

Evolution Characteristics of ERP Systems that Distinct from Traditional SDLCs

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Abstract: Information systems designed and developed in house to fit a specific or small set of functions. It's typically much smaller than enterprise system, however most of these developments also required more time, high cost to develop, not integrated, unclear customer requirements, and the most importantly working version is available during the implementation phase. On the other hand, many organizations rely on Enterprise Resource Planning (ERP) systems to manage and process their entire business requirements, including a large size of applications, where these systems comply with various business needs, like expanding markets, increasing competition and technology developments. Most of ERP systems should have specific characteristics to achieve the developments of business processes. ERP systems work in dealing with customization off-the-shelf ERP package, or changing organization business process and people structure to suite with the package. This constitutes a handicap for both the research and practice communities. The present study outlines the main and specific characteristics distinct from other information systems and discusses the influence of various enterprise system characteristics such as standardization integration, flexibility, best practices and process-orientation. The aim of this study is to recapitulation of the main characteristics of ERP systems and concludes the impact of ERP key characteristics upon the performance of the system in a given organizational setting and focusing on functionality, procedures and business needs in organizations.

Keywords: Information System, Enterprise Resource Planning, Integration, Enterprise System, Software Packages.

I. INTRODUCTION

Today, public and private organizations are facing different challenges while running their business. These challenges include expanding markets, increasing competition, rising customer expectations, increasing needs for technology; and many others. Thus, there is a need for information system to manage all these aspects [1].

Information Systems (IS) are an arrangement of several components such as hardware, software, communications systems, people, process, and data. Therefore, most organizations use information systems to interact and improve their day-to-day business activities and operations, to support the problem solving and help decision making. Hence, they become critical components for any successful organizations. Information systems provide a high level of computers automation to carry out different business functions like finance, accounting, marketing, human resources management, customer services and operations [2].

Enterprise systems or enterprise resource planning (ERP) systems are considered one of the most important business innovations and expected to have a significant impact on several aspects organizations. These enterprise systems have promised to replace discrete, un-integrated information systems with integrated enterprise wide

systems that will streamline and standardize business processes and deliver tighter control and flexibility of operations [3].

Many companies regard and rely on ERP systems to manage and process their business according to the benefits of ERP systems, although of the high cost associated to enterprise software. To launch an ERP system a company would need to invest in hardware, software and maintenance. Another fundamental cost driver is the need for adaptation of standard software [4].

As more and more organizations move from functional to process-based IT infrastructure, ERP systems are becoming one of today's most widespread IT solutions [5].

Enterprise Resource Planning system is also known as an integrative information system that supports the work processes and resource management of an organization [6].

The development of information systems contained several applications, large size, high cost, large development teams, and usually required limit time schedule [7]. The implementation process of these systems associated massive change in organization structure, business process, and people work [8].

Nowadays, the world is facing another revolution biggest and most complex after industrial revolution, which is the information technology revolution. The increase of the popularity of internet, WWW, new technological development in mobile computing and artificial intelligence is changing the business requirements and business practices. In addition, regarding to inflexibility, the execution of this type of software according to the business requirements, needs a high costly, time and efforts. Also there are important problems that face these systems: the compatibility with developments of hardware and software, integration and redundancy of data between these modules [9].

ERP system are customizable, standard application software that includes integrated business solutions, providing a significant improvements in efficiency, productivity and service quality, and reduce in service costs as well as to more effective decision-making [10].

II. ERP SYSTEMS

ERP system solutions are currently in high demand by both manufacturing and service organizations because they provide a tightly integrated solution to an organization's information system needs [11]. ERP systems have been known as systems that bring integration to several business activities within complex organizations, ERP systems are becoming a standard information system, irrespective of the size and nature of the organization, so the drives for ERP systems are technological and operational factors [12]:

- Technological factor is replacement of disparate systems (hardware/software) because of difficulty of maintenance, integration of processes and systems, and the software does not meet business needs.
- Operational factors are customer satisfaction, improvement of process, simplification of complex process, and standardization of process.

ERP system has the ability to automate and integrate the business processes of organization, to share common data and practices across the organization, and to produce and access information in real time [13].

