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The Relationship Between Technology Acceptance and Business Intelligence Systems Use Among Selected Palestinian Universities

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Abstract

Business intelligence systems (BIS) acceptance as a new information system and usage behavior are related in ways that can be identified and explained using the unified theory of acceptance and use of technology (UTAT) model. This study examines how using a business intelligence system (SU) affects self-efficacy (SE), social influence (SI), facilitating conditions (FC), and performance expectancy (PE). This study adopted systematic random sampling for university administrators in Palestine. In total, 334 questionnaires were distributed at 11 selected universities. Structured Equation Modeling (SEM) with Smart PLS software was used to analyze the data for the final conceptual model. The result of Using regression analysis, it was found that BI system usage was anticipated by facilitating conditions and self-efficacy constructs. The research indicated that the self-efficacy of BIS use was found to be the most important factor. Therefore, the researchers recommended that universities improve the administrators' capabilities to use BIS and enhance the BIS interfaces to make it easier to use. The more successful tasks are completed with the BIS, the more likely users are to adopt it. This study also recommended facilitating conditions as a further crucial factor in the technology acceptance factors. Therefore, management takes into consideration the aspects of increasing the type and quantity of training and offering BIS demonstrations, providing details on the BIS-related resources and technology, providing technical support for users, and spending additional efforts by launching programs for their administrators to increase the usage of BIS in their universities. This research contributes to university managers' enhancing the information system by understanding and predicting the system's use behaviors for administrators. In addition, by utilizing the UTAUT model and its suggested extension, the current study advances knowledge in the area of IT adoption and usage within the cultures of developing countries, specifically that of Palestine. Finally, the results of this study can aid in developing better tactics and giving more clarity to university managers for improving the current information systems and better integrating their use by administrators.

Keywords: *technology acceptance, business intelligence, administrators, UTAUT, university.*

1. Introduction

Artificial intelligence (AI) has advanced quickly in recent years, greatly improving human life and advancing the development of information systems. Among the IS tools that have benefited from the development of AI is the business intelligence system (BIS) (Torres, Sidorova, et al., 2018). Accordingly, BIS is a common abbreviation for Decision Support Systems (DSS), which are tools for gathering, analyzing, and sharing organizational data to improve business decision-making (Fink, Yogev, et al., 2017). Additionally, BIS adoption can enhance a business organization's competitiveness in today's fiercely competitive corporate market, and it is crucial to determining an organization's success. However, the literature indicates that the BI system's implementation rate is low, and it is anticipated that the rate won't significantly increase in the near future (Services, 2018). Background research studies gave a wide-ranging study that looked at studies on the adoption of BIS with less attention to discussing the problems and knowledge gaps (Richards, Yeoh, et al., 2019).

In recent times, it has been noted that numerous theoretical models have been created to investigate and forecast users' acceptance of IS in the domains of IS, sociology, and psychology (Dwivedi et al., 2017; Kabra et al., 2017; Sharma et al., 2018). As a result, user acceptance is crucial in determining whether the application of system information is successful. Additionally, user acceptance significantly affects the application of the system or technology. To determine the success rate, it is crucial to understand how much users can use and accept the technology (Reza, Sunardi, et al., 2022). An information system's effectiveness depends on the level of user acceptability. So, to gauge the degree of system information application success, an analytical model is required. As a result, to evaluate the degree of system information application success, an analytical model is necessary. In this study, the Unified Theory of Acceptance and Use of Technology (UTAUT) was used to evaluate the information system implementation (Reza, Sunardi, et al., 2022). The basis for the UTAUT model were the performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) variables (Hussein & Abdelhamid, 2021).

2. Problem statement

University administrators have been encountering many challenges in their jobs or duties that require IT applications. If information technology implementation is slow among university administrators, administrative duties suffer in turn and reduce productivity Adu-Gyamfi et al. (Ibrahim, Adu-Gyamfi, et al., 2018). Furthermore, there is currently no thorough analysis of adoption and acceptance from the viewpoint of the most significant variables, models, and theories at the individual or organizational levels. Additionally, it has been asserted in earlier studies that taking into account practical considerations has a significant impact on decisions to adopt BIS (Magaireah, 2019).

Authors Awanto, Ardianto, et al. (2020) showed that, according to the technology adoption model, user behavior and user intention depend on four factors (effort expectancy, performance expectancy, social influence, and supporting conditions). Thus, the factors deemed crucial in influencing the use of business intelligence systems should be identified. Therefore, the present study identifies the factors that underpin or have dimensions impacting the use of and interaction with BIS. Accordingly, a model of BIS use acceptance is formulated in this study.

