

THE CHALLENGES FACING GLOBAL ERP SYSTEMS IMPLEMENTATIONS

Paul Hawking, Andrew Stein

Institute of Supply Chain and Logistics

Victoria University, Ballarat Rd. Street, Footscray, Melbourne, Australia

Susan Foster

Faculty of Information Technology, Monash University

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Abstract: Large global companies are increasingly looking towards information systems to standardise business processes and enhance decision making across their operations in different countries. In particular these companies are implementing enterprise resource planning systems to provide this standardisation. This paper is a review of literature which focuses on the use of ERP systems to support global operations. There are many technological and cultural challenges facing these implementations. However a major challenge faced by companies is the balance between centralisation and localisation.

1 INTRODUCTION

There has been a significant growth in international corporate operations. For most companies this has been to take advantage of new opportunities or to leverage existing operations. While there is no “golden rule” as to how these international operations should be implemented or managed. Michael Porter (1986) in his book “Competition in Global Industries” classifies the various global strategies adopted by different corporations along a continuum from multi-domestics through to multi-nationals. According to Porter (1986) multi-domestics refers to offshore operations operating independently and are based upon local business processes supported by a local infrastructure. At the other end of the continuum are multi-nationals; where operations are integrated globally, based on standardised business processes with the ability to account for local differences. Bartlett and Ghoshi (1998) also identified a continuum consisting of four strategies which could be employed to support global operations. These strategies are multinational, international, global and transnationals. The continuum reflects increasing level of integration and control between the various global strategies. At

one end of the continuum are multinationals which by definition are similar to Porter’s (1986) “multi-domestics”. The authors argue that this strategy provides flexibility to respond to domestic opportunities. While the international strategy allows subsidiaries a level of autonomy but it also provides for the diffusion of the parent company’s knowledge and practices throughout the organisation. In a global strategy there is centralised coordination and control involving standardisation of all aspects of the value chain. Transnationals are the final strategy in the continuum and supports standardisation and a high level of integration across the organisation, while at the same time achieving the balance between flexibility and sensitivity to local needs.

2 GLOBAL INFORMATION SYSTEMS

Underpinning the level of integration and control in each of these strategies is the role of information systems (IS). This is supported by many authors who believe that a catalyst for global operations has been the improvement in the IS and the technological

infrastructure that supports the systems (Markus et al 2001; Ives and Jarvenpaa, 1991; Konsynski and Karimi, 1993). Barlett and Ghoshai (1998) argue that companies operating in a global market will be at strategic disadvantage if they are unable to control and coordinate their world wide operations.

The basic purpose of an information system is the provision of information to support decision making. Accordingly the improved flow of information provides companies with the ability to better coordinate and manage their operations while at the same time providing increased visibility to their global supply chain (Sheu et al, 2003). Traditionally this flow of information has been hindered due to a number of factors including; technological infrastructure, poor and disparate systems and lack of standardisation. Most international companies operated in a relatively autonomous nature from country to country and the supporting IS were managed developed in a similar way. However a number of authors argue that it is critical for global operations to have a centrally managed and coordinated IT infrastructure (Freeman, 1985; Carlyle, 1990). Accordingly companies developing IT strategies to facilitate their global operations has resulted in the emergence of global information technology solutions.

Ives and Jarvenpaa (1991) define these types of applications as information systems that:

- Contribute to achieving a firm's global business strategy
- Utilise information technology platforms to store, transmit and manipulate data across cultural environments.

They went further and identified a number of drivers for global IT applications. These include:

- **Global consumer/customer**
Corporate customers have operations in numerous locations or due to consumers' mobility, access to centralised systems is required. This would be relevant in airline, credit card, accommodation related companies.
- **Global Product**
The IT infrastructure supports the sales of the same product in numerous locations, or the products and/or their components are produced via subsidiaries across the world.
- **Rationalised Operations**
Subsidiaries are located to take advantage of local opportunities, where increased coordination and control is required.

- **Flexible Operations**

Due to local opportunities, operations are moved from location to location. This is facilitated by standardised IT infrastructure.

- **Joint Resources**

Shared services enable subsidiaries to standardise business practices and gain efficiencies through shared resources such as personnel and facilities

- **Duplicate Facilities**

Companies duplicate facilities in different locations including the IS infrastructure, to standardise practices and improve coordination and control by management.

- **Scarce Resources**

IT infrastructure can facilitate the sharing of scarce resources and expertise across international boundaries.

- **Risk Reduction**

Access to relevant information related to global operations in relation to supply chain management, currency conversion, global markets and business partners can alleviate possible risks.

- **Legal Requirements**

Legislated information requirements in one or more countries can be consolidated.

