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Determinants of Implementation of Enterprise Resource Planning System: A Case Study in Vietnam

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Abstract

Under the pressure of business competition and effectiveness, more and more organizations in the world are likely to apply modern software such as enterprise resource planning (ERP) which can help them to create better organizing practice, better managing capabilities of administrators, and better operations of personnel. In Vietnam, many firms are afraid to install it and the number of firms adopting this software is limited mainly due to the insufficient scientific evidence of the successful implementation of ERP. This study aims to identify and measure the factors influencing the successful implementation of ERP of firms in Vietnam. Qualitative research methodology combined with quantitative research methodology is used. The data are surveyed with 343 administrators of 45 organizations that have successfully deployed ERP in Ha Noi and Ho Chi Minh cities. Of these 19 were excluded from analyses due to unsatisfactory responses, and only 324 were used for statistical processing. The collected data were processed by using the SPSS software. The result of the study shows that there are six factors affecting the successful implementation of ERP of firms in Vietnam, (ranked in descending order of importance), they are top management commitment and support, business process re-engineering, user involvement, project management board, vendor support, and suitability of software and hardware.

Keywords: Enterprise Resource Planning, Modern Software, Software Application, Implementation, Modern Technology

JEL Classification Code: M10**,** O31, P41

1. Introduction

The rapidly changing business environment has forced companies to face severe competition from their competitors. Therefore to keep pace and have a better approach to international standards, companies have to optimize their value chain in order to enhance their competition capability. It is under these circumstances that various companies have applied information technology in their business performance by investing in enterprise resource planning (ERP) software. ERP helps companies improve warehouse management, provides a creditable delivery date of goods and better customer service, is able to quickly correlate information over a whole company, improve business processes efficiently and so on (Olson, 2004). However, implementation of an ERP system is a prolonged time, resource and expense consuming process. Hence, for companies, it is not always an easy or preferred plan.

The number of companies that have implemented ERP in Vietnam are not many. The first reason is that most

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companies in VN are small-sized or mid-sized and lack the financial resources to perform the project. Another, even more important reason is the lack of a scientific basis for a successful implementation of ERP. So the purpose of the study is to identify and measure the factors influencing the successful implementation of ERP in organizations in Vietnam, and then create a scientific foundation for companies' administrators to prepare the necessary resources and plan solutions for a successful implementation of ERP.

Hence, this paper needs to answer the following research questions:

1. What is ERP? Which elements affect the successful implementation of ERP in Vietnam?
2. What is the importance of each factor to the successful implementation of ERP in Vietnam?
3. Which solutions should organizations in Vietnam adopt to ensure a successful implementation of ERP?

2. Literature Review and Hypotheses

2.1. Definition

There has thus far, not been any formal definition of ERP, but from various researchers' points of view, ERP is understood as software that helps to improve the performance of firms. ERP is a multi-module software application, a management system with a modern procedure and international standards which creates a system of optimizing the capabilities of administrators and staff operations. ERP solutions effectively provide administrators with managing and controlling the capabilities of finance, accounting, staff administration, materials management, production, service, project management, product distribution, customer administration, forecast instruments, planning and reporting (Kumar & Jos, 2000; Olson, 2004; Beheshti, 2006; Jafari et al., 2010). The ERP system helps to improve firm performance (Ignatio & Charles, 2016) and it is used as one of the project management tools (Shakkah et al., 2016). According to Doll and Torkzadeh (1988), ERP is considered a success if it can meet the expectation of ERP users or satisfy them. Jafari et al. (2010) have added that an ERP project is considered successful if it is finished in due time, in due cost, in high quality, and its functions align with companies' demands.

2.2. Successful Implementation of ERP

In terms of factors affecting the successful implemen-tation of ERP, Zhang et al. (2003) have shown that the recognized factors are top management support, business process re-engineering, project management board, commitment of whole organization, vendor support, user involvement, suitability of software and hardware, accuracy of data, solution vendor's support, and the organization's culture. But according to Yingjie (2005), they are top management support, ERP project management board, business process re-engineering, suitability of software and hardware, vendor support, and user involvement. Bradley (2008) has claimed that the factors attributed are business planning, vendor support, project management board, top management support, user, and management of change.

