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# Towards a comprehensive model to predict perceived performance impact of wireless/mobile computing in a mandatory environment

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## ABSTRACT

Wireless technology is gaining rapid deployment in workplaces. However, it is not clear that desired results are achieved from deploying this technology. The performance impact brought about by a wireless technology in an environment where usage is mandatory is the focus of this research. This research goes beyond utilization and satisfaction measures to explain the technology's performance impact based on end-user's feedback in a healthcare environment. Building upon two existing theories, i.e., Task-Technology Fit and the DeLone & McLean updated model of IS success, this research proposes a comprehensive model to predict the perceived performance impact attributed to the use of wireless technology. Five success variables form the constructs of the structural model, i.e., System Quality, Task-Technology Fit, End-User Computing Satisfaction, System Usage, Perceived performance Impact. A 53 item instrument is developed and items were tested for reliability and validity using Cronbach's Alpha.

## Keywords

IS success, wireless technology, mobile computing, utilization, performance impact, HCI, healthcare information system, mandatory environment.

## INTRODUCTION

The purpose of this study is to develop a comprehensive model to explain perceived performance impact (PPI) of wireless/mobile computing in an environment where usage is mandatory. Organizations spend a significant portion of their budget to acquire Information and Communication Technology (ICT) products in an effort to increase productivity, maximize profit, and deliver quality service to their customers. Unlike the "productivity paradox" assertion, this attributed impact of ICT is consistent with the widely held notion that ICT improves performance on the job (Adamson and Shine 2003; Davis 1993; Davis et al. 1989; Straub et al. 1995; Venkatesh and Davis 2000).

Although substantial research exists in the area of Human Computer Interaction (HCI) that body of work is focused on improving the performance of technology as an end unto itself (Carroll 1997; Dillon and Morris 1996; Olson and Olson 2003). In this research our interest is to explicate the performance gain achieved as a result of using wireless technology in an environment where usage is mandatory. A comprehensive review of the relevant literature reveals that the bulk of the related Information System (IS) research largely focuses on IS success with the ultimate dependent variable defined as IS success (DeLone and McLean 1992; 2003). The emphasis in much of these efforts was on individual applications (such as word processing, email, etc…) in centralized facilities that rely on a legacy system. Moreover, much of this research is a variation of the IS satisfaction and acceptability research (Davis 1989, 1993; Ives et al. 1983; Straub et al. 1995).

On the other hand, our current work is predicated on the notion that today's workplaces are experiencing unprecedented technological deployment where the technology system is part and parcel of the work system. We are increasingly witnessing the proliferation of the Personal Computer (PC) and hand held wireless devices that are part of the organizational ICT infrastructure. The pervasiveness of end-user computing (EUC) has brought with it user empowerment (Barker and Wright 1997). This user empowerment is largely attributed to the convergence factor where ICT is heavily interfaced with other devices and machines in the workplace. Medical devices are good illustrations of this type of synergy because the new medical devices work together with computer and telecommunication technologies. Individual and disparate applications are more and more transformed into integrated and enterprise-wide applications. The volitional context where users are adopting new technologies based on their willful choice is evolving into mandated use because of the extent that technology is embedded in the work system. Alter (1999) claims that IS and the work systems they support are inextricably connected. This technological embeddedness impacts the fundamental nature of work and suggests that information technology (IT) is an important tool for managing change and flourishing in a competitive environment (Adamson and Shine 2003).

We believe that ubiquitous computing coupled with greater interdependence between the technology system and the work system alter the underlying relationship between system usage and its antecedent factors. In environments where usage is a matter of willful choice, ease of use and usefulness are considered the primary influencing factors of user intentions to accept the system (Brown et al. 2002). However, it is argued that the role of motivational factors is reduced in an environment where usage is mandated because users are required to use the system despite their perceptions. This difference suggests a need to find the antecedents of system usage in a mandatory environment (Brown et al. 2002). We are attempting to identify the antecedents of system use in a mandatory environment because our objective is to predict performance impact and for positive performance impact is related to increased system use that is driven by relevant factors. The relevant driving forces we consider in this research are System Quality and Task-Technology Fit. More importantly, for us mandatoriness relates to the notion of system embeddedness in work flow activities where there is no ‘work around’ or alternatives to system use in order to perform job functions.

