Understanding ICT Intention to Use by Healthcare Professionals in a Developing Country: Can Perceived Risk Theory help the Pharmacists?

Full Paper

Mary Ann Barbour El Rassi
Saint Joseph University, Lebanon
Jadelios@yahoo.com

Abstract

For the last two decades, the challenge of enhanced competition in the healthcare industry has been tackled through the ICT adoption due to the constant pressure and awareness to cut off expenses and reduce costs. However, unless the healthcare professionals in developing countries incorporate the use of ICT in their system, the benefits will not emerge. This research proposes a model to investigate the relationship and effects of users’ perceived risk, resistance to ICT usage and the enabling perceptions. The structural equation modeling technique was adopted to analyze the data gathered from healthcare professionals and therefore, to validate the proposed model. The results had identified relevant issues to successfully implement ICT in this industry shedding the light on many areas that could necessitate further research. Perceived risk strongly influences the intention to use the online system while the perceived usefulness represents an important role as a mediator.

Keywords

TAM, ICT, Resistance, Perceived Risk, Pharmacists, Healthcare

Introduction

For the last decades, information technology had proven to be having a major impact on most of the industries. Many industries have adopted ICT use to streamline their operations and leverage the potential benefits that this new economy could bring to their businesses (Rowe, Truex, & Huynh, 2012). Thus, the emergence of pharmacy benefits management system (PBMs) represents an important strategic revolution that had been seen in the pharmaceutical industry since the 1990s. Pharmacy benefits management today, offers a range of services that are tailored to affect the outpatient prescription medicine use and costs savings through the online platform. However, the use of ICT in pharmacies is usually resisted by the same users that are supposed to be taking advantage of using it. Undoubtedly, and given the expected potential advantages and benefits when this system is being adopted by the healthcare providers and more specifically by pharmacists, there are still many potential users that are still underestimating what this system could offer and resist to using it and integrating it in their work process.

The use of the Information and Communication Technology in the health care system in developing countries could bring many potential advantages (Bedelely, & Palvia, 2014; Sharifi, et al. 2013). It could enable the storage of structural patient’s records, facilitating the prescription and buying /selling process, automate the medicine bills and delivery in the supply chain and most importantly controlling the efficiency and efficacy of medicine use and improve the patient’s safety as well. A large number of pharmacists are already using ICT to support
their daily routine tasks and thus, when considering the IT necessities for their daily working practices, pharmacists should take into consideration what is the best system to use.

This research aims at investigating the adoptions of ICT use in the health care system and more specifically by pharmacists. Therefore, we attend to investigate the following major questions:

- Why do many pharmacists resist adopting the PBM which is an ICT tool.
- What is the role of the perceived risk in their intention to use.

Addressing this gap in knowledge is very crucial for practitioners and scholars as well, as it could enhance their understanding of ICT adoption and bring e-business adoption a step further. From a practitioner's perspective, understanding why pharmacists resist in adopting the online PBM system and how this resistance is visible in their attitude could possibly assist healthcare managers or policy makers to implement rigorous strategies for reducing pharmacists' resistance in adopting it. From a theoretical perspective: First, though there has been significant research on different e-health care issues in developed and developing countries, it is still not comprehensible if the knowledge attained from these research studies could be applied in the context of the online PBM adoption system or for the context of a developing country. This is due to the lack of sufficient legislation in e-business and the nature of this market that differentiates it from others, whether in the cultural, economic or geographical aspects. Second, previous research concerning the IT use has mostly disregarded the importance of the user's resistance or perceived risk in parallel with the behavior models or has been limited. We have to note at this stage that resistance does not necessarily concern the non-users only. “Non users” could be simply “non-users” that are unaware of the innovation or are still evaluating the innovation before adopting it. Therefore, for the purpose of our research we aim at examining the intention to use along with the IT resistance behavior among pharmacists as we consider that resistance is a major factor that could influence the online PBM adoption in the pharmaceutical industry. We also take into consideration the perceived risk factors in parallel with the resistance and intention to use to investigate if risk could possibly be an influential factor. Therefore, this theoretical model is expected to be tested on a larger scale by using a survey data from a large sample of pharmacists.