For application in Vietnamese companies, a successful implementation of ERP can be attributed to four factors which are identified in the studies by Zhang et al. (2003), Yingjie (2005), Bradley (2008). They are top management support, ERP project management board, vendor support, user involvement. Other than the above four factors, through qualitative research, the authors have found that there are more factors that affect this issue. They are business process re-engineering and suitability of software and hardware. Moreover, the factor of top management support is essential by showing their commitment.

From the above analysis, the authors suggest the conceptual model of determinants of a successful implementation of ERP in Vietnam. This is based on the following hypotheses:

2.2.1. Top Management Commitment and Support

Top management commitment and support means that leaders in companies must be willing to support, invest, and allocate valuable resources in an attempt to complete the project, form a conducive environment to deploy ERP, observe the implementation, invest more time, and give precise and clear instructions about the project. The studies by Zhang et al. (2003), Bradley (2008) found that top management support is the main factor leading to success in ERP implementation. Qalati et al. (2020) have claimed that the current literature on technology innovation mainly focuses on top management as the key factor for adopting it and in turn, this allows other internal stakeholders to adapt to the new technology. Thus, we hypothesize:

H1: *There is a positive relationship between the top management commitment and support, and the successful implementation of ERP.*

2.2.2. Project Management Board

Project management board consists of those who directly plan, deploy, manage, and control the process of ERP implementation**.** The studies of Yingjie (2005), Zhang et al. (2003) have concluded that the knowledge and skill of the project administrators (managers) are crucial elements contributing to the success of ERP implementation. Therefore, the hypothesis proposed is:

H2: *There is a positive relationship between the capability of project management board and the successful implementation of ERP.*

2.2.3. Business Process Re-Engineering

Companies review and re-design the business process to gain improvement in costs, quality, service, and speed of operations (Hammer & Champy, 2001). Grover et al. (1995) have stated that the more companies are willing to change the business process, the more they will be successful in ERP implementation. Vu (2020) has also added that a firm's reconfiguration capability promotes continuous transformation and will enable them to obtain new resources and capture innovation benefits. Hence, the proposed hypothesis is:

H3: *There is a positive relationship between the extent of willingness that business processes are ready to be re-engineered and the successful implementation of ERP.*

2.2.4. Suitability of Software and Hardware

Companies need to carefully analyze their business process and demands in order to make the correct choices and necessary adjustments to the ERP solution, which in return will help them reduce losses and risks. The studies of Zhang et al. (2003) and Yingjie (2005) both have stated that the suitability of software and hardware positively affect the successful implementation of ERP. Therefore, the hypothesis is:

H4: *There is a positive relationship between the suitability of software and hardware and the successful implementation of ERP.*

2.2.5. Vendor Support

Vendors are those who supply the necessary documents, form a convenient training environment, and provide quality training activities to reassure users in companies to understand and operate ERP effectively (Al-Mashari et al., 2003). Zhang et al. (2003) and Yingjie (2005) have posted that besides the suitability of software and hardware, the capability of the vendor positively affects the successful implementation of ERP. Hence, the suggested hypothesis is:

H5: *There is a positive relationship between the capability of the vendor support and the successful implementation of ERP.*

2.2.6. User Involvement

Users are those who gain an understanding about ERP through training activities. They are selected by their companies to be involved in the implementation of ERP and to continue developing this approach to all employees in their companies. Nelson and Cheney (1987) have proved there is a positive relationship between the users' satisfaction and the success of ERP projects. The capability and attitude of users to ERP is therefore crucial. Thus, the last hypothesis is:

H6: *There is a positive relationship between the user involvement and the successful implementation of ERP.*

2.3. Conceptual Model

From the results of the previous studies and the above analysis, the authors propose the following conceptual model, see Figure 1, with the prediction of the six factors that have a positive effect on the successful implementation of ERP in Vietnam.

