DETERMINANTS OF ENTERPRISE RESOURCE PLANNING (ERP) AND COMPREHENSIVE MARKETPLACE IN LIBYA

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Abstract

Enterprise Resource Planning (ERP) is an enterprise that incorporates and monitors all company operations and procedures across the whole organisation through an extensive information system. ERP vendors are now concentrating more on SMEs because of the near saturation of large enterprises' ERP adoptions. More SMEs are implementing ERP systems because of globalisation, alliances, value networks, and the widespread flow of knowledge through and within SMEs at present. This study was focused on 80 leading Libyan business organisations catering to local and international trade, manufacturing, trade, banking and hotel services. The risks of adoption relate to the fact that small and medium-sized enterprises (SMEs) have limited capital and unique features.

Keywords: enterprise resource planning, comprehensive marketplace, Libya

1. Methodology

Enterprise Resource Planning (ERP) can be defined as an integrated software system for all major business functions and resource management in an enterprise. It replaces several separate packages on its own, such as payroll and inventory management. It offers several tasks, including a centralised database, online-real-time, high performance, and security-based systems.

ERP focuses on providing knowledge to make exception decisions and simplify business process routine, workflow, business operations; and processes the streamline to fulfil the company's needs and priorities and business strategies to gain more revenues and face competition. Without such a completely market-automated scheme as the ERP, the complexities of potential business acquisition cannot be anticipated.

Owing to the rapid changes in business operations, procedures and difficulty in the detection of business scenarios, this is not favourable. Just to discover that market

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efficiency has not changed at all, businesses have spent fortunes on ERP technologies and implementation. In the software development industry, such massive investments and negative return on investment (ROIs) have developed a bad image (Boehm, Abts, & Chulani, 2000; Sherwood.com., 2019; SERC, 2019). Many concerns are reinforced by conflicting priorities and performance metrics that, to the detriment of the organisation, ultimately establish contradictory value and concept of system recognition.

ERP systems have been increasingly developed and used by large-scale IT and non-IT organisations and have been applied in Libya to small and medium-sized enterprises. There are a few main local and multinational software development firms that have developed systems in overseas businesses for industries. At the same time, international outsourcing firms have built ERP applications for local businesses that have an important and successful effect on the IT world.

The aim of this paper is to clarify the detailed comparison between expenditure in Libya and the marketplace for business process automation and the cost effect of maintaining such a complex structure. It could be due to a number of variables in various disciplines such as business management, IT and system implementation, infrastructure growth, training, data migration, and maintenance, such as subject matter expert information providers (Lagerström, 2010; Dehaghani, & Hajrahimi, 2013).

The cost of ERP depends on variables such as the number of users within an entity or the number of local or foreign branches merged in addition to the budget for implementation (Saleem, & Dhavachelvan, 2010). It depends on the level of sophistication, complexity of the solution within a business scenario, and the size and complexity of the implementation project (aptean.com., 2019). It also depends on whether one needs to buy and install hardware and major changes with infrastructure along with the software, and the architecture of ERP implementation or the business process reengineering methodology.

2. Literature Review

Effectively calculating the remuneration brought to the organisation by ERP, which is advantageous for both consumers and software vendors, is crucial and necessary (Chen & Liu, 2009). With the convergence of local and overseas firms, ERP applications are expanding worldwide, including to developing countries like Libya (Molla & Bhalla, 2006). Integrated packaged software solutions are ERP systems, the main feature of which is synchronising work in a corporation. Depending on the sophistication of the business processes, the problem domain of organisational ERP cost estimation varies from business to business and also depends on the approaches to modelling relationships (Daneva & Wieringa, 2008).

In software development projects, cost estimation models are commonly used. They explain the cost estimation model formulas of parametric software, size inputs, cost drivers, and how the Standard Metrics Concepts apply to them. Constructive Cost Model (COCOMO), Software Assessment and Resource Estimation-Software Model Estimation

(SEER-SEM), and (SERC, 2019; Saleem, & Dhavachelvan, 2010) Device Life-Cycle Management (SLIM).

When calculating the budget for ERP implementations and maintenance, the COCOMO family of models (Boehm, Abts, & Chulani, 2000; Boehm et al., 2000; SERC, 2019), which include research and management structures, are not sufficient for cross-organizational projects. This is because every organisational ERP project is often part of an effort for corporate transformation, which ensures that the project not only offers business functionality, but also brings improvements in organisational structures, data and business processes with it. Therefore, there must be multidimensional commitment, efficiency, and cost modelling (Stensrud, 2001). For the exposure of collaborators to estimate the budget to decrease the probability of failure in an organisation, the integrated approach to ERP project cost modelling is particularly relevant (Daneva & Wieringa, 2008).