PBM System and the Lebanese Pharmacies

Pharmacy benefits management (PBM) system has changed over the last two decades from different aspects. It has been used for processing firm’s claims, mail orders, and a supportive alternative for insurance firms and managed healthcare institutions. The competitive environment and the rising health care costs have again become an important factor that had influenced the healthcare companies to search for a new alternative such as adopting new technology and creating new business models. Gaining control over claims can reduce an insurer's cost significantly. These activities had led to improve the service quality and cost savings by gaining control over the prescription claims, lowering processing charges and avoiding any waist or uncontrollable orders. Competition in the PBM industry has centered on managing drug benefits on a carved-out basis, independent of other health care services and benefits. Nevertheless, PBM firms expect a promising future role in adopting the role of disease management for chronic disease patients especially those with high cost such as cancer, diabetes and asthma. This would allow them, not only to improve the delivery of health care service to their patients, but also to profit from their constant move once they are loyal to the system. What is exactly the PBM system? In Lebanon, there are 3999 official pharmacists operating and are spread all over its territories in addition to three “third party administrators” (Globemed, Nextcare and Bankers) that offer the PBM service on the behalf of insurance companies and the social security system (in case the patient is registered in both systems). Patients’ data is usually uploaded into the Pharmacy Benefit Management web system by the third party administrator (TPA) to manage their pharmacy programs from their database where the patient can access all related information needed such as predefined list of medication approved and pharmacies that are already adoption the PBM system online. Despite several efforts to create an efficient e-health care system, most citizens in developing countries still rely on their own pocket to finance their health care needs. In many cases, these
out-of-pocket expenditures could account for up to 80% of their total health expenditure with no guarantee of 100% reimbursed later. In an era where the healthcare service is considered one of the major service industries Lebanon, it is important to investigate the ICT intention to use as it could bring this industry a step further. Lebanon, and due its geographical location and human resources experience, has always been considered as a role model in the service industry and more specifically in the healthcare industry in the Middle East region (Lebanese Ministry of Economy and Trade Report, 2013).

**Previous Research**

There have been many studies and scholars that have discussed the role of health practitioners in resisting IT adoption, such as doctors, nurses and employees (Taylor et al., 2002) but there has been no systematic investigation concerning the pharmacists in resisting or adopting ICT in their daily routine work. Furthermore, the relationship between intention to use and behavior was different among the two groups. In a research study, Lapointe & Rivard (2005) observed significant evidence of physician resistance to clinical IT adoption. Hassan et al (2011), identified several factors that affected ICT usage among JKKK members in Malesia. Attitude was identified as the most significant contributor for perceived usefulness towards ICT usage while Perceived Usefulness and Perceived Ease of Use, Self-efficacy and Subjective Norms explained about 60% of the variance/variation in perceived usefulness towards ICT usage. The above research studies share the same view when it concerns user resistance as a significant problem for information technology use in general (Venkatesh & Brown, 2001) and more specifically in the healthcare sector (Poon et al 2004). In addition, they imply to resistance as the result of different factors than IT acceptance. Yet, most of those studies were conducted separately and in developed countries, and not for the case of developing country. As we know, developed countries differ from developing countries in terms of services availability and facilities (El Rassi and Harfouche, 2016; El Rassi, 2016). In addition, the results are not necessarily tied to each other. Part of the problem may have been the lack of a comprehensive theory of users’ resistance and risk taking and the lack of grounding within an established stream of research. In the next section, we attempt to build such a theory, while also grounding it in the IT adoption and resistance to change literature. The source of one of the most broadly acknowledged psychological models that compels organizational behavior is the idea that there is a resistance to change. This could be traced back to Lewin’s (1947) research on force-field analysis in the organizational development literature. Lewin had argued that the social system tends to preserve its actual status by resisting to a new change. The present study also considers the perceived risk attitude when considering ICT adoption. Perceived risk has been rarely taken into consideration in the online healthcare research studies. According to Dowling and Staelin (1994), perceived risk is a construct of perceived situations that has been described in several ways. To simplify it further, numerous types of perceived risk have been adopted in several research contexts and defined as follows: financial risk, performance risk, physical risk, psychological risk and convenience risk. (Dowling and Staelin, 1994; Islam, & Daud, 2011). Based on Zakaria and Mohd Yusof (2001), a culture that tends towards supporting and promoting change, would be more ready to accept the use and implementation of ICT. Resistance towards using ICT in the healthcare system could possibly be witnessed if the culture is resistant to change.

