

The Effective Factors on User Acceptance in Mobile Business Intelligence

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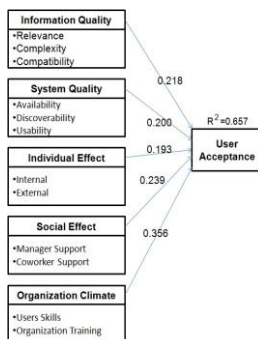
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Graphical abstract



Abstract

Mobile business intelligence used for business intelligence mobile service applications increasingly. According to Gartner (2011), global smartphone sales had arrived at 630 million in 2012, and are supposed to reach 1,105 million items in 2015. As a result, business intelligence users not only rely on desktop computers, while they as well want mobile access to joint and used data. Nevertheless, few studies have been consummate on mobile business intelligence services and the user acceptance rate of mobile BI is still moderately low. For these reasons, the current article centred on the significant of the factors and levels of mobile business intelligence user acceptance that affect the mobile business intelligence user Acceptance. The conceptual model planned and data collected between mobile business intelligence users and quantitative method used. The collected data, analysed by SPSS software. The result of data analysis exposed that how factors such as organization climate, information quality, system quality, society effect and individual effect were influenced user acceptance in mobile business intelligence applications.

Keywords: Mobile business intelligence; user acceptance; information quality; system quality; organization climate; individual effect and social effect

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1.0 INTRODUCTION

According to the Gartner (2013), in latest years many companies have decided their efforts in implementing business intelligence (BI) systems to get better their decision-making procedures [1]. A usual BI system offers functions such as reporting, multi dimensional analysis, online logical processing, ad hoc querying, data-mining and analytical modelling [2]. Nevertheless, in a progressively mobile globe, the mobile workforce needs significant information to be available immediately 'real time' at anytime and anywhere, therefore described for a focus on BI deliverance. In reply to this require, attention in mobile BI by business markets has grown obviously recently.

Mobile BI lets knowledge workforce on the move to achieve immediate access to BI, or to actionable information in different arrangements by handheld devices [3]. In exacting, based on Gartner (2011), universal smartphone sales will have reached 630 million units in 2012, and are predicted to arrive at 1,105 million items by year 2015. Consequently, IT-literate workers not only

rely on desktop computers, but they also want mobile access to corporate data. The following information show that mobile devices are now in everywhere: 33 percent of business intelligence reports and dashboards will be contacted via handhelds such as smartphones and tablets computers by year 2014 [4].

Approximately 60 percent of huge businesses are likely to have some form of mobile reporting and analytics inside the subsequently two years. So, 17 percent and 35 percent of respondents rated Mobile BI as "critically important" and "very important" correspondingly (Dresner, 2011). Near 33 percent of organisations preparation or in the process of planning of organize mobile BI (Gartner 2012). The above results shows that mobile BI will go most important flow in the near prospect since there is an rising development in the acceptance of mobile platforms to get real-time BI [5].

Nevertheless, Gartner's (2012) survey results show that mobile BI acceptance is still in its premature phases, with only 20 percent of the respondent organisations by mobile BI in 2012.

So, even though the rising smartphone sales universal, the acceptance rate of mobile BI is still fairly low. Consequently, there is a growing require to study which factors influences the user acceptance of mobile BI application [5].

Though, after a inclusive reconsider of the literature, we found very few past studies have explored the factors that control the acceptance of mobile BI user acceptance. Therefore, the plan of this paper is to consider related factors based on a exact test of the academic and consultant literature in this issue. The paper then in attendance the findings on factors, followed by the conclusion and recommendations for next research. Today, information and knowledge characterize the primary possessions of an organization. Associations try to use this prosperity to expand competitive advantage when making key decisions. Determined to realize a competitive advantageous place and attractive the firms' presentation comparative to their competitors should be the major business purpose for business organizations [6].

Organizations require to know fast what has occurred, and what is currently happening, in order to determine and influence what needs to happen in the prospect [7]. So, many organizations go on to raise their asset in implementing a variety of information systems (IS) e.g. business intelligence (BI) systems. BI systems create it probable for an organization to gain useful information from huge amounts of data from several sources. Businesses require BI to get better their performance, profit and to stay competitive in today's greatly violent business world [8].