The expected benefits of an ERP investment have been defined by organisations; they must combine both technological expertise and awareness of the functional field. Furthermore, ongoing assistance following implementation is also a prerequisite. It is necessary to consider and use the business units' functional Subject Matter Experts (SMEs) (Chen & Liu, 2009) as representatives of the implementation, and a great effort is required to tap into and notify the SMEs' knowledge of business processes of any possible changes in the processes. Functional SMEs are also viewed as highly regarded, critical staff to configure and execute ERP systems due to their knowledge of business processes and this is one of the key reasons that increases the budget for ERP systems (Kevin, Gallagher, Worrell, & Mason, 2019).

The selection for the ERP is budgeted according to the selection process system. This covers all of the main and minor budgeting elements (Stefanou, 2002). The initial costing process is the development of the ERP program, taking into account Software License Fees, Maintenance Fees, Hardware and Implementation Services, including Feasibility Study Requirements Review / Scope Specification, Installation, Configuration, Integration, Data Migration or Conversion, Customization, Reporting, Testing, Training, Documentation, and Project Management (Sherwood.com, 2019). In addition, when designing an ERP scheme, the strategic advantage helps to gain returns on investment. Therefore, because this implementation and maintenance cost is high, rivals build sustainable competitive advantages and strategy to formulate it uniquely (Molla & Bhalla, 2006). ERP users also refuse to disburse the payment balance because they conclude that the goals will not be reached by software providers (Chen & Liu, 2009). To boost business efficiency, ERP systems encourage business processes and business functions across the entire value chain (Chen & Liu, 2009). By removing upfront capital expenditure and thus eliminating the need for in-house IT services and external infrastructure, 'ERP on Demand' aims to improve the availability of ERP solutions to companies. Depending on the complexity, the degree of protection and the monthly or annual basis, the payment form is module-wise or package-wise. It is updated with new versions periodically and made available to all customers (180systems.com, 2014).

Only a portion of the overall ERP system development fee is the ERP programme cost. Cost estimation, using a standard rule for software, was classified into common parts. It reflects 30 percent of the overall cost of implementation. For implementation facilities, data conversion, consulting, and training, hardware may be another 20 percent and half of the total envisaged. Such percentages can differ significantly from 30-20-50 (aptean.com, 2019).

Larger and more complex solutions have a reputation for high implementation costs due to the complexity of the solution (SERC, 2019). Vendors find this (high cost) especially difficult and actively strive to simplify the process and reduce the burden of implementation. Some explanations for the difference in ERP implementations have been found (Kumar Pal, 2008).

There are direct and indirect variables influencing the cost of ERP implementation. The initial licencing and maintenance costs are a crucial factor in the cost of implementation. The licence, the number of modules and the operating systems for the database are some of the costs covered by the initial licence and, in general , the cost of implementation depends on the software chosen by the manufacturer and the technology. Hardware maintenance costs, including servers, networks, terminal series, and workstations, are a key factor shaping ERP implementation (Daneva & Wieringa, 2008; erpsoftwareblog.com, n.d.).

Sufficient preparation is recommended before choosing any ERP vendor (Lindley, Topping, & Lindley, 2008) to minimise hidden costs during ERP implementation. Cost estimation models are available to assist in estimating the exact budgets (Daneva & Wieringa, 2008, GAO, 2009; DODIG, Inspector General, 2019; SERC, 2019).

In a group of solution providers or suppliers, ERP device rates for applications are usually competitive. The prestige or rank of the seller they hold locally or globally has been enriched (tgiltd.com, n.d.). Compared to others, SAP and Oracle are costly goods (aptean.com, 2019), but businesses might be shocked to find that the costs are very competitive between market scenarios in final negotiations with multiple solution providers from various levels (Westrup & Knight, 2000; Jama, 2006).

SAP is the undisputed leader in ERP, enjoying a 22 per cent market share, according to a new report conducted by the US consulting company Panorama Consulting. Oracle has a market share of 15 percent, while Microsoft has 10 percent. The remainder is dispersed through other ERP suppliers (blogs.sap.com, 2010). The 53 percent balance includes all other leading vendors who are over 100. It concludes that the remaining suppliers will not get even 2% each.

