Exploring the Black Box of Task-Technology Fit: The Case of Mobile Information Systems[1]

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Abstract

Task-technology fit has been developed as a diagnostic tool to determine whether information systems meet user needs, and has been demonstrated to have a positive impact on the effectiveness of various types of information systems, such as group support systems and management support systems. Despite empirical evidence for the relevance of task-technology fit to improve information system effectiveness, the theory of task-technology fit provides little guidance of how to determine and operationalize fit for particular combinations of task and technology. Consequently, the theoretical validity of the concept of task-technology fit remains limited as does its practical applicability. In this paper, we present the results of an inductive study to explore the concept and antecedents of fit for mobile information systems to support mobile professionals. We performed a content analysis of online user reviews of four mobile technology products with the objective to identify issues that are relevant to users. The mobile technology products include a cell-phone, two personal digital assistants (PDAs), and an ultra-light laptop. The identified issues can be grouped into four conceptual constructs: overall user evaluation, task-related fit, context-related fit, and technology performance, and are characterized by a lower level of abstraction than the level of abstraction deployed in previous research studies on task-technology fit. In order to improve our understanding about how to achieve fit for particular combinations of task, use context, and technology we performed several statistical analyses. (1) An exploratory factor analysis yielded five factors, each indeed including a different set of conceptual constructs; (2) a case-wise analysis indicated user-perceived strengths and limits of individual devices with respect to the five factors; and (3) the results of a multiple regression analysis provided insights about the extent to which the five factors were related with overall technology evaluation. The results presented in the current paper will serve as input for a larger survey.

Keywords: Task-technology fit, fit operationalization, mobile information systems, mobile professionals, use context, technology comparison, content analysis

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1. Introduction

As professionals, such as knowledge workers and managers, increasingly perform tasks outside of traditional office environments, mobile technology often provides critical support, in particular at the middle level of the organizational hierarchy, including midlevel executives, project managers, company and sales representatives, and field service workers (Computerworld 2003). Nevertheless, the requirements for the development and use of mobile information systems to support managerial tasks are not fully understood.

Research on technology innovation and diffusion has long pointed out the importance of matching information systems with the organizational tasks to be supported or automated (Kimberly 1981, Tornatzki and Klein 1982) as a precursor to system use and subsequent benefits. Goodhue and Thompson (1995) first coined the term of task-technology fit in their research quest to improve the assessment of information system success beyond self-reported user evaluations. Goodhue and Thompson (1995) conducted an empirical research study that investigated the support of tasks, such as managerial decision making, changing business processes, and routine tasks, with different scenarios of workstation-based information systems, in a mandatory use setting. The results show that, in addition to use, the fit between tasks and technology was an important factor that explains performance impacts of the systems. Zigurs and Buckland (1998) presented a theory of task-technology fit that matched the features of group support systems with the requirements of group tasks. Goodhue and Thompson's work was later extended and integrated with the technology-acceptance model (Dishaw and Strong 1998, 1999, Mathieson and Keil 1998), while Staples and Seddon (2004) found evidence for the validity of Goodhue and Thompson's (1995) model in voluntary, as well as mandatory use settings. Zigurs and Buckland's (1998) framework has been applied and extended to gain further insights about the success factors of group work (Hollingshead, McGrath, O'Connor 1993; Murthy and Kerr 2000; Strauss and McGrath 1994). Recently, the theory of task-technology fit has been applied to mobile information systems (Gebauer, Gribbins, and Shaw 2006, Gebauer, Shaw, and Subramanyam 2006), emphasizing the role of the system use-context and technology maturity.

