

Overview about Enterprise Resource Planning

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Abstract:

Enterprise Resource Planning (ERP) system is commercial software that automates and integrates many or most of a firm's business processes. It allows to access to integrated data cross the entire enterprise according to real-time (Davenport, 1998). Therefore, ERP system is expected to increase productivity via processes standardization, to improve decision-making ability via information integration throughout the whole enterprise, to enhance cooperation between organizational entities by connecting them smoothly, and the most important, to maintain competitive advantage once these benefits are satisfied (Davenport, 1998). These promises are possibly a close explanation of its increasing popularity. Namely, Fortune 500 companies are trusting ERP system and it is also a solution that large-sized organizations in Vietnam select and adopt more growingly.

Keywords: *Enterprise Resource Planning*

1. Introduction

Enterprise Resource Planning (ERP) system is one of the most popular forms of IT for businesses at present. Deriving from efforts to rationalize lead times and possession stock costs, the 80's manufacturing resource planning (MRP II) is developed into ERP system considered as the standard that integrates business processes throughout the organization, which in turn enhances operational efficiency (Akkermans, Bogerd, Yücesan, & Van Wassenhove, 2003; Davenport, 1998). Callaway (1999) states that the ERP system promises to achieve benefits in both tangible (e.g., reduced personnel, inventory, IT and procurement, transportation, and logistic costs; improved cash flow management, revenue and profits) and intangible (e.g., increased visibility of corporate data, speed of decision making, and control over global business operations; improved customer responsiveness and business processes) manner.

Such those benefits push business organizations towards adopting the ERP systems (Davenport, 1998; Ifinedo, Udo, & Ifinedo, 2010; Vincent A. Mabert, Soni, & Venkataramanan, 2003). This has been proved by tremendous expansion of the worldwide ERP applications market for the last ten years. Its revenue, about \$38 billion in 2008 (Ifinedo, Rapp, Ifinedo, & Sundberg, 2010), has grown more than twice to approach nearly \$82.2 billion in 2016. This ERP applications market is expected to continuously increase and reach \$84.7 billion by 2021.

Being consistent with the trend, in Vietnam, E-Commerce Indicator Report in 2017 also indicates that the number of organizations adopting ERP system has been more increased in 2016

As such, this study is conducted in the context, which the ERP system has already been one of the most popular business-management-applications in organizations all over the world and begins to be increasingly adopted in Vietnam.

2. Literature review

2.1. Enterprise Resource Planning

There is not an official definition of ERP system in IS literature. Most researchers often illustrate its functionality to clarify what it is. For example, ERP system allows information flows to go throughout business functions as well as business units, those connections are precisely similar to what the Internet communicates among companies (Davenport, 2000).

Another explanation is that this packaged-business-management-software type enables an organization to optimally utilize its resource via integrated approach to its information- processing as well as operating upon a process-oriented perspective instead of function- oriented view (Nah, Lau, & Kuang, 2001). In a little more detail, Soh, Kien, and Tay-Yap (2000) summarizes that ERP system is capable of automating, integrating business processes, sharing data across the whole enterprise, and accessing, producing information in real time.

To image more clearly what ERP system is, Loh and Koh* (2004) graphically compare ERP- integrated architecture with stand-alone applications' architecture. In term of traditional approach previously happening within organizations, each individual department has its own computer system in order to run its work (see Figure 2.2). More often than not, these systems are developed in isolation, and each function will fail to consider how it fits in with other departments. This can lead to duplication of data across the organization, which creates its own problems. The systems become like silos within the organization operating on their own with little interaction.

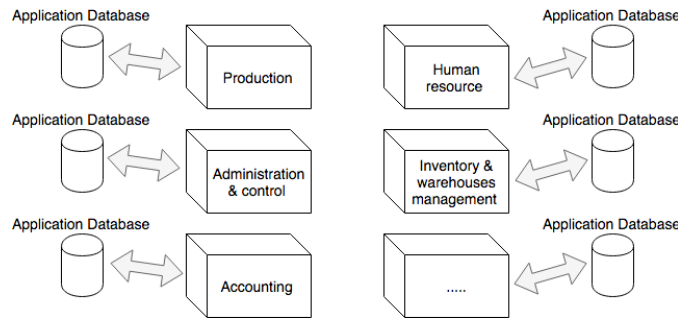


Figure 1: Stand-alone applications' architecture (Loh & Koh, 2004)

When appearing, ERP system combines them all into a single, integrated software in which consists of a series of modules related to an organization’s the different functions areas themselves. These modules run upon a single shared database central so that they are integrated and able to operate efficiently. In other words, unlike in the information silo approach, in an ERP system, departments can share information and communicate with each other in an easy and quick manner and addition, the problems of data duplication and redundancy are resolved (see Figure 2.3).