This research aims to determine the factors that help explain PPI of a wireless/mobile computing in an environment where usage is mandatory. We adopt the definition of a mandatory use environment given by Brown et al. (2002) as “one in which users are required to use specific technology or system in order to keep and perform their jobs.” The mandatory environment considered in this research is a large healthcare provider. Technology use is mandatory in the healthcare industry because technology provides access to timely and quality information that is critical for the conduct of patient care. What constitutes the system in this study is a wireless/mobile computing device used to interact with institution wide healthcare information system (HIS), more specifically interaction with Electronic Medical Records (EMR).

In conclusion, based on the assumption that 1) the wireless/mobile computing fits the healthcare practitioner’s task needs and 2) utilization of the wireless/mobile technology in a healthcare setting is mandatory, the goal of this research is to:

1. Develop a comprehensive model to explain PPI of wireless technology use in a mandatory environment.
2. Create a reliable scale and validate the constructs.
3. Establish a linkage between technology-usage-performance chains.

## WIRELESS/MOBILE COMPUTING IN HEALTHCARE

Faced with the ever rising cost of care, increasing medical errors, and stringent government regulations, healthcare organizations are continuously searching for methods to reengineer their business processes with the intent of improving outcomes. One approach to this reengineering of organizational business processes involves the implementation of technological solutions. Research on quality issues in HIS has shown that there is a high priority for IS improvement including the alignment of IT across the institution (Prybutok and Spink, 1999). Healthcare information is inherently “mobile” because ideally it should travel with the patient and there is a need for the ubiquitous availability of information to improve diagnostic accuracy, reliability of care, and reduced medical errors (Seshadri et al. 2001).

Wireless technology in a healthcare setting provides access to real-time patient information at the point-of-care (POC). Wireless technology and mobile medical devices (MMDs) empower practitioners that make productive use of mobile computing. The appeal of wireless networking in the healthcare environment comes not only because of the situations where installation of physical media is not feasible but also because of the need for on-the-spot access to information (Chen et al. 2004; Malladi and Agrawal 2002). EMR is the predominant healthcare practice for patient data management and its use via wireless technology has allowed care providers to access huge amounts of patient data at the POC, as well as from the office or from home (Rogoski 2004). The introduction of wireless technology further enhances opportunities for healthcare practitioners to retrieve and add to the EMR repository during the conduct of their day-to-day activities rather than having them enter data later at a work station (McCormick 1999). A survey (Fontelo et al. 2003) showed that usage of wireless technologies such as the PDAs has increased in recent years and this supports the contention of the availability of ubiquitous computing in the healthcare environment (Fontelo and Chismar 2005).

## THEORETICAL FRAMEWORK

This research combines both exploratory and confirmatory investigation. It is exploratory research because we propose a new model that explains PPI of a wireless technology at an organizational level where usage is mandatory. It is confirmatory research because the constructs that make up the research model are drawn from two existing theories, i.e., Task Technology Fit (Goodhue and Thompson 1995) and the DeLone and McLean updated IS success model (DeLone and McLean 1992, 2003).

### Task-Technology Fit (TTF)

TTF is defined by Goodhue and Thompson (1995) as the degree that a technology assists an individual in performing his or her portfolio of tasks. Goodhue and Thompson (1995) posit that the principal component of TTF research is to establish links between TTF, system usage, and performance impact. Because TTF has its theoretical roots in two existing streams of research, i.e., user attitudes as predictors of utilization and TTF as a predictor of performance (Goodhue 1998; Goodhue and Thompson 1995; Staples and Seddon 2004), its use in this research is relevant to the technology-to-performance chain. More importantly TTF explains the advance posited in this research because TTF embodies technology characteristics, individual abilities and task characteristics. TTF also helps explain aspects of technological embeddedness, job relevance, and ubiquitous computing. The components that make up the TTF construct are described below.

