes	.314***	Yes
H2a	Information quality → Use	-.002	No	.014	No
H2b	Information quality → User satisfaction	-.025	No	-.026	No
H3a	Process quality → Use	.533***	Yes	.237***	Yes
H3b	Process quality → User satisfaction	.300***	Yes	.518***	Yes
H4a	Service quality → Use	.053	No	.039	No
H4b	Service quality → User satisfaction	.009	No	.030	No
H5a	Use → User satisfaction	.409***	Yes	n/a	n/a
H5b	User satisfaction → Use	n/a	n/a	.567***	Yes
H6	Use → Individual impact	.201***	Yes	.203***	Yes
H7	User satisfaction → Individual impact	.665***	Yes	.663***	Yes
Path-ß: * significant at p<.050; ** significant at p<.010; *** significant at p<.001					

Table 5. Results of hypotheses test

6 Discussion and Conclusion

Our empirical results align with the existing literature on mobile business applications (e.g. Gebauer & Shaw 2004) that emphasizes *system quality's* relevance for mobile applications' success. System quality has a direct positive influence on user satisfaction, but only an indirect influence on use. Similar to the studies on employee portal success conducted by Urbach (2010), *service quality*, which comprises the responsiveness, reliability and competence of end-user support, has neither a positive influence on use nor on user satisfaction. In the case of DEKRA, this can be explained by the fact that the mobile application has been designed as an easy-to-use and low support application. Users can follow an easy procedure to initialize the device if any problems emerge, and the number of service incidents is very low. A key finding from our analysis is that *process support* has a positive influence on use and user satisfaction. It thereby is the most important determinant of the individual benefits of using mobile applications in service and maintenance scenarios, whereas information quality has no significant impact. This contradicts many studies that use the D&M IS Success Model (Petter et al. 2008) and show a strong correlation between information quality and user satisfaction. It also contradicts the recent study conducted by Lee et al. (2010) that identifies information quality as a significant motivator of (consumer-oriented) mobile data services. Our interpretation is as follows: In service and maintenance processes, mobile business applications are embedded in the operational business processes. Hence, the productivity and quality improvements that technicians realize in their daily activities by using the mobile device are the main individual benefits. The quality of vehicle specific information without reference to the process plays a minor role, since PTI inspectors do not access information independently from their work processes.

Based on the study's findings, we can derive guidelines for designing mobile business applications that support service and maintenance processes. The results indicate that such applications' design should primarily focus on system quality and the specific process support. To improve system quality, companies should concentrate on aspects such as accessibility, interface design, navigation, and usability. The latter are highly dependent on the device and networking context. With regard to the functionality provided by mobile business applications, the results suggest that companies should target process quality and provide specific functionality that supports field service workers' operational tasks in their work environment. Activities related to the information quality provided and to the service provided by support personnel can be deprioritized, since they have less influence on the individual benefits of the application's use.

The main contribution of our research is the empirical study of mobile business applications' adoption and use from end-users' perspective. We make contributions to both theory and practice. From a practical point of view, our model serves as a framework for evaluating mobile business application's success at DEKRA. Furthermore, the empirical results indicate the most important levers of the mobile business application's success, notably system quality and process quality. Our contribution to theory is the development and empirical testing of a modified version of the D&M IS Success Model for mobile business applications. Our research thereby complements mobile applications' existing studies, which mostly focus on consumer-oriented mobile services. They may serve as a foundation for future research on the evaluation of mobile business applications.

Our study is limited in that the assessment is based on individual perceptions only. In order to improve future research, we suggest integrating additional factual data to avoid subjective estimation variance. The use construct is especially appropriate to be measured by automatically collected data. Furthermore, since the survey participants responded to items for both independent and dependent variables, common method bias might affect the results. Future research will incorporate statistical approaches for assessing this potential bias. A further limitation relates to individual benefits as the final dependent variable. Although the individual impact is an important indicator of the applications success, future research should also incorporate the organizational impact. Finally, the results may be influenced by different context factors that we considered to be important for the design of mobile applications (table 1). Future research should investigate the impact of those variables on the research model's constructs.

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