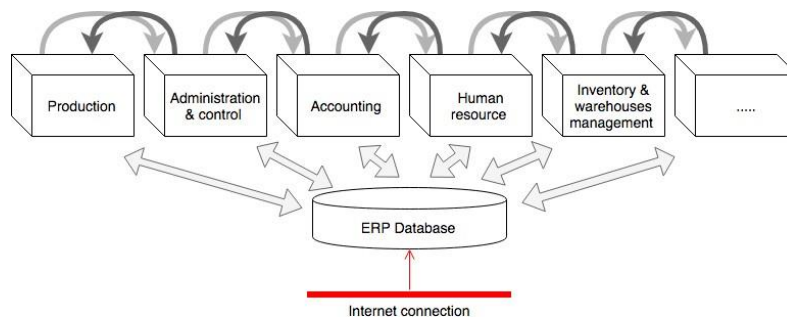


Figure 2: ERP-integrated architecture (Loh & Koh, 2004)

Based on the preceding descriptions mentioned above, we may conduct that an ERP is a packaged complex business software designed to integrate business processes and functions through using single database in order to be able to permit the sharing of common data and information in real time.

Evolution of ERP

ERP has its roots in Materials Requirement Planning (MRP) of the 1970's ((Davenport, 1998); (Wortmann, Hegge, & Rolefes, 2000); (Hwa Chung & Snyder, 2000)). From a business perspective, ERP has expanded from coordination of manufacturing processes to the integration of enterprise-wide backend processes. Meanwhile, from technological aspect, ERP has evolved from legacy implementation to more flexible architecture for clients. Based on studies of Mohammad A. Rashid, Liaquat Hossain, and Patrick (2002) and Utzig, Holland, Horvath, and Manohar (2013), the historical events related with ERP are summarized in Table .1 in order to illustrate the key characteristics of the ERP evolution from 1960s up to date.

Table 1: Evolution of ERP

Timeline	System	Description
1960s	Inventory Management and Control	Inventory Management and Control is the combination of information technology and business processes of maintaining the appropriate level of stock in a warehouse. The activities of inventory management include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status.
1970s	Material Requirement Planning (MRP)	Materials Requirement Planning (MRP) is adopted to plan production processes, generate operation schedules, decide when and how many raw materials are purchased, identify the current level of inventories, and determine batch size for each activity.
1980s	Manufacturing Requirements Planning (MRP II)	Manufacturing Requirements Planning (MRP II) is utilized to gather manufacturing processes together to create manufacturing-activities- chain from planning products, purchasing related parts, controlling inventory to distributing finished-products.
1990s	Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP) is multi-module package, in which includes various modules relating to not only manufacture-activities- chain as MRPII, but also assisting accounting, finance, human resource, and marketing. ERP systems base on integration of business process, utilize a single database, therefore, promising improved-internal-business-activities-performance. The initial ERP is considered as an on- premises model.
2000s	Extended Resource Planning (ERP II)	ERP II not only focuses on clients with additional development of supplier management module and customer management module to optimize the entire business processes, but also focuses on e-commerce with growth of html interfaces. ERP II is a hosted-solution model since its platform is run off-site while its software must be installed on end-users' computers.
2010+	ERP in the cloud	This is a third model of ERP, in which the ERP is distributed from the cloud and accessed by end-users via Web browsers.

