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FACTORS INFLUENCING KNOWLEDGE SHARING IN ENTERPRISE RESOURCE PLANNING SYSTEM USAGE IN SMALL AND MEDIUM ENTERPRISES

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ABSTRACT

Enterprise resource planning (ERP) system is a comprehensive integrated system, which has been increasingly utilized in many organizations. The system is used by organizations to help manage integrated business processes. The success of such systems depends on how ERP users integrate and share relevant knowledge that is needed to ensure the effective performance of their collective task. Thus, it is evident that knowledge sharing is a key factor for the success of ERP system usage. This study aims to identify the factors affecting knowledge sharing among ERP users in small and medium-sized enterprises (SMEs). By means of a survey of 413 ERP users from 32 Jordanian SMEs was executed. It was found that absorptive capacity; organizational culture, top management support, effective communication and ICT tools factors have impacted significantly on knowledge sharing among ERP users. Such as finding could provide guidelines for the management to enhance knowledge sharing process among ERP users other than achieve business benefits with the use of ERP system.

Keywords: *Knowledge sharing, ERP system usage, Small and medium enterprises*

1. INTRODUCTION

Enterprise resource planning (ERP) systems are a set of standardized software and organization-wide database in which all business transactions are entered, recorded, processed, monitored, and reported. As a kind of process-based information systems, ERP supports multiple business functions like accounting and finance, human resources, production, and logistics. Therefore, ERP is critical for an organization to meet customer demand as it balances the process of internal production and external information feed [1].The ultimate objective of organizations investing in ERP systems is to gain the opportunities and advantages that they are promised with, once the implementation and routinization of the system is realized in the organization. These advantages have many dimensions, which can be categorized into operational, managerial, strategic, technological and organizational dimensions [2].Small and medium enterprises (SMEs) are encountering a rapidly changing global market and the need to be able to respond to the requirements. ERP systems prepare the instrument for SMEs to address the competitive demand for the rapidly changing marketplace. This helps them to succeed in terms of improved customer relations and management, aside from time reduction, quality improvement, sales volumes increase, manpower reduction and market share improvement [3]. Although ERP systems are used to help people manage integrated business processes, yet, the success of such systems depends on how ERP users integrate, share, and source the relevant knowledge that is needed to ensure the effective performance of their collective task [4]. The complexity of an ERP system calls for intensive interactions among ERP team members

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and with the system users. All these interactions involve constant knowledge creation, sharing, extraction, preservation, and learning among members [5]. Thus, sharing of knowledge is significant to the success of ERP system. In an enterprise system project, enhanced knowledge sharing throughout various lines of interaction among organizational members is required in different organizational aspects and in different engagement levels within the project [6]. For the ERP success, the formal barriers between the users of functions should share and integrate knowledge between functions and business units for a coordinated work [7]. Further successful usage of ERP in organization requires the getting rid of hindrances to knowledge sharing. However, only little is known concerning the occurrence of knowledge sharing among team members when it comes to ERP systems [10]. For the ERP success, the formal barriers between the users of functions should share and integrate knowledge between functions and business units for a coordinated work [11]. Further successful usage of ERP in organization requires getting rid of hindrances knowledge sharing. Chiu, et al. [12] indicate that "better knowledge sharing occurs through established trust relationships". Thus, knowledge sharing among ERP end users may be facilitated by their environment.

Organizational factors are crucial factors affecting knowledge sharing. As such, it is important that organizations overcome cultural hurdles and start the fitting culture in order to optimally ease knowledge sharing (Shao et al. 2012). In relation to this, Ha and Ahn (2014) state that knowledge sharing can optimally take place by way of effective communication. Meanwhile, support from top management is integral as to assure the success of ERP and the reinforcement of knowledge sharing by way of making available the conditions that make possible cross-functional interaction (Wang & Noe 2010). Further, by making knowledge sharing easier and more effective, the use of technology can ease the support and encouragement of knowledge sharing (Wangpipatwong 2009)