III. ADOPTION OF ERP SYSTEMS

The business environment is significantly changing. Companies today face the challenge of expanding markets,

increasing competition, business requirements, and rising customer expectations. This increases the pressure to reduce total costs with less time [1]

According the literatures, there are many organizations which have adopted these ERP systems into their business systems management to minimize the cost and save time through cutting the amount of paperwork, labor cost for operating and maintenance [14], [15]. ERP system uses a commonly shared database management system in order to provide access to the information to and/from all departments within an organization at the same time. This enables decisions to be made from an enterprise point of view, rather than making a decision from a separate department, and then coordinating the information manually. In addition, there are a lot of reasons for buying and using ERP system, the major reason according to [16] that ERP system uses a common shared database management system enables easier access to information by all departments within an organization in same time.

Although moving from client-server architecture to internet architecture, or by changes in the business environment, so vendors are constantly evolving to meet the changing business demands, and allow the organization to move agilely and adapt quickly changes in the business environment [17],[18].

[19] Presented four reasons that urge organizations to implement ERP system: (1) simplify and standardize systems, (2) replace legacy systems, (3) gain strategic advantage, (4) improve interaction between suppliers and customers.

ERP Packages fit organizations needs of all sizes, ERP market was \$16.67 billion in 2005 and forecasted to be over \$21 billion in 2010 [20]. Also according to [21] ERP is large information system, many organization have to adopt ERP systems, and there are over 35 hundred million U.S. dollar has been invested in the deployment of ERP, and over 60,000 companies have already implemented ERP system in the whole world.

ERP system implementation can bring significant benefits, such as manage and integrate business processes across various functions, minimize sharing time for information, streamline the business processes and enhance the competitive advantage [22]. A summary of the past studies about the reasons and significance for organizations to adopt ERP system implementation is classified into technical and business reasons. However, it is important to take into account these wide variations in motivation to adopt enterprise systems as shown in Table I.

TABLE I SUMMARY OF MAJOR ADVANTAGES AND BENIFITS OF ORGANIZATIONS ADOPTED ERP SYSTEM

Technical and Business Advantages	[23]	[24]	[16]	[25]	[19]	[12]	[26]	[27]	[28]	[29]	[30]	[2]	[31]	[22]	[3]
Integration			√	√		√	√	√	√	√		√	√	√	√
Productivity and quality		√	√	√						√			√		√
Standardization		√		√	√	√					√				√

Improve Business Process		√		√		√		√	√			√	√		√
Business Strategic Advantage				√	√				√			√		√	
Business Profit & Cost Reduction		√		√				√	√	√			√	√	√
Improve Decision Making			√	√		√			√	√	√	√		√	
Respond to Change Environment	√	√						√	√		√			√	√
Replace Legacy System	√			√	√					√		√			
Market Share		√		√					√				√		
Real Time Processing		√	√				√			√	√	√	√	√	√
Improve Delivery Time	√	√	√						√	√		√	√	√	
Interact suppliers and customers	√	√			√		√		√	√	√	√			√

IV. CHARACTERISTICS OF ERP SYSTEMS

ERP system has a set of specific characteristics, so these characteristics is derived and based on the literature search on ERP system characteristics in general and the comparisons with traditional IT project.

Therefore, in this work the unique features of ERP project were identified and used as a help to understand what they are, what they can do, how they differ from other IT packages, and what characteristics of an ERP development methodology [23].

This paper identifies the main characteristics of ERP systems such as complexity, integrated and packaged software, which perform number of applications through a number of functions, and manage the organization with the integration of business processes [32].

For a better understanding, the ERP characteristics regrouped under three dimensions according to their classifications, namely technical, organizational and informational as described below [10]:

- Technical dimension includes flexibility, complexity and openness; it refers to the capabilities for applications development offered by ERP systems in comparison to traditional systems.
- Organizational dimension includes integration, best practices, completeness and change process; it refers to the system’s deployment in the firm that is the best reflect impact of system on organization.
- Informational dimension includes software package relates to the quality and usefulness of the information provided by the system as presented below (see Fig. 1).

