USER ASSESSMENT OF PERSONAL DIGITAL ASSISTANTS USED IN PHARMACEUTICAL DETAILING: SYSTEM FEATURES, USEFULNESS AND EASE OF USE

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ABSTRACT

This study explores the perceptions of pharmaceutical sales representatives toward the use of personal digital assistants (PDAs) in pharmaceutical detailing. It uses data from a survey of sales representatives at a large pharmaceutical company that adopted a PDA system for use in pharmaceutical detailing. The study first identifies the specific PDA features that users perceive as being important in performing pharmaceutical detailing tasks. Then, built on the technology acceptance model (TAM), the study examines the important PDA features as antecedents to the perceived usefulness (PU) and perceived ease of use (PEOU) of the system. The results suggest some ways to improve specific system features, which in turn enhance PU and PEOU and through them, system usage. The findings would be useful to those who use or plan to use PDAs for pharmaceutical detailing or other similar mobile tasks.

Keywords: personal digital assistants; salesforce automation systems; technology acceptance model; pharmaceutical detailing.

INTRODUCTION

The pharmaceutical industry in the United States spends more than $20 billion per year advertising its products, and pharmaceutical detailing, which is using sales representatives to call on physicians and other healthcare professionals to promote products, accounts for over 80 percent of this spending [15]. In order to help sales representatives track sales leads, sales, service requests, and other sales-related information, many pharmaceutical companies have adopted mobile devices such as personal digital assistants (PDAs) and laptop computers as a vital part of salesforce automation systems. While some salesforce automation systems have been reported to increase sales 10 to 30 percent [5][20], previous studies have also found that users often complain about those systems [22] and tend to resist and under-utilize them [2][12][16]. It seems that there are mixed opinions regarding PDAs and laptop computers adopted for salesforce automation.

This study attempts to increase our understanding of PDAs used in pharmaceutical detailing in the light of the technology acceptance model (TAM) proposed by Davis [3][4]. Specifically, the study examines the PDA features that are important to pharmaceutical detailing tasks and the effects of those features on the user's perceived usefulness (PU) and perceived ease of use (PEOU) of the PDA. The study uses data from a survey of sales representatives at a large pharmaceutical company (referred to as 'the Company' hereafter, for anonymity and brevity) that adopted a PDA system for use in pharmaceutical detailing. While PDA use by pharmaceutical sales representatives and other mobile workers is increasing, little systematic research has been done to understand the factors associated with the use. On a theoretical level, the study extends the line of research on TAM by examining system features as antecedents of PU and PEOU in the specific context of PDAs used in pharmaceutical detailing. On a practical level, the findings can help improve the system features and hence, usage of PDAs for pharmaceutical detailing. Although the findings may not be generalizable in a broad context, they may also be able to suggest some implications for PDA use in other applications.

CONCEPTUAL CONSTRUCTS

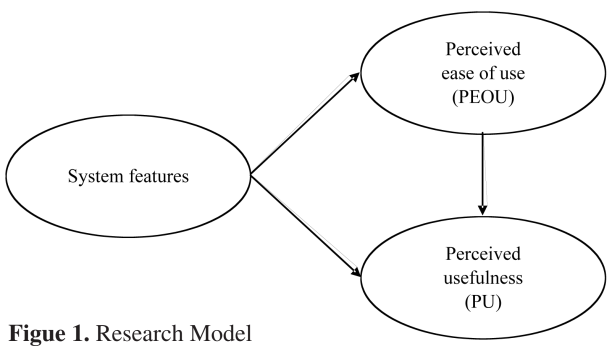
TAM [3][4] posits that PU and PEOU are important factors that determine the user's attitude toward his or her intention to use and actual usage of information systems. PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance," while PEOU is defined as "the degree to which a person believes that using a particular system would be free of effort" [3]. Using the cases of electronic mail system, file system and graphics packages, Davis [3] showed that both PU and PEOU have direct effects on intention to use and actual usage, while PEOU also has an indirect effect on intention to use and actual usage via PU. Previous studies on TAM in general have agreed that TAM is a powerful and parsimonious framework to predict and explain the adoption of information systems, and numerous empirical studies have tested and validated TAM across different user populations and information systems.