As such, with this study, a gap exists in the development and establishment of BI system adoption. This study broadens the Unified Theory of Acceptance and Use of Technology (UTAUT) to achieve this. Moreover, the researchers add self-efficacy as one key element that could have an impact on the adoption of new information systems. Also, when referring to developing nations, nearly all past studies didn't comprehensively test the models of adoption. Also, even among developing countries within the same region, differences can occur, particularly concerning demographic, cultural, economic, and political attributes.

3. Research questions

1. Is there a positive correlation between performance expectancy (PE) and BI system use (SU)?
2. Is there a positive correlation between effort expectancy (EE) and BI system use (SU)?
3. Is there a positive correlation between Facilitating Conditions (FC) and BI System Use (SU)?
4. Is there a positive correlation between social influence (SI) and BI system use (SU)?
5. Is there a positive correlation between self-efficacy (SE) and BI system use (SU)?

4. Research objective

1. To investigate the connection between BI system use (SU) and performance expectations (PE).
2. To investigate the connection between effort expectancy (EE) and BI system use (SU).
3. To investigate the connection between facilitating conditions (FC) and BI system use (SU).
4. To find out the connection between social influence (SI) and BI system use (SU).
5. To investigate the connection between self-efficacy (SE) and BI system use (SU).

5. Literature review

5.1 The Concept of BIS

In the middle of the 1990s, rapid technological advancement fueled the development of BIS (Ain, Vaia, et al., 2019). Moreover, BIS is commonly identified as an extensive compilation of practices, methodologies, and systems that enable businesses to merge and evaluate large data sets to define their weaknesses, strengths, and opportunities (Niño, Niño, et al., 2020). In addition, BIS encourages decision-making through the management of big data, the accessibility of ad hoc search, monitoring, predicting, and analysis solutions, and the support of cutting-edge technologies that allow users to discover new knowledge by processing, summarizing, screening, and convergent data from various sources (Veeramisti, Paz, et al.,2020). As a consequence of tough competition and big knowledge technological developments in businesses, BI technology has been recognized as one of the modern technical objectives by a percentage of decision-making organisms, including company leaders, chief information

officers, and chief executive officers (CEOs) (Ain, Vaia, et al., 2019).

The execution of BIS can improve the competitive nature of an organization's business in today's extremely competitive corporate market, and it plays an essential role in deciding an organization's achievement. However, the literature indicates that the implementation rate of the BI system is low, and it is expected that the implementation rate will not rise much in the near future (Services, 2018). In earlier studies, less attention was paid to this issue. A wide-ranging study that reviewed research papers relating to BIS acceptance prompted discussion of the concerns and research gaps (Richards, Yeoh, et al., 2019). In the field of BI adoption research, there isn't a clear agenda or roadmap. Also, there is a lack of a specific objective or roadmap.

5.2 Information Systems Adoption in the Universities

Academic activities play a significant role in educational institutions, which contain student data starting from registration and tuition fees to graduation (Reza, Sunardi, et al., 2022). Moreover, there is always a desire to make the right decision in certain situations, regardless of how intense the decision-making process is. conditions. Therefore, it appears crucial that every university administrator establish a decision-making process. Good judgment at all levels of management will be able to encourage positive business performance (Alhawamdeh & Alsmairat, 2019). Consequently, like almost all organizations, higher education institutions must adopt information management systems to enable them to handle routine tasks without difficulty and provide ad hoc reports and a wide variety of standardized forms. However, higher education institutions must overcome numerous obstacles to implement their information systems (Mukred, Yusof, et al., 2019). Therefore, a better digital society can be improved by achieving high-quality education, enhanced with modern technologies (Robles-Gómez, Tobarra, et al., 2021).

According to Rahman (2018), effective utilization of IT should play a critical role in the market competition of today in the service and product sectors to maintain profits. Additionally, Kang (2011) demonstrated that colleges could only gain a competitive edge by fostering competition through education service enhancement. Furthermore, Choi and Chung (2014) stated that it is crucial to respond to quick changes in the college educational environment and offer top-notch service while meeting student demands. Finally, according to LEE and SEONG (2020), there is a constant need for service quality development and improvement as universities are currently undergoing rapid changes in the educational environment.