The theory of task-technology fit provides little guidance of how to operationalize fit, generally limiting the theoretical validity of the concept of task-technology fit as well as its practical applicability. In this paper, we explore the concept of fit of mobile technology in support of mobile professionals inductively. We seek to identify issues and requirements that are considered relevant by users as a basis to achieve fit between tasks, use-context, and mobile technology. With Gebauer, Gribbins, and Shaw (2006) and Gebauer, Shaw, and Subramanyam (2006), we assume that the theory of task-technology fit may help improve our understanding of the requirements of successful mobile information systems, yet that in order to successfully apply task-technology fit in a mobile environment the fit between technology and use context must be taken into consideration, in addition to the fit between technology and task. In the current research study, we applied an inductive research approach. We performed a content analysis of online user reviews of four mobile technology products, including a cell-phone, two personal digital assistants (PDAs), and an ultra-light laptop. Our analysis allowed us to identify a number of issues that can be grouped into four conceptual constructs: overall user evaluation, task-related fit, context-related fit, and technology performance. In addition, our list of user-relevant issues is characterized by a lower level of abstraction than the level of abstraction deployed in previous research studies. The results of our research study promise to be of value for the providers of mobile technology and services as well as for firms wanting to benefit from mobile technologies, given that task-technology fit can be considered a pre-condition for actual use and performance impacts (Goodhue and Thompson 1995, Dishaw and Strong, 1998 and 1999). From a theoretical perspective, the results of our research study can contribute to strengthen the validity of the concept of task-technology fit, as well as to help generalize its applicability. In the following, we point out the underlying research streams, before we present and discuss the results of the empirical analysis.

2. Conceptual Foundations and Research Model

The current study extends recent research work by Gebauer, Gribbins, and Shaw (2006) and Gebauer, Shaw, and Subramanyam (2006). Gebauer, Gribbins, and Shaw (2006) suggested the need for a three-way match between the dimensions of managerial tasks, mobile information systems, and the mobile use context in order to achieve fit. The authors discussed the need to consider the differences related to the use situations that prevail for mobile users, and that are characterized for example by high user distraction, poor quality of network connection, and high user mobility differ from the use situations that are typically assumed in information systems research. In a field study on mobile e-mail systems, Gebauer, Shaw, and Subramanyam (2006) found evidence for the significance of (1) mobile use context, and (2) technology maturity, as a predictor for overall technology fit. In addition, technology maturity was found to be related to the extent of use. Gebauer, Shaw, and Subramanyam (2006) furthermore found evidence for the expected positive relationships between overall fit, extent of use, and user-perceived benefits from the use of mobile technology.

In the current paper, we build on Gebauer, Gribbins, and Shaw's (2006) suggestion to achieve a three-way fit between task, technology, and use context, as well as on Gebauer, Shaw, and Subramanyam's (2006) suggestion to take into consideration use-context and technology maturity. In order to help develop a better understanding of technology fit, we propose the research model depicted in Figure 1.

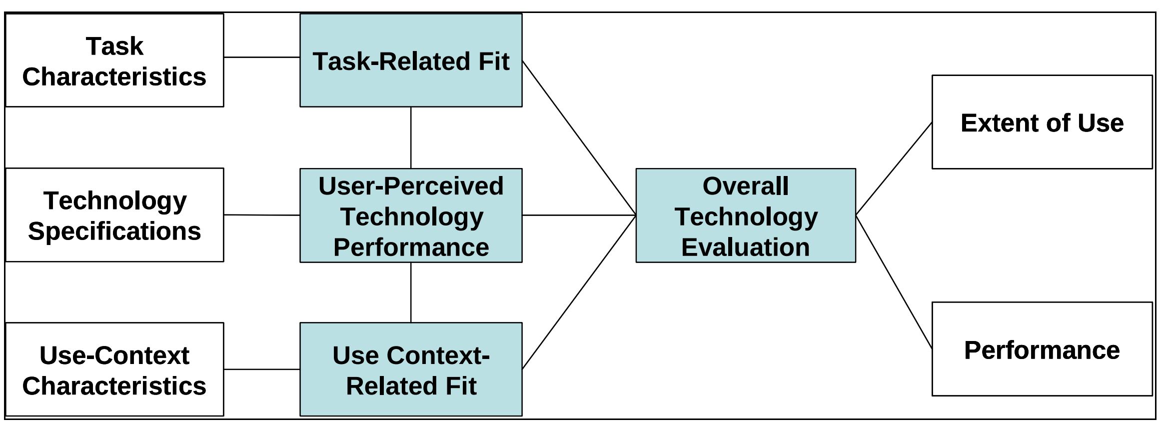

Figure 1: Research model (user reviews that were analyzed for this study provided evidence for the shaded components)

2.1 Overall Technology Evaluation

Goodhue (1995) empirically demonstrated the ability of users to correctly assess task-technology fit. In the current research study, we suggest that a situation of good fit between task, technology, and use context should be reflected in an overall high rating and positive evaluation of the technology by the user. In other words, in this study, we do not "pre-construct" fit by proposing conditions that should result in a good fit between tasks, technology and use context, similar to what Zigurs and Buckland (1998) have proposed. Instead, we start our analysis with an assessment of user-perceived "overall technology evaluation" as a general indicator of fit that we then hope to relate to three additional constructs, namely task-related fit, use context-related fit, and technology performance.