In 2010 and 2011, BI peaked the list of mainly significant application and technology developments in a yearly survey that was detained under senior IT executives from over 600 respondents situated in US, Europe, Asia and Latin America [9]. Additionally, research shows that most organizations should focus their IT asset plan on BI [10].

The present BI systems in mainly organisations are only available on desktop computers and laptops. Ten years ago, laptops, set with WiFi admission were a benefit to mobile productivity. Business travellers were able to access business intelligence and analytical functionality at places outer of the organisation. Afterward, 3G USB firewood enabled laptop users to join their laptop with the internet even as they were on the move. But, that doesn't make the laptop a perfect travelling tool for accessing BI systems; users have to boot up the laptop, which can take reasonably some time, and it is a quite large machine to carry around all the time. This doesn't raise the user acceptance in using a BI system when being on the move. The more pleased the user is, the more the BI system is used [11].

By increasing in number and options of mobile devices in organizations nowadays make general use of 'smart' devices such as smart phones and tablets. In compare of laptops, these gadgets are much more sensible to carry around in anytime and anywhere. Smartphones and tablets make it probable for workers to see and use significant company information in a more innovative way. In 2003, Research In Motion (RIM) established first BlackBerry smartphone, that enabled users to send and obtain e-mail and text messages and use the internet to access information [12].

Mobile BI is an rising technology with high prospect. Based on Dresner Advisory Services mobile BI study it has the highest precedence in many organizations after email and individual information. Even though interest and funds, not all BI plans are successful. BI success can be calculated by an increase in organizations' earnings, or improvement to competitive benefit [7](Farrokhi and Pokoradi, 2012). Measuring the go again on asset is a way that is sometimes used to calculate BI success [13]. Though, the return on asset of BI is often hard to measure, because many profits provide by BI are indefinable and non-

financial, such as superior decision-making and timely information.

User acceptance is definite as "an end-user's overall affective and cognitive evaluation of the pleasurable level of consumption related fulfilment experienced with an IS" A significant research has recognized user acceptance as an significant part of IS success. Because it is powerfully connected to users' motivation and skill to use information systems, user acceptance is a powerful determinant of planned, real and sustained use of IS [14]. User acceptance can be distinct as the "demonstrable willingness within a user group to employ information technology for the tasks it is designed to support" [14]. The matter of user acceptance is not limited to BI or mobile applications but is an essential factor for software development projects in common.

Mobile BI application acceptance is still in its first steps. So, even with the escalating smartphone sales global, the user acceptance rate of mobile BI application is silent relatively low. Consequently, there is an essential need to study which factors influence the user acceptance of mobile BI application. The success of business intelligence systems rely on the system's users. Without recognizing user acceptances factors, organizations can waste a lot of time and money on mobile BI and do not reach to organizational success. It causes detrimental results such as financial losses and not acceptance among staff. Then, understanding mobile BI application user acceptances factors is essential [14].

■2.0 BUSINESS INTELLIGENCE

Business intelligence (BI) is making decisions fast. It manages and analysis data for making decisions and improve competitive. By increasing amount of business data every two or three years, companies need to make decisions better and quicker. Business intelligence (BI) helps organizations to make knowledge from information from the data. Business Intelligence (BI) is the application to sustain the decision making process by transferring the suitable information into the right user at the right time [15].

Business intelligence (BI) systems establish information admission of end users and by presenting business solutions. These systems offer some tools for manage and process the compound business information that connected with the business situation like compound information analysis tools and information search tools. Business intelligence system condense IT costs and controls business information. It also develop the operational and warehouse data and managed information that are the extent of the information by office systems and web servers [15].

Business intelligence (BI) decrease report delays, expand operational efficiency, confer better agreements with suppliers and customers, find out damaged income, decrease record costs, put on the market data to stakeholders, thought investment, develop strategies with better marketing analysis, offers better decisions and also faces by suppositions with sensible information [15].

