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# Physicians' Behavior Intentions Regarding the Use of Mobile Technology: An Exploratory Study

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**Abstract**

*This study aims to explore physicians' willingness to accept new technology in the form of a mobile medical information system. The study focuses on the effects of temporal and spatial working behavior. A research model built up on previous research into the adoption of an information system, mainly TAM and UTAUT, is proposed and empirically tested, using data collected from 134 physicians working in the health-care sector in Finland. The results suggest that our proposed model could explain about 61% of the variance in physicians' intentions to use the mobile system. Spatial working behavior has the potential to moderate the relationships between physicians' beliefs and their intention to use mobile technology, in this case the mobile medical information system. Temporal working behavior as an important external variable does affect physicians' beliefs of the mobile system, exerting a negative impact on their perceived usefulness of the system. It is too soon to examine the effects of temporal and spatial working behavior on individual adoption of technology; further validation of our findings is necessary in other contexts.*

**Keywords**: technology acceptance, mobile information system, physicians, temporal working behavior, spatial working behavior

## 1. Introduction

Recent years have seen the adoption of mobile technology as a potential aid for business activities. It is clear that although mobile technology has not been able to fulfill all its expectations to change the basic nature of business, it is a profitable innovation that opens up new business opportunities and offers added value for both the customer and the company (Barnes, 2002; Tarasewich et al, 2002). Innovative organizations are adopting wireless technology to support their employees' work in general and mobile workforces in particular. However, the success of the technology may depend on how workers use it into their work.

So far, users' perceptions of and intentions to adopt information systems (IS) and the rate of diffusion and penetration of technology within and across organizations are two important foci of

IS research (e.g. Straub et al, 1995; Taylor and Todd, 1995). They are understood to represent or stand for the essential aspect, property or value of information technology (Orlikowski and Iacono, 2001). It is generally accepted that the use of information systems at work could increase employees' productivity and improve both the individual's and the organization's performance. System Usage is an important way of measuring IS success (DeLone and McLean, 1992 and 2003).

The information technologies used in work settings have been found to transform the working behavior of workers. Kakihara and Sørensen (2002) argued that, concerning the impacts of technology, work is today very mobile and can be broken down into multiple temporal models and cannot be interpreted from a linear "clock time" aspect. Furthermore, technologies shape knowledge workers' working behavior by increasing their spatial mobility, i.e. in the modern era they could work geographically independently. Mobile technology can enhance temporal and spatial mobility so that workers become more mobile and yet accessible at any time and any place. Consequently, new ways of working are emerging in organizations. Such new working behaviors, in turn, are worth examining for their effects on individuals' beliefs and behavior intentions towards new technology, especially mobile technology.

This paper reports an exploratory study on technology acceptance by physicians' regarding their beliefs and behavior intentions to accept a mobile medical information system, focusing on the effects of temporal and spatial working behaviors. The theoretical background to the research model in the study is based on the Technology Acceptance Model (TAM) (Davis et al, 1989; Davis 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The effects of new working styles in terms of temporal and spatial behaviors were incorporated into the model, making it more adequate for the target "professional" user population and mobile technology context. The model was then tested empirically, using data collected from a survey that involved 134 physicians practicing in the Finnish health-care sector.

In the next section, we briefly review the relevant literature on technology acceptance. The conceptualizing of working behavior in terms of time and space is discussed. The research model and research hypotheses are then described. The methodology issue is followed by a presentation of our measurement instruments and our study context. The next section presents the important results found in the study. The paper ends with a summary of the study's findings and discussions.

## 2. Theoretical Background

### *2.1 Theories of Technology Adoptions*

In the past few decades, many studies, based on different theoretical approaches, have been made in order to predict, explain and increase user acceptance of information systems at work (e.g. Venkatesh et al., 2003).