**Research Designs**

**Research Model**

At this point of our research, we may state that all the above perspectives and definitions highlight the importance of the exceptional characteristics of the resistance to change construct and its difference from the information technology acceptance for two major reasons: the acceptance behavior of an innovation is driven by user’s perceptions that are related to ICT, while resistance is usually against change rather than against ICT adoption; Resistance could be understood as a result of a cognitive behavior that affects the potential behavior rather than
a simple behavior (Lewin, 1947) and could be considered as a possible predictor of ICT rejection or acceptance. Perceived Risk could be treated as a multi-dimensional construct. It could consists of several types of risk including financial risk, performance risk, physical risk, psychological risk and convenience risk as well (Huang et al 2002; Rindfleisch and Crockett, 1999). In order to investigate further our research objective, we consider that Cenfetelli’s (2004) dual-factor model of Information Technology use is an important model for us to start with. Similar to Lewins’ (1947), this model considers that the ICT use is affected by enabling and inhibitors factors as well. The model considers also that inhibitors discourage ICT use when it is there, but does not essentially encourage the use when missing. Based on the above description of Resistance and Cenfetelli’s model of ICT usage, we suggest that pharmacists intentions to deploy ICT and more specifically PBM systems is based on the Technology Acceptance Model (Davis et al., 1989; Venkatesh et al., 2003), such as Intention to Use PBM, perceived Ease of Use and Perceived Usefulness in addition to the Resistance to Change theory and the Perceived Risk theory as well.

**Research Hypothesis**

Perceived Usefulness refers to which extent the potential users suppose that the system use could improve the job performance, while Perceived Ease of Use refers to which extent the potential users suppose that the system use could be somewhat free of any effort (Davis et al., 1989). The TAM model proposed by Davis et al (1989), suggested that the Perceived Usefulness (PU) and the Perceived Ease of Use (PEOU) as well are important cognitive factors that determine the Intention to Use ICT. Thus, and according to the TAM model, (PEOU) and (PU) are expected to influence their intentions to use ICT. Therefore, we propose the following hypothesis:

H1- Pharmacists’ perceived usefulness of PBM system use has a significant influence on their intention to use it.

H2- Pharmacists’ perceived ease of use of PBM system has a significant influence on their intention to use it.

Yet, introducing a new system to adopt is usually subject to resistance as it would often cause significant change for the users’ routine tasks. Users will most often tend to resist to change and the new technology implementation or adoption which would result in a lower intention to use (Poon et al. 2004). Therefore, we suggest the following hypothesis:

H3 - Pharmacists’ resistance to change has a significant influence on their intention to use the online system.

According to Cenfettelli (2004), resistance could also be considered as an indirect factor that could affect ICT intention to use through mediators. (PEOU) and (PU) could be directly influenced by resistance. In light of this, we propose the following hypothesis to be tested:

H4 - Pharmacists’ resistance to change has a significant influence on their perceived usefulness

H5 - Pharmacists’ resistance to change has a significant influence on their perceived ease of use.

Vijayasarathy & Jones (2000) argue that the perceived risk has a negative influence on (PU) and (POEU) as well. Thus, we can consider that perceived risk is a measure that precedes (PU) and (PEOU). Therefore, we tend to propose the following hypothesis:

H6: Perceived risk has a significant influence on pharmacists’ perceived usefulness (PU).

H7: Perceived risk has a significant influence on pharmacists’ perceived ease of use (PEOU).

Following to the literature review, we propose a model to be used by the healthcare community and more specifically by pharmacists to predict usage intentions by identifying the enablers and inhibitors from the perceived risk, resistance to change literature as well and based on Cenfetelli’s (2004) dual-factor model of ICT usage. This model took into consideration the broad nature of association between the factors that enable or inhibit information technology use. The only restraint to their model is that it did not take all the above mentioned factors. We have extended the model by recognizing factors that could affect PBM use. A preliminary model is represented in figure 1.
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Research Methodology

The major objective of our study was to propose a model to investigate the relationship and effects of users’ resistance of online PBM usage and the enabling perceptions in the healthcare industry and more specifically in the pharmaceutical industry in a developing country. Therefore, the research was conducted in Lebanon, which is considered a developing country (Lebanese Ministry of economy and trade report, 2013).