### Task Characteristics

A simplistic definition of a task is "the actions carried out by individuals in turning inputs into outputs." (Goodhue and Thompson 1995). Tasks are analyzed on different levels and according to different characteristics, for example, simple versus complex (McGrath 1984; Simon 1977), management and leadership tasks versus operational and administrative tasks (Mintzberg 1973), and new classification types such as 'Information and knowledge tasks' (Davenport et al. 1996). Information and knowledge tasks are often performed by knowledge workers who are experts in their own area of specialization but try to solve problems by collecting information and analyzing data that results in decisions that are relevant to actions. Service professionals in this category include teachers, doctors, and lawyers (Mintzberg 1989).

### Technology Characteristics

Technology characteristics are relevant to IT, and information system (IS) discourse. In this research, IS, IT, system, and technology are used interchangeably. We adopt the definition of IT given by Cooper and Zmud (1990) as a tool with an underlying technological base that is comprised of computer and communications hardware and software. IS is used in the context of its generic definition (Burch 1986) and is comprised of six building blocks - input, output, technology, database, and controls. Wireless technology is part of the IS infrastructure deployed in an organization to provide connectivity via radio signals instead of physical connections. The range of technologies collectively termed wireless include Personal Digital Assistants (PDAs), robots, telehealth apparatus, pagers, telephones, tablet computers, subnotebook computers (smaller, lighter, portable computers), smart telephones, wireless networks, mobile hardware peripherals, and all related software (Newbold 2004).

### Individual Characteristics

At the end of the day the technology or system put in place is used by individuals for whom the system is acquired. The most important individual attributes that affect utilization of the technology include training, background or system knowledge, beliefs and/or attitudes about the system (Compeau and Higgins 1995; Davis 1989; Goodhue and Thompson 1995).

### The DeLone and McLean updated IS Success Model

The second theoretical stream on which this research is based comes from the DeLone and McLean updated IS Success model (DeLone and McLean 2003). In 1992 DeLone and McLean carried out a comprehensive literature review of 180 IS research articles (DeLone and McLean 1992) and more recently, in 2003, provided an updated model (DeLone and McLean 2003). Their work is an excellent compendium that gives valuable insight into the nature of IS success research. DeLone and McLean's comprehensive review characterizes the body of research as one engaged in determining the dimensions for IS success. Their findings suggest that IS success is relevant to the following six factors - System Quality, Information Quality, Use, User satisfaction, Individual Impact and Organizational Impact.

## OPERATIONALIZATION OF THE CONSTRUCTS

### TTF

In this research, TTF is conceptualized as the degree that a wireless technology assists the healthcare professional to perform his or her clinical activities. Wireless technology/mobile computing is evaluated using items such as hardware devices, network connectivity, software functionality, bandwidth, geographic network coverage, interoperability between networks, and whether the connection is permanent or not (Baker 2003). Three dimensions of TTF, i.e., task requirements, technology characteristics, and individual abilities were assessed in this study. The three dimensions were operationalized with an 11-item scale.

**System Usage**

There is widespread agreement among IS researchers that system usage, defined as the utilization of IT by individuals, groups, or organizations, is an important variable through which IT impacts and improves performance (Straub et al. 1995; Davis 1989). Existing system usage research is based on user attitudes and behavior to predict a user's behavior towards using IS. In the extant literature, system use is one major variable considered as a surrogate for IS success (Davis 1989; Davis et al. 1989; Doll and Torkzadeh 1991; Landrum and Prybutok 2004; Thompson et al. 1991).

Measurement of system usage often includes a distinction between self-reported system usage, such as the perceptual behavioral measurements in TAM, and computer-recorded system usage (Straub et al. 1995). Comparison of self-reported (subjective) and computer-recorded (objective) measures show that self-reported measures have methodological problems and do not reflect actual usage of the system (Straub et al. 1995; Trice and Treacy 1988). Building upon this premise, Straub et al. (1995) suggest that it is desirable to reformulate system use into two entirely separate constructs, i.e., perceived system use, a construct with its own attributes and relationships, versus actual system usage. We argue, however, that objective measures usually obtained by analysis of log files are not always indicators of actual usage. It is rather plausible to assume that users can pass a better judgment of usage based on the degree of interdependence between the task and the technology.

Measures such as the frequency of use, the degree or extent of use or the diversity of features of the technology used, time spent, perceived daily use, perceived frequency of use, the number of software packages used, and the number of business tasks for which the system is used constitute measures of system usage. More importantly, system usage is operationalized in terms of the frequency and degree of dependence of the healthcare workforce on wireless technology to interact with HIS in general and EMR in particular. This construct is operationalized with an eight-item scale.