2.2 Tasks and Task-Related Fit

It has been proposed that task-characteristics may drive the requirements for appropriate technology support. For example, highly non-routine tasks are expected to be best supported with technology that has a high level of media-richness (Daft and Lengel 1984), whereas tasks of high interdependence may require more complex methods of coordination than tasks of low interdependence (Thompson 1966). In our research study, we would like to be able to determine task-related fit as a result of appropriate combinations of specific task-characteristics and technology performance. We furthermore expect users who appreciate the support that is provided by the technology to help perform their tasks to also rate the technology highly.

2.3 Use Context and Use Context-Related Fit

In order to distinguish the context in which mobile information systems are used from the stationary context in which more traditional types of information systems are typically used, we include the concept of use-context into our research model. We expect to find evidence for situations where a user is without immediate access to corporate information system resources, for example because of travel and because of participation in offsite meetings and conferences. Use conditions in mobile and non-mobile environments differ in a number of aspects, such as access to power, network connectivity, distraction, and the ability to carry equipment, thus resulting in varying use requirements. Again, we hope to be able to determine use context-related fit as a result of appropriate combinations of specific use context-characteristics and technology performance. We further expect users who appreciate the support that is provided by the technology for a particular use context to also rate the technology highly.

2.4 User-Perceived Technology Performance

Technology performance has been included in research studies focusing on novel technologies, such as e-commerce, and has been found to have an impact on the overall user evaluation of the technology. For example, Kishore, Agrawal, and Rao (2004-5) recommend varying governance structures (hierarchical, transactional, or hybrid relationships) for the (out-)sourcing of e-commerce technologies depending on growth and maturity phases of the technology, using a product life cycle approach. Gebauer, Gribbins, and Shaw (2006) found technology maturity to be positively related both with user-indicated technology fit and with actual use. For our purpose of exploring the antecedents of the overall evaluation of mobile information systems (fit), technology performance is also expected to play an essential role. We expect technology performance to be related with the two concepts of task-related fit and of use context-related fit, but also with the overall evaluation of the technology by the users.

3. Data Collection

We gathered data from www.cnet.com, an online media website that allows users to publish technology reviews. The site provided a large amount of relevant data that were readily available, as well as a homogeneous publishing environment. Since the reviews were essentially unsolicited, we assume that the comments are particular helpful for an inductive study and to identify issues that are important to users. We selected reviews for four technology products, namely a smart cell phone, two personal digital assistant (PDA) devices, and an ultra-light laptop. The devices were selected based on popularity in the CNET user community, as indicated by the number of posted reviews, in addition to the number of users who indicated the review to be useful, the number of comments on the reviews, and replies to comments; and based on the relevance of the device to support mobile professionals as stated in non-user technology reviews published in the trade-press and online. To ensure comparability of the technologies, we focused on devices that have been introduced into the market during 2005, followed by reviews that were posted in 2005 to early 2006. For each device, between 18 and 44 reviews were analyzed in the order that the reviews were listed on the website, which by default is according to the number of users who indicated they found the respective review useful. The number of users indicating they found a particular review useful (in some cases over 100) may help to offset the limitation of self-selection that is inherent in the current research setup. By relying on the comments of users who chose to voice their opinions online, we can only capture the issues that are of importance to that particular user group, and may miss some of the issues that are of importance to users who chose not to share their opinions online. We note the need to address this issue in subsequent research studies. The content analysis resulted in a list of comment categories that indicated issues of importance to the users. In addition, the analysis provided information about the extent to which the individual issues were successfully addressed by the mobile technology products. Table 1 provides examples of user comments, comment categories, and ratings on a 5-point scale ranging from strongly negative to strongly positive.