Sample, Data Collection and Response Rate

Our research methodology was based on a survey conducted among a large number of pharmacists that were chosen from the order of pharmacies and were operating in Lebanon. The list contained 3999 pharmacists among which 623 pharmacists were working or owning pharmacies that were using the system. We ended up with 99 responses that seemed to be valuable and useful to our research study which is equivalent to a 15.9% response rate. According to other studies conducted in the IS field, this rate is quite acceptable (Pinsonneault, & Kraemer, 1993).

Statistical Analysis, Findings and Discussion

Data collected was analyzed through the use of Structural Equation Modeling technique (SEM) and was processed by using Smart PLS (Ringle, Wende, & Will, 2005). We first started by measure the internal consistency of the different constructs in this model as measuring the internal consistency is very important before the results’ analysis (Petter et al., 2007). Therefore, we have used the « composite reliability »values that traditionally replace the «Cronbach’s alpha» values. We then checked the Variance of the latent variables.
and we finally estimated the structural model by using Smart PLS. The last phase consisted of using the Sobel test in order to check the mediator role of some of the variables.

**Validation of the Model: Scale Reliability**

**The Internal Consistency of the Model**

Based on the proposed model, we proceeded by measuring its internal consistency (Petter et al., 2007). For this purpose, we have used the « composite reliability » as stated before and considered 0.7 as a minimum acceptable level (Bagozzi & Yi, 2012). According to the results, all the latent variables have a composite reliability >0.7 which allows us to conclude that there is an acceptable level of consistency within the constructs of this model.

**Variance of the Latent Variables and the Bootstrapped Model.**

We proceed further by checking the variance of the latent variables and estimating the above model using Smart PLS, and the results are presented in the below table.

<table>
<thead>
<tr>
<th></th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>Standard Deviation (STDEV)</th>
<th>T statistics (T-values)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>0,721</td>
<td>0,713</td>
<td>0,075</td>
<td>9,638</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>H2</td>
<td>0,139</td>
<td>0,149</td>
<td>0,083</td>
<td>1,970</td>
<td>0.05</td>
</tr>
<tr>
<td>H3</td>
<td>0,170</td>
<td>0,160</td>
<td>0,087</td>
<td>1,960</td>
<td>0.05</td>
</tr>
<tr>
<td>H4</td>
<td>0,110</td>
<td>0,102</td>
<td>0,108</td>
<td>1,017</td>
<td>0.23</td>
</tr>
<tr>
<td>H5</td>
<td>-0,132</td>
<td>-0,131</td>
<td>0,117</td>
<td>1,127</td>
<td>0.20</td>
</tr>
<tr>
<td>H6</td>
<td>-0,549</td>
<td>-0,553</td>
<td>0,087</td>
<td>6,332</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>H7</td>
<td>-0,349</td>
<td>-0,358</td>
<td>0,128</td>
<td>2,731</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Table 1. Bootstrapping Results**

The results generated from this study led us to some interesting findings. Regarding the Resistance to Change theory, it has an influence on the Intention to Use (IU). The relationship between those two constructs seems to be statistically significant even though not very strong (path value = 0.170 and t=1.96). While the remaining two relationships, Resistance to Change towards Perceived Usefulness (path value = 0.110; t=1.017) and Resistance to Change towards Perceived Ease of Use (path value=-0.132 ; t=1.127), do not show any statistical significance.

The relationship between Perceived Ease of Use and the Intention to Use is also significant (path value = 0.139 and t=1.97) but not as strong as the relationship between Perceived Usefulness and the Intention to Use which is significant and very strong (path value = 0.721; t=9.638).

The relationship between the Perceived Risk and the Perceived Usefulness appears to be significant but negative (path value= -0.549; t= 6.332) while the relationship between Perceived Risk and Perceived Ease of Use appears to be strongly significant but negative (path value =-0.349; t= 2.731).

Furthermore, the Intention to Use construct has an R²=0.589 which implicates that the two constructs, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), explain 58.9% of the intention to use process (see table 2).
Perceived Risk (FR) and Resistance to change (RC) explain 28.2% of the Perceived Usefulness construct \( R^2=0.282 \) and Perceived of risk and Resistance to Change explain only 16.4% of the Perceived Ease of Use. 