Among these theories, the Diffusion of Innovation Theory has been widely used to study consumer behavior in marketing, organization adoption and diffusion behavior in a social system and in the IS research field (e.g. Mahajan et al., 1990; Cooper and Zmud, 1990; Roger 1995; Robertson and Gatignon 1986; Gopalakrishnan and Damanpour, 1997). Of the factors proposed by Rogers (1995),

relative advantage (similar to usefulness), complexity (ease of use) and compatibility are consistently related to the decisions made by individuals with regard to the adoption of technology. The Technology Acceptance Model (TAM) is tailored to study user acceptance of computer technology. According to TAM, behavior intention (BI) is a major determinant of usage behavior; behavior can be predicted by measuring BI. BI is viewed as being determined by the perceived usefulness (PU) and ease of use (EU) of the systems under investigation. "PU and EU are postulated a priori, and are meant to be fairly general determinants of user acceptance" (Davis et al., 1989). EU influences behavior through two mechanisms: self-efficacy and instrumentality. This means the easier the system is to use, the greater will be the efficacy felt by the user regarding his or her capacity to use the system. TAM emphases the importance of how external variables, e.g. various individual differences, situational constraints, organizational characteristics and system characteristics etc. affect the individual's internal decision process and behavior intentions.

Venkatesh et al., (2003) proposed a unified model, the Unified Theory of Acceptance and Use of Technology (UTAUT), based on examinations of eight prominent models in IS adoption research. UTAUT is formulated with four core determinants of intentions and usage: performance expectancy, effort expectancy, social influence and facilitating conditions, together with four moderators of key relationship: gender, age, experience and willingness to use. The model was empirically examined and found to outperform the eight individual models (adjust $R^2 = 0.69$), including TAM. According to UTAUT, examination of the effects of the four moderators has contributed to a better understanding of the complexities of technology acceptance by individuals. Because of its outstandingly strong theoretical premises and explanatory power, this model gives us greater insight into the individual's adoption of an information system, especially the role played by important moderators in the key relationships between individual beliefs and behavioral intentions.

A number of researchers have studied user acceptance of mobile technology and services including mobile internet, text messaging, contact services, mobile payment, mobile gaming and mobile parking services based on IS adoption models (e.g. Pedersen, 2002; Pedersen and Nysveen, 2003; Pedersen, Nysveen and Thorbjørnsen, 2003). They found that usefulness and ease of use are very important factors determining user acceptance of mobile technology. Khalifa and Cheng (2002) found that exposure of an individual to m-commerce influences positively the individual's intention to adopt m-commerce. The results of these studies confirm that in the mobile technology context, traditional adoption models such as TAM could be applied, but need modification and extension in order to increase their prediction and explanation power.

### *2.2 Temporal and Spatial Working Behaviors*

Technology has played an important role in transforming our society into the so-called post-industrial or information society. In particular, the pervasive use of information and communication technology (ICT) in organizations has changed and is changing all aspects of work. Lee and Sawyer (2002) in their pioneer work on conceptualizing time, space, information technology, work and organization, claim that within the organization context, using IT changes the way in which time and space are structured at work. In turn, the structured perceptions of time and space might build an "interpretive" framework that influences the introduction and use of technology (Kakihara and Sørensen 2002). In other words, it might influence an individual's adoption behavior regarding newly introduced IT, e.g. mobile technology, in organizations. The

framework covers the temporal dimension with two domains: the temporal nature of work and individual temporal working behavior, as well as the spatial dimension with two domains: the spatial nature of work and individual spatial working behavior.

### *2.2.1 Temporal Working Behavior: Fragmentation of Working Time (FWT)*

Barley (1998, p. 160) argues: "new technology may enhance or inhibit conflict by triggering changes in the structural allocation of events that in turn, shift the interpretive temporal framework". He further introduced the dichotomy of temporality-monochronicity and polychronicity based on the work of Hall (1976). Monochronicity (or monochronic behavior) is defined as the preference by individuals to engage in one activity at a time, as opposed to polychronicity where individuals prefer to be engaged in two or more activities at once. Besides monochronicity and polychronicity of individual temporal preference, Lee and Sawyer (2002, p282) also described the temporal nature of work, i.e. tasks or events take place in an unexpected temporal way (polychronic) or come in an organized temporal way (monochronic). The interaction between the domains of individual temporal working behavior and the domain of the temporal nature of work will lead to a complex working environment and increasing temporal mobilization.