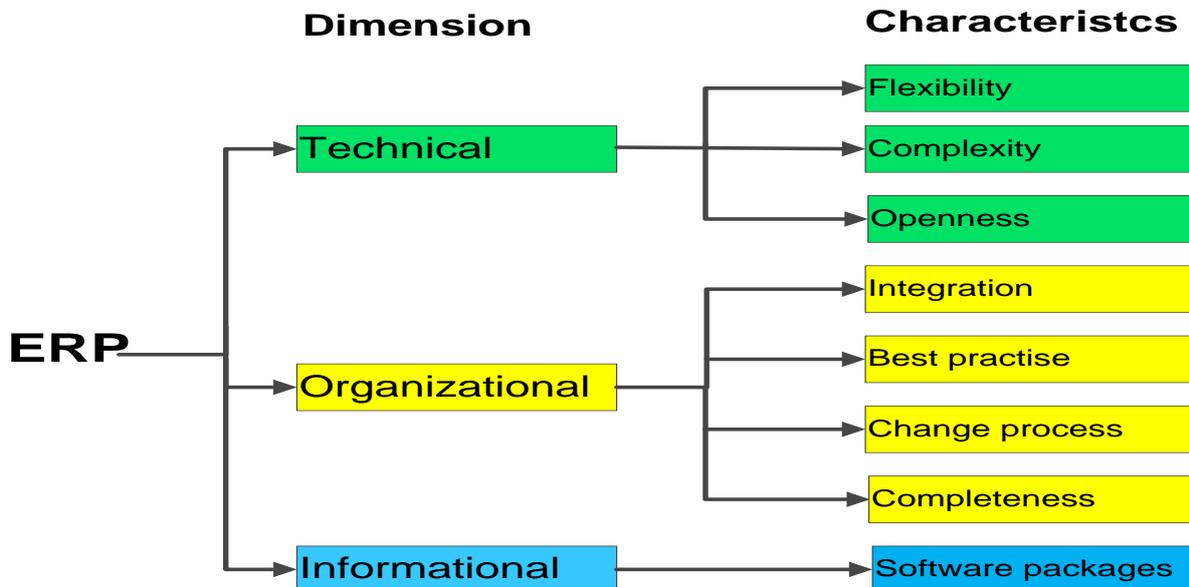


Fig. 1. ERP Characteristics regrouped under three dimensions

V. DISCUSSION OF ERP SYSTEM CHARACTERISTICS

This study identifies the main characteristics of ERP systems such as complexity, integrated and packaged software, which perform number of applications through a

number of functions, and manage the organization with the integration of business processes as follows:

Flexibility: it is one of the specialist characteristics that are differentiation ERP system from other IT project [24]. This characteristic is particularly important to the strategic

business decision. Therefore organizations perform customization and configuration ERP system in order to achieve objectives and reach to competitive advantages [1], [6], [19].

Complexity: ERP system is the most complex software within the most information system. It usually includes one application, which can be operated separately of other organizational applications with friendly user interface [6], [8], [23], [33], [34].

Software Packages: it is one of the essential characteristics that distinguishes ERP system from custom built software, because it is developed to meet the general needs of a group of organizations. ERP software packages must be designed in a way that organizations can be customized, in order to add/remove or reconfigure these modules to respond to the specific organization needs [23], [24], [35].

Integration: Integration is defined as the coordination of activities, processes and exchanges of the information across units or departments and functions, this property is representing an extremely important part and provides a tightly integrated solution to ERP system, and it's one of the core functions that differ from previous IT project. [23], [33].

Best Practices: ERP system is implement the best business practices to serves a large variety of organization. It adopted many options to fit and support various business processes used in different type of organization. This characteristic represents a powerful reason to adopt an ERP system without modifying the process of business [33], [36], [38].

Completeness: Complexity defined that the system consists of many components, many interactions and relationships, and deals with a variety of hardware, software and human components. ERP is much broader scope than that early software packages; they designed to affect the entire enterprise structure rather than unique or set of function those traditional software packages [6], [23].

Openness: ERP system has evolving over several years and most organizations need to implement ERP system to replacement or upgrading the existing infrastructure. It was gradual and continuous developments without considerable changes, these characteristics allow ERP system flexibility to the organization [1], [6], [37].

Change Process: ERP project can be viewed as an organizational change due to the large number of changes it brings to an organization structure like workflow processes, business process and the way people do job. ERP system makes different impacts on most aspects of the environment of the organization like technology, task, structure, people, culture, strategy and size [1], [17], [13], [27].

VI. CONCLUSION

Enterprise Resource Planning system is designed to implement an entire business solution which supports major business functionalities of an enterprise. The ability of enterprise systems (ES) to integrate processes and information and to deliver automation and consistent execution of processes across the enterprise is important to all type of organizations. Carefully comparing the challenges and potential benefits, increasing availability of cost-effective of ES in the marketplace. Successful adoption, implementation and exploitation of enterprise systems is dependent on factors such as suitable to fit between ES solution and their processes, and the extent of standardization and integration of information and processes achieved after implementation. The services and service oriented architecture and their incorporation into the enterprise systems software solutions is expected to make it possible to build bridges between disparate IT systems across and between the enterprises.

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