The following statistics prove that the market for ERP has been dramatically growing since its introductions in 1988 (Muscatello, 2003). In 1998, the revenues to ERP vendors were approximately \$16.6 billion (Carlino & Kelly, 1999); this figure shot speedily up to \$47.8 billion in 2004 (Fitzgerald, 2005). After more than twenty years since its appearance, the global ERP application market has grown to approach nearly \$82.2 billion in 2016. The tops of ERP vendors includes SAP, FIS Global and Oracle achieving nearly 7%, 4% and 3% market share, respectively (Apps Run The World, December 2017) 9 (see Figure 2.4). Obviously, the rapidly upward trend in the revenues of ERP providers has been a clear proof confirming the popularity of this type of software for the enterprise in the world.

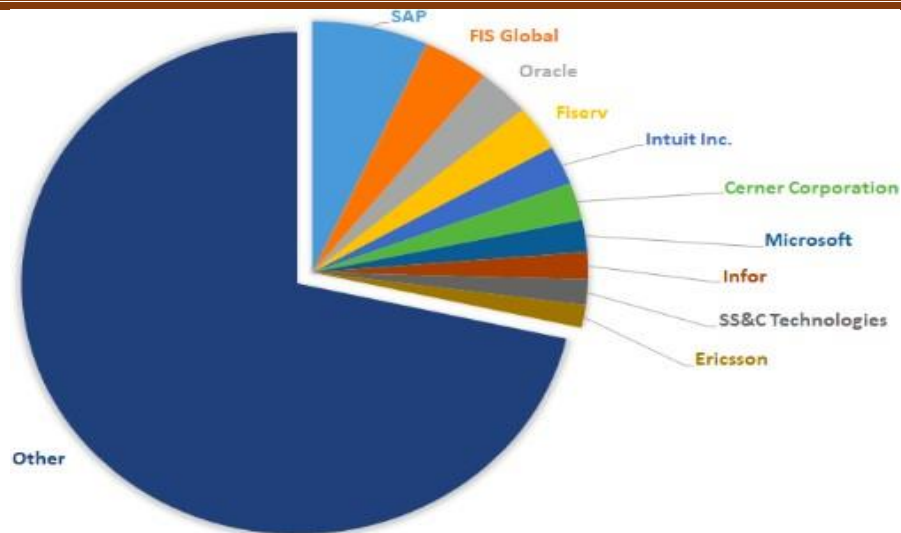


Figure 3. ERP applications market shares split by top 10 ERP vendors and others in 2016 (Source: Apps Run The World, December 2017)

Advantages and disadvantages of ERP

Organizations’ expectations for ERP has generally created a misleading perception that implementing ERP system will immediately improve their functionalities. This is obviously impossible. To have an accurate understanding of characteristics of ERP, it is necessary to comprehend its advantages and disadvantages. Mohammad A. Rashid et al. (2002) show the benefits that a standard ERP system may bring to organizations (see Table 2.2) and simultaneously list certain disadvantages that they need to overcome (see Table 2.3).

Table 2: Advantages of ERP (Mohammad A. Rashid et al., 2002)

What benefit	How
Reliable accessibility	A single database, consistently and precisely integrated data, advanced reports
Avoid duplication of data	Applications use a common central database, where different functional departments enable to access same data at the same time
Transportation and reduction of turnaround time	Optimize retrieving and minimize delays in delivery
Minimize cost	Design of “best practice” on business processes and capability of integration processing enable to save time and improve performance of internal business processes
Flexibility	Business processes re-engineering make internal business activities adapt and restructure easily
More capability of expansion	The modules is developed towards ‘add-ons’-oriented design
Enhanced and active long-term maintenance	Firms are often on a permanent maintenance-related contract with ERP vendors or implementation-authorized organizations
Association with parties on a global scale	Appearance of added modules that relate to customer management (CRM) and supplier management (SCM)
E-commerce, e-business	Internet popularization, ‘social customer’ revolution

Table 3: Disadvantages of ERP (Mohammad A. Rashid et al., 2002)

Disadvantage	How to overcome
Spend a lot of time to implement a system	Focus on preparing and training people to reach a high consensus on ERP adoption, timely support of management, minimizing sensitive issues, setting effective and efficient internal policies.
Costly	ERP itself is very expensive software, implementation of ERP system often leads to business processes re-engineering, which also cost very high. Hence, it should be extremely careful for organizations to choose an ERP system that is suitable with their software-purchase-budget.
Match between ERP and organization' business processes	System's structure and modules should be appropriate, relevant with business processes, culture and strategic vision of an organization.
Dependence on ERP vendor	Consider to select either single vendor or multi-vendor, prefer long-term support-committed vendors
Multi-features system and its complexity nature	Focus on training people to ensure them understanding precisely must- conducted manipulations when using ERP system.
Global scalability	Consideration for investment in Research and Development, product- and-service-related permanent commitment, priority to Internet- enabled systems
Capability of ERP extension	Examine to implement additionally 'add-on' modules, in particular CRM and SCM.