Table 1 – Example user comments, ratings, and comment categories (Source: User technology reviews published on www.cnet.com)

Rating	Example user comment	Comment category/issue (in brackets: corresponding research model dimension)
5: strongly positive	"This [device] is unarguably the best I have owned'	Overall user evaluation
	"The size [is] truly amazing"	Form factors (technology performance)
4: positive	"Keyboard is really comfortable"	Input (technology performance)
	"Smooth operating system, quite stable"	Stability (technology performance)
3: neutral	"The screen on the [device] isn't as lustrous as other [devices] and doesn't have that glossy look to it, but to me it does just fine."	Output (technology performance)
	"As mp3 player, quality is okay, not excellent, but enough to be happy and listening music on the plane."	Fit with need to use technology during travel (use context-related fit)
2: negative	"I had trouble with email, email settings and sending attachments too."	Fit with need for messaging communication (task-related fit)
	"The keys are a little too close together"	Input (technology performance)
1: strongly negative	The [device] "just sucks when it comes to the personalization of menus… [and that] just frustrates the hell out of me"	Fit with need for customization and adaptability (task-related fit)
	"Terrible reception… Soft resets, hard resets, loading and unloading software, even using it without 3rd party software. Nothing has improved the phone reception."	Network access and reception (technology performance)

The comment categories were derived inductively through a process of continuous iteration, and frequent interaction between the first author and a graduate student over a period of approximately three months. The first author set out to develop an initial list of comment categories, determined an appropriate rating scheme, and prepared a first set of interpretations of the user reviews. In order to improve the reliability of the interpretation and replicability of the research study, the graduate student was instructed about the research purpose, provided with an annotated list of suggested comment categories, and then proceeded to interpret and code the user reviews independently. Regular discussions throughout the coding process served to uncover ambiguities with respect to category descriptions and coding guidelines, and also served to assess the completeness of the categories in relation to the user reviews. For the remaining differences in interpretation, an inclusive approach was chosen to include comments that had only been identified by one coder and to allow a comment to appear in more than one category if determined so by the two coders. In the case of differences in ratings, the average rating of the two coders was used for further data analysis. The interpretations of the two coders are correlated at a value of .788 ($p<.000$) for instances where both coders agreed about the relevance of a comment for a particular comment category. The correlation of interpretation between the two coders is lower (.675) yet still highly significant ($p<.000$) when including instances where only one or no coder determined a comment to be relevant for a particular comment category. The difference in correlation reflects the high degree of freedom related with the initial interpretation of the reviews, and highlights the need for concise category descriptions. At the same time, the coding results also reflect strong agreement with respect to the individual ratings once a comment has been determined as relevant for a particular comment category. The cross-tabulation provided below provides further details about the agreement and disagreement between the two coders (Table 2).

Table 2 – Agreement and disagreement between the two coders regarding the relevance and rating of user comments (interpretation of 143 reviews with respect to 48 comment categories)

Rating Scale: 1..5 Count		**Coder 2**						Total
		No rating	1	2	3	4	5	
Coder 1	No Rating	**5319**	2	53	17	69	9	5469
	1	8	**6**	12	1	0	0	27
	2	165	15	**136**	21	7	1	345
	3	118	4	23	**45**	41	3	234
	4	233	0	18	26	**283**	52	616
	5	46	0	1	2	59	**69**	179
Total		5889	27	243	112	459	134	6864

Cohen's Kappa: 0.524 ($p<.000$)

4. Data Analysis

The interpretive coding procedure resulted in a list of 49 items[2] that can be grouped into four of the nine conceptual categories of our research model (Figure 1): overall technology evaluation, task-related fit, use context-related fit, and technology performance. Because the list of items was derived inductively based on the available online user reviews, we cannot claim the list to be exhaustive and note its reflection of the underlying dataset. In fact, we found little useful information on several concepts of our research model, including underlying task characteristics, technology specifications, context characteristics, extent of use, and performance impacts. We suggest that such information might be more readily available from online user forums, through explicit surveys, and from the manufacturers and retailers of the devices. Table 3 summarizes the results indicating the percentage of reviews that mentioned an issue, and the averages of the respective ratings for each comment category. All ratings range from 1 to 5, except for Overall Rating ranging from 1 to 10, the only category that was not derived interpretively. Besides the results for all devices, Table 3 also lists the results for each device separately.