Time is a rich cultural concept. Based on the work of Schriber and Gutek (1987) and Benachou (1999), we try to understand the following temporal dimensions of work. They are:
*Schedules and deadlines*: work has a specified beginning and ending;
*Co-ordination and synchronization*: it assumes a specific ordering of activities, especially when many workers are involved in completing the same activity;
*Pace* represents the degree to which activities occur in a regular manner repeatedly;
*Allocation of time* is the amount of time workers commit to an activity;
*Variety versus Routine,* routine implies repetition of work at regular and cyclical intervals: the time when this repetition occurs is rather well defined;
*Separation of work and non-work time* represents the distinction between the use of time for work or for leisure;
*Autonomy of time use* corresponds to the degree to which workers have the freedom to control and plan their own time use.

Tétard (2002) pointed out that, by measuring those dimensions, we are able to identify the actual temporal behavior of how workers organize their working time to deal with tasks and events. He initiated the concept of fragmentation of working time (FWT)[1]. On the basis of his definition, we interpret FWT narrowly here as the degree to which individuals' working time is fragmented by their temporal preferences and the temporal dimension of their work.

Adopting and using information technology will help workers to deal with FWT (Tétard 2002), but somehow increase polychronicity in the work settings (Kvassov 2002). Polychronic individuals are more strongly oriented towards the present and feel less bound by a schedule or a procedure than monochronic individuals. Therefore, when doing similar work, polychronic individuals might

[1] Tétard (2002, pp36) have defined the problematique of "Fragmentation of Working Time" as: "The whole of effects and consequences on managerial, personal and organisational productivity resulting from the influence of new ways of organising, information overload, interruptions and temporal dimensions of managerial work. These aspects are amplified by business process discrepancies and inefficient information technology support".

have rather highly fragmented working time while monochronic ones have less fragmented working time.

### *2.2.2 Spatial Working Behavior: Fragmentation of Working Space (FWS)*

Space and time are inter-related concepts when it comes to understanding what work is in an organization. In the spatial dimension of the "interpretive" framework, the first domain concerns the spatial nature of work. It takes place in a relatively stationary physical location or office and does not involve much geographical movement for a worker to accomplish a task (less fragmented space) or requires an intensive mobile life-style to finish a task in different locations (highly fragmented space). The second domain is about the individual spatial preference of working, the way workers organize their work to be done in different locations. Traditionally, workers do their work mostly in an office. In the modern era, with a supportive information system, workers can also do their work in different places or space, physically or virtually, e.g. virtual team work. Focusing on 8 CEOs' managerial work in terms of time and space, Tengbald (2002) found that CEOs' work is plagued by expansion and fragmentation of working space. The best use of space is emerging as an important management issue in organizations.

Concerning physical space, we conceptualize the following spatial dimensions of work using the work on modality by Kristoffersen and Ljungberg (1998) and local mobility by Luff and Heath (1998). They are:
*Stationary* means workers do their job mostly at a physical office, not involving movement locally or globally;
*Wandering* represents workers who do work involving local mobility within a smaller area such as a building with very little time spent in any one place;
*Traveling* describes workers performing a task while traveling in a vehicle, e.g. automobile, airplane;
*Visiting* means workers performing a task that takes place in one place for a coherent but short period of time;
*Home* represents a non-working environment characterized mostly by leisure activities.