- **Economies of scale for systems**

Global IT infrastructure through the standardisation and consolidation of business processes can facilitate the reduction in IT systems and supporting personnel. (Ives and Jarvenpaa, 1991)

Although the benefits of global expansion have been documented, researchers have identified a range of factors which impact on business in an international context and therefore should be strategically planned for. These include the impact of culture, language, customs, politics, management style, and legal requirements (Simchi-Levi et al, 2000; Hofstede, 1983). Accordingly if a global IT infrastructure is to be implemented, then these issues need to be understood in terms of their impact on this infrastructure. Cash (1988) identified a number problems associated with global IS solutions such as, language, currency, culture, national infrastructure, availability of IT staff, data export control trade unions and IT vendors support.

3 ENTERPRISE RESOURCE PLANNING SYSTEMS

The predominant information system implemented to support the various business processes in large corporations is an Enterprise Resource Planning (ERP) system. ERP systems are information systems which are enterprise wide, modular, integrated and have broad business functionality (Hawking, 2005). An alternate definition is

"An Enterprise Resource Planning (ERP) software application package is a suite of pre-engineered, ready-to-implement, integrated application modules, catering to all the business functions of an enterprise and possessing the flexibility for configuring and customizing dynamically the delivered functionality of the package to suite the specific requirements of the enterprise. ERP enables an enterprise to operate as an integrated, enterprise wide, process-oriented, information-driven, and real-time enterprise." (Klause et al, 2000)

Due to the purported benefits of ERP systems, many companies consider them as essential information systems infrastructure to be competitive in today's business world and provide a foundation for future growth. A survey of 800 top US companies showed that ERP systems accounted for 43% of these companies' application budgets (Somer & Nelson, 2001). The market penetration of ERP systems varies considerably from industry to industry. A report by Computer Economics Inc. stated that 76% of manufacturers, 35% of insurance and health care companies, and 24% of Federal Government agencies already have an ERP system or are in the process of installing one (Stedman, 1999). The purported benefits of ERP systems make them an essential information systems infrastructure to be competitive in today's business world and provide a foundation for future growth. The ARC Advisory Group (2006) estimated that the worldwide market for ERP systems was \$16.67 billion in 2005 and is forecasted to surpass \$21 billion in 2010. Researchers believe the growth in the uptake of ERP systems is due to several factors; the need to streamline and improve business processes, better manage information systems expenditure, competitive pressures to become a low cost producer, increased responsiveness to customers and their needs, integrate business processes, provide a

common platform and better data visibility, and as a strategic tool for the move towards electronic business (Davenport et al, 2003; Hammer, 1999; Iggulden, 1999; Somer et al, 2001; Markus et al, 2001).

Increasingly due to the integrative nature of ERP systems and their ability to incorporate "best business" practice many large corporations are using these systems to underpin their international expansion. The systems can facilitate the control and coordination of various international operations in real time. This coordination and control can occur through the implementation of standardised business practices, independent of location, language, time and currency (Bingi et al, 1999; Madapusi and D'Souza, 2005). Texas instruments with 13,000 users worldwide, 45,000 products and 120,000 orders per month implemented an ERP system to support their operations. The system enabled the company to standardise business processes, leverage supply chain efficiencies and achieve a response time of less than a 3 seconds (Sarkis and Sundarraj, 2003). In the Australasian region companies like BHP Billiton, Fonterra, Monash University, Carter Holt Harvey, Bluescope Steel and National Australia Bank are using ERP systems to support their global operations.

For many companies underestimating the impact the system would have on their organization, caused them to initially struggle with their ERP implementation. For some the barriers associated with the lack of skilled resources and inexperience with projects of this scope became insurmountable (Calegero, 2000). Davenport (2000) believes that ERP systems by their very nature impact on a company's business strategy, organisation and culture. The move to become process rather than functionally focused and the resultant need for business process integration can result in a loss in competitive advantage in particular areas. However the potential benefits across the entire organisation often outweighs the losses in individual areas (Holland and Light, 2001). Many researchers have attempted to identify the critical success factors which impact on the successful implementation of an ERP system (Holland and Light, 1999; Sumner, 1999; Summer, 2000; Shanks et al, 2000; Esteves, Casanovas, and Pastor, 2003).

4 CHALLENGES IN GLOBAL ERP IMPLEMENTATIONS

Although the potential benefits of global ERP systems implementation have been documented these types of implementations are faced with a number of issues. The critical success factors of ERP implementations identified previously in the paper are predominantly based on research on a particular ERP system in a particular country. Very little research discusses the relevance of these factors in global implementations and obviously there is a need to validate these. A number of authors rather than identifying CSF's in global implementations have identified what could be termed as "challenges". The remainder of this paper discusses these challenges.