2.1 Mobile Business Intelligence

Mobile BI enables a mobile workforce to utilise handheld devices and gain access to real time analytics reports whenever and wherever the information is needed. Further, mobile BI encompasses additional capabilities not commonly available on desktops and laptops, for example, location awareness. It also possesses other capabilities such as tracking of near real time

data, proactive alerting to the user, and instant event-based action/function [16].

In fact, many MBI(mobile business intelligence) applications developers have learned that in a changing world not so many users can easily and precisely identify what data they will need and when. So the developers have created many set of key performance indicators and various types of reports, dashboards, tables, or charts for the wireless devices and for their small screens [17].

2.2 Theoretical Background

In this study we proposed mobile BI as an IS. Therefore, to show the relationship between quality factors, social and individual and organization climate with customers' satisfaction in a mobile BI system Delone and McLean's (1992, 2003) IS success model was used which is combined with mobile services user satisfactions variables.

Also, diffusion of Innovation Theory (DOI) [18] serves as a fundamental theoretical base of innovation adoption research in many disciplines, including sociology, communications, marketing, education, etc. [18]. DOI is one of the dominant theories used to examine adoption of IT innovation over the prior two decades [19].

DOI argues that variables such as relative advantage, compatibility, complexity, trialability, and observability impact an individual's decision to accept or reject IS innovation [20]. According to Tornatzky and Klein [18] there were other innovation variables such as costs, communicability, divisibility, profitability and social approval. Also, Moore and Benbasat [18] said that it is a helpful theory for studying a variety of IT innovations. There are many studies that used DOI theory to their studies the effect of IT innovation characteristics on the

individual acceptance of IT innovation [18]. Furthermore, DOI theory received reliable empirical support from prior studies on the individual acceptance of IT innovation [18].

3.0 RESEARCH MODEL

The MBI model explains the effect of factors in acceptance of the mobile BI. For doing this DOI and Delone and McLean models were used. Table 3.1 shows the factors and variables that used in this proposed model. As it was shown five factor such as information quality, system quality, individual effect, social effect and organization climate used in this model as independent variables that affect the user acceptance of the mobile BI. In the third column of this table the variables of each factor were shown.

After designing the model, factors and variables the questionnaire were designed. For each variable three question were designed and totally 40 questions designed. Four of these questions were about the demographical question about the respondents. Respondents were chosen between different groups of the mobile BI users. Many mobile BI groups from the Linkdin looked and the respondent selected. Questionnaires were distributed by the internet and 85 respondents answer completely for them. The collected data from the questionnaires inserted in SPSS software for analysis. Table 3.2 shows the alias and brief name of the factors and variables that used in the SPSS.

Table 3.1 Name of the factors and variables that used in proposed model

Row	Factors	Variables
1	Information Quality	Relevance
		Complexity
		Compatibility
2	System Quality	Availability
		Discoverability
		Usability
3	Individual Effects	Internal
		External
4	Social Effects	Manager Support
		Coworker Support
5	Organization Climate	Users Skills
		Organization Training

Table 3.2 Alias of the variables that used in SPSS

Variables	Alias in SPSS
Relevance	IQR
Complexity	IQCX
Compatibility	IQCB
Availability	SQA
Discoverability	SQD
Usability	SQU
Internal	IEI
External	IEE
Manager Support	SEM
Coworker Support	SEC
Users Skills	OCS
Organization Training	OCT

3.1 Information Quality

Information quality influences user [21]. Furthermore, according to the Fung and Lee (1999) the more trust customers have, the more information quality and good interface design influence user acceptance. “Information quality imprisons the e-commerce satisfied issue. Web satisfied should be modified, complete, appropriate, easy to understand, and safe if we expect prospective buyers or suppliers to initiate transactions via the Internet and return to our site on a regular basis.”

3.2 System Quality

System quality at first was established by Delone and McLean (1992). They defined system quality as obvious in the system’s in general performance that can be deliberate by individual perceptions of this quality [21]. This quality is a demonstration of the system’s hardware and software. Measures such as ease of use, convenience of access, reliability and flexibility have been used in before tested survey tool to measure system quality.

System quality in the Internet surroundings, measures the characteristics of an e-commerce system. Such as usability, availability, reliability, adaptability, and response time that are examples of qualities.