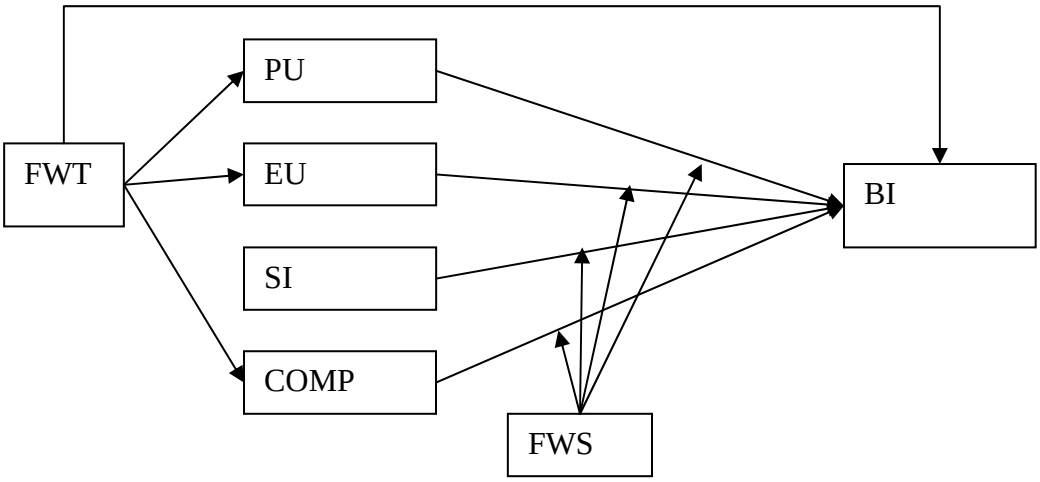
Workers might organize their work only in one space, e.g. the office, but others might perform a task while they are on the move locally or globally or even use their leisure space to perform a task. Here, fragmentation of working space (FWS), as a measure of spatial working behavior, refers to the degree to which workers organize their work in different space rather than in an office only and deal with tasks and events according to their spatial working preferences and spatial nature of the work.

## 3. Research Model and Research Hypotheses

Venkatesh et al., (2003) called for new future research to validate the UTAUT in other contexts, rather than business users in business organizations. Here, we test the model in completely different context regarding the use of mobile technology by physicians in health care organizations. Supporting "work" "on the move" is a fundamentally distinguished characteristics of mobile technology in comparison with other information systems investigated in previous IS adoption research, i.e., stationary and physically located. Therefore, instead of examining the moderation

roles of gender, age, experience and voluntariness proposed in the UTUAT, we do a pioneer test to demonstrate the potential interaction effect of an individual's spatial working behavior in term of FWS. In spite of rich research having been done regarding information technology adoption and use in the work place, the effect of an individual's temporal working behavior on adopting technology has never been examined. By recognizing its significance, we integrate its effect to the research model.

Figure 1 depicts the research model employed in the study. We used behavior intention as the dependent variable, not the actual usage, since TAM asserts that intention is a proper proxy to examine and predict a user's behavior towards information systems (Davis et al., 1989). In this study, behavior intention refers to a physician's intention to use a mobile medical information system in his practice in the future. Behavior intention is predicted by four determinants, perceived usefulness (PU), perceived ease of use (EU), social influence (SI), and compatibility (COMP) with one moderator - fragmentation of working space (FWS) - and one external variable - fragmentation of working time (FWT). In the remainder of this section, we define each of the determinants, discuss the role of FWS and FWT and present the theoretical rationale for the hypotheses.




FWT - Fragmentation of Working Time, FWS - Fragmentation of Working Space, PU - Perceived Usefulness, EU - Perceived Ease of Use, SI - Social Influence, COMP - Compatibility, BI - Behavior Intention

**Figure 1: Research Model**

### *3.1 Beliefs Concerning Use of Mobile Technology*

Several beliefs have consistently emerged as salient predictors of adoption behaviors. We adapt them to examine physicians' beliefs concerning the use of mobile technology. Perceived usefulness (PU) is defined as physicians' subjective assessment of the extent to which using a mobile information system will increase his or her performance in patient care and management. Many empirical studies in information technology support the importance of usefulness in predicting adoption behavior (see recent review, Legris et al., 2003).

A second construct, perceived ease of use (EU) is a significant determinant of adoption behavior. It defines the degree to which a physician views use of a mobile information system as relatively free of effort. Innovations have a higher likelihood of being accepted and used by potential users if they are perceived to be easier to use. Chau and Hu (2002a and b) argued that ease of use has weaker effects on physicians' decisions to adopt technology because they constitute a special professional group. However, in early exposure to a new technology, it is still considered to have an important effect on behavior intentions (Legris et al., 2003).