Awareness of skills and previous experience is really countable and eliminates both overhead and expenditure by choosing the right methods and methodologies (Kumar Pal, 2008). There are processes for outsourcing some aspects of the project to third-party consulting companies that are more secure about the handling of sections such as feasibility analysis , reporting and presentation, costing and budgeting efficiency (Clarke & Connor, 2019).

In the sense of lifecycle cost or total cost of ownership (TCO), ERP device cost should be presented. Consider the up-front cost of hardware, software and deployment over a fair period of time (at least 5 to 7 years), plus operations, service and maintenance costs. It is focused on the life cycle of Business Analysis, System Design, System Implementation and System Testing of the ERP implementation process. The lifecycle of growth is based on a business process-aligned conceptual structure (Maditinos, Chatzoudes, & Tsairidis, 2011; SERC, 2019). In addition to this, most ERP device providers charge an annual maintenance fee in the range of 18-20 percent of the purchase price and it is well worth the expense (aptean.com, n.d.). A maintenance subscription will ensure that, if the provider continues to invest in the product and take advantage of new functionality and technology within a given time or under the arrangement, there is ongoing support, 'bug-fix' services, as well as device upgrades and improvements.

Due to the complexities of the business process, most ERP system providers now give their systems a Software-as-a-Service (SaaS) implementation solution rather than operating on their own to reduce the overhead of maintenance, duties, and risk of the programme. Since the device is hosted in the cloud, there are no up-front software licencing costs and no hardware or operating system costs. However, for standard licences, monthly or annual expenses will be higher than the maintenance fee.

Software vendors may promote SaaS, implementation accelerators, pre-configured solutions, and out-of-the-box implementations as the silver bullet to an easy implementation, but businesses are still more likely to go over the budget and take longer than anticipated (Zimin, Qiang, Jing, & Jianwei, 2013).

Likewise, software is always priced according to the complexity of the business process and the features included. In general, software with more features is more costly than software with less functionality, which means that many modules need to be added to reflect the various business processes, such as human resource planning, finance and accounting, manufacturing and material management. Similarly, it would cost more to incorporate applications supporting a wider range of business processes and functions (Scavo F. (2010), Rosa & Max Hodal, 2010). The study and reporting of basic market criteria and the execution of feasibility studies have contributed significantly to ERP pricing (Erpsoftwareblog.com, n.d.).

A point of function is a unit of calculation to express an ERP system's amount of business functionality. The software size and the expense of a single unit are calculated by Function Points. Function Point-based software sizing standards and public specifications are known as ISO standards, i.e. COSMIC: ISO / IEC 19761:2011 Engineering applications. A Functional Size Measurement Tool, FiSMA: ISO / IEC 29881:2008 Information Technology-Engineering of Software and Systems-FiSMA 1.1 Functional Size Measurement Method, FiSMA: ISO / IEC 29881:2008.

Method, IFPUG: ISO / IEC 20926:2009 Software and Systems Engineering-Software Measurement-IFPUG Method of Measurement of Functional Dimension, Mark-II: ISO / IEC 20968:2002 Software Engineering-Ml II Feature Point Analysis-Counting Practices Manual, NESMA: ISO / IEC 24570:2005 Software Engineering-Version 2.1 of the

NESMA Function Size Measurement Method-Definitions and Counting Guidelines for the Application.

Without a lot of data migration from the old system and without creating interfaces to legacy or third-party systems, an organisation that can clearly incorporate the new system can get away with a lot less implementation budget than an organisation that needs a lot of data conversion or integration. The complexity or simplicity of the interface depends on the business features, but the end user can easily understand the interfaces and navigation structure very clearly, including the navigation structure (Scavo, n.d.). This is focused on the number of interfaces determining the metric and the scale of the ERP project to assess complexity (Rosa & Max Hodal, 2010; Clarke & Connor, 2019).

There is a team to represent the internal phase of the organisation even after the ERP production is outsourced. The organisation that has to provide professional services to a well-formed internal project team will normally pay less for implementation than an organisation that relies more on external contractors to carry out implementation activities (Scavo, n.d.). It decreases the process and configuration of business research, including the time, and while they are on the job, they have live experience (Robert, McLeod, & Davis, 2011).