Further, Davis [4] called for "future research (to) consider the role of additional (external) variables within TAM." A better understanding of the antecedents to PU and PEOU would help managers know which levers to pull in order to affect PU and PEOU and through them, system usage [6]. Managers need some useful guidance on effective methods and interventions by augmenting PU and PEOU through manipulating their causal antecedents to achieve greater acceptance and usage of information systems [19]. Recognizing this need, previous research has identified various external variables such as user training and support [18][21], user characteristics [11][17][24][25], and system characteristics [1][13][14][23] as major categories of antecedents to PU and PEOU. Prior studies including system characteristics within TAM have demonstrated that system characteristics have direct and/or indirect effects on both PU and PEOU. However, most of these studies did not highlight the effects of individual system characteristics on PU and PEOU, since they either used a dummy variable to represent different systems or adopted a single overall construct to substitute for the system characteristics

[10]. Therefore, there is a need for research to investigate various system characteristics and their individual effects on PU and PEOU in order to better understand and facilitate system usage.

System characteristics of PDAs used in pharmaceutical detailing are different from those available in other PDAs. In the light of limited evidence available for evaluating PDAs used in pharmaceutical detailing, we first asked a focus group consisting of several sales representatives at the Company to develop a list of PDA features that are important to pharmaceutical detailing tasks. This process resulted in a list of nineteen PDA features. Then, we asked the survey respondents to rate the importance of those PDA features in successfully performing pharmaceutical detailing tasks (details of the survey are described in the following section). The extent of their agreement on the importance of each PDA feature was measured using a 7-point Likert-type scale ranging from 'not important at all' (= 1) to 'very important' (= 7). The mean ratings of fourteen PDA features were found to be greater than 5, high enough to confirm that those features are, in fact, important in successfully performing pharmaceutical detailing tasks. The mean ratings of the remaining five PDA features were found to be less than 5, and so, those features were excluded in our analysis of PDA features and their effects on PU and PEOU.

Figure 1 shows this study's research model, which incorporates system features as antecedents of PU and PEOU. The research model posits that PU and PEOU are influenced by system features and PU is also influenced by PEOU. The research model excludes two constructs commonly included in previous studies on TAM: behavioral intention and actual usage. This is because PDA use by sales representatives at the Company was mandatory regardless of their intention to use. That is, the Company required sales representatives to use the PDA in performing pharmaceutical detailing tasks.



Figue 1. Research Model

DATA AND METHODS

The Company is one of the industry giants and its revenue totaled about $37 billion in 2004. The Company manufactures prescription medications as well as vaccines, over-the-counter drugs, oral care products, and nutrition drinks. The Company markets more than 1,200 different brands in 130 countries worldwide. The Company adopted the PDA for use by its sales representatives in the United States. The PDA adopted was similar in design and capability to other PDAs used in pharmaceutical detailing. The PDA's front-end software was written in Microsoft C++ and back-end servers utilized SQL relational databases based upon Windows NT. Both the front-end software and back-end databases were custom developed by a third-party vendor. Appendix A describes how a sales representative at the Company uses the PDA in performing pharmaceutical detailing tasks.

A survey containing questions on the items of PDA features, PU and PEOU, as well as other questions related to the PDA use, was sent out to 290 randomly-selected, full-time sales representatives working in a Northeastern state. The sales representatives were asked to rate both the importance of each PDA feature as described in the previous section and their satisfaction with the capability of the PDA with respect to that feature. User satisfaction is considered as "the most useful surrogate measure of system success" [7] and "the most useful assessment of system effectiveness" [9]. The extent of satisfaction with each PDA feature was measured using a 7-point Likert-type scale from 'not satisfied at all' (= 1) to 'very satisfied' (= 7). For the constructs of PU and PEOU, we adopted the items proposed by Davis [3] and tailored them so that they suit the current context. Appendix B lists the items used to measure PU and PEOU in this study. The extent of the user's agreement on each item of PU and PEOU was also measured using a 7-point Likert-type scale from 'strongly disagree' (= 1) to 'strongly agree' (= 7).

