ERP Strategy and a Firm’s Contextual Dimensions: A Multiple Case Study

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Abstract—The decision to implement an Enterprise Resources Planning (ERP) system involves a large initial capital investment followed by a complex process. It is important that organization structures its ERP systems to conform with organizational competitive strategy and identifies prospective benefits of ERP implementation. The purpose of this study is to explore how a firm’s context affects its ERP strategic planning process and how ERP strategies achieve organizational value. The research design was a multiple case study with cross-case comparisons in the Taiwanese IT industry. The case findings show that the company with aggressive organizational characteristics is more likely to adopt an innovation or innovative strategies. The findings also support that organizational characteristics and industrial characteristics affect ERP strategy. ERP implementation improved operational processes, enhanced the company’s image and customer service. Providing more effective customer service is an important value of ERP implementation. ERP systems provide competitive advantages to the organizations and support organizations’ visions in various ways.

Index Terms—Enterprise resources planning, organizational strategy, case study.

I. INTRODUCTION

When developing information systems in the past, companies would first decide how they wanted conduct business and then choose a software package that correspondingly supports their proprietary processes [1]. The options for long term investment in IT are of three forms: replacements and minor improvements, expansion, and strategic moves [2]. ERP systems may be adopted as a replacement for existing systems because of the needs associated with expansion, or as a strategic initiative. According to Morris’s research [3] found ERP implementation mainly beneficial in reducing inventory, improving customer services and improving communications. According to Morris’s research [4] research also supported that share prices are positively associated with ERP implementation. However, the maintenance and implementation of ERP systems are highly expensive and time consuming. According to Lengnick-Hall et al. [5] argued that ERP has the potential to either constrain or expand a firm’s strategic opportunities. The possibilities for improved competitive advantage resides in how well the information system (IS) is integrated with the organization’s culture and learning capabilities. It is important to evaluate ERP requirements in the context of their long-term goals and objectives and not just short-term gains and operational improvements. The achievement of greater organizational effectiveness is the paramount consideration in most of the management decisions which the MIS is to support; it also must be of paramount importance in the design of the MIS. There is an intrinsic linkage of the decision supporting MIS to the organization’s purpose, objectives, and strategy [6]. The development of appropriate IS strategy and its effective implementation should be viewed as interdependent critical elements of the success of many contemporary organizations [7]. An organization should structure its IS systems to conform with its overall organization context variables, such as organizational decision-making structure, managerial philosophy, organization form and organizational competitive strategy [8]. There have been a number of studies of ERP implementation. Although those studies provide ERP benefits [9], [10] and successful factors [11]-[13], there is still a lack of understanding the linkage of the firm’s context and ERP value. The primary unanswered research questions center on determining how an ERP system’s strategic and control benefits can be achieved to realize firm efficiencies, enhance agility and problem solving, and support firm strategy. While much has been learnt, many unanswered issues remain [14].

This study illustrates the mutual influence between the firm context and the system; and in turn, our improved understanding should enable us to answer rigorously the following two specific questions:

Q1. How does the firm’s context shape ERP strategy?
Q2. How does the ERP strategy generate business value and competitive advantage?

This study seeks answers to these questions by examining ERP implementation in Taiwan Information Technology (IT) industry.

II. LITERATURE REVIEW

The issue of the successful factors for ERP implementation [13], [15]-[18] has become a popular cliché. The results from [12] survey show that ERP implementation success significantly depends on the organizational fit of ERP and certain implementation contingencies. In addition, a study of, according to Morris’s research [19] shows that many problems related to ERP implementation is a result of a misfit of the system with the characteristics of the organization. The integration and standardization imposed by most ERP systems may not be suitable for all types of organizations and thus the fit between the characteristics of the adopting organization and the standardized business process design embedded in the adopted ERP systems affect the like hood of...
implementation success of failure [20]. This is consistent with the finding of [1], who argues that ERP tends to impose its own logic on a company’s strategy, culture, and organization which may or may not fit with the existing organizational arrangements. This means that an ERP-project can be viewed as an organizational change project, rather than as the replacement of a piece of technology.

