Technology Acceptance Model for Business Intelligence System

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Abstract

This study examines technology acceptance model for business intelligence system. Business intelligence system is selected as the dependent variable. Similarly, customer's attitude, perceived usefulness, subjective norms, perceived ease of use and social values are selected as the independent variables. This study is based on primary data with 111 observations. To achieve the purpose of the study, structured questionnaire is prepared. The correlation coefficients and regression models are estimated to test the significance and importance of different factors influencing the technology acceptance for business intelligence system.

The study showed that customer attitude is positively correlated to the business intelligence system. It indicates that increase in consumer attitude leads to the increase in technology acceptance for business intelligence system. Similarly, perceived usefulness is positively correlated to the business intelligence system indicating that perceived usefulness increases technology acceptance for business intelligence system. Moreover, subjective norms are also positively related to the business intelligence system. It means that better the subjective norms better will be the technology acceptance model for business intelligence system. Likewise, perceived ease of use is positively correlated to the business intelligence system. It shows that increase in perceived ease of use leads to the increase in technology acceptance for business intelligence system. Further, social value has a positive impact on the business intelligence system. It shows that better the social value better will be the business intelligence system.

Keywords: customer attitude, perceived usefulness, subjective norms, perceived ease of use, social values, business intelligence system.

1. Introduction

Business Intelligence (BI) system refers to a set of software tools, applications, and methodologies that help organizations to collect, analyze, and present data to support decision-making processes (Bach *et al*., 2016). The Technology Acceptance Model (TAM) is a theoretical framework that seeks to explain and predict users' acceptance and adoption of information technology (IT) systems. Moreover, Pejic *et al*. (2017) stated that business intelligence systems (BISs) refer to a wide range of technologies and applications useful for retrieving and analyzing a large amount of information with the goal to generate knowledge useful for making effective business

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decision. Business intelligence systems (BISs) are used to analyze information with the goal to acquire valuable data, information and knowledge which could improve the quality of management decision making across different business processes. According to Fang *et al*. (2018), with the continuous growth of mobile devices and technologies and the great potential of mobile BI in organizational decision-making, it shows that user acceptance and usage behavior are important aspects in determining BI success in organization. The technology, the user group, and the organizational context are all new to IT acceptance/adoption research (Hu *et al.*, 1999).

Fred Davis *et al*. (1989) investigated technology acceptance model (TAM) and introduced the concepts of perceived usefulness (PU) and perceived ease of use (PEOU) as key determinants of users' acceptance of information technology. The study showed that perceived usefulness and perceived ease of use are significant factors influencing user acceptance of information technology. Further, Tam *et al.* (1999) investigated the factors influencing physicians' acceptance and use of the technology. The study found that subjective norm, representing the influence of colleagues and peers had a notable impact on physician acceptance of telemedicine technology. Similarly, Gefen & Straub (2000) investigated the role of perceived ease of use in the adoption of Information Systems (IS), specifically focusing on the context of e-commerce adoption. The study showed that perceived ease of use had a stronger impact on adoption intentions among potential adopters than among actual adopters of e-commerce. Moreover, Venkatesh & Davis (2000) found that social influence and facilitating conditions had varying impacts on user acceptance depending on the specific context and stage of adoption.

Larsen *et al.* (2003) examined the technology acceptance model (TAM), tracing its development, discussing its applications, and suggesting directions for future research. The study found future research to explore additional factors that may influence technology acceptance, such as individual characteristics and situational factors. Amoako & Salam (2004) found that the impact of perceived usefulness and perceived ease of use on ERP system adoption was mediated by shared beliefs. This means that shared beliefs amplify the effect of perceived usefulness and perceived ease of use on ERP system adoption. Further, Liu *et al*. (2018) found that the impact of perceived usefulness and perceived ease of use on smart construction system adoption was mediated by external isomorphic pressures and social influence. This means that external isomorphic pressures and social influence amplify the effect of perceived usefulness and perceived ease of use on smart construction system adoption. Similarly, study found that perceived usefulness, perceived ease of use,