Social influence (SI), a third user perception examined in UTAUT, refers to the degree to which a physician perceives that other important actors, e.g. peers, colleagues, family members etc. think he or she should use the system under investigation. The role of social influence in technology acceptance decisions is very complex in general and involves a vast range of contingent effects. Nonetheless, it has been found to have a significant influence when a behavior is new (Triandis 1971). In the early adoption phase where physicians have little or no experience of the innovations, their beliefs would be strongly affected by opinions expressed by other important actors, i.e. their reference groups.

A final user belief examined here, compatibility (COMP) proposed by Rogers, refers to "the degree to which an innovation is perceived as being consistent with the existing value, needs, and past experiences of potential adopters" (Moore and Benbasat 1991). All four perceptions are relative concepts and can be perceived differently by different individuals.

It is worth examining possible moderating effects between beliefs and adoption behavior as proposed in UTAUT. With mobile information systems designed to support knowledge workers in the performance of their tasks, the degree of their movement, or the degree to which they organize their work as fragmented working space (FWS), might exhibit an important moderating role. Spatial mobility is the immediate and obvious advantage of using mobile technology. In different given conditions, e.g. "on the move" versus "stationary" spatial working behavior, the effects of potential users' beliefs regarding mobile technology on their behavior intentions might be non-uniform. Hence, our first research objective is to examine the moderating effect of FWS between physicians' beliefs and behavior intentions on the system under investigation. Physicians who are very likely to do jobs in highly fragmented space might perceive a mobile system is useful and compatible with their work. They might perceive the system as easy to use even though much mental effort might have to be committed because it is the only convenient and handy channel to access information. As they work in different places, they need a suitable mobile tool to perform tasks at any place according to their spatial working preference. Therefore, they might be easily influenced by the opinions of important reference groups. Thus, we pose the following hypotheses:

*H1: In cases of FWS the influence of perceived usefulness of a mobile information system on a physician's behavior intention will be stronger for those who have a high level of FWS in performing the work.*
*H2: In cases of FWS the influence of perceived ease of use of a mobile information system on a physician's behavior intention will be stronger for those who have a low level of FWS in performing the work.*
*H3: In cases of FWS the influence of perceptions of social influence of a mobile information system on a physician's behavior intention will be stronger for those who have a high level of FWS in performing the work.*
*H4: In cases of FWS the influence of perceptions of compatibility of a mobile information system on a physician's behavior intention will be stronger for those who have a high level of FWS in performing the work.*

Prior empirical work grounded in technology acceptance models has examined the effects of external variables on internal beliefs and adoption decisions (e.g., Legris et al., 2003; Venkatesh et al., 2003). None of these studies has examined the effects of temporal working behavior of an individual, i.e. how the way he/she organizes work in a fragmented manner according to the degree of fragmentation of working time (FWT) affects internal beliefs and adoption behaviors. Hence, our second research objective is to examine the influence of FWT as an external variable. As mobile technology offers more freedom to people not adhering to a specific working time frame, polychronically oriented individuals with their higher fragmented working time might perceive a mobile information system as useful and compatible with their job. Physicians are pragmatic; they might not use a system because of its ease of use (Berg 1999, Chau and Hu, 2002a and b). Freedom or value added derived from mobile technology in providing support at the point of care and at the point of need means that physicians with a polychronic temporal preference can deal efficiently with many unexpected events occurring during their working time (Berg 199). Thus, any external stimuli might not affect their perception of ease of use of a system. It might affect physicians' intention directly to use mobile technology. Therefore, we come to the hypotheses:

*H5: FWT has a positive and direct effect on a physician's perceived usefulness of a mobile information system.*
*H6: FWT has a positive and direct effect on a physician's perception of compatibility of a mobile information system.*
*H7: FWT does not have any effect on a physician's perceived ease of use of a mobile information system.*
*H8: FWT has a positive and direct effect on a physician's behavior intentions to a mobile information system.*

## 4. Methods

### *4.1 Instruments*

Items assessing various constructs are adapted from past research with changes in wording to make them appropriate for the mobile medical information system and the health-care context. In particular, items such as perceived usefulness, ease of use and social influence were adapted from Davis et al. (1989) and Venkatesh et al. (2003); items such as behavioral intention and items such

as compatibility came from Moore and Benbasat (1991) with reference to Teo and Pok (2003). Most constructs were measured on a five-point Likert-type scale ranging from (1) strongly agree to (5) strongly disagree.