2.2. ERP Success Models

Challenges of measuring ERP success

Researches of Baer (1999), Davis (1989), Consulting (1998), Knowles, Fotos, and Henry (2000), Sedera, Rosemann, and Gable (2001) and Sedera (2006) agree that the impacts resulting from ERP are exhausting to measure. In previous studies, most of measurement and evaluation methods of ERP success focus on justifying whether investment in ERP system will pay off via return on investment (Vickers, 2000) or profit, costs, or market share, etc. (Pan, Baptista Nunes, & Chao Peng, 2011; Zhu, Li, Wang, & Chen, 2010) or sales, total assets, employment (Hendricks, Singhal, & Stratman, 2007); however, the traditional approach has failed to yield an appropriate estimate of the pay-back of the ERP (Barua, Kriebel, & Mukhopadhyay, 1995), (M. G. Martinsons, 1991); (Mukhopadhyay, Lerch, & Mangal, 1997); (Sharda, Barr, & McDonnell, 1988). Likewise, Consulting (1998), Vincent A Mabert, Soni, and Venkataramanan (2000), M. Martinsons, Davison, and Tse (1999) believe that perspectives on financial aspect only show a quantitative and historic facet of the business operations, thus, insufficient to evaluate ERP success. In brief, some researchers increasingly believe that financial measurements do not enable to offer a way to entirely evaluate ERP system's advantages and disadvantages although they do not reject this approach (Stefanou, 2001).

Instead of just being interested in tangible benefits, P. Cameron (2000) emphasizes the importance of ERP benefits measurement in intangible aspect that supports to provide deeper understanding of firms' goals, strategies and expectations at both organizational and individual levels, then recommends that it is optimal for measuring ERP success to cover both tangible and intangible benefits in relation to ERP success.

Furthermore, it is extremely difficult to measure ERP success perhaps due to the complexity nature of the system (Markus, Tanis, & Van Fenema, 2000). Recall that, ERP system is a way for an organization to implement a system to overcome the information silos of the functional approach and put into practice the philosophy of a process perspective (see Figure 2.2 and 2.3). However, implementation and post-implementation process of ERP system is not simple as the design philosophy of ERP systems is centered on the idea of best practice. The business processes supported by an ERP system have been designed and programmed into the system based on what is deemed to be the best way to perform them (Crofts, 2005). Therefore, normally, an organization chooses to change its existing business processes instead of changing an

ERP package when adopting the ERP system. It means the deployment of ERP system often is attached to business process re-engineering that leads to numerous must- solved issues in an attempt to achieve dramatic improvements in organizational effectiveness (C. Yoon, 2009). Moreover, the intrinsic nature of its integration itself makes the usage of the ERP system complex (Markus et al., 2000; E. T. G. Wang & Chen, 2006).

In conclusion, challenges to success measurement, success evaluation and business value creation from ERP system are a balance between financial measures reflecting quantitative and historic aspect and non-financial measures contemplating qualitative and futuristic facet (Eicklemann, 1999; Thorp, 2003; Van Der Zee & De Jong, 1999) and the consideration of complex nature of the ERP systems. Up to now, there has been no any comprehensive way to completely capture both financial and non-financial measures when evaluating performance of ERP. Therefore, in the context of this thesis, except for efforts to reflect complex nature of the ERP system, evaluating intangible success of ERP system is focused rather than its tangible benefits.

A summary of ERP Success Models from 1990 up to present

An extensive review of ERP-related literature without restriction on a list of the leading journals in information system and accounting information system are conducted to indicate the number of studies of ERP success models at organizational level that measure intangible effectiveness achieved when using or ongoing using the ERP system. Although a history of ERP evolution has lasted almost three decades, the quantity of these ERP success studies up to present is actually not much. Related information of these models is tabulated in Table 2.5 below. The prominent things are that all eleven ERP success models have overcome the intangible-measures-related challenge, but have still been threatened by complexity-nature- related challenge. Hence, this study needs to attempt to find how to bridge this gap.