The organization’s strategy is the universal direction in which it chooses to move in order to achieve its goals and objectives. Strategy content principally focuses upon the outcome of strategic decisions and the manner in which business strategy content is manifested in a firm has been variously described as strategic fit, strategic predisposition, strategic thrust, strategic choice, and more generally strategic orientation [21]. According to Morris's research [1] attributed many failures of ERP implementation to the lack of alignment with business needs. The broadest strategic planning which must be done by an organization is that of its mission. Once the organization’s mission has been determined, its objectives - desired future positions or "destinations" that it wishes to reach -should be selected [6].

The disorganized purchase and implementation of systems without the consideration that the support they provide to the strategic goals of the organization may lead to failure of internal and external relationships and operations. It is commonly accepted that successful organizations are those that have a clear and agreed strategic vision – and a clear and agreed means of processing towards this vision. It follows that the information systems and the underlying information architecture of an organization should be based on, and indeed be supporters of, the strategic vision [22]-[24]. According to Morris's research [25] argued that competitive strategy should be considered as a decision factor in the IT systems strategic planning stage because IT systems play an important role in the implementation of contemporary organizations’ competitive strategy. Strategy describes how an organization matches its own capabilities with the opportunities in the marketplace in order to accomplish its overall objectives [26]. IS strategies cannot be developed independently of the business strategy, nor should they follow the business strategy. Successful IS strategies must be developed simultaneously as the business strategy [27]. Porter’s distinction between operational effectiveness (efficiency and effectiveness) and strategic positioning (reach and structure) can be translated directly into corresponding goals for IT. Efficiency is achieved by using IT to reduce operating costs or to improve productivity, while effectiveness comes from using IT to foster greater flexibility and responsiveness to changing market needs [28].

Maximization of organizational efficiency and effectiveness through IT as the common goal of all organizational stakeholders [29] is widespread within IT business value research.

An influential framework for understanding Management Information System (MIS) adoption in an organizational context has been developed by [30]. The Technology Organization Environment (TOE) framework identifies three aspects of a firm’s context that influence the process by which it adopts, implements, and uses technological innovations: (a) Technological context describes both the existing technologies in use and new technologies relevant to the firm. (b) Organizational context refers to descriptive measures about the organization such as scope, size, and the amount of slack resources available internally. (c) Environmental context is the arena in which a firm conducts its business-its industry, competitors, and dealings with government [31, pp. 152-154]. It is a useful analytical tool for distinguishing between inherent qualities of an innovation itself and the motivations, capabilities, and broader environmental context of adopting organizations [32].

The TOE framework has consistent empirical support in various IS domains, such as Information technology adoption models, cloud computing adoption and [33]-[35] and E-business adoption [36], as well as the eventual adoption of an enterprise resource planning (ERP) system in medium-sized enterprises (SMEs) [37]. To explore the influence of firm’s context that on ERP strategy and value in the Taiwan IT industry, a research model was developed based on [30] TOE framework and [6] MIS strategic planning process.

III. MATH

The research involved a series of case studies on organizations where ERP systems were being or had been implemented. Case study research is a common qualitative method used in information systems [38], [39]. It is particularly well-suited to the study of IS because the object is the study of information systems in organizations, and hence interest is focused on organizational rather than technical issues [40]. Stake [41] and Yin [42] described a multiple case study enables the researcher to explore differences within and between cases. Qualitative research as often using multi-site multi-case designs. Having multiple sites and cases increases the scope of the study and the degrees of freedom. The aim is to increase generalizability, thus providing a measure of reassurance that the events and processes described are not wholly idiosyncratic [43]. The generalizations have been seen as explanations of particular phenomena derived from empirical interpretive research in specific IS settings, which may be valuable in the future in other organizations and contexts [44]. The emphasis tends to be placed on qualitative methodologies where the aim is to pursue fine-grained research using case study analyses. Comparison is restricted across cases of analysis because of the uniqueness of strategy to the organization, environment, and temporal circumstance [45].