Responses were received from 148 sales representatives, representing a response rate of fifty-one percent. Fifty-nine respondents (forty percent) were male and eight-five respondents (fifty-seven percent) were female (four respondents did not provide information on their gender). On average, the respondents were in the current pharmaceutical sales position for about three years with pharmaceutical sales experience of about seven and half years. They made eight visits to physicians on average each day. On average, they used the PDA for about fifteen minutes per visit to a physician and about fifty-five minutes elsewhere (e.g., home) per day. On average, they used the PDA for about eleven months for pharmaceutical detailing tasks.

RESULTS AND DISCUSSION

This study was conducted for an exploratory purpose, and readers are cautioned in interpreting the findings. Of course, the findings are limited to the specific PDA adopted by the Company. As a result, one should be careful not to over-generalize based on these findings. Given the paucity of studies on PDA use in pharmaceutical detailing, however, the implications suggested by the findings could be significant for those involved in pharmaceutical detailing and salesforce automation systems. Further studies will be needed to confirm the findings and examine the reasons for them.

Table 1 shows the mean ratings and standard deviations of system features with respect to the importance and satisfaction constructs as well as the results of paired *t*-tests of mean differences between the two constructs. The mean ratings of system features with respect to the satisfaction construct are generally low, indicating that the respondents were not satisfied with the system. In addition, a significant difference between the importance and satisfaction constructs is observed in all system features considered, indicating that a significant gap existed between the needs of users and the capabilities of the system. There may be various reasons for the gap, from technical and functional issues specific to the system itself all the way to perceptual and behavioral issues involved in the system adoption. While there is a need for more studies on those issues, it seems that the capabilities of the system did not come up to the needs of users and much of the reason lied in the system itself.

Table 2 shows the results of a confirmatory factor analysis conducted on the items of system features with respect to the satisfaction construct. The factor analysis was conducted using

Table 1. Mean Ratings of System Features

	Importance		Satisfaction		Paired Differences	
System Features	Mean	Std. Dev.	Mean	Std. Dev.	Mean	*t*
Entering samples/quantities after physician signs	6.521	1.235	1.641	1.470	-4.864	-27.601***
Tracking sample inventory	6.778	0.597	2.178	1.721	-4.629	-28.891***
Monthly calls/sample reports	6.472	0.920	2.535	1.836	-3.936	-20.986***
Entering multiple physicians in a group practice	6.373	1.082	2.543	1.871	-3.833	-19.005***
Daily inventory information	6.587	0.772	2.910	2.031	-3.702	-19.206***
Periodic reports (record of activity)	6.254	1.188	3.169	2.000	-3.080	-14.627***
Managing territory effectively	6.385	1.054	3.441	1.641	-2.972	-16.782***
Screen (e.g., color, resolution)	6.176	0.977	3.384	1.828	-2.824	-15.294***
Capturing signature	6.716	0.759	3.952	2.066	-2.730	-14.420***
Capturing call notes	5.743	1.541	3.310	1.965	-2.554	-12.535***
Physician workday and hours availability	5.479	1.556	3.375	1.975	-2.093	-8.617***
Physician profile information	6.107	1.001	4.043	1.815	-2.090	-11.036***
Keyboard (e.g., size, layout)	6.021	1.114	3.993	1.964	-2.049	-10.528***
Entering secondary locations of physicians	5.593	1.622	3.624	1.984	-2.029	-9.044***
Presentation templates	5.387	1.520	3.582	1.920	-1.899	-10.300***
Stylus (e.g., touch screen, signature capture)	6.183	0.994	4.438	1.785	-1.761	-10.510***
Dialing in and connecting to server	6.538	0.758	4.864	1.804	-1.706	-10.791***
Completing entire transfer in one call	6.664	0.593	5.184	1.732	-1.497	-9.636***
Time to download and upload data	6.441	0.802	5.327	1.648	-1.133	-7.854***