In Table 2.5, the review of these eleven ERP success models suggests that there are noticeable differences in the dimensions, which are used for ERP success measurement. However, the common points of most of models are to utilize system quality, information quality, and user satisfaction as measure of ERP success, couple models focus on impact of system on organizational performance only while most of them are interested in both individual and organizational performance.

Based on this analysis, it could be said that the D&M IS Success model (1992) is considered as underlying theory of most of existing ERP success models. This thesis is not an exception. We are also going to adopt the D&M IS Success model (1992) as our underlying theoretical framework when developing the ESMAP

3. Methodology

This study makes use of positivism paradigm⁷ and quantitative research method, as it is appropriate for validating a new theories-based-formed ESMAP against empirical data.

Review articles are mainly done by the method of synthesis analysis and evaluation.

4. Results

The current study is to develop an ERP success model for accounting professionals in order to guide them how to become increasingly productive enabling enhanced organizational performance when adopting ERP. For this, it is obvious that this research idea is entirely different from all four previous ERP-related studies in Vietnam. If being compelled to compare, Tho's (2013) study, one of these four Vietnamese researches, seem likely to be the closest to this thesis as it also pays attention to the impacts of ERP on organizations. However, Tho's (2013) study exists some limitations. First, it is conducted at individual level and "net benefit" is measured by net benefits that users can obtain from the ERP system. Evaluating impacts of ERP implementation on organizations at individual level is not sufficient to comprehend ERP's impacts. The second restriction relates to incompleteness of both TAM model and D&M IS Success model (1992). According to G. G. Gable (1996, p. 1177), the completeness of the model becomes critical as removing several constructs may 'neutralize or distort

results'. Further, training is clearly variable that may cause success rather than being a part of success (DeLone and McLean 2003), hence, in nature, Tho's (2013) study just test whether system quality, information quality and training have impacts on intention to use, use and net benefits, rather than developing ERP success model at individual level.

Table 4: A summary of studies involving measuring ERP success in Vietnam (Source: by author)

No.	Authors	Research objectives	Underlying theories	Research model	Research method	Unit of analysis	Time frame	Analysis technology	Nature of study is to
1	Thọ (2013)	Identifying key factors affecting successful implementation of ERP system in Vietnam	The D&M IS Success Model (DeLone and McLean 2003) and TAM (Davis 1989)	<pre> graph LR SQ[System quality] -- (+) --> IU[Intention to use] IQ[Information quality] -- (+) --> IU T[Training] -- (+) --> IU IU -- (+) --> U[Use] U -- (+) --> NB[Net benefits] </pre>	Quantitative survey	Individuals	Implementation phase	SEM	Build model in order to test relationships
2	Hiền and Trung (2014)	Identifying ERP critical success factors in Vietnam, then making recommendations in order to improve the success of ERP implementation project in Vietnam	No underlying theory	<pre> graph LR M[Management characteristics and supports] -- (+) --> S[ERP implementation success: + Time + Cost + Effectiveness] P[ERP-project-term characteristics] -- (+) --> S O[Organisational characteristics] -- (+) --> S U[User characteristics] -- (+) --> S ES[ERP system characteristics] -- (+) --> S V[ERP vendor/consultant quality] -- (+) --> S </pre>	Quantitative survey	Organizations	Implementation phase	Regression analysis	Identify critical success factors of ERP implementation