Twenty Information Technology (IT) companies were approached on the basis of ERP vendor lists. At the present, the IT industry is the leading industry in Taiwan. Seven companies declined to be involved in the research, possibly because of negative experiences associated with implementation, or possibly because they regarded their implementation process as sensitive and of competitive significance. Thirteen Taiwanese IT industry companies participated in this study. The sample companies were drawn from middle and downstream Integrated Circuit (IC) companies and computer manufacturers. Companies were approached via their CEO regarding willingness to participate in the study. An information sheet was sent to the CEO with a follow-up phone call. The CEO was asked to
provide a list of people from within the organization who have had contact with the process of ERP implementation. These people were then contacted independently, provided with the information sheet and invited to participate. If they agreed to participate, a consent form was faxed to them for completion before the interview.

The primary means of data collection was via interviews. Interviews were conducted with 30 individuals. Interviewees were either implementation project leaders or functional managers. A semi-structured interview is a useful device for focusing responses and ensuring some degree of comparability between respondents [46]. Interviews were conducted with 24 individuals from 13 companies. Interviews were tape recorded and transcribed verbatim, and lasted 60 to 90 minutes. Participants were asked to review their transcriptions from the interviews in order to verify the content. Follow-up by telephone or e-mail was used to clarify ambiguities or discrepancies, or to confirm information.

Materials like annual reports, promotional materials, company website information were also used for this purpose.

After the interviews, a coding process was designed to uncover meaningful information in the case companies. First, the participant firms differed on a range of potentially important dimensions including established year, size, revenue, ERP investment, and phase of implementation. The sample firms were divided into two groups. Group 1 contained companies with legacy systems. These are companies which had some existing IT system for information management. Group 2 was a group of new start-ups and smaller companies who were therefore, without legacy systems. The themes were summarized into a matrix for the purpose of intermediate qualitative data analysis [43]. Data was analyzed and proposed relationships were obtained using methods for building theory from case studies [47] as well.

IV. FINDINGS

A. Demographics of Sampled Firms

The main products of the companies in Group 1 consist of IC, computers and related products. In contrast, the main products of group to with no pre-existing legacy systems were TFT LCD displays and related products. Most companies, in both two groups, had overseas production facilities. Different ERP system providers were represented in the sample, the most common being SAP. Six firms had implemented their ERP systems before 2000, the other firms’ implemented ERP systems during or after 2000. All companies implemented three or more modules with finance, purchasing and material modules. These modules are common to all except the human resources module being absent from all in the first implementation. Some companies like Company A implemented the HR model a few years later.

B. Driving Forces for ERP Implementation

Various factors affected the companies’ decision to implement ERP systems. The motivational factors were a mix of internal and external organizational factors. Y2K compliance was a common driver of ERP implementation for some companies (B, E, F) who implemented ERP systems before 1999. Customer requirements were also important. Some IC and computer manufacturing companies in group 1 were OEM manufacturers, and were required by customers to implement ERP systems (A, B, E, F, K). Globalization caused companies A, E, F, H and I to use ERP to integrate operation systems and standardize operational processes in multiple sites or countries. Legacy system replacement was also a common driver (A, B, E, G, D). The implementation objective of a Hi-Tech company like D with an efficient management system was only to achieve an advanced information system. Some growing companies like A and H, needed ERP systems to support their companies’ future operational processes. Only Company A took cost-benefit analysis into consideration, with reducing material costs and tax reductions as their primary concerns.

C. ERP Value

Improved Business Processes

For Group 1 companies with legacy systems, ERP provided an opportunity for the companies to review their business processes and organization structures. For instance, it was reported that:

“In ERP implementation, we redefined the structure of our organization. The new structure is more logical and leads to better internal control. Before implementation, the organization was controlled by people, now it is controlled by the system.” [Project Leader,, Company F].

In contrast to Group 1 companies, new start companies in Group 2 were not always clear about their business model when they implemented their ERP systems, or they were growing rapidly. ERP systems provided a best practice model and imposed ERP system logic on the company’s business processes, organizations and cultures.

“We were a new start company without a legacy system when we implemented an ERP system. ERP helped to define the business process as we needed. We see it as a necessary tool for our business operation system.” [Logistics Manager, Company I]

System Integration

ERP systems enhanced the data integrity of the organizations. The participants noted:

“The best value of ERP is data flow. The same data is used by users in different functional areas. ERP value is intangible. It improves data reliability”. [Project Leader, Company A].

“ERP integrates the information from the upstream to downstream. All functional users use the same package data.” [MIS Manager, Company L].