5.3 The Unified Theory of Acceptance and Use of Technology (UTAT)

Authors Venkatesh, Morris, et al. (2003) organized the relevant theoretical theories for technology acceptance and proposed the UTAUT model. The main influencing factors in this model include performance expectancy, effort expectancy, social influence, and facilitating factors. Individual background elements like gender, age, experience, and voluntariness of use are the moderating variables. Performance expectations, effort expectations, and social influence are three of these factors that directly affect consumer behavior intentions, while facilitating conditions directly affect the consumer's use behaviors with new technology, going beyond the intention of behavior (Liao, Shaw, et al., 2019). The UTAUT model has been used successfully in many fields to describe how consumers accept and adopt new technology, according to several earlier studies (Khechine, Lakhal, et al., 2016).

The Motivational Model (MM), the combined TAM and TPB (C-TAM-TPB), the Model of PC Utilization (MPCU), IDT, and Social Cognitive Theory (SCT) were the eight previous models on which the UTAUT was developed. Since UTAUT is the theory chosen to support the current study, it is considered more appropriate to implement all eight theories at once by combining them under UTAUT. In addition, the UTAUT model suggests more leniency in measuring behavior as well as acceptance in comparison to the eight previous theoretical models (Venkatesh, Morris, et al., 2003). Moreover, UTAUT merges four crucial elements that are crucial to this study, such as effort expectancy (EE), performance expectancy (PE), social influence (SI), and facilitating conditions (FC); these variables are regarded as important factors for behavioral purposes and the manner in which users interact with technology, and this is successfully combined with the moderating variables (Venkatesh, Morris, et al., 2003).

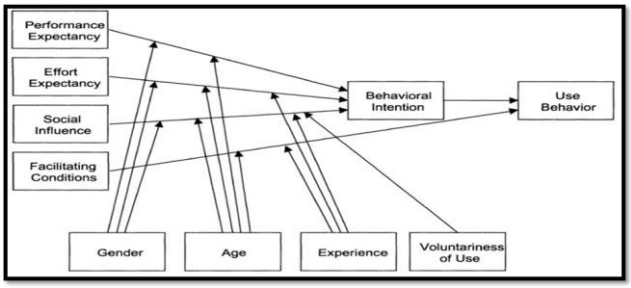

Fig. 1: UTAUT Model, (Venkatesh, Morris et al., 2003)

6. Conceptual framework

The framework model of the study used the Unified Theory of Acceptance and Use of Technology (UTAUT). The framework model is made up of independent variables

(IV), namely: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and self-efficacy (SE), and dependent variables (Services, 2018) namely, BI System Use (SU). Figure 2 shows this framework model.

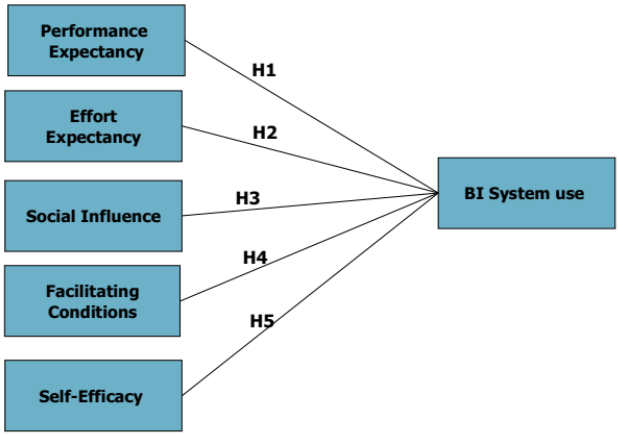

Fig. 2: Conceptual Model.

7. Hypothesis

H1: The performance expectations of business intelligence systems directly influence the BI system's use in Palestinian universities.
H2: The effort expectations of business intelligence systems directly influence the BI system use in Palestinian universities.
H3: The social influence of business intelligence systems directly influences the BI system's use in Palestinian universities.
H4: The facilitating conditions of business intelligence systems directly influence the BI system's use in Palestinian universities.
H5: The self-efficacy of business intelligence systems directly influences the BI system use in Palestinian universities.

8. Basic Research Method

The researchers used a survey technique. A convenient sample size of 334 administrators at the selected academic universities in the Gaza Strip was drawn from a sample of the 2522 administrators in the total population. The reading we're doing right now uses a descriptive methodology. In the present investigation, a descriptive survey design was used. Assessments provide significant information on all categories of public information and research areas, while descriptive analyses seek to collect comprehensive and realistic information that labels a current phenomenon. The researcher will conduct a survey to collect information about the anticipated phenomenon (Aljounaidi & Mohamed, 2017).