**Perceived Performance Impact**

Performance impact is the accomplishment of a portfolio of tasks by an individual and higher performance implies some mix of improved efficiency, improved effectiveness and/or higher quality (Goodhue and Thompson 1995). Distinction is made between performance impact of a technology and system performance of the technology itself. Performance impact in this research is conceptualized as how well the work is performed or how much value is added/created as a result of using the system. Ideally one would like to evaluate EUC based on the degree of use in decision-making and the resultant change in productivity and competitive advantage. The resultant benefits are described as utility in decision-making where EUC satisfaction (EUCS) is a potentially measurable surrogate for utility in decision-making (Doll and Torkzadeh 1988).

It is widely recognized that increased utilization then leads to positive performance impact. Goodhue and Thompson (1995) assert that performance impact is a joint function of system utilization and TTF. The operationalization of performance impact in this research relates to business process measures such as productivity, cycle time, consistency of the work, and rate of output (Alter 1999; Seddon et al. 1999). Intermediate outputs such as operational performance that is time-based, quality-based, and flexibility-based are more associated with IS than financial performance (Scott 1995). PPI is operationalized with an eleven-item scale in this research.

**End-User Computing Satisfaction (EUCS)**

EUC is defined by Igbaria et al. (1997) as the "use of computers by individuals who are not computing professionals and is characterized by the control that users have over the choice as to when and how to use a computer." In this context we define end-user mobile computing as any computing activity by a healthcare practitioner that employs wireless devices to interact with HIS to access EMR in the course of conducting clinical activity. User satisfaction is widely known by different names such as "felt need", "system acceptance", "perceived usefulness", "MIS appreciation", "feelings" about a system and has been variously defined as the 'extent to which users believe the IS available to them meets their requirements' (Ives et al. 1983). User satisfaction is also considered as the most important indicator of IS success. Bailey and Pearson (1983) for instance came up with a 39 item instrument to measure user satisfaction to which Ives et al. (1983) added 4 more items to measure overall user information satisfaction (UIS).

EUCS is measured in terms of how a user feels about the system, i.e., his/her affect toward the system. User satisfaction is also generally considered to be measurable by a comparison of user expectations (or needs) of the IS with the perceived performance (or capability) of the IS on a number of different facets of the IS such as content, accuracy, format, ease of use and timeliness (Bailey and Pearson 1983; Chin and Newsted 1995; DeLone and McLean 1992; Doll and Torkzadeh 1988; Goodhue 1988; Ives et al 1983; Remenyi and Money 1991). EUCS is operationalized with a ten-item scale.

### System Quality

The most widely adopted definition of quality in use today has its root in the service marketing literature that defines quality as “the extent to which a product or service meets and/or exceeds a customer's expectations” (Zeithaml et al. 1990). Measures of system quality usually focus on performance characteristics of the system. From an end-user’s evaluation perspective, it is usually difficult to ascertain these system specific performance features. However, there are certain desirable characteristics users expect to see from the system that they consider is quality. In view of the impact of the system on business processes, end-users evaluate quality based on the friendliness of their experiences with the system use. Attributes such as ease of use, response time, reliability, convenience of access are appropriate empirical measures for such a construct (Bailey and Pearson 1983). A similar measure of system quality is given in terms of ease of use, functionality, reliability, flexibility, data quality, portability, integration and importance (DeLone and McLean 2003). Based on prior research, Igbaria et al. (1997) adopted five dimensions of system quality: functionality, equipment performance, interaction, environment, and the quality of the user interface. System Quality (SQ) is operationalized with a thirteen-item scale in this research.