***$p < 0.001$

Table 2. Factor Analysis of System Features

	Factor 1	Factor 2	Factor 3	Factor 4
Entering secondary locations of physicians	**0.682**	0.089	0.184	0.276
Capturing call notes	**0.606**	0.142	0.185	-0.026
Physician profile information	**0.767**	0.176	0.099	0.016
Physician workday and hours availability	**0.727**	0.091	-0.101	0.122
Tracking sample inventory	0.131	**0.604**	0.103	0.166
Daily inventory information	0.020	**0.789**	0.035	0.114
Periodic reports (record of activity)	0.362	**0.765**	-0.017	0.174
Monthly calls/sample reports	0.164	**0.819**	-0.032	0.111
Dialing in and connecting to server	0.229	-0.007	**0.849**	0.113
Completing entire transfer in one call	0.044	-0.021	**0.861**	0.113
Time to download and upload data	0.022	0.125	**0.831**	0.140
Keyboard (e.g., size, layout)	0.122	0.097	0.356	**0.657**
Screen (e.g., color, resolution)	0.224	0.300	0.040	**0.751**
Stylus (e.g., touch screen, signature capture)	-0.018	0.064	0.127	**0.721**
Eigenvalue	2.306	5.570	1.717	1.070
% of variance	12.139	29.313	9.037	5.631

principal axis factoring with varimax rotation as an extraction method. Five items were excluded in the factor model, as their factor loadings were below the acceptable cut-off value of 0.50 [8]. The remaining fourteen items loaded into four factors with eigenvalue larger than 1.00. The four factors collectively explain about 56 percent of the variance. Factor 1 consists of four items associated with features of data entry and physician information. Factor 2 consists of four items associated with features of reports on call activities and inventory. Factor 3 consists of three items associated with features of data communications. Factor 4 consists of three items associated with hardware features. Table 3 shows the mean ratings, standard deviations and internal consistency reliability coefficients (Cronbach's alphas) of the four factors of system features as well as those of PU and PEOU. The internal consistency reliability coefficients of the six constructs are all above the suggested cut-off value of 0.7 [8].

The factor model was then used to examine the effects of the four factors of system features on PEOU and PU. Table 4

Table 3. Statistics and Reliability of Constructs

Construct	Number of Items	Mean	Std. Dev.	Cronbach's Alpha
Factor 1: Data entry and physician information	4	3.576	1.462	0.750
Factor 2: Reports on call activity and inventory	4	2.681	1.490	0.799
Factor 3: Data communications	3	5.125	1.506	0.841
Factor 4: Hardware features	3	3.941	1.446	0.760
Perceived usefulness (PU)	6	3.485	1.841	0.975
Perceived ease of use (PEOU)	6	5.119	1.139	0.826

Table 4. Regression for Dependent Variable PEOU

	R	R^2			
	0.426	0.181			
ANOVA					
	Sum of squares	df	Mean square	F	Sig.
Regression	27.695	4	6.924	6.538	0.000
Residual	124.956	118	1.059		
Total	152.650	122			
Coefficients					
		Unstandardized coefficients	Standardized coefficients		
	B	Std. error	Beta	t	Sig.
(Constant)	3.522	0.376		9.355	0.000
Factor 1: Data entry and physician information	0.193	0.072	0.255	2.692	**0.008**
Factor 2: Reports on call activity and inventory	-0.012	0.068	-0.016	-0.174	0.862
Factor 3: Data communications	0.051	0.068	0.068	0.747	0.456
Factor 4: Hardware features	0.176	0.075	0.230	2.347	**0.021**

shows the results of regression analysis conducted on PEOU as the dependent variable. The regression model is statistically significant ($R^2 = 0.181$ at $p < 0.01$). R^2, the coefficient of determination, represents the percentage of the variance that can be explained by the predictors in a relationship. The threshold of R^2 at significance level of 0.01 is suggested to be about fifteen percent for a sample of 100 participants with four independent variables [8]. That is, if R^2 for a relationship is greater than fifteen percent, we can be confident that the effect of the independent variables on the dependent variable is statistically significant [8]. Factor 1 of data entry and physician information ($t = 2.692$ at $p < 0.01$) and factor 4 of hardware features ($t = 2.347$ at $p < 0.05$) have statistically significant, positive effects on PEOU, while the other two factors have no statistically significant effect on PEOU.