As measurements of temporal and spatial working styles in terms of FWT and FWS, I created an aggregate, which was calculated on the basis of the 7 temporal dimensions and 5 spatial dimensions aforementioned in the theoretical section. The questions to measure the temporal dimensions are: (1) I usually have a fix schedules; (2) I usually do many things at the same time; (3) My work schedule often depends on other peoples' schedule; (4) I usually try to keep on a specific schedule at work; (5) Unexpected events occur often during my working day; (6) Unexpected events can influence my work schedule; (7) Over a long period of time, my work is becoming a routine; (8) I do work in my free time (non-office time); (9) My typical working day is planned and I usually achieved what is planned. The questions to measure the spatial dimensions are: (1) I usually do work at my own office; (2) My patients visit me by appointments; (3) for different reasons, I visit other places near my office often during my working time; (4) I often go to other buildings within my work location (same hospital or healthcare centers); (5) I do work on a transportation vehicle (e.g., bus, train, plane or ferry etc); (6) I regularly visit other healthcare locations (other hospitals or healthcare centers) within or outside the same municipality; (7) I take "house call" visit; (8) I do work at home sometime. The answers to the questions on organizing work were used to distinguish between less FWT and high FWT, less FWS and high FWS subjects. The aggregate is computed as follows: the answers to the questions are binarily coded to indicate tendencies towards less FWT or high FWT temporal behaviors, and less FWS or high FWS spatial behaviors. The aggregate is used further to place physicians on a continuum ranging from less FWT to high FWT, and from less FWS to high FWS based on the mean values (mean FWT= 5.63, S.D= 1.93; mean FWS=3.19, S.D=1.58 ).

### *4.2 Study Context*

In Finland, the first computerized medical information database was launched in 1989 and disseminated on diskettes. It mainly contained 20 Finnish collections of guidelines dealing with common and important primary healthcare problems. In 1991, a CD-ROM was issued with the database as well as other, additional databases, e.g. Finnish medial journals, laboratory databases, pictures. During the whole of the 1990s, Duodecim Publishers Ltd, fully owned by the Duodecim Finnish Medical Society, has put more effort into improving evidence-based medical guidelines (EBMG) and making them more comprehensive and reliable. With the development of Internet technology, an Internet-based version of EBMG was introduced in October 2000(www.ebm-guidelines.com). Translation into English was completed 2000 and into Swedish in 2001. It has established as an important source of information for Finnish physicians. Currently, EBMG as well as other databases, e.g. drug, diagnosis, etc. can be accessed by various channels, including printed books (published annually), Intranet or the national Internet portal Terveysportti (www.terveysportti.fi), which also contains links to many domestic and international providers of healthcare information. In 2003, a mobile version of those databases was developed and ready for a pilot trial. The mobile medical information system is built on an XML database and can easily be modified to work in most mobile devices with different operating systems e.g. Symbian, Palm OS and Windows CE, etc. The system also contains search engine and user interfaces. In Finland the device most commonly used as a platform is the Nokia 9210 Communicator. Currently the updates are delivered as physical memory cards, the

users returning the older ones. In the near future the system will be able to update itself partly or completely through the wireless network. For instance, a new price list for drugs was updated successfully through the GSM network in autumn 2003.

This study was conducted in close co-operation with Duodecim Publisher Ltd. From spring 2003, the Publisher has, with support from Pfizer Finland Oy, started a pilot trial in which 800 physicians were supplied free with Nokia 9210 communicators equipped with the mobile databases. It is voluntary for them to sue it in their work. The questionnaires for this study were sent out through training sessions provided by the Publishers from November 2003 to January 2004. In total, 350 questionnaires were distributed; 151 were returned and of these 17 had incomplete responses and were excluded from the data analysis. Thus, useful answers totaled 134, showing a 38% valuable response rate. There were 88 respondents located in the less FWT group, 46 in the high FWT while 79 were grouped as less FWS, 55 as high FWS.