attitude towards AI, and subjective norm were all significant determinants of AI acceptance in German agriculture. The study also found that the impact of perceived usefulness and perceived ease of use on AI acceptance was mediated by attitude towards AI. This means that attitude towards AI amplifies the effect of perceived usefulness and perceived ease of use on AI acceptance (Mohr & Kuhl, 2021). Moreover, study found that perceived usefulness, perceived ease of use, managerial support, organizational readiness, and IT infrastructure were all significant determinants of AI implementation in the UAE healthcare sector (Alhashmi *et al.,* 2019).

Chen & Chen (2009) found that perceived usefulness, perceived ease of use, subjective norms, and compatibility with existing technologies are important factors affecting the acceptance of automotive telematics technology in Taiwan. Moreover, Alhashmi *et al.* (2019) found Technology Acceptance Model (TAM) can be extended to capture the acceptance of AI technology in this context and identified factors such as perceived usefulness, perceived ease of use, social influence, facilitating conditions, and trust as important determinants of AI acceptance in the UAE healthcare sector, highlighting the significance of these factors in driving the successful implementation of AI technology in healthcare settings.

Zhu *et al*. (2012) found that perceived usefulness and perceived ease of use significantly influence users' attitudes towards online games. The study also showed that attitude towards online games has a significant impact on users' intention to use online games, highlighting the importance of these factors in understanding user behavior in the context of online gaming. Further, Kamal *et al*. (2020) examined that perceived usefulness, perceived ease of use, and trust are significant factors influencing the intention to use telemedicine services. The study also found that subjective norm and perceived behavioral control have indirect effects on the intention to use telemedicine through the mediating factors of usefulness and perceived ease of use. Moreover, Pettersson & Arvidsson (2012) found that perceived usefulness, perceived ease of use, and subjective norm significantly influence users' intention to use BI systems.

Na *et al.* (2022) found that the technology acceptance model (TAM) combined with the Technology-Organization-Environment (TOE) framework provides a comprehensive understanding of AI technology adoption in the construction industry. The study showed that perceived usefulness, perceived ease of use, organizational support, and external factors such as competitive pressure and government support significantly influence the intention to adopt

AI-based technologies. Further, Gefen & Straub (1997) found that there is no significant gender difference in the perceived usefulness and perceived ease of use of e-mail; there are differences in the actual usage of e-mail between men and women. The study also identified that women tend to use e-mail more for interpersonal communication, while men use it more for task-related purposes, indicating gender-based variations in the patterns and motivations of e-mail usage. Moreover, Money & Turner (2005) found that perceived usefulness, perceived ease of use, and system quality significantly influences users' intention to use knowledge management systems. The study also found that perceived usefulness and perceived ease of use are positively correlated with user satisfaction, indicating the importance of these factors in driving user acceptance and satisfaction with knowledge management systems.

In the context of Nepal, Sthapit & Bajracharya (2019) investigated that factor such as perceived usefulness; perceived ease of use, security concerns, and trust significantly influenced the intention to adopt e-banking services among the surveyed students. The study found that the perceived benefits of e-banking, convenience, and accessibility were important drivers for adoption. Similarly, Shrestha *et al.* (2020) found that the importance of addressing security concerns, enhancing perceived usefulness and ease of use, and improving accessibility and convenience to promote the adoption of Internet banking services in underdeveloped countries like Nepal. Shyam *et al.* (2019) found that individual innovativeness and training were not significant determinants of business intelligence system adoption. This finding suggested that these two factors may not be as important as other factors, such as perceived usefulness, perceived ease of use, and top management support, when it comes to the adoption of business intelligence systems in Nepal, Sharma & Shrestha (2018) found that perceived usefulness and perceived ease of use were significant determinants of business intelligence system adoption. This finding is consistent with the TAM, which posits that these two factors are key determinants of technology adoption. Moreover, Adhikari & Shrestha (2017) found that perceived usefulness, perceived ease of use, management support, organizational readiness, and top management commitment were all significant determinants of business intelligence system adoption in Nepalese organizations.