Table 5 shows the results of hierarchical regression analysis conducted on PU as the dependent variable. The use of hierarchical regression allows testing recursive models, where a predictor in one model may become the dependent variable in another model, and thus, an antecedent variable may have some direct and indirect effects on a consequent variable in multiple distinct ways [19]. In order to consider the influence of the four factors of system features before that of PEOU on PU, the four factors of system features were first entered into the regression model (model 1), and then, PEOU was entered into the model (model 2). Both the regression models are statistically significant ($R^2 = 0.215$ at $p < 0.01$ in model 1 and $R^2 = 0.240$ at $p < 0.01$ in model 2).

In model 1, factor 1 of data entry and physician information ($t = 2.426$ at $p < 0.05$) and factor 2 of reports on call activities and inventory ($t = 2.353$ at $p < 0.05$) have statistically significant, positive effects on PU, while the other two factors have no statistically significant effect on PU. In model 2, only factor 2 of reports on call activities and inventory ($t = 2.412$ at $p < 0.05$) has a statistically significant, positive effect on PU, while the other three factors as well as PEOU have no statistically significant effect on PU at $p < 0.05$. In model 2, however, the p value of PEOU (0.054) as well as that of factor 1 of data entry and physician information (0.059) is very close to 0.05. Further, when PEOU is entered into the model as the sole predictor of PU for a test of moderation, PEOU is found to have a statistically significant, positive effect on PU ($t = 4.409$ at $p < 0.001$). Thus, it seems that PEOU has a moderating effect on PU as reported in most previous studies on TAM.

Finally, we calculated the coefficient of each path, called direct

Table 5. Hierarchical Regressions for Dependent Variable PU

Model 1

			Change statistics		
	R	R^2	R^2 change	F change	Sig. F change
	0.463	0.215	0.215	7.862	0.000

ANOVA	Sum of squares	df	Mean square	F	Sig.
Regression	83.717	4	20.929	7.862	0.000
Residual	306.135	115	2.662		
Total	389.852	119			

Coefficients	Unstandardized coefficients		Standardized coefficients		
	B	Std. error	Beta	t	Sig.
(Constant)	0.613	0.608		1.008	0.316
Factor 1: Data entry and physician information	0.286	0.118	0.226	2.426	**0.017**
Factor 2: Reports on call activity and inventory	0.253	0.107	0.214	2.353	**0.020**
Factor 3: Data communications	0.136	0.110	0.113	1.242	0.217
Factor 4: Hardware features	0.123	0.119	0.099	1.028	0.306

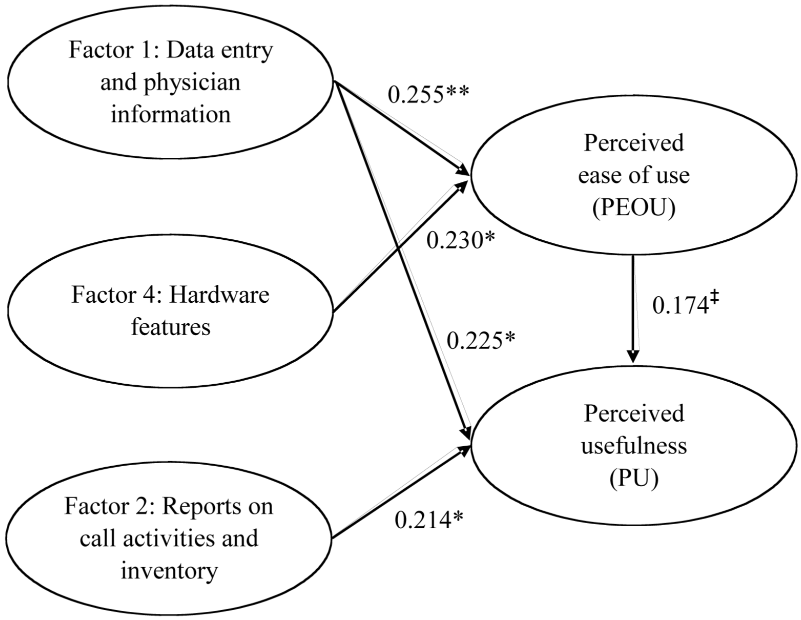
Model 2

			Change statistics		
	R	R^2	R^2 change	F change	Sig.F change
	0.490	0.240	0.025	3.775	0.054