## RESEARCH MODEL AND HYPOTHESES

The research model developed in this work (Figure 1) combines theories from TTF (Goodhue 1998; Goodhue and Thompson 1995; Zigurs et al. 1999) and the relevant constructs from the updated DeLone & McLean IS success model (2003). Of the six IS success dimensions identified by DeLone and McLean (1992, 2003), we incorporated System Quality, System Usage, and User Satisfaction into our research model and combined individual impact and organizational impact into one construct, i.e. perceived performance impact (PPI). The selection and interdependence of these dimensions in our research model is such that it is consistent with the goal of this research, i.e., develop a comprehensive model to predict PPI in an environment where usage is mandatory and is one that addresses the new reality of the work-technology systems interaction. Moreover, it conforms to the widely accepted model of a technology-utilization-performance chain (Scott 1995; Staples and Seddon 2004). The significance of matching IS technology with the requirements of organizational tasks is supported by the theory of TTF (Goodhue and Thompson 1995; Zigurs et al. 1999). We believe this synergy between the prevailing IS success measures and TTF allows the creation of a comprehensive model for the measurement of PPI of wireless technology in a mandated use environment.

The proposed research model has 5 variables: SQ, TTF, system usage, EUCS, and PPI. PPI is the ultimate dependent variable and is measured from the perspective of the user. SQ and TTF are antecedents of system usage and user satisfaction that affects performance impact. In general we hypothesize that SQ and TTF singularly and jointly impact system use and EUCS that subsequently predicts PPI. We believe there is a strong correspondence between task characteristics in healthcare and technology characteristics (Wireless/Mobile technology), i.e., a mobile technology supporting mobile workforce (Seshadri 2001).

It is the aim of this research to go beyond the predominant IS research practice that measures utilization or satisfaction for its own intrinsic value. By taking PPI as our ultimate dependent variable, we aim to explore how SQ, TTF, and system usage together gauge PPI in a mandatory environment. Empirical evidence from the existing IS research that support our hypotheses and defining the relationships between each of the constructs shown in Figure 1 is provided below.

### System Quality and System Usage

Several empirical studies (Brynjolfsson 1996; DeLone and McLean 1992; 2003; Scott 1995) support the path from system quality to system usage. System quality measured in terms of ease of use, reliability, response time, flexibility, and accuracy among others plays a prominent role as a determinant of system usage. System quality is a key component for offering end-users assurance of self-efficacy, judgments of mastery, and self-determination. These constructs are subsequently determinants of perceived ease of use and usefulness. Systems with higher user-perceived quality are likely to have more frequent utilization than those of lower quality (Igbaria et al. 1997).

Hypothesis one (H1): System quality is positively correlated with system usage.

### System Quality and End-User Computing Satisfaction

In an input-process-output (I-P-O) framework for IS effectiveness, Scott (1995) mapped system quality as ‘input’ and showed that it was causally related to user satisfaction. DeLone and McLean (1992, 2003) also shown how system quality and information quality singularly and jointly affect both system usage and user satisfaction. Another study (Seddon 1997; Seddon and Kiew 1996) supports the positive relationship between system quality and user satisfaction.

Hypothesis two (H2): System quality is positively correlated with end-user computing satisfaction