[2] One item (Overall Rating) was not derived through interpretation, but provided directly by the users.

Table 3 – Analysis of online user reviews: Frequency (in percent) average ratings (scale 1..5, unless indicated)

	All Devices (n=143)		Cell Phone (n=44)		PDA 1 (n=18)		PDA 2 (n=40)		Laptop (n = 41)	
	Frequency	Rating	Frequency	Rating	Frequency	Rating	Frequency	Rating	Frequency	Rating
Overall Technology Evaluation										
Overall Rating (1..10)	100.00%	6.89	100.00%	6.95	100.00%	7.11	100.00%	5.53	100.00%	7.95
Overall Performance	85.79%	3.81	86.36%	3.70	78.95%	4.37	92.50%	3.09	85.37%	4.10
Price, Value	38.08%	2.82	34.09%	2.60	36.84%	2.43	37.50%	2.67	43.90%	3.58
Task-Related Fit										
Fit with need for voice communication *	53.26%	3.32	75.00%	3.76	63.16%	3.67	70.00%	2.63	4.88%	3.25
Fit with need for messaging communication *	28.26%	3.10	13.64%	2.08	42.11%	3.69	50.00%	3.30	7.32%	3.33
Fit with need for information and data access *	23.85%	3.61	15.91%	3.00	42.11%	4.00	32.50%	3.42	4.88%	4.00
Fit with need to use entertainment and multimedia applications (audio, video, camera) *	23.42%	3.04	34.09%	3.13	5.26%	2.00	27.50%	3.55	26.83%	3.50
Fit with need for personal productivity *	23.05%	2.96	13.64%	2.50	21.05%	2.88	57.50%	3.52	0.00%	
Fit with need to use office applications *	12.44%	2.97	2.27%	2.00	10.53%	2.50	15.00%	3.25	21.95%	4.11
Fit with need to support business purposes *	10.66%	3.33	6.82%	3.33	21.05%	4.25	5.00%	1.75	9.76%	4.00
Fit with need to support personal purposes	4.99%	3.83	4.55%	4.00	10.53%	4.50	0.00%		4.88%	3.00
Fit with need to have immediate and constant interaction	1.22%	2.00	2.27%	3.00	0.00%		2.50%	1.00	4.88%	4.50
Fit with need to have continuous and immediate access to computer and network resources, need to perform work promptly	1.19%	4.50	0.00%		0.00%		0.00%		0.00%	
Fit with need for security	0.57%	2.00	2.27%	2.00	0.00%		0.00%		0.00%	
Context-Related Fit										
Fit with need to limit equipment to be carried *	17.58%	4.08	9.09%	4.00	0.00%		10.00%	4.13	51.22%	4.12
Fit with need for adaptability and customization of the technology *	14.14%	2.98	22.73%	2.20	26.32%	3.40	7.50%	3.33	0.00%	
Fit with need to use technology during travel *	12.29%	3.70	0.00%		0.00%		15.00%	3.50	34.15%	3.89
Fit with need to use technology during commute	7.28%	3.29	4.55%	2.25	0.00%		7.50%	3.33	17.07%	4.29
Fit with need to use technology while having limited access to power	6.50%	2.82	11.36%	1.80	0.00%		0.00%		14.63%	3.83
Fit with need to use technology while working on location	5.93%	3.38	9.09%	2.75	0.00%		0.00%		14.63%	4.00
Fit with need to use technology where network connection is limited or unavailable	5.72%	3.39	20.45%	3.78	0.00%		0.00%		2.44%	3.00
Fit with need to use technology while having limited time to work and concentrate on particular location	4.55%	2.00	18.18%	2.00	0.00%		0.00%		0.00%	
Fit with need to use technology while telecommuting	4.23%	3.92	2.27%	4.00	0.00%		0.00%		14.63%	3.83
Technology Performance										
Form factors *	58.73%	3.48	72.73%	3.80	36.84%	3.64	40.00%	2.50	85.37%	3.99
Input *	48.56%	3.21	40.91%	2.44	47.37%	3.37	45.00%	3.31	60.98%	3.72
Output *	46.54%	3.93	43.18%	3.58	42.11%	4.56	35.00%	3.89	65.85%	3.69
Customer Service *	38.23%	2.88	54.55%	2.92	26.32%	2.80	55.00%	2.39	17.07%	3.43