ANOVA	Sum of squares	df	Mean square	F	Sig.
Regression	93.529	5	18.706	7.196	0.000
Residual	296.323	114	2.599		
Total	389.852	119			

Coefficients	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-0.392	0.792		-0.494	0.622
Factor 1: Data entry and physician information	0.229	0.120	0.181	1.911	0.059
Factor 2: Reports on call activity and inventory	0.256	0.106	0.217	2.412	**0.017**
Factor 3: Data communications	0.125	0.108	0.103	1.151	0.252
Factor 4: Hardware features	0.075	0.121	0.060	0.618	0.538
PEOU	0.281	0.145	0.174	1.943	0.054

Figure 2. Direct Effects in the Research Model



*$p < 0.05$, **$p < 0.01$, ‡$p < 0.10$

Table 6. Summary of Total Effects in the Research Model

From	To PEOU	To PU
Factor 1: Data entry and physician information	0.255	0.269
Factor 2: Reports on call activities and inventory	—	0.214
Factor 3: Data communications	—	—
Factor 4: Hardware features	0.230	0.040
PEOU	—	0.174

effect, as well as the total effect of each predictor. A direct effect, which represents the change in the dependent variable directly attributable to a standard deviation change in a predictor, is a standardized beta coefficient in the full model [19]. Figure 2 shows the direct effects considered in the research model. A total effect represents the total change in the dependent variable attributable to the direct effect of the predictor, as well as its indirect effects that are moderated through other predictors [19]. If a path has no moderator, it carries a direct effect. If a path consists of one or more moderators, it carries an indirect effect, which is the product of all direct effects on the path [19]. The indirect effect of factor 1 on PU via PEOU is 0.044 (= 0.255 * 0.174), and the indirect effect of factor 4 on PU via PEOU is 0.040 (= 0.230 * 0.174). The total effect is simply the sum of direct and indirect effects carried by all the paths. Table 6 summarizes the total effects considered in the research model.

The results on the effects of system features on PU and PEOU suggest some ways to improve PU and PEOU and through them, system usage. First, PEOU can be improved by enhancing the features of data entry and physician information and those of hardware, as users who are more satisfied with those features are likely to perceive the system as being easier to use in performing their tasks. Second, PU can be improved by enhancing the features of data entry and physician information and those of reports on call activities and inventory, as users who are more satisfied with those features are likely to perceive the system as being more useful in performing their tasks. While the features of data entry and hardware are largely associated with the functionalities and capabilities of the front-end PDA itself, the features of reports on call activities and inventory are largely associated with the functionalities and capabilities of the back-end database server. Also, the results suggest that generic system features such as those of data entry and hardware have effects on PEOU, while application-specific system features such as those of reports on call activities and inventory have effects on PU. Based upon these results, we may posit that PEOU is more likely to be influenced by generic system features, whereas PU is more likely to be influenced by application-specific system features. Of course, we need to test this posit in a broad context in order to provide more generalizable implications.

As the PDA technology advances, PDAs used in pharmaceutical detailing continue to incorporate new functionality such as mobile communication, wireless connectivity, navigation capability, and medical references. We may further examine the importance of such new system features in performing pharmaceutical detailing tasks as well as the effects of those system features on the user's PU and PEOU and through them, usage. Also, some pharmaceutical companies have adopted tablet PCs for use in pharmaceutical detailing. As system specifications are different between PDAs and tablet PCs, we may compare them with respect to their system features as antecedents to PU and PEOU in the light of TAM. Finally, PDAs used in pharmaceutical detailing are a vital part of a pharmaceutical company's salesforce automation system, which in turn is an important part of the company's customer relationship management system. In this regard, we may extend to examine the roles of PDAs in the big picture of salesforce automation systems or customer relationship management systems.

CONCLUSION

The main results of this study are the identification of specific PDA features that are important to pharmaceutical detailing tasks and the effects of those features on the user's perceptions of usefulness and ease of use of the system. The respondents perceived that the capabilities of the PDA system did not come up to their expectations on those important features. They also perceived that a significant gap existed between their needs and the actual capabilities of the PDA system with respect to those features. Further, the features of data entry and physician information and those of reports on call activities and inventory were found to have positive effects on the usefulness of the system, while the features of data entry and physician information and those of hardware have positive effects on the ease of use of the system. These findings will prove a helpful viewpoint on which system features to improve in order to enhance the usefulness and ease of use of the system and eventually facilitate the system usage.