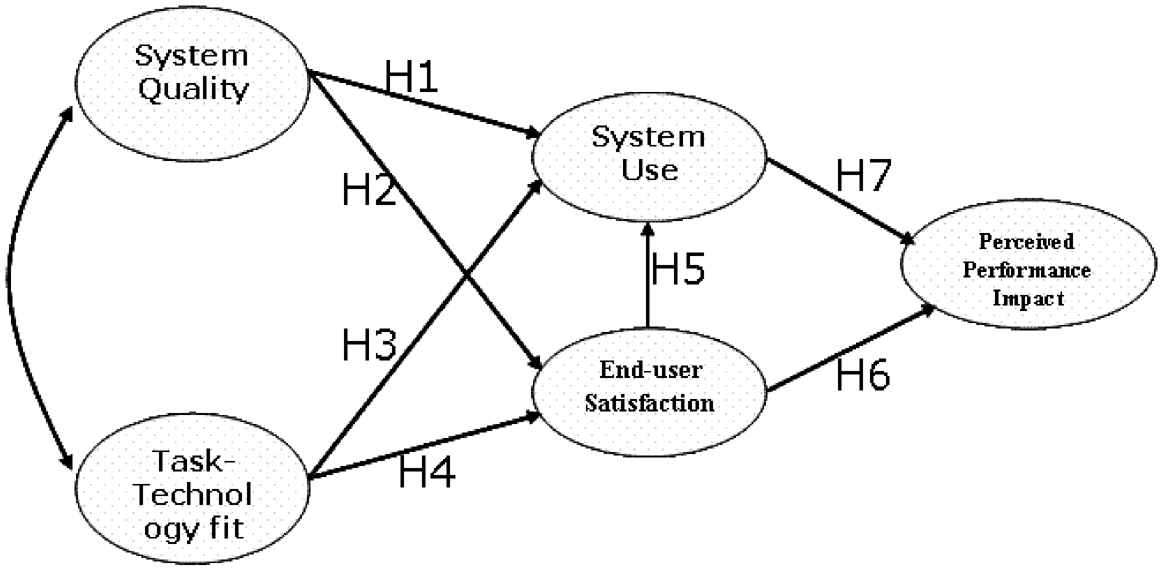


Figure 1. Proposed Research Model

**TTF and System Usage**

The link between fit and utilization is reinforced by the fact that the better the 'fit' the more likelihood of utilization. At the organizational level, 'fit' and utilization are an established link (Cooper and Zmud 1990).

The impact of fit on system use is shown via the link between TTF and beliefs about the consequences of using a system (Goodhue and Thompson 1995). This link is in recognition of the fact that whether systems are believed to be more useful, more important, or give more relative advantage largely depends on how well there is a correspondence between the task and the technology, TTF.

Hypothesis three (H3): TTF is positively correlated with system usage.

**TTF and End User Computing Satisfaction**

TTF is a heavily loaded construct combining the attributes of task characteristics, technology characteristics, and individual abilities. In situations where we have a higher harmony between these three dimensions, it is generally believed results in end-user satisfaction. According to Goodhue (1988), user satisfaction is a fit between personal needs and benefits of using a system and would be most appropriately measured by assessing how a user feels about his system, i.e. affect toward the system.

Hypothesis four (H4): TTF is positively correlated with end-user computing satisfaction.

**End-User Computing Satisfaction and System Use**

Based on Doll and Torkzadeh's (1988) EUCS instrument, research investigated the influence of user satisfaction on system usage and 'individual impact' and found a significant, positive, influence of user satisfaction on both usage and individual impact (Igbaria and Nachman 1990; Igbaria and Tan 1997). Other studies (Baroudi et al. 1986) also support the path from user satisfaction to system usage suggesting that satisfaction leads to usage rather than usage stimulating satisfaction.

Hypothesis five (H5): End-user computing satisfaction is positively correlated with system-usage.

**End-User Computing Satisfaction and Perceived Performance Impact**

In the extant IS literature, user satisfaction is synonymous with system success. Several studies (Etezadi-Amoli and Farhoomand 1996; Gelderman 1998; Igbaria and Tan 1997) found a strong relation between user satisfaction and performance or individual impact. Sixteen studies empirically tested the DeLone and McLean IS success model, six of these studies show a positive and significant relationship between user satisfaction and individual impact (DeLone and McLean 2003, p.14)

Hypothesis six (H6): End-user computing satisfaction is positively correlated with perceived performance impact.

**System Use and Perceived Performance Impact**

System use has a significant and positive influence on individual impact (Igbaria and Nachman 1990; Igbaria and Tan 1997). DeLone and McLean (1992) proposed a model suggesting that both utilization and user attitudes about the technology lead to individual performance impacts. In the ten-year update of the DeLone and McLean IS success model (DeLone and McLean, 2003), seven studies tested and confirmed the positive relationship between system use and individual impact, that is an aspect of the performance impact construct we consider in this study.

Hypothesis seven (H7): System use is positively correlated with perceived performance impact

## RESEARCH DESIGN & METHODOLOGY

**Sample and Procedures**

This research primarily focuses on the development of a comprehensive model to predict PPI of a wireless technology where usage is mandatory. The second main goal was to develop a reliable and valid instrument that measures the constructs of the model. The mandatory environment considered in this study is a large healthcare institution where we have knowledge of wireless technology deployment. At this stage, however, in order to better validate the instrument a pre-test was conducted in an academic setting. In confirmatory empirical research, instrument validation is the first task (Straub 1989). Nunnally and Bernstein (1994), on the other hand advise the test-retest method for determining reliability.