Network access and reception *	34.66%	3.62	54.55%	3.98	36.84%	4.21	37.50%	3.03	9.76%	3.25
Battery *	33.12%	3.12	40.91%	2.89	10.53%	2.75	22.50%	3.50	58.54%	3.35
Ease of use *	31.61%	3.58	40.91%	3.39	47.37%	4.17	32.50%	2.77	39.02%	3.88
Design *	31.41%	4.05	61.36%	3.96	21.05%	4.38	5.00%	4.00	4.88%	4.00
Links with other devices *	29.76%	2.90	31.82%	2.54	10.53%	3.50	45.00%	2.86	31.71%	2.69
Speed *	28.38%	3.36	15.91%	2.71	31.58%	4.33	7.50%	2.67	58.54%	3.71
Handsfree (Bluetooth) *	24.66%	3.48	20.45%	3.50	21.05%	3.50	42.50%	2.91	14.63%	4.00
Stability *	24.40%	3.24	4.55%	3.00	15.79%	4.17	67.50%	2.28	9.76%	3.50
Storage *	23.67%	2.84	15.91%	2.64	0.00%		30.00%	2.92	48.78%	2.98
Multiple purposes *	23.12%	3.80	4.55%	3.00	15.79%	4.17	57.50%	4.04	14.63%	4.00
External sound *	22.36%	2.90	38.64%	3.91	21.05%	2.63	20.00%	2.81	9.76%	2.25
Camera/video/audio recorder *	19.11%	3.18	40.91%	3.39	10.53%	2.50	25.00%	3.65	0.00%	
Internal sound (call quality)*	15.37%	2.89	18.18%	3.75	15.79%	2.83	27.50%	2.09	0.00%	
Operation *	14.07%	2.78	0.00%		0.00%		7.50%	2.33	48.78%	3.23
Alerts *	13.27%	2.78	27.27%	2.54	15.79%	3.67	10.00%	2.13	0.00%	
WiFi *	10.54%	2.70	0.00%		5.26%	2.00	12.50%	2.30	24.39%	3.80
Backlight of screen and keyboard	7.83%	4.20	0.00%		26.32%	4.40	5.00%	4.00	0.00%	
Video and audioplayer	6.72%	3.07	11.36%	3.20	10.53%	2.50	5.00%	3.50	0.00%	
Voice dialing	6.71%	2.99	9.09%	4.38	5.26%	2.00	12.50%	2.60	0.00%	
Voice mail	1.88%	2.00	0.00%		0.00%		7.50%	2.00	0.00%	
Document management, attachment processing	1.86%	3.00	0.00%		0.00%		5.00%	3.00	2.44%	3.00

* Item included in multiple regression and factor analysis

Table 3 shows differences of user-perceptions of the four devices regarding technology performance, task-related fit, and use context-related fit, resulting from variations in device functionality and features, as well as from differences in technology performance.

During the interpretation of the user reviews, we noted that the fact that an issue (e.g., form factors) was mentioned in a review typically indicated that the issue was of importance to the user.[3] As a result, we suggest using the relative frequency as an indicator for the user-perceived importance of the issue. The graphical combination of the frequency with which the various issues were mentioned (indicator of importance) with the ratings on a scale from one to five (indicator of actual performance) can help identify (1) issues where the technology provides a good fit with user needs (high frequency/high rating; low frequency, low rating); (2) issues that are particularly problematic (high frequency/low rating, low frequency/high rating); and (3) issues that are controversial (high variance, especially for a individual devices) (graph omitted due to space restrictions; an extended version of the current paper is available at www.judithgebauer.com). Across all devices, we identify a need to improve form factors, input components and customer service, whereas users seem to be relatively satisfied with the ease of use of the devices. Based on the data provided in Table 3, graphs can be constructed for all devices and for all constructs.