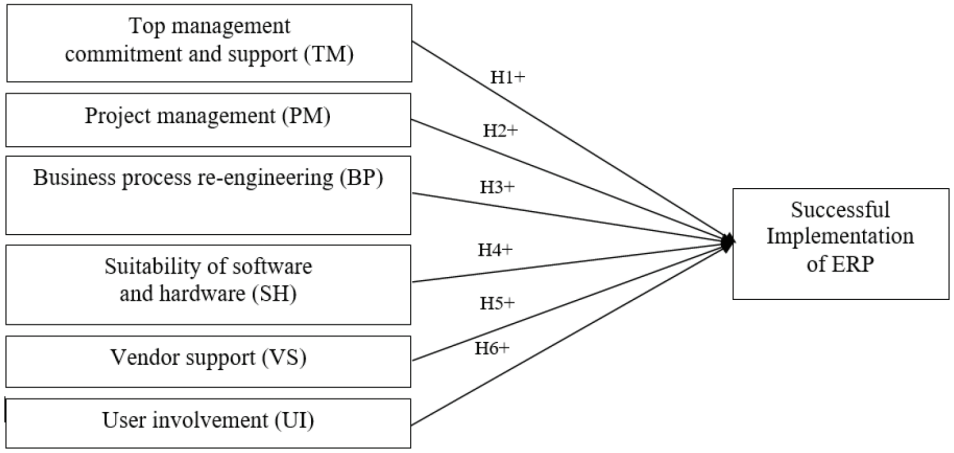

Figure 1: The Proposed Conceptual Model

3. Research Methodology

The study primarily uses qualitative methodology together with quantitative methodology.

3.1. Qualitative Research Methodology

Since the measurement items were mainly drawn from the literature in English, we carefully considered them when translating into Vietnamese. First, they were translated into Vietnamese. The Vietnamese version was then translated back into English by another author. Next step, the translated English version was compared with the original English version to scrutinize for discrepancies. In qualitative research, there is no requirement for a specific number of samples, but it depends on the information received in the answers of volunteers. Qualitative research is arrived at by group discussion. There are two groups with seven people in each. Group one consists of seven participants who were involved in the implementation of ERP projects in Vietnamese firms. Group two has seven experts from the companies supplying ERP software solutions.

After a group discussion with group two all answers were not entirely new. Everyone agreed with the proposed factors and their measurements. Based on the feedback from discussions, we modified the wording in some questions to ensure that the measurement items were understandable and relevant to practices in Vietnam. Then, the questionnaire in Vietnamese for determining the successful implementation of ERP in Vietnam is finalized.

3.2. Quantitative Research Methodology

In the questionnaire, the authors have developed the five-point Likert scale (from "strongly disagree" to "strongly agree) for the six proposed factors with 30 measureable items, and for the dependent variable i.e. successful implementation of ERP, four measureable items based on the studies of Zhang et al. (2003), Yingjie (2005) and Bradley (2008).

Quantitative research is used to evaluate the reliability of the scales of factors affecting the successful implementation of ERP, test the conceptual model and the proposed hypotheses. The research data are collected by interviewing volunteers with a questionnaire. The interviewed individuals are administrators (such as executive directors, finance directors, information technology directors, managers in departments) from a selection of 45 companies in Vietnam which have successfully deployed the ERP system. The data of the first 30 respondents are tested and made sure the testers thoroughly understand the questionnaire before the bulk of the investigation is carried out. The survey was conducted in February and March 2017, see Table 1. Samples are chosen as below:

The techniques that are used in the analysis process of data are Cronbach's alpha and exploratory factor analysis (EFA) to test the reliability of scales, double regression analysis to test the research model, the research hypotheses, and identify the importance of the attributed factors of a successful implementation of ERP.

4. Results

The result of the research has identified the six factors suggested in the conceptual model, as shown in Figure 1, being the key factors that affect the successful implementation of ERP in Vietnam.

The result from Cronbach's alpha shows that reliability coefficients are acceptable for all factors. The lowest figure is $\alpha = 0.821$ from the factor of suitability of software and hardware, the highest figure is $\alpha = 0.885$ from the factor of vendor support.

The results from EFA of the factors affecting the successful implementation of ERP, and assessed through principal axis factoring and promax rotation have indicated that KMO = 0.909 with significant sig = 0.000 and 30 measurement items are loaded into seven factors with the eigenvalue = 1.071 accounting for 61.487% percent of the total variance. This confirms the scales of the affecting factors and successful implementation of ERP are acceptable for the coming step called analysis of regression.