Initially a 64 item instrument was discussed with two computer system managers. This discussion helped to reduce the number of items to 53 and extensive changes were made to the content and language of the instrument as a result of the impact of these IT professionals. The revised 53 items instrument was finally published on the Internet using open source survey software (SurveyMonkey.com). Then 15 graduate IS students that we know are frequent users of wireless technology were selected based on purposeful sampling technique to participate in pilot test. Complete responses were obtained from twelve of these 15 subjects (80% return rate).

**Measures, Measurement Validity, Reliability**

Based on extensive review of related literature items that measure the constructs in the proposed research model were identified. The definition and operationalization of variables was considered in the selection of scales and items. Previously developed and validated instruments were adopted directly while some items required modifications and some new items were developed. Using a validated measurement, the instrument offers a standardized evaluation approach and as much as possible we adopt tested existing instrument items (Compeau and Higgins 1995; Scott 1995; Straub 1989).

An instrument is valid if it measures consistently without errors and such validity is assessed by techniques such as Cronbach's alpha, or squared multiple correlations (SMCs) in structural equation modeling (SEM). Validity of the measurement instrument on the other hand is concerned with whether a variable measures what it is supposed to measure (Scott 1995). Content validity assures the theoretical meaningfulness of a concept. The pilot study examined content validity and readability of the instrument and changes were made accordingly. Internal consistency of the items were ascertained through Cronbach's alpha.

The reliability coefficient obtained for each of the constructs is indicative of the high reliability of the scales. The factor analysis results support the construct validity in terms of both content and discrimination.

| Construct/Scale | Number of Items | Cronbach's Alpha |
|---|---|---|
| Perceived Performance Impact | 11 | 0.980 |
| End-User Computing Satisfaction | 11 | 0.880 |
| System Usage | 8 | 0.990 |
| Task-Technology Fit | 10 | 0.980 |
| System Quality | 13 | 0.940 |

Table 1. Internal Consistency of the Constructs

## DISCUSSION AND RESULTS

Consistent with the theories upon which this research is based, the pilot-test conducted supports the appropriateness of the constructs in the proposed research model. While acknowledging system use and satisfaction at the heart of this model, what sets this research from extant works is that it has attempted to find the antecedent factors that impact usage and satisfaction in view of the fact where usage is considered mandatory. While remaining under the framework of Technology-Utilization-Performance chain, this research has set a new direction how TTF and SQ singularly and jointly impact SU and EUCS that subsequently impact performance. The reliability coefficients computed by Cronbach's alpha show the reliability of the constructs, which is higher than .60 and .70 for exploratory and confirmatory type of research respectively (Hair et al. 1998). Based on simple correlation and t-test statistics, all hypothesized paths in the research model were significantly supported. Using principal component analysis with Varimax rotation method and Kaiser Normalization, the strength of the observed variables loading on each underlying construct is also proved.

## CONCLUSION

This research is a first attempt to predict PPI in an environment where usage is mandatory. In the process of proposing this model this work relates system to the use of wireless/mobile technology as it relates to HIS in general and EMR in particular. In addition, this research assumes the healthcare industry is a mandatory environment when it comes to system usage. Based on two existing theories viz. TTF and the updated McLean and DeLone IS success model, we have developed a comprehensive model and a corresponding instrument for use in future research. A rigorous data collection from a healthcare institution is required to retest and provide situational validation of the constructs and corresponding scales. The initial pilot-test of the developed instrument shows high reliability of measures, content validity, and language use. The proposed model confirms the technology-utilization-performance chain that is much explored in the extant literature.

Based on extensive review of the literature, we also believe this research has contributed towards the establishment of linkages between technology availability, utilization and performance impact in a mandatory environment. The bulk of existing MIS literature aims at establishing a backward linkage between technology and utilization and/or satisfaction. This backward linkage considers utilization or satisfaction as the ultimate dependent variable and places greater emphasis on determining the variables that cause utilization or satisfaction. This research, by way of its theoretical investigation, aims to establish a forward linkage after utilization and satisfaction that is between utilization and performance impact. Providing appropriate conceptual definitions of the constructs and clarifying their conceptual relationships are also significant contributions of this research.

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