3.3 Individual Effect

Individual differences such as motivation, cognitive style, personality, gender, education have been found to impact individual acceptance. There are two type of individual effect such as extrinsic motivation and extrinsic motivation.

Motivation theory has been used to know individuals’ IT acceptance [14]. Motivation theory recommends that individual performance is identified by two basic types of motivation: extrinsic motivation and intrinsic motivation. Extrinsic emphasizes the importance of having an enjoyable and playfulness technology experience. Intrinsic motivation has been found as an important predictor of technology adoption [14].

3.4 Social Effect

Social pressure on technology acceptance performance has been generally recognized. Previous studies advise that the extent to which outstanding others view technology use as important has positive influence on technology acceptance behavior of an individual. Social pressure has been found to originate from a diversity of sources such as co-worker, supervisor, and friends. In organizations, co-workers and supervisors are important in influential technology acceptance behavior [14].

3.5 Organization Climate

Previous study has shown that organization climates are significant determinants of purpose to use technology. Usually, the impression of situational constraints has been operationalized using the apparent behaviours control construct in the theory of designed behaviour. Based on the theory of planned behaviour, the attendance or lack of requisite skills, resources necessary to do a behaviour can pressure the likelihood of performing that behaviour [22].

Organization climates have been extensively studied in the training literature. Furthermore to the requisite skills and resource, the training literature suggests that organizational learning climate could be influence behaviour [22].

3.6 User Acceptance

User acceptance is a general measure of IS success for which some standardised tools have been developed and tested [14]. User acceptance is a critical construct because it is important variables in systems analysis and design. It used in IS success and effectiveness, the success of decision support systems and office automation success, and in decision making [14]. In a Web-based system, user acceptance depends on many factors such as Web design, content, user interface, navigation and information structure [14].

From a marketing perspective, user acceptance depends mainly on performance. From a user’s perspective, acceptance is a particular form of assessment to decide the value or value of what is being used or provided. In a company’s view, acceptance is a critical element of user retention that leads to a company’s successful long-term association with users [18].

4.0 FINDING

Different analysis was done in SPSS software based on collected data. Table 4.1 shows the descriptive analysis results. As you can see in this table IQR has the highest amount in mean and OCS has the least amount in mean. So, it was concluded that information quality is significant factor that affect the user satisfaction in mobile BI. Whereas, the organization climate is rarely important in this issue in compare of other factors .In addition, other factors like system quality, individual effect and social effect are important factors in mobile BI user satisfaction.

Table 4.1 Result of the descriptive analysis in this study

Descriptive Statistics			
	N	Mean	Std. Deviation
IQR	85	3.86	.758
IQCX	85	3.68	.694
IQCB	85	3.58	.624
SQA	85	3.33	.892
SQD	85	3.26	.861
SQU	85	3.20	.784
IEI	85	3.22	.661
IEE	85	3.14	.639
SEM	85	3.19	.645
SEC	85	3.20	.613
OCS	85	3.13	.632
OCT	85	3.15	.627

Table 4.2 shows the result of the correlation analysis. For doing this the averages of the factors calculated and six factors input to this analysis. US is the dependent factor and other five factors are the independent. As it is shown in this table, the relation between the independent factor and dependents factors were strong. Therefore, SO, SE, IE, IQ and SQ have strong significant relation with US.

Table 4.3 shows the model summary table. It shows that the value of the R and R square. As it is shown in this table the value of R square is 0.657.

Table 4.4 shows the ANOVA table of the regression analysis, so as it is shown in this table sig=0 and this means the relation between factors is significant.

Table 4.4 ANOVA table

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.008	5	4.202	30.326	.000 ^b
	Residual	10.945	79	.139		
	Total	31.953	84			

a. Dependent Variable: US
b. Predictors: (Constant), SO, SQ, SE, IQ, IE

Table 4.5 Coefficients table of the regression analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.422		.318	-1.330	.188
	IQ	.219		.074	.218	2.966
	SQ	.157		.057	.200	2.769
	IE	.190		.074	.193	2.561
	SE	.237		.074	.239	3.214
	SO	.354		.073	.356	4.878

a. Dependent Variable: US

Table 4.5 shows the coefficients. In this table the amount of the sig is shown that the relationship between independents factors and depend factor is important and the amount of the beta shows or each factor.