Table 1: Statistic of the Surveyed Samples

		Quantity (Persons)	Percentage (%)
Business fields of companies		75	23.2
	Forwarders, Media companies	72	22.2
	Service suppliers, Retailers	118	36.4
	Others	59	18.2
	Total	324	100.0
Kinds of ERP software that companies have applied	SAP	140	43.2
	Oracle	88	27.1
	Microsoft	32	9.9
	Others	64	19.8
	Total	324	100.0

Table 2: Coefficients of the Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	Variance Inflation Factor
Constant	–0.514	0.332		–1.548	0.123		
TM	0.240	0.065	0.234	3.674	0.000	0.613	1.631
PM	0.174	0.079	0.158	2.191	0.030	0.477	2.098
BP	0.259	0.065	0.219	3.992	0.000	0.828	1.208
SH	0.157	0.067	0.137	2.333	0.021	0.721	1.387
VS	0.156	0.070	0.150	2.239	0.026	0.551	1.816
UI	0.164	0.063	0.169	2.616	0.010	0.591	1.692

Spearman's Rho test indicates the correlation coefficients among the affecting factors are from 0.211 – 0.624, the correlation coefficients between the affecting factors and successful implementation of ERP are from 0.446 – 0.577. This shows there is very little possibility of collinearity and these suggested factors in this conceptual model would certainly explain the successful implementation of ERP.

The results of the analysis of regression presents R^2 = 0.568; adjusted R^2 = 0.553, F-value = 38.182 and sig = 0.000. This indicates the chosen regression model is suitable for the research and can explain 55.3% of successful implementation of ERP. The results of the analysis of regression also show all coefficients B and Beta are positive numbers and all t-values are statistically significant, see Table 2. Therefore, the study can confirm that the hypotheses H1, H2, H3, H4, H5, H6 are all acceptable and the regression equation indicating the determinants of a successful implementation of ERP is as below:

$$SDE = 0.240*TM + 0.174*PM + 0.259*BP + 0.157*SH + 0.156*VS + 0.164*UI$$

The result testing the assumed violations of the regression model shows that all assumptions are not violated. Thus, the regression model and the hypotheses tested in this study are acceptable.

5. Conclusion

In conclusion, the result of the study has a similarity with the results of Zhang et al. (2003), Yingjie (2005), Bradley (2008). The successful implementation of ERP is attributed to top management commitment and support, project management board, business process re-engineering, suitability of software and hardware, vendor support, and user involvement. The three most significant influencing factors are the top management commitment and support (Beta = 0.234), the business process re-engineering (Beta = 0.219), and the user involvement (Beta = 0.169). Next positions are the project management board (Beta = 0.158), the vendor support (Beta = 0.150), and the suitability of software and hardware (Beta = 0.137). From the discussion with the surveyed participants in the qualitative research, they all have agreed that the result of this study is suitable for today's practice in Vietnam. Thus, from the result of this study, the authors would like to give the following suggestions to leaders of companies:

To begin with, companies' leaders should well understand and identify their active roles to support, encourage ERP project teams. They need to carefully study the ERP project and implementation process to have the best software supplying vendors and ensure that the software is totally aligned to their companies' business special features and their own conditions. Furthermore, it is critical that companies' top managers should be sufficiently invested in the process and be ready allocate their resources.

Secondly, companies need to critically analyse their companies' present activities, the current business process, and the software and hardware currently being used. Ensuing from here, they will need to proactively ensure that business processes are standardized, and select the hardware vendor suitable with the selected ERP software. Also, it is necessary to actively upgrade their companies' technology infrastructure prior to the implementation of ERP.

Thirdly, companies need to match the right personnel and train the ERP users in the companies so that they are on par with standards when involved in the implementation process of ERP. Not only they must have the work experience, career knowledge, but also master business strategy, the operations of departments in their companies, and be fluent in English. Especially, if the companies select ERP solutions of SAP supplier, from Germany, or of Oracle, Microsoft suppliers USA, they must get the certification of using the above software, so that the ERP system can later be operated with correct functions and requirements.