The above discussion shows that empirical evidences vary greatly across the studies on technology acceptance for business intelligence system. Though there are above mentioned empirical evidences in the context of other countries and in Nepal, no such findings using more recent data exist in the context of Nepal. Therefore, in order to support one view or the other, this

study has been conducted.

The main purpose of the study is to analyze technology acceptance model for business intelligence system. Specifically, it examines the impact of customer attitude, perceived usefulness, subjective norms, perceived ease of use and social values on business intelligence system.

The remainder of this study is organized as follows. Section two describes the sample, data and methodology. Section three presents the empirical results and the final section draws the conclusion

2. Methodological aspects

The study is based on the primary data. The data were gathered from 111 respondents through questionnaire. The respondents' views were collected on customer attitude, perceived usefulness, subjective norms, perceived ease of use and social values and business intelligence system. The study used descriptive and casual comparative research design.

The model

The model estimated in this study assumes that the technology acceptance depends on business intelligence system. The dependent variables selected for the study is business intelligence system. Similarly, the selected independent variables are customer attitude, perceived usefulness, subjective norms, perceived ease of use and social values Therefore, the model takes the following form:

$$BI = \beta_0 + \beta_1 PU + \beta_2 PE + \beta_3 CA + \beta_4 SN + \beta_5 SV +$$

Where,

BI = Business intelligence system

PU = Perceived usefulness

PE = Perceived ease of use

CA =Customer attitude

SN = Subjective norms

SV = Social values

Perceived usefulness was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "The BI system helps me in making more informed business decisions.", "BI system provides valuable insights into business performance and trends." and so on.

The reliability of the items was measured by computing the Cronbach's alpha (α =0.809)

Perceived ease of use was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "The BI system provides clear and user-friendly visualizations of data.", "The BI system is easy to learn and understand." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α =0.742).

Customer attitude was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "I have a positive attitude towards using the BI system in my daily work.", "I trust the accuracy and reliability of the information provided by the BI system." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.838).

Subjective norms were measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "My friends/family expect me to use/adopt [the technology/behavior] being studied.", "I feel social pressure to use/adopt [the technology/behavior] being studied. And so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.810).

Social value system was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "Social value of a product/service enhances its overall appeal to me.", "I perceive companies or organizations with a strong social mission as more trustworthy." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.724).

Business intelligence system was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "The BI system enhances my productivity and efficiency in analyzing data.", "The BI system is user-friendly and easy to navigate." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.735).

The following section describes the independent variables used in this

study along with hypothesis formulation.

Customer's attitude

Customer attitude refers the perception, evaluation, and emotional disposition that customers have towards a particular product, service, or brand, which influences their behaviors, decision-making processes, and intentions (Pejic Bach, 2017). Bach *et al.* (2016) found that perceived usefulness, perceived ease of use, and management support were all significant determinants of BI system adoption. Perceived usefulness refers to the extent to which users believe that a system will help them to achieve their goals. Perceived ease of use refers to the extent to which users believe that a system is easy to use. Management support refers to the extent to which top management is supportive of the adoption of BI systems. According to Verma *et al.* (2018), customer attitude refers to the overall evaluation or opinion that a customer holds toward a particular product, service, or brand. Based on it, this study develops following hypothesis:

H_1: There is a positive relationship between customer attitude and business intelligence system.

Perceived usefulness

Perceived usefulness is the degree to which a person believes that using a telehealth system will help them achieve their health goals. The study found that social capital, social cognitive, and technology acceptance theories all contribute to the adoption of telehealth systems (Tsai, 2014). Salloum *et al.* (2019) found that a comprehensive technology acceptance model (CTAM) is a better predictor of e-learning acceptance than the traditional technology acceptance model (TAM). The study also found that perceived usefulness and perceived ease of use have a direct impact on e-learning acceptance. Zhang *et al.* (2010) found that perceived usefulness, perceived ease of use, image, and job relevance were all significant determinants of MIT adoption. The study also found that the impact of perceived usefulness and perceived ease of use on MIT adoption was mediated by image and job relevance. Based on it, this study develops following hypothesis:

H_2: There is a positive relationship between perceived usefulness and business intelligence system.