For local and overseas companies that are connected together, ERP applications are created. After adopting the vendor selection protocol, the organisation has the right to choose a vendor. The cost of travel is a vital factor for overseas vendors, as they must stay on the platform according to their requirements. If the supplier remains in the backyard of the customer, has a local branch office, or implementers who are geographically diverse and use a home office, then travel expenses could be lower, including bed, board, airfare, car rentals, parking, and mileage (Scavo, 2010).

This problem occurs when, without following proper protocols, data is transferred into a new system. The appropriate integration of organisational data is hampered by parallel structures and leads to data mismatching in other modules. As a result, the vendor's support system is outdated and difficult to incorporate (Dixit & Prakash, 2011). Therefore, in order to prevent a spike in implementation and to maintain costs, the use of parallel systems should be entirely avoided.

The ERP Consultants should properly perform the training and testing of the system. As part of the implementation process, the supplier offers training to a group of individuals, known as the 'Core Team,' composed of 30 percent from the customer side. The core team is responsible for functioning as the trainee team that trains the rest of the end users (Dixit & Prakash, 2011). It was found that, primarily due to the lack of computer literacy, 50 percent of the training given to end users was not carried out. They require additional training and time, thus. For this reason, an additional budget was allocated for this purpose. For in-house workers, a mixed training approach is ideal in this regard (Noudoostbenil & Hashem, 2009). Coverage- based testing approach could significantly reduce the risk of failures (Gerrard, n.d.; Lagerstrom, von Wurtemberg, Holm, & Luczak, 2010).

On average, ERP implementation takes two to five years. Thus, ERP vendors have found that the system goes live to the employees after completion of the training, but many trainees from the organisation leave the business within a short period of time. In the form of a lack of key personnel, i.e. skilled workers, this creates a significant loss for the company. Therefore, with the order of the company, the provider must continue to train individuals. This is viewed as a hidden expense and raises the cost of implementation (Dehaghani & Hajrahimi, 2013; Jama, 2006; Clarke & Connor, 2019). When considering budgeting, this is a highly challenging and main competitive element. It is possible to choose the technology used to create the ERP application according to customer requirements or the choice of the seller. The factors that increase the ERP budget are technological uncertainty, potential rivalry sustainability, and expertise in these fields (Lagerström, von Württemberg, Holm & Luczak, 2010; Lagerström, 2010).

A complicated job is recording a large-scale ERP project. It begins from the start and should be consistent with the whole phase of development, including the production of the user manual (Sherwood.com, 2019). This is a legal document as well as a reference material that can be reused when appropriate by the developer. There are hidden costs within the documentation process, including user manuals, such as printing, filing and maintaining, drafting, and typing (Dehaghani & Hajrahimi, 2013).

The complexity of the business process, or how new the current module is, was considered, according to the available budget, to remove any module from the new system to minimise the customer's overall budget. However, it unnecessarily raises the budget because the seller has to put more work into integrating the new programme with existing modules (Sherwood.com, 2019; Herbert, 2006).

Throughout the project, budget control and auditing costs are also a major factor. They are outsourced or retain the in-house documents to sustain the budgeting according to the stability of the seller (Herbert, 2006). In order to minimise their burden, software development firms like to outsource this to the auditing business, but this expense would be applied to the client (Lagerström, von Würtemberg, Holm, & Luczak, 2010). Due to factors such as inauguration, project completion, meeting at various times, and with different levels of personnel or consultants for the milestones and length of the project, budget allocation for the celebration of the project is also a substantial sum (Herbert, 2006). In order to celebrate turning points in the project, ample funds were allocated at the beginning of the drafting of the budget.

This is the responsibility of the seller during the production of the ERP system, even though the customer has been allocated a separate budget for this reason. This is particularly considered for large-scale projects because the supplier needs to create an artificial environment to back up and secure the data when designing such a system (Lagerstrom, von Wurtemberg, Holm & Luczak, 2010). The seller needs to buy third-party applications or plug-ins to create the ERP programme, according to the client requirement. For this reason, a budget is thus allocated (Herbert, 2006). Technology advancements and emerging technologies are being used to sustain the productivity of

companies. Owing to these technical advances, budgeting has been increased (Lagerström, 2010).

Budgeting is influenced by data transfer or conversion (Erpsoftwareblog.com, n.d.; Rosa & Max Hodal, 2010). This involves the process of data migration and the application techniques anticipated.