In order to further improve our understanding about the relationships between the identified items and categories, we performed a more in-depth statistical data analysis that included all items that were mentioned in more than 10% of all reviews (indicated by * in Table 3). Missing values were replaced by the neutral rating of 3. We started with an attempt to perform a regression analysis with four composite variables that included: overall technology evaluation (3 items, averaged) as dependent variable, and task-related fit (7 items, averaged), use context-related fit (7 items, averaged) and technology performance (20 items, averaged) as independent variables. It turned out, however, that low values of Cronbach's alpha for all composites (except for overall

[3] In the few cases where a user commented on an issue (e.g., quality of camera, ability to play games on the device) yet explicitly indicated that the issue was of no importance to him or her, the comment was omitted from the analysis.

technology evaluation) pointed to a situation of multidimensionality underlying the composites, thus invalidating multiple-regression. A factor analysis on the individual composites was also not very successful as it resulted in many factors with low loadings and few items.

We were more successful with an exploratory factor analysis that we performed independent of the underlying conceptual constructs. For the sample of 143 reviews, we used a principal component analysis with Varimax rotation to explore the structure underlying the items (Field 2000). The results show the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to be borderline, with a value .596. This measure should be greater than .5 and as close as possible to 1.0 and indicates how suitable it is to conduct factor analysis with the data set. For situations of low KMO-values it is recommended to collect more data or to drop items. A look at the anti-image correlation matrix that provides KMO-values for individual items gave us an indication as to which items to drop. We found five items with diagonal values of less than .5, the recommended threshold, and subsequently dropped these items.[4] We re-ran the analysis and found an increase in the KMO measure of sampling adequacy (.639). Bartlett's measure of sphericity indicated significance of the results at the $p<.001$ level.

The initial analysis yielded eight factors (cumulative variance explained: 57%), among them several factors that included two items only, and a structure that was overall difficult to interpret. After examining the scree plot of eigenvectors for all factors, we performed a principal component analysis with a target of five factors[5]. Table 4 shows the results. We interpret factor 1 to focus on *voice communication*, factor 2 to focus on *mobile office*, factor 3 to focus on *knowledge work (including internet access and messaging communication)*, factor 4 to focus on *productivity support, versatility, and design*[6], and factor 5 to focus on *wireless features and stability*. While all factors include items related to technology performance (*tech*), factors 1..4 also include items related to task-related fit (*task*) and factors 2 and 3 include items related to use context-related fit (*use context*), thus overall validating the relevance of all three fit-related concepts.

Table 4 – Exploratory factor analysis, five factors

	Components				
	1	2	3	4	5
Fit with need for voice communications (*task*)	.814				
Quality of internal sound (call quality) (*tech*)	.756				
Quality of external sound speakers/speakerphone) (*tech*)	.673				
Quality of Network access and reception (*tech*)	.531				
Ease of use (cross-loaded) (*tech*)	.482		.467		
Quality of customer service (*tech*)	.388				
Fit with need to limit equipment to be carried (*use context*)		.648			
Fit with need to use office applications (*task*)		.592			
Fit with need to travel (*use context)*		.540			
Quality of input component (keyboard) (*tech*)		.539			
Quality of form factors (cross-loaded) (*tech*)		.450			.426
Fit with need to use entertainment applications (*task*)		.412			
Speed (*tech*)		.363			
Fit with need to use device for business purposes (*task*)		.394			
Fit with need for information and data access (*task*)			.716		

[4] Items dropped: Alerts; Battery; Storage; Operations; Camera/Video Recorder

[5] With respect to the extracted factors, the only difference between the two analyses was that four two-item factors of the 8-factor model were now combined into Factor 2 of the 5-factor model. The 8-factor model did not exhibit cross-loadings of the two variables that cross-loaded in the 5-factor model. Mainly for interpretive reasons we use the five factor model, yet generally acknowledge some limitations of the underlying data set that seem to be evident in the results of the analyses.