2. LITERATURE REVIEW

2.1 Small and Medium Size Enterprises and ERP System

Globalization at industry level has highlighted the absence of the small industry concept at the operational area. In the organizing and guiding, companies with little financial power, employees or customers should act as large companies. Although these companies work as a small part of supply chain, they exist in global markets. Therefore, it is necessary to improve their competitiveness continuously and gain their rights within such markets. This is the main reason for the ERP usage in the small and medium enterprises [8]. Since the major part of large companies have benefited from ERP systems and the market of this system is somewhat saturated, producers had thought to provide systems that are appropriate with the requirements of small and medium enterprises. For this reason, to fit the system with conditions of these enterprises, sellers reduce the complexity level and implementation cost and created appropriate conditions for the use of these systems, which led to increased demand of SMEs ERP implementation. SMEs are encountering a rapidly changing global market and the need to be able to respond to the requirements. ERP systems prepare the instrument for SMEs to address the competitive demand for the rapidly changing marketplace. It helps them achieve success in terms of improved customer relations and management. Cycle time reduction, quality improvement, increasing sales volumes, manpower reduction and market share improvement [3] are some other achievements of ERP systems. SMEs have modest IT/IS resources and budgets and thus expect to benefit rapidly and largely by implementing off-the-shelf application products like ERP systems. In other words, ERP systems have been the domain of large companies, but there is an increasing number of small and medium-sized enterprises (SMEs) adopting them as well. There are some reasons for this trend including, saturation of the market, successful implementation in large organizations and increasing the possibility and the need for the integration of systems in SMEs [9, 10].

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2.2 ERP System Usage

ERP system usage includes automating and informating. Automating refers to using ERP systems to automate business processes, so that these processes can be performed with more continuity, uniformity and control. On the other hand, informating means that ERP systems are used to generate information about the processes by which an organization performs its work [11]. The success of ERP system depends on ERP end-users' attitudes toward the system and actual use of the system [12] Only when employees are pleased with their direct system interaction can the full potential of the system be exploited [13]. Enterprise systems, such as ERPs, are categorized as collaborative workflow systems, which are complex applications that span a wide set of functionalities, support cross-functional business processes and enforce a high degree of task interdependence [14]. For collaborative applications like ERPs and other enterprise systems, the hierarchy of knowledge is theorized to include three knowledge categories of a) application knowledge, b) business context knowledge, and c) collaborative task knowledge [15].

3. Conceptual Model and Theoretical Hypotheses

3.1 Knowledge Sharing

van den Hooff and de Leeuw van Weenen [16] defined knowledge sharing as "the fundamental means, through which employees can contribute to knowledge application, innovation, and ultimately, the competitive advantage of the organization." Knowledge sharing is "the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures." According to their definitions, knowledge sharing can occur by direct interaction between individual (face-to-face), communication via online means, documents, handbooks, and expert lecturing. Knowledge sharing after ERP implementation involves more than the connection of how to perform routine tasks; it enables employees to develop and exchange their underlying opinions, assumptions and the ways of working. Colleagues' sharing feedback could produce improved success of ERP system [4, 17]. Aside from the above studies, Boudreau [18] research found that employees could quickly update each other with tips on work when one figures out how to perform a useful task - that is, through knowledge sharing, users can exchange what they know to create new knowledge jointly, enable correct operations and, consequently, facilitate system usage. Knowledge sharing is a key factor in successful ERP system usage [19].Thus, this study proposes the first hypothesis as follows:

H1: Knowledge sharing has a positive effect on ERP usage.

3.2 Absorptive Capacity

According to Roberts, Galluch, Dinger and Grover [20], absorptive capacity is described as the individual's ability to identify, obtain, modify and employ external knowledge. Absorptive capacity to learn from colleagues at work positively influences a worker's attitudes towards sharing knowledge. Stated differently, individuals that possess high absorptive capacity are more likely to perceive the advantages of knowledge sharing that stems from their positive attitudes towards it (Wang & Noe 2010). The more the individual is able to value, assimilate and employ the knowledge relayed, the more he is likely to be capable of understanding the way ERP best practices can be employed within firms [11]. In contrast, [21] stated that individuals who lack absorptive capacity prevent knowledge sharing. In other words, individual ERP user's absorptive capacity plays a key role in the process of knowledge sharing [19]. The second hypothesis is proposed as follows:

H2: Absorptive capacity has a positive effect on ERP knowledge sharing.