All six variables underwent Cronbach's alpha analysis to ensure the validity of the research instruments' components. As for this research, the reliability of the constructs ranged from 0.602 to 0.835, all of which were above the cut-off point of 0.6 (Hair Jr, Bush, et al., 2003). In the literature on technology acceptance, reliability values of more than 0.6 are regarded as acceptable (Krishnaveni & Meenakumari, 2010).

9. Analysis

100% of the 334 questionnaires that were distributed received responses. The accuracy of the data entry into SPSS for the questionnaire items was checked before the data analysis. Multiple regression was used to carry out the conventional pre-analysis screening procedures for examining multivariate assumptions. Nearly all of the suppositions were true. It's important to note that the study's statistical test is conducted with an alpha value of 0.5.

On checking for outliers, the findings showed that the observations' standardized (z) scores for the research variables varied between -3.78 and 1.299, according to Hair, Anderson et al. (1998). Absolute (z) > 4 for large sample sizes over 200 indicates an extreme observation. indicating that the threshold of ±4 was not exceeded by any of the variables. Therefore, none of the observations are univariate outliers.

To check for normality, the result of the assessment of normality has shown that all items have skew and kurtosis, as well as the variables, which were placed among ±3 and ±7 respectively. Consequently, we can be sure that the complete set of items' data constructs were well-modeled utilizing a normal distribution. As we can see from Table 4.3, the skew ranged from -0.921 to 0.054 and the kurtosis ranged from -0.471 to 2.118.

Once again, using Table 1, verifying the significance of the predictor variable coefficients, facilitating conditions and self-efficiency are significant at a 5% significance level. Performance expectations, effort, and social influence are all unimportant. As exact as it may be, the study's empirical evidence suggests that self-efficiency is the most powerful factor influencing university administrators to use BIS when performing their administrative responsibilities. Additionally, the results are consistent with numerous studies' conclusions by Mujalli, Khan, et al. (2022), Salloum, and Shaalan (2018) that facilitating conditions influence technology acceptance and BIS usage.

The norms, culture, values, training, and technical support may be factors in these findings. Facilitating conditions are connected to elements in the environment that affect a person's motivation to complete a task. Training, education, and technical support provided by an

organization are examples of factors that can be considered organizational facilitators because they foster an environment that is conducive to technology adoption (Oye, Iahad, et al., 2011).

Staff will undoubtedly be encouraged to use BIS in their work if the institution's work culture and organizational structures are set up to support its use for administrative tasks. An evaluation of their use in a particular context and in a specific research environment is necessary to comprehend the true effects of BIS on work (Muriithi, Horner, et al., 2013). Therefore, it is not surprising that the findings show that work culture, norms, internal training, workshops, seminars, and the availability of hardware and software devices (which exert the most influence on the staff's decision to adopt BIS in Palestinian universities) all influence the staff's decision to adopt BIS.

Table 1: Examining Results of Hypothesized Direct Effects of the Constructs

Path	Unstandardised Estimate		Standardised Estimate	critical ratio (c.r.)	P-value	Hypothesis Result
	Estimate	S.E.	Beta			
PE -> SU	0.254	0.056	0.241	1.034	0.151	H1) Rejected
EE -> SU	0.020	0.072	0.015	0.074	0.470	H2) Rejected
SI -> SU	0.0780	0.064	0.064	0.717	0.237	H3) Rejected
FC -> SU	0.382	0.075	0.284	2.144	0.016	H4) Supported
SE -> SU	0.299	0.074	0.215	2.210	0.014	H5) Supported

9.1 Answers to research questions

Is there a positive correlation between performance expectancy (PE) and BI system use (SU)?

Performance expectancy was one of UTAUT's four components. When defined, it was the extent to which administrators believed that using cutting-edge technologies would improve job performance (Venkatesh, Morris, et al., 2003). From Table 1, performance expectancy (sig =.151) *has no influence* on BI system use for the university administrators in Palestine.

Is there any positive nature to the relationship between effort expectancy (EE) and BI system use (SU)?

One of the four constructs used in the UTAUT was effort expectancy, and it was defined in terms of ease, which is how administrators feel they use technology in an easy way (Sair & Danish, 2018). From Table 1, effort expectancy (sig =.470*) has no influence* on BI system use for the university administrators in Palestine.