3	Thanh (2015)	Proposing a model for success of information system projects.	TAM (Davis 1989), UTAUT (Venkatesh et al. 2003, 2006), D&M IS success model (DeLone and McLean 1992, 2003), CSFs in projects (Belassi & Tukul 1996; Pinto & Prescott 2013; Pinto, Steven 1989)	<pre> graph LR Habit --> Intention SocialInfluence --> Intention PerceivedEasyToUse --> Intention ProjectQuality --> Intention ProjectObjective --> Intention Intention --> Use Use --> UserSatisfaction Use --> ProjectSuccess ProjectCharacteristics --> Use ProjectCharacteristics -.-> ProjectSuccess UserSatisfaction --> ProjectSuccess </pre>	-----	Organizations	Implementation phase	-----	Propose a success model without testing it
4	Thông (2017)	Exploring factors identifying organizational effectiveness in ERP environment in Vietnam	Balanced Scorecard theory (Kaplan & Norton 1992),	<pre> graph LR ERP[ERP organisational effectiveness] --> OrgCap[Organisation capacity] ERP --> BusRead[Business readiness] OrgCap --> ProfComp[Professional competitiveness] OrgCap --> CustMgmt[Customer management] OrgCap --> FinProfit[Financial profit] OrgCap --> Workflow[Workflow improvement] OrgCap --> CostRed[Cost reduction] OrgCap --> WorkCoord[Work coordination] BusRead --> CustCare[Customer care] BusRead --> ProdEff[Production Effectiveness] BusRead --> ProdImp[Production improvement] </pre>	Quantitative survey	Organizations	Post-implementation phase	EFA	Develop an instrument measuring ERP organizational effectiveness

The review of literature provides the foundational knowledge on the topic area. It includes two objectives. Firstly, in terms of identifying the uniqueness and worth of the research topic, the chapter begins with making clarify to definition and characteristics of ERP system. Then it moves on extensive literature of ERP success models. More specific, it discusses two challenges of measuring ERP success including evaluating intangible benefits of ERP and a call for focusing on the complex nature of ERP system, and suggests how to overcome them. Subsequently, a summary of ERP success models that resolve somewhat these two challenges is tabulated. Based on this table, the issues and weaknesses of existing ERP success measurement models are analyzed and represented systematically. The first part of this chapter then also shows the difference between the current research idea and previous ERP success studies. And finally, a review of ERP success studies in Vietnam is carried out to ensure that this study is unique and worth in Vietnam at present.

Secondly, in terms of identifying inherent, crucial construct(s), which are used to embed into the EMSAP, this chapter reviews related literature and finds out perceived-accounting- benefit of Kanellou and Spathis (2013) which is developed at organizational level as the most appropriate one.

5. Conclusion

From a theoretical perspective, this study is significant and worth due to a numerous contributions. There are the four most remarkable theoretical implications. First, the ESMAP is developed with a goal of improving accountant performance, which in turn enhances organizational performance. The results of a process of theories-based-model development and rigorous empirical investigation support to conclude that accounting professionals, via adopting effectively the ERP system, make advance organizational performance, thus, indeed, add irreplaceable value to the ERP-implemented organizations. Obviously, the ESMAP more provides empirical evidence on the accounting value chain of J. E. Hunton (2002). Second, it should be noted that almost previous studies pay attention on perspectives of multiple stakeholders on ERP success while this study focuses on perceptions of accounting professionals only. It is regarded as ‘pioneer’, and therefore, expands new research direction focusing on developing ERP success models for each particular user in order to maximize the positive impacts of ERP on performances of each employee type. Once ERP’s these impacts on all employees are high, it seems likely that the effect for organization that the whole individuals participate in will likely be high (Princely Ifinedo et al., 2010). Third, perceived accounting benefit concept is firstly validated in the complex model as the ESMAP. The perceived-accounting-benefit-related findings such as its significant role in the ESMAP as well as its outcomes so far constitute to bring unique, priceless contributions to both ERP and BAR literature. Finally, the ESMAP focusing on the post-implementation stage adds more insights into the paucity of research on ERP system after implementation (Grabski et al., 2011).

This study is also an essential from a practical standpoint. Organizational profits, in nature, are generated from productive employees. Thus, the ESMAP is precious as it guides accounting professionals how to become productive under ERP settings. More specific, the ESMAP supports them to adjust their ERP adopting behavior in order to improve their work performance. Furthermore, also the most important, the ESMAP guides organization management how to predict, access and improve organization’s accountant performance to achieve the advanced organizational performance for their organizations. As a result, the ESMAP allows management to better manager, control accounting experts and their work in ERP post-implementation context. Finally, organization will obtain beneficial outcome when individual benefits are positive influenced (Princely Ifinedo et al., 2010). To put it differently, accounting professionals and organization management obtain direct benefits from the ESMAP while their organization receives indirect benefits from the ESMAP.

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