Subjective norms

Soon *et al.* (2016) found that perceived usefulness, perceived ease of use, compatibility, and relative advantage were all significant determinants of big data adoption. The study also found that the impact of perceived usefulness

and perceived ease of use on big data adoption was mediated by compatibility and relative advantage. Nurqamarani *et al*. (2021) found that the TAM has been extended to include other factors, such as trust, security, and compatibility, in the context of SMEs. According to Silva (2007), subjective norms are the perceived social pressure to use or not use a particular technology. Based on it, this study develops following hypothesis:

H_3: There is a positive relationship between subjective norms and business intelligence system.

Perceived ease of use

Brockmann *et al.* (2012) found that perceived ease of use was a significant predictor of the intention to use M-BI services and showed that users who believe that M-BI services will be easy to use are more likely to intend to use them. Khor (2014) found that the technology acceptance model (TAM) is a valid predictor of open and distance learning (ODL) student adoption behavior and perceived usefulness and perceived ease of use are the two most important factors influencing ODL student adoption behavior. Balakrishnan *et al*. (2021) found that perceived ease of use was a significant predictor of the intention to use AI-powered voice assistants. Lin & Chen (2017) provided a valuable contribution to the literature on the role of perceived ease of use in augmented reality tour-sharing application adoption. Vukovic *et al.* (2019) found that social influence and facilitating conditions have a significant impact on internet banking acceptance. Based on it, this study develops following hypothesis:

H_4: There is a positive relationship between perceived ease of use and business intelligence system.

Social values

According to Liu & Han (2022), social values are the beliefs and attitudes that people hold about what is considered important and desirable in society. Liao *et al.* (2018) found that perceived usefulness, perceived ease of use, and top management support are the three most important factors influencing business intelligence system (BIS) adoption and BIS adoption has a positive impact on organizational performance, decision-making quality, and user satisfaction. Lee *et al.* (2018) found that social values mediated the relationship between perceived trust, perceived interactivity, and perceived output quality and the intention to use. Based on it, this study develops following hypothesis:

H_5: There is a positive relationship between social values and business intelligence system.

3. Results and discussion

Correlation analysis

On analysis of data, correlation analysis has been undertaken first and for this purpose, Kendall's Tau correlation coefficients along with means and standard deviations have been computed, and the results are presented in Table 1

Table 1

Kendall's Tau correlation coefficients matrix

This table presents Kendall's Tau coefficients between dependent and independent variables. The correlation coefficients are based on 112 observations. The dependent variable is BI (business intelligence system). The independent variables are PU (perceived usefulness), PE (perceived ease of use), CA (customerr attitude), SN (subjective norms) and SV (social value).

Variables	Mean	S.D.	BI	PU	PE	CA	SN	SV
BI	4.516	0.525	1					
PU	4.278	0.661	O.495**	1				
PE	4.262	0.616	0.358**	0.496**	1			
CA	4.201	0.678	0.275**	0.375**	0.550**	1		
SN	4.239	0.731	0.365**	0.403**	0.433**	0.439**	1	
SV	4.260	0.601	0.329**	0.398**	0.368**	0.307**	0.375**	1

Note: The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent levels respectively.

Table 1 show that perceived usefulness has a positive relationship with the business intelligence system. It means that increase in perceived usefulness increases the business intelligence system. Perceived ease of use has a positive relationship with the business intelligence system. It means that increase in perceived ease of use increases the business intelligence system. Customer attitude has a positive relationship with the business intelligence system. It means that better the customer attitude better will be the business intelligence system. Subjective norm has a positive relationship with the business intelligence system. It means that better the subjective norms better will be the business intelligence system. Social value has a positive relationship with the business intelligence system. It means that better the social value of eco-friendly product better will be the business intelligence system.