A few limitations are recognized in this study. First, the PDA features considered are certainly not comprehensive, although they were found as being important in successfully performing pharmaceutical detailing tasks. There is a need to develop instruments that are more comprehensive and are capable, with a high degree of validity and reliability, of capturing and operationalizing the factors associated with PDA use in pharmaceutical detailing. Second, the findings are limited to the specific PDA adopted by the Company, and so, one should be careful not to over-generalize based on these findings. The findings of this study may not be generalized to PDAs used in other applications or user organizations. Certainly, there are some anecdotal success stories of PDAs used in pharmaceutical sales and other applications. But the kinds of PDA features discussed in this study are important for avoiding any potential problems that may afflict adoption of PDAs for pharmaceutical detailing tasks and improving the functionalities and capabilities of such PDAs. Third, only the perceptions of sales representatives toward PDA use in pharmaceutical detailing were examined. Further consideration may be given to incorporating the perceptions of vendors and encompassing a large number of pharmaceutical companies for more balanced and generalizable findings. These limitations are certainly not exhaustive, but important ones. Obviously, these limitations, in turn, suggest several possibilities for future study.

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Appendix A. Example of PDA Use in Pharmaceutical Detailing

A sales representative decides to call on a particular physician because, according to market data, the physician is a high prescriber of Product X. This product is currently being featured by the Company and is to be promoted in a primary presentation, or the first product the representative will talk about. A presentation involves the representative's stressing the benefits and features of Product X directly to the physician. If the representative has time and the physician is willing to listen, the representative may present other products she is carrying.

Prior to meeting with the physician, the representative opens the physician's electronic file and reviews the pertinent information such as the receptionist's and nurses' names, when and what they talked about the last time they were seen, what products were left behind and any particular interests the physician may have. Once in the physician's office and talking to the physician, the representative clicks on the 'Call' tab of the physician's profile, the current date is automatically inserted along with the physician name and location. While talking with the physician, the representative taps the 'Presentation 1' tab and a list of products she could possibly present appears. Using the PDA stylus, the representative touches the screen on the appropriate product and the product name automatically fills in to the 'Presentation 1' box. The cursor on the screen automatically drops to 'Presentation 2', where she can select the second product she will talk about and so on.

Should the representative decide to leave drug samples with the physician, she clicks on the 'Sample' tab of the physician's profile. The physician's name and address fills in. Then the representative taps 'Sample 1' and a list of products drops down. Selecting one product, she then fills in the quantity left before moving on to 'Sample 2'. Once the representative has finished entering the sample information, the physician signs the PDA screen on the signature line. In the event that a physician refuses to sign the PDA screen, the representative fills out a paper form, has the physician sign the paper and enters 'Refuse to Sign' on the signature screen. The representative must obtain the physician's signature in order to leave samples behind, according to the rules of the Food and Drug Administration.

When the representative returns home, she fills in her timesheet for the day. Attaching the modem cord to the PDA system, the other end is plugged into a phone jack. She then taps 'Transmit' on the home screen and the PDA system dials out. When connection is made, the data entered is uploaded to the server at a remote site and any changes the Home Office has made to the physician database are downloaded to the PDA system.

Appendix B. Items Used to Measure PU and PEOU

	Strongly disagree 1	2	3	4	5	6	7 Strongly agree
Perceived usefulness (PU):							
Using the system enables me to accomplish tasks more quickly.							
Using the system improves my job performance.							
Using the system increases my productivity.							
Using the system enhances my effectiveness on the job.							
Using the system makes it easier to do my job.							
I find the system useful in my job.							
Perceived ease of use (PEOU):							
Learning to operate the system is easy for me.							
I find it easy to get the system to do what I want it to do.							
My interaction with the system is clear and understandable.							
I find the system to be flexible to interact with.							
It is easy for me to become skillful at using the system.							
I find the system easy to use.							