4. ORGANIZATIONAL CULTURE

Organizational culture includes the shared beliefs, ideologies, rituals, myths, and norms that influence organizational actions or behavior. Culture is a system of shared values that lead to the

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attitudes and behaviors of organizational members. Moreover, culture is a collective mental programming, which distinguishes the members of one category of people to another. As an organization evolves, organizational culture is what holds the firm together. Organizational culture is defined as a system of shared meaning held by members that differentiates the organization from other organizations [22].Organizational culture is one of the top significant factors often addressed in literature. Successful knowledge creation and sharing depends on a culture that contributes to sharing of knowledge and trust among workers. In this regard, Goh [23] stated that an affective culture positively impacts the sharing of knowledge. Thus, in order to change worker's actions, the more basic underlying layers of culture should be addressed. Therefore, the study proposes the third hypothesis as follows:

H3: Organizational culture has positive effect on ERP knowledge sharing.

4.1 Top Management Support

Top management support refers to the support provided by the top executives in the organization that is expected to contribute to the ERP implementation success [24, 25]. Top management support has been evidenced to influence both knowledge sharing level and knowledge sharing quality via employee's knowledge management commitment. In addition, perceived supervisor and co-workers' support and encouragement of knowledge sharing also contribute to the employees' knowledge sharing and perception of knowledge sharing value [26]. Top management's support is essential to guarantee ERP implementation success and the encouragement of knowledge sharing and integration through the provision of conditions that enable cross-functional interaction [27]. On the basis of the above discussion, this study proposes the fourth hypothesis as follows:

H4: Top management support has a positive effect on ERP knowledge sharing.

4.2 Communication

Communication is characterized as a two-way, face-to-face discussion that offers an enriching medium for exchange of information by resulting in more chance interactions and by maximizing familiarity – activities which could increase the sharing opportunities [28]. Despite the fact that the generality of current communication occurs via various technological solutions, face-to-face communication appears to be the platform for establishing trusting relationships and should therefore not be completely exchanged with information technology [29]. Communication encapsulates the formal promotion of ERP project initiatives and the feedback of its progress throughout the organization [24]. In fact, effective communication refers to an honest information policy communicated to the users and this can lead to their satisfaction of information requirement [30]. Therefore, the study proposes the following fifth hypothesis for testing;

H5: Communication has a positive effect on ERP knowledge sharing.

4.3 ICT Tools

The use of ICT and knowledge sharing is interconnected owing to the fact that ICT allows the rapid search, access and retrieval of necessary information and it supports employees' communication and collaboration [31]. The use of ICT in knowledge sharing leads to new methods and applications like groupware, online databases, intranet, and virtual communities among others. It also enables the organization to extend available social networks by tackling geographical boundaries and achieving the most effective activities catered to collaboration [32]. At the level of operations, ICT is useful in enhancing information exchange, communication and sharing of documents throughout the ERP project life cycle [33]. The ERP team's use of ICT tools can lead to effective knowledge sharing in the implementation stages of ERP [34]. Hence, the following sixth hypothesis is proposed:

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H6: ICT tools have a positive effect on ERP knowledge sharing.

5. METHOD

5.1 Sample and Data Collection

A self-administered questionnaire method was applied in order to collect the data required to achieve the research objectives and answer the research questions, as well as to test the research hypotheses. A delivery and collection approach of hard copies of the questionnaire was chosen as the most appropriate method for this study to guarantee a high response rate. The questionnaire was distributed in various small and medium enterprises size located in Jordan. The questionnaire was to be completed by ERP users and IT managers, financial and accounting managers and auditing managers working on ERP systems. . 600 questionnaires were distributed within 32 small and medium organizations using ERP systems. A total of 413 completed responses were obtained. The demographics of survey participants as well as the backgrounds of their affiliated organizations are shown in Table 1.