The next problem is how to handle the database to maintain high security and easy maintenance until the organisation or provider decides the sensitivity of the data (Rosa & Max Hodal, 2010). Therefore, during budget allocation, data encryption phase and recovery, and backup procedures are included. Testing process and production process on real environments are configured before beginning, and several configurations are running on a server. Traders use a development environment website (Oracle Software Corporation, 2014). An additional expense must be included in the budget when a client demands a different design for the purpose of reuse in the future (SERC, 2019; Lagerström, 2010). This is critical when the application is expanded or different modules are introduced in the future.

The overall cost of the creation of the ERP is paid for additional consultations other than the number of times initially set (Lagerström, von Würtemberg, Holm & Luczak, 2010). To validate and ensure the company process and testing phases, these meetings are performed (Herbert, 2006; Clarke & Connor, 2019). According to the business process, the considerations considered to assess the risk of the project are the degree of data sensitivity, online and real-time data transaction, and also protection (Lagerström, 2010; Clarke & Connor, 2019). It is difficult to allocate separate budgets, as mentioned above, for each category. Companies therefore maintain a secret cost segment to assign a budget for products that they cannot correctly classify or break down and name as miscellaneous costs (Saleem & Dhavachelvan, 2010; Jama, 2006). In order to review and verify the bond or the signed document, legal enforcement needs to be considered. This ensures that a proper legal channel is used by the supplier and the customer and adheres to all legal points for all parties' survival (BearingPoint, 2004).

3. Materials and Methods

For 80 leading firms, the analysis was quantitatively performed using a questionnaire. The principal focus was on the cost of implementation of the ERP framework and the cost of maintenance. Companies were chosen to cover leading companies in Libya according to various business processes. Some of the firms were locally completely functional and others were associated with or doing international business with foreign corporations. The participating companies in the research were a mixture of stakeholders that were interested in in-house or out-sourced ERP framework implementations. In order to calculate the amount that was spent on software to operate the company in an organisation, implementation and maintenance costs were considered together. A questionnaire was used to identify the budget planning priority level for the above variables. Senior and middle-level consultants working for software development firms

in Libya have been interviewed. Descriptive, Hypothesis Testing [Anova, Analysis and variance (One Way), Pearson Correlation], and Frequency Analysis are approaches for conducting the study. A Hypothesis Testing technique known as the 'deductive approach' is used for this research. Hypotheses formed in the earlier part of the analysis will be tested using the above model. Since this is a paper focusing on the subject of the ERP application marketplace, implementation and spending, and co-factors that raise maintenance costs, it has been presented in tabular format. To verify the relationship between these variables, individual variables were compared. This helps to understand the ERP deployment and maintenance marketplace in order to improve the efficiency within the Libyan realm of in-house ERP and outsourced-developed ERP applications.

4. Quantitative Analysis

For local businesses, the average cost of implementing software (per system) is about LYD570,833, while the median cost is about LYD194,298. These expenditures range from a minimum of LYD384 to a maximum of LYD6,268,207 and were reported for companies and banks of the service category, respectively. The total cost per module for local businesses for the implementation of software is approximately LYD119,082. Approximately LYD35,273 is the median rate. Depending on the form of the firm and the sophistication of the business process, the price range ranges from LYD77 to LYD1,567,052 per module. The cost for modules is often correctly distorted, similar to the cost per device, suggesting that most of the cost values are less than LYD600,000.

5. Conclusion and Discussion

As with other business organisations, the banking sectors show high expenditure per system for software implementation costs. The business method is more complicated, accountable, and dangerous when evaluating business scenarios. These organisations maintain transactions globally and, therefore, in order to trust them, automated systems should be more reliable and more stable. The findings indicate that the average and median cost of deployment and maintenance of software is comparatively higher for multinational companies than for local companies. These multinational corporations deal online and on a real-time basis with all enterprises. Therefore, due to established reasons, the control process and the implementation process differ. Cost and Data Transfer or Conversion of Software Service suggests that more attention is given to the highest values when considering software development. ERP lifecycle creation, risk classification, number of modules / amount of functionality, internal project team skills and availability, documentation, back-up tracking and data security, hidden costs, knowledge of experience and expertise, training and testing, and running parallel systems are considered as key factors of primary importance. In addition, various server environments, employee retention, vendor credibility, external system integration,

licensing costs for third-party applications, cloud storage technology, and database management costs have added substantially to the estimation of the budget.

Conflict of Interest Statement

The authors declare no conflicts of interests.

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