# 5. Results

## *5.1 Analysis of Measurement Validity*

The validity of the measurements was evaluated in terms of reliability and construct validity. The reliabilities of the measures using Cronbash's alpha were 0.96 for behavior intention, 0.95 for usefulness, 0.87 for ease of use, 0.81 for social influence, and 0.89 for compatibility. The coefficients of these latent variables are all above the value of 0.70 often recommended in a survey. Construct validity of the instrument was evaluated by computing convergent and discriminant validity using factor analysis. A principal component with a varimax rotation was performed. Table 1 summarizes the factor analysis results. Six factors were obtained with eigenvalues greater than 0.50. The convergent validity is therefore satisfactory. Meanwhile, each item's loading is higher on its respective construct than that on any other construct. This indicates the measures exhibited satisfactory discriminant validity. Therefore, the instruments used in the study are adequate.

| Items | Factor1 | Factor 2 | Factor 3 | Factor4 | Factor 5 |
|---|---|---|---|---|---|
| PU1 | .808 | .329 | .249 | 5.701E-02 | .147 |
| PU2 | .880 | .182 | .176 | .155 | .171 |
| PU3 | .865 | 9.317E-02 | .166 | .169 | .256 |
| PU4 | .873 | .147 | .291 | 6.522E-02 | .174 |
| EU1 | .164 | .890 | .235 | -.105 | .106 |
| EU2 | .222 | .835 | 8.266E-02 | -7.167E-02 | .226 |
| EU3 | .186 | .709 | .399 | 3.689E-02 | .296 |
| SI1 | .139 | -.127 | -5.017E-02 | .886 | .134 |
| SI2 | .111 | 9.126E-03 | 3.796E-02 | .924 | -1.799E-02 |
| COMP1 | .465 | .364 | .204 | 5.731E-02 | .700 |
| COMP2 | .290 | .307 | .239 | .118 | .822 |
| BI1 | .366 | .350 | .813 | 1.779E-03 | .191 |
| BI2 | .400 | .257 | .831 | -2.935E-02 | .215 |
| Eigenvalues | 6.90 | 2.08 | 1.14 | 0.71 | 0.61 |
| % of Variance | 53.09 | 16.03 | 8.80 | 5.47 | 4.67 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

**Table 1 Results of Factor Analysis**

### *5.2 Hypothesis Testing*

The research model was evaluated by running linear regression procedure in SPSS 11.0. Table 2 contains the regression results used to address hypotheses 1 through 4. The following analysis was conducted: a multiple regression was run with intention as the dependent variable and each of the four beliefs, fragmentation of working time and fragmentation of working space as independent variables, together with a multiplicative term for FWS and each of the four beliefs. A significant coefficient for the multiple terms was considered as the term of interaction effects (Cohen and Cohen, 1983). As shown in Table 2, the proposed model can explain up to 61% of the variance in physicians' behavior intention as regards the information system. Fragmentation of working space had a significant negative moderating effect on the relationship between perceived ease of use and behavior intentions. None of the other three interactions was significant. Thus, hypotheses H1, H3 and H4 were not supported but H2 was supported.

| **Dependent Variable**: Behavior Intention (N=134) | | |
|---|---|---|
| | D ONLY | D+I |
| $R^2$ | .60 | .64 |
| Adjusted $R^2$ | .58 | .61 |
| PU | .46(5.55)*** | .46(5.06)*** |
| EU | .35(4.49)*** | .46(4.99)*** |
| SI | ns | ns |
| COMP | ns | ns |
| FWT | ns | ns |
| FWS | ns | ns |
| PU*FWS | | ns |
| EU*FWS | | -.45(-2.47)* |
| SI*FWS | | ns |
| COMP*FWS | | ns |

Notes: 1. D ONLY: Direct effects only; D+I: Direct effects and interaction terms. 2. β (t value) is reported. 3.*p<0.05, **p<0.01, ***p<0.001, ns-not significant.