Regression analysis

Having indicated the Kendall's Tau correlation coefficients, the regression analysis has been carried out and the results are presented in

Table 2. More specifically, it presents the regression results of customer attitude, product quality, environmental awareness, labeling and packaging on consumer perception towards eco-friendly products in Kathmandu valley.

Table 2

Estimated regression result of perceived usefulness, perceived ease of use, consumer attitude, subjective norms and social value on business intelligence system

The results are based on 112 observations using linear regression model. The model is BI $= \beta_0 + \beta_1 PU + \beta_2 PE + \beta_3 CA + \beta_4 SN + \beta_5 SV +$ where the dependent variable is business intelligence system (BI). The independent variables are perceived usefulness (PU), perceived ease of use (PE), customer attitude (CA), subjective norms (SN) and social value (SV).

Model	Intercept	Regression coefficients of					Adj. R_bar^2	SEE	F-value
		PU	PE	CA	SN	SV			
1	2.468 (9.413) **	0.479 (7.902) **					0.356	0.421	62.44
2	2.798 (9.073) **		0.403 (5.629) **				0.217	0.465	31.68
3	3.524 (11.764) **			0.236 (3.353) **			0.084	0.503	11.24
4	3.109 (11.892) **				0.332 (5.463) **		0.206	0.468	29.84
5	2.821 (8.832) **					0.398 (5.359) **	0.200	0.470	28.71
6	2.246 (7.545) **	0.402 (5.153) **	0.129 (1.540)				0.364	0.419	32.79
7	2.271 (7.324) **	0 .403 (5.136) **	0.146 (1.437)	-0.024 (0.304)			0.359	0.421	21.71
8	2.212 (7.182) **	0.360 (4.464) **	0.117 (1.151)	-0.080 (9.954)	0.142 (1.917)		0.374	0.415	17.60
9	2.039 (6.134) **	0.322 (3.780) **	0.108 (1.064)	-0.085 (1.014)	0.123 (1.645)	0.111 (1.345)	0.379	0.414	14.55

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Consumer buying behavior is dependent variable.

The regression results show that the beta coefficient for perceived usefulness is positive with the business intelligence system. It indicates that perceived usefulness has positive impact on the business intelligence system. This finding is consistent with the findings of Chyou *et al.* (2012). Likewise, the beta coefficient for perceived ease of use is positive with the business intelligence system. It indicates that perceived ease of use has positive impact on business intelligence system. This finding is consistent with the findings of Brockmann *et al.* (2012). In addition, the beta coefficient for consumer attitude is positive with the business intelligence system. It indicates that consumer attitude has a positive impact on the business intelligence system. This result is consistent with the findings of Hu *et al*. (1999). Further, the

beta coefficient of subjective norms is positively related with the business intelligence system. It indicates that subjective norms have a positive impact on the business intelligence system. The finding is consistent with the findings of Soon *et al.* (2016). Moreover, the beta coefficient for social value is positive with the business intelligence system which indicates that social value has positive impact on business intelligence system. This finding is consistent with the finding of Fussell & Truong (2021).

4. Summary and conclusion

Business Intelligence (BI) system refers to a set of software tools, applications, and methodologies that help organizations to collect, analyze, and present data to support decision-making processes. Business intelligence systems (BISs) are used to analyze information with the goal to acquire valuable data, information and knowledge which could improve the quality of management decision making across different business processes.

This study attempts to examine the technology acceptance model for business intelligence system. The study is based on primary data with 112 observations.

The study also showed that customer attitude, perceived usefulness, subjective norms, perceived ease of use, social values has a positive relationship with business intelligence system. The study concluded that proper customer attitude, perceived usefulness, subjective norms, perceived ease of use, social values have a significant role in increasing technology acceptance model for business intelligence system. The study also concluded that the most influencing factor is perceived usefulness followed by perceived ease of use and subjective norm that explains the technology acceptance model for business intelligence system.

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