[6] Negative factor loading

Fit with need for messaging communication (*task*)			.701		
Quality of output component (screen) (*tech*)			.519		
Fit with need for adaptability and customizability (*use context*)			.393		
Fit with need for productivity support (organizer) (*task*)				.754	
Quality of support for multiple purposes (*tech*)				.613	
Quality of links with other devices (compatibility) (*tech*)				.563	
Quality of design (*tech*)				-.338	
Quality of WiFi (*tech*)					.659
Quality of hands free features (Bluetooth) (*tech*)					.500
Stability (*tech*)					.420

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 24 iterations; cumulative variance explained: 43%

A case-wise analysis provides us with the average standardized factor scores of each device, indicating the extent of fit with respect to the five factors (Table 5). We see that in comparison to the other devices, the cell phone received particularly high scores for items related to factor 1, and particularly low scores for items related to factors 2, 3, and 4; PDA 1 scored particularly high on factors 1 and 3; PDA 2 scored particularly high on factor 3, but low on factors 1 and 2; and the laptop scored particularly high on factors 2 and 5.

Table 5 – Average standardized factor scores, according to devices; significance of factors to predict overall technology evaluation (based on multiple regression analysis)

Factor	**Devices with high average standardized factor scores**	**Devices with low average standardized factor scores**	**Factor significant as predictor of overall technology evaluation?**[7]
1: Voice communication	Cell phone (.59), PDA 1 (.23)	PDA 2 (-.55)	+ Significant (p<.001)
2: Mobile office	Laptop (.81)	Cell phone (-.40), PDA 2 (-.31)	+ Significant (p<.001)
3: Knowledge work	PDA 1 (1.1)	Cell phone (-.40)	+ Significant (p<.001)
4: Productivity support and versatility	PDA 2 (.79)	Cell phone (-.45)	Not significant
5: Wireless features and stability	Laptop (.46)	PDA 2 (-.6)	+ Significant (p<.001)

Finally, a multiple regression analysis (the details of which are omitted in this paper because of space restrictions) indicates that four of the five factors are significant predictors of overall technology evaluation, as indicated in the far right column of Table 5. All of factors 1 (voice communication), 2 (mobile office), 3 (knowledge work), and 5 (wireless features and stability) exhibit a positive relation with the dependent variable of overall technology evaluation, whereas factor 4 (productivity support and versatility) was not significant as a predictor of overall technology evaluation.

5. Conclusions and Outlook

The purpose of the current research study was to explore the concept of fit of mobile technology in support of mobile professionals, seeking to identify issues and requirements to achieve fit between tasks, use-context, and mobile technology. A content analysis of online user reviews of

[7] Results based on multiple regression analysis with overall technology evaluation as dependent variable (derived based on three items averaged, yielding an alpha-value of internal consistency >.7), and the five identified factors as predictor variables.

four mobile technology devices allowed us to identify a number of issues that users considered to be important, in addition to information about the extent to which the factors held up to user expectations. The results of the inductive analysis of user reviews indicated differences between devices (technology) with respect to what issues are considered important by users, as well as with respect to the overall ratings (fit). We also found that in fact a three-way match between task, use context, and technology is relevant to achieve overall fit (Gebauer, Gribbins, and Shaw 2006), in addition to the finding that use context as well as technology performance matter (Gebauer, Shaw, and Subramanyam 2006). However, our results also indicate that the determination of fit as a three-way match between task, technology and use context is not straightforward, in particular across technologies. Based on an exploratory factor analysis and a regression analysis, we found four (out of five identified) factors to be significant as predictors of overall technology evaluation, yet the factors included a mixture of items related to technology, task and use context, suggesting interdependence between the concepts. A repetition of our analysis with larger sample sets, each drawn from user evaluations of a single technology device may help improve our understanding about relevant task/use-context/technology scenarios.

Having set out to find empirical evidence for a fit construct that is based on previous research work and that includes the four factors of technology performance, task-related fit, use context-related fit, and overall technology evaluation, the results of our analysis uncovered a number of issues that were overall less abstract and more concrete compared to what earlier research studies have proposed. Our specific results can help inform technology development and technology management, as well as contribute to theory building in the research area of task-technology fit. Several limitations of our study, however, related for example to sample size and sampling method that included user self-selection and a large degree of interpretive freedom, point to the need to conduct additional research studies. We have begun to utilize the results of the current analysis as input for a larger survey-based research study.

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