As a result, based on the correlation analysis and based on the β value the SO (Organization Climate) has the highest β in compare that other factors, by it is equal to 0.356 and so the effect of this factor in user satisfaction is the highest. On the other hand, the lowest amount is for IE (individual effect) by β=0.193. The relations were shown in the Figure 5.1.

Table 4.2 Correlation analysis table

Correlations						
	US	IQ	SQ	IE	SE	SO
US	1	.525*	.484**	.529**	.536**	.606**
IQ	.525*	1	.286**	.326**	.306**	.318**
SQ	.484*	.286*	1	.278*	.306**	.266*
IE	.529*	.326*	.278*	1	.382**	.332*
SE	.536*	.306*	.306**	.382**	1	.267*
SO	.606*	.318*	.266*	.332**	.267*	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 4.3 Summary model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.81	.657	.636	.372

a. Predictors: (Constant), SO, SQ, SE, IQ, IE
b. Dependent Variable: US

5.0 RESULT AND DISCUSSION

In Conclusion, SO (organization climate) has strongly effective relation with user satisfaction and IE (individual effect) has rarely affected on user satisfaction. Also, the impact of the IQ (information quality), SQ (system quality) and SE (social effect) were enough related by user satisfaction.

The values of the R square are 0.657 and it means that the 65.7% of the factors that evaluated were related with user acceptance. Figure 5.1 shows the factors and the level of the impact of each on the user acceptance.

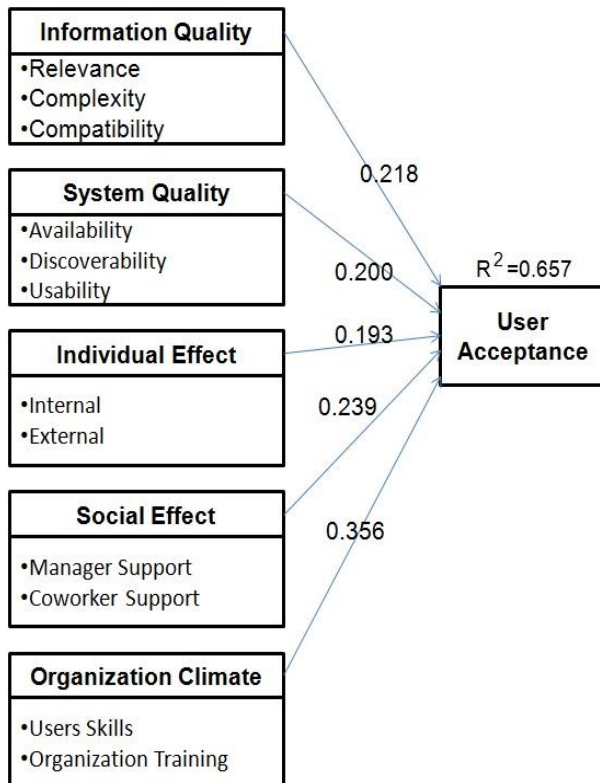


Figure 5.1 Mobile BI user acceptance model

6.0 CONCLUSION

In conclusion, in this study we identified the factors that influence on user acceptance in mobile BI applications. SO (organization climate) has strongly effective relation with user satisfaction and IE (individual effect) has rarely affected on user satisfaction. Also, the impact of the IQ (information quality), SQ (system quality) and SE (social effect) were enough related by user satisfaction. Also the variable like IQR (relevance) is more related to the user acceptance than other variables that studied in this research.