Table 1Profile of respondents (N= 413)

Category	N	%
Demography		
Male	215	52
Female	198	48
Highest education level		
Diploma	63	15.3
Bachelor degree	294	71.2
Master degree	48	11.6
PhD	8	1.9
Usage of ERP system experience		
< 5	157	38
5 – 10	84	20.3
> 10	172	41.6
Levels of ERP system usage		
Operation	279	67.6
Technical support	61	14.8
Decision-making	45	10.9
Management	28	6.8
Type of company		
Manufacturing	20	4.8
Transportation	28	6.8
Education	34	8.2
Tourism	36	8.7
IT company	40	9.7
Retail	41	9.9
Construction	46	11.1
Pharmaceutical	50	12.1
Financial service	58	14.0
Health	60	14.5

5.2 Construct Measurement

The survey instrument was developed based on a comprehensive review of the existing literature. The questionnaire was then translated into Arabic, and a few revisions were made to adapt to ERP usage context. All the items were measured on a five-point likert scale, anchored from 1 (strongly disagree) to 5 (strongly agree).

Three items measuring absorptive capacity were adapted from Ebrahimi, Ibrahim and Sedera [35] to evaluate the ability to identify, assimilate, transform, and apply external knowledge research. The items measuring organizational culture were adapted from Raymond, Rivard and Jutras [2] to measure four typologies of organizational culture including development culture, group culture, hierarchical culture and rational culture Quinn and Spreitzer [36]. Four items were used to measure top management support from Svetlik, Stavrou-Costea and Lin [32]. Three items were used to measure effective communication adapted from Ismail Al-Alawi, Yousif Al-Marzooqi and Fraidoon Mohammed [28], which focused on encouraging users to share knowledge. Four items measuring ICT tools were adapted from Chennamaneni [37]. Six items measuring knowledge sharing were adapted from van den Hooff and De Ridder [38]. Those items measured individuals' attitudes towards and behaviors of knowledge sharing on ERP systems Eleven items measuring ERP system usage were adapted from Doll and Torkzadeh [39], which focused on individual's ERP system usage with respect to decision support, work integration and customer service.

6. ANALYSIS AND RESULTS

Instrument validation is a prior process in statistical analysis. First, this study tested the construct reliability. Using SPSS package, the psychometric properties of the instrument were evaluated in terms of internal consistency of scales. The analytical results show that all constructs used in this study have Cronbach's Alpha values ranging from 0.691 for organization culture to 0.831 for ICT tools and the level of variables was examined through the

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rating of mean score as presented in Table 2, where the table illustrates the mean score, standard deviation and variance for each variable.

Table 2 Descriptive Analysis

	Items	Mean	Std. Deviation	Variance	Alpha
Absorptive Capacity	AC1	1.23	.634	.402	.705
	AC2	1.16	.504	.254	
	AC3	1.06	.302	.091	
Org Culture	OC1	1.21	.610	.373	.691
	OC2	1.11	.421	.177	
	OC3	1.04	.238	.057	
	OC4	1.04	.247	.061	
	OC5	1.06	.297	.088	
	OC6	1.08	.340	.115	
	OC7	1.00	.070	.005	
	OC8	1.05	.299	.089	
	OC9	1.89	.981	.963	
	OC10	1.90	.974	.948	
	OC11	1.83	.972	.945	
	OC12	1.47	.702	.493	
Top M Support	TMS1	1.40	.736	.541	.726
	TMS2	1.42	.719	.517	
	TMS3	1.73	.717	.515	
	TMS4	1.21	.626	.391	
Communication	C1	1.12	.429	.184	.735
	C2	1.05	.265	.070	
	C3	1.05	.260	.068	
ICT Tools	ICT1	1.08	.321	.103	.831
	ICT2	1.11	.378	.143	
	ICT3	1.04	.187	.035	
	ICT4	1.07	.323	.104	

Moreover, regression analysis was conducted in order to provide the researcher with different outcomes so he can answer the study questions and test the research hypothesis postulated, as presented in Tables 3-6.