**Table 2 Hypotheses Testing**

The remaining hypotheses, H5 through H8, were tested by means of a multivariate multiple regression (run using the SPSS 11.0 GLM procedure) with the three beliefs (usefulness, ease of use and compatibility) and behavior intention as dependent variables and the fragmentation of working time as the independent variable. The overall relationship between the two sets of variables was significant using Pillai's criterion (F = 2.66, Sig. = 0.035). Hypothesis H5, which proposed that the fragmentation of working time would affect usefulness of the mobile system directly, was supported, but negatively (ß = -0.174, t = -2.824, Sig. = 0.005). But other relationships were not statistically significant. Thus, H7 was supported while H6 and H8 were not supported.

## 6. Discussion and Conclusion

The study conducted is an exploratory research activity in order to ensure a more rigorous, more conclusive future study. Exploratory research, in essence, is concerned as a useful preliminary step that helps in discovering or clarifying the general nature of the problem and the variables that relate to it (Tull and Hawkins, 1987). The preliminary research aims to refine the problem into a researchable one not yet to be formal or precise but with a high degree of flexibility. It will help in uncovering hypotheses.

This paper set out to explore physicians' behavior intentions as regards a mobile information system by examining the effects of physicians' temporal and spatial working behavior. A research

model involving 134 physicians currently working in the Finnish health sector was proposed and empirically tested. The results of the regression analysis showed that the research model could explain 61% of the variance in physicians' behavior intentions.

Only hypotheses H2 and H7 predicted by the theory underlying the research model were supported by the data, and partly for H5. The proposed interaction effects are presented, increasing the level of the variance in behavior intention explained by 3%. The lack of support for the moderating effects of FWS on all proposed relationships might be not so surprising in view of the nature of physicians' work; its spatial nature is rather "stationary" and less spatially fragmented. Physicians still adhere largely to their traditional way of working. The office or physical space of health-care centers or hospitals are the preliminary space for the performance of their tasks and for meeting patients. In other words, their work does not require much geographical movement globally. Even if their work involved intensive local mobility, the accessibility of other information resources, e.g. desk computer, colleagues, and printed books, might undermine the advantage of the mobile information system provided. Furthermore, it is confirmed that the influence of perceived ease of use of the mobile information system on physicians' behavior intention was weaker for those working mostly "on the move", but was stronger for those working "stationary". It is understandable that when physicians are on the move, they are less likely to be able to access information by other means. Then they might depend mainly on the mobile information system to retrieve relevant medical knowledge and information at the point of need and consequently be more ready commit more mental effort to using the system. From another perspective, physicians who perform their work mostly in a "stationary" manner are likely to be able to access other information resources more conveniently. Therefore, they rate perceived ease of use as a more important factor that might determine their decision to adopt the mobile information system.

The lack of support for the effects of FWT on physicians' internal beliefs and intentions is surprising. The explanation might lie in the fact that physicians, who are mostly polychronically temporally oriented with high fragmented temporal working behavior, might already have suffered from information overload. In that case the availability of the mobile information system might exacerbate the situation. The bad effect of FWT would reduce individuals' productivity and performance (Tétard 2002). Thus, they might perceive the mobile system as less useful for their practice, as well as not matching their current working values. As a pragmatic and professional group, physicians do not use the mobile system because of its ease of use.

Technology is transforming working behavior in terms of time and space. It is of great importance to examine their effects on an individual decision to accept technology in organizations. Mobile technology has penetrated work practices by supporting mostly "mobile" workers. Workers' "geographical movement", their changing spatial working behavior, has the potential to moderate the relationships between individual beliefs in the technology and their behavior intention to use it. Their temporal preference, here defined as an external variable, provides a significant effect on physicians' internal beliefs in mobile technology. It is too soon to examine the effects of temporal and spatial working behavior on individual adoption of technology in general and mobile technology in particular. Our findings need to be further validated rigorously in other organizational contexts and different user groups, e.g. business professionals, focused on.

## 7. References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