The « IU » variable has the highest value of R square (0.589) which means that the «PEOU », «PU » and « RC » variables explain 58.9% of the variance in « IU ». Despite the fact that the R2 values for the last two mentioned constructs exceeded the required minimum of 0.1 (Santosa et al. 2005), the Perceived Ease of Use (PEOU) is considered relatively low. This could lead us to conclude that there might be other additional significant factors that could describe our model.

According to the above results in table 2, 5 hypothesis were statistically valid (H1, H2, H3, H6 & H7) and the remaining hypothesis were statistically rejected (H4, H5).

**Mediator Role**

We propose to test the significance of the mediation effect through a Sobel test (Sobel, 1982). Thus, the Sobel test value for Perceived usefulness that acts as a mediator between “Perceived Risk” and “Intention to Use PBM” is relatively strong while the “Perceived Ease of Use” mediator that acts between “Perceived Risk” and “Intention to Use” is found to be weak.

**Table 3. Sobel Test Results**

<table>
<thead>
<tr>
<th>Fear of risk → Perceived usefulness → Intention to use PMB</th>
<th>Sobel Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Fear of risk → Perceived ease of use → Intention to use PMB</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Conclusion, Implications, Limitations and Future Research**

This study aims at understanding why many pharmacists still resist adopting the BPM system which is an ICT tool and what is the role of the perceived risk in their intention to use it. For this purpose, we have proposed a theoretical model that could be tested further for the case of developing countries. Based on the empirical results, this research presented several contributions for policy makers and research as well.

In terms of contributions for policy makers, this research was specifically done to understand the actual situation of ICT adoption in the healthcare industry in Lebanon. Nevertheless, pharmacists are experiencing resistance that is influenced by the perceived risk factor for many reasons that hinder them from applying any online system that is proposed and tailored to them. Perceived risk can be considered as a valuable diagnostic tool for post-modern analysis of failed ICT use in the healthcare industry or ex ante evaluation of the ICT implementation success. Thus, policy makers in this field should measure and diagnose the current and expected levels of users’ perceived risk and that is by identifying the most influential source. Policy makers should also try to uncover the risk factors that are salient to their user population and assess the relative importance of these threats. In our current research, the risk sources were identified to be related to financial risk, performance risk, physical risk,
psychological risk and convenience risk as well (Huang et al 2002; Rindfleisch and Crockett, 1999). Thus, policy makers should identify and quantify such risk by communicating openly and honestly with their targeted users in an attempt to lessen the risk before conducting any ICT implementation.

Since perceived usefulness variable acts as an influential mediator between the perceived risk and intention to use, this explains the relationship between the dependant variable (IU) and the independent variable (PR). The process of complete mediation is defined here as the complete intervention caused by the perceived usefulness. The major problem in adopting such a system and integrating it in their daily routine is the risk behind the perceived usefulness much more than perceived ease of use, even though both are considered important for our case. Once the risk is managed, users will be more willing to perceive the advantage in using the system and use it more efficiently.

Thus, these factors can be used by policy makers as essential references to promote using the PBM system or any other online system that could help them further. In terms of contributions to researchers, in the internet era, ICT adoption has become of the most important key factors that could determine the organizations success. Despite the fact that there have been several studies that focused on the ICT adoption in the healthcare industry, there hasn’t been much done in developing countries and more specifically in the pharmaceutical industry. However, this study has been done to fill this gap in knowledge and the findings can be used as a foundation for future research. In doing so, we showed that negative perceptions, such as perceived risk, influence ICT intention to use indirectly. This suggests that in situations where the risk perception is predominant, scholars should consider this important construct in existing models of ICT intention to use and cautiously study the complex relationship by which risk may shape ICT intention to use.

With no exceptions, this study has several limitations. One of the limitations could be contributed to the sample size. Given the fact that the survey was collected through online survey software, and the sample size was small, we were not able to collect a larger sample. Testing the model on a larger sample that could include other professions in the healthcare industry, such as physicians for example, could be recommended. Therefore, a larger sample would have been recommended to have more solid results.

Given the fact that both mediators have resulted in $R^2<0.4$, this leads us to conclude that there might be other factors than resistance and fear that could influence their adoption. Furthermore, a detailed study concerning the direct effects of the perceived risk could be interesting such as measuring the direct effect of financial risks, performance, physical, psychological and convenience as stated earlier and their potential weigh on the Intention to Use.

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