Table 3 Analysis Of Variance Of Factors And Knowledge Sharing

Model	Sum of Squares	df	Mean Square	F
Regression	57.303	4	14.326	415.223
Residual	14.077	408	.035	
Total	71.380	412		

The model is a summary of the factors (absorptive capacity, organization culture, top management support, communication and ICT tools) and knowledge sharing, the independent variables were observed to have a positive correlation to the knowledge sharing as indicated by the positive R value of .896. A computed R^2 value of .803 suggests that the variables explain more than 80.1% of the variance in the knowledge sharing (with a standard error estimate of 0.183).

Table 4 Relative Contribution Of Factors

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Absorptive Capacity	.082	.020	.148	4.03	.000
Org Culture	.065	.019	.102	3.53	.000
Top M Support	.077	.012	.193	6.32	.000
Communication	.517	.037	.497	13.88	.000
ICT Tools	.333	.021	.300	15.78	.000

*significant is at .05 ($p < .05$)

The results in Table 4 reveal the relative contribution of each of the predictor variables to the variance in the dependent measure (knowledge sharing). In terms of predicting ERP knowledge sharing attribution, all factors are significantly contributing. This is followed by absorptive capacity ($\beta = .148$, $t = 4.032$, $p < .05$), communication ($\beta = .497$, $t = 13.882$, $p< .05$), organization culture ($\beta = .102$, $t = 3.533$, $p< .05$) and top management ($\beta = .193$, $t = 6.322$, $p< .05$). ICT tools contributed the highest ($\beta = .300$, $t = 15.788$, $p< .05$).

Table 5 Analysis Of Variance Knowledge Sharing And ERP System Usage

Model	Sum of Squares	df	Mean Square	F
Regression	25.853	1	25.853	142.90
Residual	74.353	411	.181	
Total	100.205	412		

The model summary of knowledge sharing and ERP system usage, knowledge sharing was observed to have a positive correlation to ERP system usage as indicated by the positive R value of .508. A computed R^2 value of .258 suggests that the variables explain more than 25.6% of the variance in the ERP system usage (with a standard error

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estimate of .425).

Table 6 Relative contribution of knowledge sharing

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.639	.074		8.65	.000
Knowledge Sharing	.602	.050	.508	11.95	.000

*significant is at .05 ($p < .05$)

The result in the Table 5 and Table 6 show that the relative contribution of knowledge sharing to the variance in the dependent measure (ERP system usage). In term of predicting ERP system usage attribution, knowledge sharing ($\beta = .508$, $t = 11.954$, $p < .05$) is contributed significantly. Thus, knowledge sharing positively affect ERP system usage. Thus, hypotheses 1 – 6 are accepted where absorptive capacity, organization culture, top management, communication, and ICT tools all positively affect ERP knowledge sharing. Based on the results this study proposed the knowledge sharing model as shown in figure 1.