References

- [1] Chen, C.-Y., Shih, B.-Y., and Yu, S.-H. (2012). Disaster Prevention and Reduction for Exploring Teachers' Technology Acceptance Using a Virtual Reality System and Partial Least Squares Techniques. *Natural Hazards*. 62(3): 1217–1231.
- [2] Turban, E., Sharda, R., and Delen, D. 2011. *Decision Support and Business Intelligence Systems*. Pearson Education, Inc. Upper Saddle River, New Jersey.
- [3] Tyrväinen, T. 2013. Business Intelligence Trends in Finland in 2013. *Organizational Behavior and Human Decision Processes*. 83(1): 33–60.
- [4] Brodzinski, J., Crable, E., Ariyachandra, T., and Frolick, M. (2013). Mobile Business Intelligence. *International Journal of Business Intelligence Research (IJBIR)*. 4(2): 54–66.
- [5] Dresner, H. (2011). Mobile Business Intelligence Market Study.
- [6] Raduan, C., Jegak, U., Haslinda, A., and Alimin, I. 2009. Management, Strategic Management Theories and the Linkage with Organizational Competitive Advantage from the Resource-based View. *European Journal of Social Sciences*. 11(3): 402–418.
- [7] Farrokhi, V., and Pokoradi, L. (2012). The Necessities for Building a Model to Evaluate Business Intelligence Projects-Literature Review. *arXiv preprint arXiv:1205.1643*.
- [8] Ghazanfari, M., Jafari, M., and Rouhani, S. (2011). A Tool to Evaluate the Business Intelligence of Enterprise Systems. *Scientia Iranica*. 18(6): 1579–1590.
- [9] Luftman, J., Zadeh, H. S., Derksen, B., Santana, M., Rigoni, E. H., and Huang, Z. D. 2012. Key Information Technology and Management Issues 2011–2012: An International Study. *Journal of Information technology*. 27(3): 198–212.
- [10] Evelson, B. 2011. Trends 2011 and Beyond: Business Intelligence. *Forrester Research, Cambridge, MA*. 31.
- [11] Shah, G. U. D., Bhatti, M. N., Iftikhar, M., Qureshi, M. I., & Zaman, K. 2013. Implementation of Technology Acceptance Model in E-Learning Environment in Rural and Urban areas of Pakistan. *World Applied Sciences Journal*. 27(11): 1495–1507.
- [12] Milolidakis, G., Akoumianakis, D., and Kimble, C. (2014). Digital Traces for Business Intelligence: A Case Study of Mobile Telecoms Service Brands in Greece. *Journal of Enterprise Information Management*. 27(1): 66–98.
- [13] Wixom, B. H., Watson, H. J., and Werner, T. 2011. Developing an Enterprise Business Intelligence Capability: The Norfolk Southern Journey. *MIS Quarterly Executive*. 10(2).
- [14] Yoon, T. E., Ghosh, B., and Jeong, B.-K. 2014. User Acceptance of Business Intelligence (BI) Application: Technology, Individual Difference, Social Influence, and Situational Constraints. *System Sciences (HICSS), 2014 47th Hawaii International Conference on*. 3758–3766.
- [15] Bargshady, G., Alipanah, F., Abdulrazzaq, A. W., and Chukwunonso, F. (2014). Business Intelligence Technology Implementation Readiness Factors. *Jurnal Teknologi*. 68(3).
- [16] Hagerty, J., Sallam, R. L., and Richardson, J. 2012. Magic quadrant for business intelligence platforms. *Gartner for Business Leaders (February 6, 2012)*.
- [17] Airinei, D., and Homocianu, D. (2010). The Mobile Business Intelligence Challenge. *Economy Informatics*. 10(1): 5–12.
- [18] Song, J., Kim, J., Jones, D. R., Baker, J., and Chin, W. W. 2014. Application Discoverability and User Satisfaction in Mobile Application Stores: An Environmental Psychology Perspective. *Decision Support Systems*. 59: 37–51.
- [19] Zahraee, S. M., Hatami, M., Rohani, J., Mihanzadeh, H., and Haghighi, M. 2014. Comparison of Different Scenarios Using Computer Simulation to Improve the Manufacturing System Productivity: Case Study. *Advanced Materials Research*. 845: 770–774.
- [20] Zahraee, S. M., Hashemi, A., Abdi, A. A., Shahpanah, A., and Rohani, J. M. 2014. Lean Manufacturing Implementation Through Value Stream Mapping: A Case Study. *Jurnal Teknologi*. 68(3).
- [21] Delone, W. H. 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*. 19(4): 9–30.
- [22] Venkatesh, V., Morris, M. G., and Ackerman, P. L. (2000). A Longitudinal Field Investigation of Gender Differences in Individual Technology Adoption Decision-making Processes.