Business Process Standardization

For global companies, ERP is a good tool to standardize business rules and operation systems of overseas sites. Several companies (A, D, E, F, H) in Group 1 were international companies. A particular benefit flowing from ERP implementation was the standardization of information systems and operational processes. For instance:

“We are an international company. The value in ERP is its standardization of the same operation processes and business rules in different sites of different countries.” [Project Leader,
Company E].

However, issues tended to emerge later in the post-implementation phase, as the new companies grew and the original “best practice” seemed no longer to fit organizational needs. Company J reengineered operational processes in the post-implementation phase.

Customer Trust, Company Image and Customer Service

ERP implementation also brought improvements to company image and customer trust, as commented by companies B, F, G, and J. In particular, companies J and B announced their successful ERP implementation on their website. For instance:

“Because of ERP, the customer trusts our MIS system. SAP systems can improve our company image. We announced our successful ERP implementation on our website” [Project Leader, Company B].

“We are an OEM company. Our customers required us to implement ERP system. They highly value this system. With the ERP system, they understand and trust our operational processes; furthermore, they believe our costs and find it easy to track their product process.” [Project Leader, Company F].

“We are a public company. With an ERP system, our customers will trust our operation system. We have disclosed our successful ERP implementation in our annual report and website. We believe the ERP implementation will improve the company image and therefore provides us with a competitive advantage” [Logistics Manager, Company J].

In addition, there was satisfaction with the better customer services provided by the ERP systems.

“In the Taiwanese Hi-Tec industry, the customer orders today, and the required delivery date is tomorrow. We can control the operational process and value chain with ERP systems and give our customers quick responses. It cannot be achieved with paper work.” [Logistics manager, Company L].

V. DISCUSSION

A. Organization Size, Characteristics and Organization Strategy are the Influential Organizational Issues in the ERP Strategy

According to Morris's research [48] identified the organizational context variables affecting the success and failure of MIS. The money required for ERP systems is a huge investment for a startup business. In particular, companies H and J were still small-medium companies when they implemented their ERP. The findings seem to support that it is possible for start-up companies to use computerized information systems to gain competitive advantage [49]-[50]. This study indicates in new companies without legacy systems, acceptance was gained readily. The companies with an aggressive organizational strategy are more likely to adopt an innovation. By viewing and using information systems as a strategic weapon, a small business can compete against large and more established organizations in an industry and gain the competitive advantage [51]. This study also supports that organization size influences the ERP strategy. In general, large companies tend to adopt innovations more easily than small ones because they have good risk management abilities, abundant available resources, and strong infrastructures. Small companies, in contrast, suffer from high competition, lack of resources, financial difficulty and the lack of professionals, which results in difficulty in adopting an innovation [35]. ERP project managers should be able to assess the fit between their organization and the ERP system [52]. The companies in this study had often expanded into foreign markets and established production facilities in foreign countries. As distinct from much of the earlier literature’s focus on technical and managerial issues, it is clear from the case study organizations in this research that organization strategies are major determinants of ERP impact. For some companies, the adoption of an ERP system was a strategic decision driven by organization objectives, such as foreign customer requirements and trust, the need to globalize operations, and company image. Compared with US companies whose ERP implementations are motivated by the need to reduce lead times, inventory levels and to increase customer satisfaction [53].

B. Value Chain Cooperative Partners’ Impetus, Competitors’ Technological Accomplishments are Related to ERP Strategy

Firm effects capture the unique firm characteristics which influence variation in strategies and performance outcomes across industries and firms. Industry effects refer to attributes common to an industry [54]. Organization information systems depend not only on the organization's characteristics but also on industry characteristics. There are many factors behind the success of Taiwan’s computer industry. In addition to domestic manufacturers' efforts, international technology transfers, foreign investments and foreign purchases have all played roles in developing Taiwan’s computer industry [55]. The Taiwanese IT industry has successfully developed an industrial system utilizing OEM and ODM business strategies. Taiwan IT firms did not attempt to challenge the technology leadership in a confrontational manner, but focus on being a superior quick-follower. Dynamic environments are stressful and require decisions to be made quickly. Organizations are compelled to scan their environment to understand the external forces of change that may affect their future position so that they can develop effective responses [56]. IT firms in Taiwan have the incentive to invest in ERP Implementation, not only due to the pressure of their competitors' technological accomplishments, but also that of their value chain cooperative partners’ impetus.