Is there a positive correlation between social influence (SI) and BI system use (SU)?

Among the four UTAUT constructs, social influence was one, and it was defined as the degree to which administrators realized how other people thought they should use a new BIS (Venkatesh, Morris, et al., 2003). From Table 1, social influence (sig =.237) *has no influence* on BI system use for the university administrators in Palestine.

Is there a positive correlation between facilitating conditions *(FC) and BI system use (SU)?*

Facilitating conditions was one of the UTAUT's four components, and it's about how administrators view favorable conditions and the suitability of different technical requirements required to successfully use business intelligence systems (Venkatesh, Morris, et al., 2003). From Table 3, facilitating conditions (sig =.016) *have an influence* on BI system use for the university administrators in Palestine.

The found answers are reliable with Alzuabi, Abdulhadi, et al. (2022), Liao, Shaw, et al. (2019), and Salloum and Shaalan (2018), who revealed that facilitating Cconditions(FC) have significant effects on use behavior.

Is there a positive correlation between self-efficacy (SE) and BI system use (SU)?

Self-Efficacy was one of the Theories of Planned Behavior constructs and was added to the model based on earlier research; it was defined as administrators' evaluations of their capacity to plan and carry out the steps necessary to achieve specific performance goals (Compeau & Higgins, 1995). From Table 1, self-efficacy (sig =.016) *has an influence* on BI system use for the university administrators in Palestine.

10. Recommended for Future Research

This research has evolved a modified model that offered a methodical means of comprehending the acceptance of business intelligence systems by target users. There are still several promising areas for further study, though. For example, the results of the current research are restricted to university information systems. Future studies might replicate or apply this study in other fields, such as the banking sector, private companies, and government institutions. This would help determine the model's external validity. Additionally, it will be intriguing for future research to examine and test the model created for this study in various cultural contexts.

Moreover, there are mixed results because some of the study's hypotheses were found to be unfounded. In other words, some conclusions are inconsistent. This necessitates the conduct of additional studies of a similar nature to resolve the discrepancies.

11. Conclusions

The current study investigated which factors influence the acceptance and usage of a BIS regarding university administrators in Palestine through the UTAUT acceptance model. Furthermore, the study examined whether performance expectancy, effort expectancy, social

influence, facilitating conditions, and self-efficacy can explain the expectation of university administrators to use BIS. By taking self-efficiency into account as a predictor to include a BIS in the model questionnaire based on prior literature and the study's case, this study broadened the theoretical horizon of UTAUT.

Using the collected data, tests were run against the model with input from 334 university administrators in Palestine. For this purpose, analysis was implemented in addition to showing the experimental outcomes to check the hypotheses of this study by implementing SmartPLS and SPSS software packages.

This study's main goal was to examine whether the UTAUT, which was created in developed countries, could be applied to other developing countries. The majority of technologies developed and produced in developed nations are widely believed to be biased by culture to support the social and cultural systems of those nations.

According to the findings, the self-efficiency structure affected how BIS was used, and its overall influence was greater than that of any other construct in the model. Moreover, the results revealed that facilitating conditions had a significant positive effect on BI system use.

According to this study, the most important factor influencing BIS use was self-efficiency. Therefore, universities should improve the administrators' capabilities to use BIS and improve the BIS interfaces to make it easier to use. Where the BIS can effectively complete tasks, the more likely it is that users will adopt it. Accordingly, BIS developers should continuously work to advance BI implementation that can complete the most tasks quickly to maintain the intention of BIS users in universities. Also, this research suggested the "facilitating conditions" as another important determinant of the technology acceptance factors, so management takes into consideration the aspects of enhancing the type and quantity of training, offering BIS demonstrations, supplying details on the technology and resources related to the BIS, providing technical support for users, and spending additional efforts by launching programs for their administrators to increase the usage of BIS in their universities.

This research has important contributions for university managers as well. How to improve the system's usability is one of the difficult tasks that IT managers now have to deal with. Despite significant investments in IT over the past few years, there is concern that the adopted systems are underutilized and that users limit themselves to using the systems' basic functionalities (Jasperson, Carter, et al., 2005). In this situation, managers need to understand and predict administrators' system-use behaviors. In addition, the current study adds to our understanding of how IT is adopted and used in the cultures of developing countries, particularly that of Palestine, while utilizing the UTAUT model and its proposed extension. Finally, the results of this study can aid in developing better tactics and giving more clarity to university managers for improving the current information systems and better integrating their use by administrators.

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