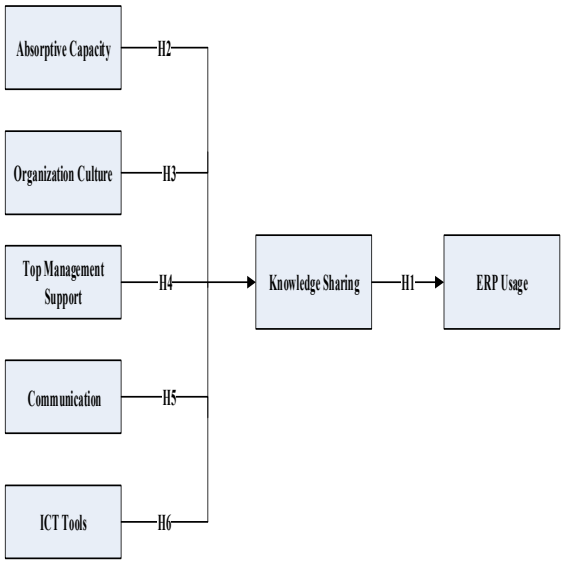

Figure 1: proposed model

7. DISCUSSION AND CONTRIBUTIONS

7.1 Discussion of Findings

Previous studies evidenced the positive relationship between organizational culture and knowledge sharing but in this study, group culture, hierarchical culture and rational culture were found to have a direct impact on knowledge sharing. Top management support was found to have continuous significant importance in the post implementation stage influencing communication and collaboration between ERP users. Together with top management support, the effective communication among ERP users has direct impact on knowledge sharing as shown. Due to the large scale and complex nature of an ERP system, ERP users have to acquire new knowledge and skills to perform their jobs, presenting them with more challenges than those presented in legacy systems. As a result, individuals with higher capacity to apply and assimilate new knowledge persist longer and learn better than those with low absorptive capacity. Therefore, as shown in this study, absorptive capacity positively affects knowledge sharing, to conclude this field, the results show that the availability of the ICT tools are of great importance to the knowledge sharing process. Those results are not surprising since the role that the technological tools play in people's communication with each other is quite known. The availability of the tools does not guarantee well-sharing practice without having the will to do so. The results show that ERP users need to have effective ICT tools to be available for use.

7.2 Research Contributions

This study contributes to the research of knowledge sharing in ERP context by exploring the impact of organizational culture on ERP users knowledge sharing. Previous studies have signified the positive relationship between organizational culture and knowledge sharing. This study found that group culture, rational culture and hierarchical culture have direct impact on knowledge sharing among ERP users. The next study contribution is the examination of the effects of individual user's absorptive capacity of ERP knowledge sharing. Knowledge sharing calls for interactions between the sources of knowledge and its recipients but it is almost impossible for the knowledge recipients of ERP systems to directly interact with the sources as the systems do not provide a description of task and process-related knowledge.

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With regards to organizational factors, top management support was effective for ERP user's willingness to knowledge sharing with colleagues. The findings indicate that perceptions of top management encouragement of knowledge sharing influence ERP user's willingness to share knowledge. To promote knowledge sharing activities, top management facilitation of social interaction culture is more important than extrinsically motivating employees. The results reveal that effective communication in an organization is a central condition for successful knowledge sharing, where communication climate exerts a relatively strong direct influence on willingness to share knowledge among ERP users. Moreover, the results show a positive significant relationship between ICT use and knowledge sharing and that ICT tools help ERP users in receiving knowledge.

8. CONCLUSION

The usage of ERP system and information systems is an increasingly popular area of interest to managers in many sectors, especially when the organizational dynamic sustained competitive advantage is emphasized. Knowledge sharing links individual, team and organization by sharing knowledge and expertise from an individual to an organizational level where it is converted to competitive value and advantage for the organization. Moreover, implementing and operating ERP systems involve many people from different backgrounds and with different characteristics, such as different cultures (hierarchical, egalitarian, fatalistic and individualistic), different disciplinary backgrounds (including IT, accounting, management, marketing, manufacturing engineering, etc.) and level of ERP expertise (low or high expertise). On the whole, there is a general lack of awareness about how to enhance knowledge sharing process among ERP users. However, the results of this thesis can help organizations' top management, IT managers, accounting and financial managers, and other managers to increase their awareness about the factors that could enhance knowledge sharing among ERP users. Understanding these factors and their effects on the success of ERP systems in organizations could be useful for practitioners and improve their experience.

More importantly, dimensional factors that influence the dynamics of knowledge sharing and ERP system usage have received little empirical attention. The study results suggest that ERP system can succeed by encouraging the appropriate knowledge sharing behavior. This research studied knowledge sharing among ERP system users and the results indicated that the success of ERP is influenced by the complex interplay of knowledge sharing behavior. The results clearly suggest that continued research on these topics has the potential to yield useful practical suggestions for organizations that are implementing the ERP system.

The results show the importance of having helpful working environment to get acceptable knowledge sharing practice. The factors that are studied here are absorptive capacity, organization culture, top management support, communication and ICT tools. These are just a selected group of many other organizational factors that could be studied, but they have the most potential to affect ERP usage. The results also highlighted the importance of having helpful environment to have good knowledge sharing practice within the organization.

Finally, Future studies should identify other factors which related to this model. This study used relevant variables to test the success of ERP system; however, many other elements contribute to the success of ERP system. Knowledge sharing is only one aspect a researcher can measure to evaluate ERP success. The study revealed that there is a need for further research on some other aspects of ERP usage. To this end, the researcher recommends future researchers to study other factors that may have direct effect on the ERP usage.

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