C. Fitting the ERP Systems to Current Operational Processes Rather than Changing to Best Practice Models

Taiwan’s competitiveness originates from design speed, quality, cost and flexibility. According to Morris's research [57] For these concerns, much customization in ERP implementation was required, which meant fitting the ERP systems to current operational processes rather than changing to best practice models. ERP provides the information that’s needed for effective central control of an international business, while giving local operations the information they need to operate from day to day. The findings support that start-up companies use computerized information systems to
gain competitive advantage. On the other hand, the large companies in this study had often expanded into foreign markets and established production facilities in foreign countries. Standardization of the operations processes in multiple sites or countries and centralization of IT resources had, therefore, become of paramount importance.

D. ERP Strategy Affects ERP Value

Investing in an ERP system is a strategic information technology investment. Improving operational processes, enhancing relationships with clients and company image were evident among the case findings. ERP systems are beneficial in providing support for best business practices, in enabling the implementation of these practices with a view towards enhancing productivity, and as well as in empowering the customer to modify the implemented business processes to suit their needs [58]. ERP implementation impacted many aspects of business processes and performance. The findings also support that by linking IT strategy with business strategy, information output can be designed to provide information that enhances organizational effectiveness [59].

The main reason one ERP implementation is a success and another is not depends on what ERP is meant to be: i.e. how long-term or short-term-oriented is a company’s view of what it means for its ERP system to be complete [60]. It is widely accepted that customer service is the most important issue to all service-oriented business. Industry characteristics appear to have a substantial impact on ERP strategy planning process. “Customers come first” is a strategic consensus of Taiwanese IT industry. Enhancing company image and relationships with clients were evident among the case findings. With the ERP system, the customers understand and trust the company’s operational processes. Providing more effective customer service is the other value of ERP implementation. According to Morris's research [61] argued that an ERP system (i.e. a resource or capability) can provide a competitive advantage when it is valuable, heterogeneously distributed across competing firms, imperfectly mobile, and when the firm is organized to exploit the full competitive potential of the system. The findings support that although ERP is valuable, it is not rare and does not resist the duplicative efforts of competitors. ERP supports traditional, strategic IS activities and business goals (globalization, standard business process, customer service). ERP systems deliver real value and provide competitive advantages to the organizations in the aforementioned ways.

VI. CONCLUSION AND IMPLICATIONS

This paper explores the possible relations between ERP implementation and the contextual dimensions of organizations (size and life cycle, technology, strategy and environment). This study finds strategic considerations, such as the requirements of specific customers and business process standardization, outweigh cost/benefit investment considerations in ERP implementation. ERP implementation generally starts with an organizational characteristics analysis of an enterprise’s future vision and current goals which are meant to guide business strategy. Dynamic environments are contingencies for effective decision-making. Companies with an aggressive organizational strategy are more likely to adopt an innovation or innovative strategies. In such cases, the more the ERP system strategy was aligned with the business strategy, the more likely the ERP project was completed on budget and on time [62]. This study also displays that organizational characteristics and industry objectives affect organizational objectives, which define the purposes which ERP systems aim to serve. The case studies indicated that ERP implementation improved operational processes and customer service, and in addition enhanced company image, although these perceived benefits were not often measured.

For a practical perspective, this study directs attention that the ERP is regarded as a strategic decision and hence it is only logical that success in achieving these strategic goals. One implication of this finding is that organizational characteristics and industry characteristics needs to be considered when planning ERP implementation and connect the organizational objectives to the measure metrics. Most ERP vendor should focus on offering industry specific functionality to manage items, routes and formula versions. The Cloud has inspired a new way of thinking about ERP software deployments. Some “traditional” ERP vendors have developed new versions that can be deployed in the cloud. The initial adoption of Cloud ERP has not been as rapid or widespread as expected. However, there are some questions related to the Cloud ERP adoption and they differ from traditional ERP adoption issues: Whether Cloud ERP can be an effective alternative to traditional ERP; whether there are any significant differences in their acceptance. Future information system implementation research could consider more service innovation through ERP implementation.

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