Also, the routine workload of participants of the ERP project must be reduced so that they have more time to focus on the project. The selected staff should be given a timely compliment or bonus to garner their involvement and commitment to the project.

Fourthly, the selected participants in the ERP project should be managers in departments, section heads who have many years of experience and they can manage the project. They also need to be good at information technology and the implementation process of ERP. With these capabilities, they can follow up, cooperate, and quickly resolve any problems or issues arising in the implementation of ERP.

References

Al-Mashari, M., Abdullah A., & Mohamed Z. (2003). Enterprise resource planning: A taxonomy of critical factor. *European Journal of Operational Research, 146*(2), 352–364. https://doi.org/10.1016/s0377-2217(02)00554-4

Beheshti, H. M. (2006). What managers should know about ERP/ERP II. *Management Research News, 29*(4), 184–193. https://doi.org/10.1108/01409170610665040

Bradley, J. (2008). Management based critical success factors in the implementation of enterprise resource planning systems. *International Journal of Accounting Information Systems 9*(3), 175–200. https://doi.org/10.1016/j.accinf.2008.04.001

Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly, 12*(2), 259–274. https://doi.org/10.2307/248851

Grover, V., Jeong, S.R., Kettinger, W.J., & Teng, J.T.C. (1995). The implementation of business process reengineering. *Journal of Management Information Systems, 12*(1), 109–144. https://doi.org/10.1080/07421222.1995.11518072

Hammer, M., & Champy, J. (2001). *Reengineering the corporation: A manifesto for business revolution*. New York, NY: Harper Business.

Ignatio, M., & Charles, M. (2016). Enterprise resource planning (ERP) in improving operational efficiency: Case Study. In: Proceedings of 13th *Global Conference on Sustainable Manufacturing – Decoupling Growth from Resource Use* (pp.225–229). https://doi.org/10.1016/j.procir.2016.01.108

Jafari, S. M., Osman, M. R., Yusuff, R. M., & Tang, S. H. (2010). ERP systems implementation in Malaysia: The importance of critical success factors. *International Journal of Engineering and Technology, 3*(1), 125–131. https://doi.org/10.48009/1_iis_2010_507-512

Kireyeva, A. A., Turdalina, S., Mussabalina, D., Turlybekova, N. M., & Akhmetova, Z. B. (2020). Analysis of the efficiency technology transfer offices in management: The case of Spain and Kazakhstan. *Journal of Asian Finance, Economics and Business, 7*(8), 735–746. https://doi.org/10.13106/jafeb.2020.vol7.no8.735

Kumar, K., & Jos, V. H. (2000). ERP experience and evolution. *Communications of the ACM, 43*(4), 22–32. https://doi.org/10.1145/332051.332063

Nelson, R. R, & Cheney, P. H. (1987). Training end users: An exploratory study. *MIS Quarterly, 11*(4), 547–59. https://doi.org/10.2307/248985

Olson, D. L. (2004). *Managerial issues of enterprise resource planning systems*. New York, NY: McGraw-Hill.

Qalati, S. A., Li, W., Vela, E. G., Bux, A., Barbosa, B., & Herzallah, A. M. (2020). Effects of technological, organizational, and environmental factors on social media adoption. *Journal of Asian Finance, Economics and Business 7(*10), 989–998. https://doi.org/10.13106/jafeb.2020.vol7.no10.989

Vu, H. M. (2020). A review of dynamic capabilities, innovation capabilities, entrepreneurial capabilities and their consequences. *Journal of Asian Finance, Economics and Business, 7*(8), 485–494. https://doi.org/10.13106/jafeb.2020.vol7.no8.485

Yingjie, J. (2005). Critical success factors in ERP implementation in Finland. Research paper. *Swedish School of Economics and Business Administration*. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.105.9285&rep=rep1&type=pdf

Zhang, L., Lee, K. O. M., Zhang, Z., & Banerjee P. (2003). Critical success factors of enterprise resource planning systems implementations success in China. In: *Proceedings of 36th Annual Hawaii International Conference on System Sciences (pp.10)*. Big Island, HI, USA, Jan 6–9. IEEE. https://doi.org/10.1109/hicss.2003.1174613