5 ALIGNMENT OF GLOBAL AND ERP STRATEGY

This is the most important challenge facing companies when implementing their ERP system. Much has been written about the importance of the alignment of corporate and IT strategies (Scott Morton, 1991; Broadbent and Weill, 1993; Teo and King, 1997). Previously the various global strategies companies could adopt for their international operations were discussed. Each strategy differs in the level of integration and control. Accordingly ERP systems can be implemented differently to support each of these strategies. Markus et al (2000) argues that ERP system implementation at geographically dispersed locations adds to the complexity of such systems in terms of management and technical infrastructure. However companies should focus on the strategic issues before addressing the technological issues. Clemmons and Simon (2001) developed a framework for ERP implementation based on the level of control and coordination required in global organisation. Madapusi and D'Souza (2005) delve deeper and discuss the variations in ERP systems configuration, architecture and roll out to support various global strategies. They argue that unless there is an alignment between a company's international strategy and their ERP system, it can result in unsuccessful ERP implementations and suboptimal performance. This was further supported by Clemmons and Simon (2001).

Koch (2001) identified four levels of ERP configuration which should be considered in support of the various international strategies; the enterprise level, system level, business process level and customization level. These are discussed briefly below:

1. **Enterprise level:** from an international perspective ERP systems can be configured around: single financial/single operation, single financial/multi-operations, multi-financials/single operations and multi-financials/multi-operations.
2. **System level:** this reflects the implementation of particular modules such as financials, logistics and human resources
3. **Business process level:** within each module business processes can be configured to represent current practices or "best business" practices
4. **Customisation:** although not recommended this involves modifying the ERP system to suit a company's needs.

Furthermore Clemmons and Simon (2001) identified three common IT infrastructure configurations which support ERP systems in a global scenario. These are centralised, distributed and hybrid architecture,

1. **Centralised architecture:** This type of architecture suits companies who want to achieve a high degree of standardization of data and business processes. An example in the Australasian region would be Fonterra. Fonterra, is one of the largest dairy companies in the world. Their supply chain extends from New Zealand to customers in 140 countries (Fonterra A, 2004). To support their supply chain, the company has sites in 40 countries and a work force of more than 20,000; and implemented an ERP system. The company decided to have a single implementation of their ERP system (instance) in New Zealand. This is based on a global template which has restricted localisation in each of the 40 countries where it will be rolled out. This ensures standardised definitions and business processes throughout the company. This will facilitate the information flow and thus improve reporting and decision making (Fonterra B, 2004). The adoption of a global template to standardise operations is a well established strategy to ensure improved coordination and control and the more changes

which are made to this template to address local issues results in less control and coordination (Hanseth et al, 2001).

2. **Distributed architecture:** This architecture suits companies who have a number of autonomous business units where data definitions and business processes reflect domestic needs. However this increases the difficulty of information sharing across the organization. Toyota have adopted this type of architecture worldwide allowing its various international operations to implement their choice of IS solutions to capitalise on local opportunities.
3. **Hybrid architecture:** This is a combination of both the previous architectures with some components being centralised to gain standardisation and efficiencies while at the same time allowing some localisation. BHP Billiton implemented this type of architecture to ensure standardisation and facilitate the flow of information and to implement a shared services facility, while at the same time accounting for local business processes (Warren, 2002).

As mentioned previously the alignment of the global operations strategy and the ERP systems strategy is critical to the effective use of these types of systems. However there are other challenges identified by the literature which is implicit in the above implementation configurations and need to be considered.

5.1 Centralisation versus Localisation

Global organisations by implication require the sharing of data and information across their various operations to facilitate control and coordination. ERP implementations are designed to facilitate this. However there are many challenges which can hinder this communication. This can include problems with different languages, government regulations, inconsistent data format, and non compatible business processes and other cultural issues (Hanseth et al, 2001; Sheu et al, 2003; Soh et al, 2000; Robinson, 2000; Ghosh, 2002; Ives and Jarvenpaa, 1991). These issues need to be considered during the configuration and implementations of ERP systems and usually results in the degree of localisation of the ERP system.

From a language point of view many of the modern ERP systems can operate in various languages and

enable the user to determine the language of preference at the time of logging on. Sheu et al (2003) found the issue more related to the reluctance of employees to communicate in different languages rather than a fault of the ERP system. This was further reinforced by the difficulty in sharing information between China and Taiwan operations due to diplomatic implications.

However, more of an issue is the difficulty in the sharing of information between operations which are due to inconsistent data formats. This can especially occur as the level of localisation of the ERP system increases. Companies initially implement ERP systems to integrate existing disparate systems to facilitate the flow of information (Delliotte, 1998; Wood and Caldas, 2000). However this lack of integration can still occur between ERP systems due to different data definitions and variations in business processes. The lack of standardisation between ERP systems has resulted in many companies moving to a more centralised control and coordination through the use of a global template to facilitate data sharing. This template provides standardised definitions for data and business processes across the corporation.

Much of the literature argues against the extensive use of global templates due to the lack of flexibility at the local level to take advantages of regional opportunities and to account for cultural differences (Hanseth et al, 2001; Liang et al, 2004). Krumbholz et al (2000) investigated cultural differences between a large pharmaceuticals company's operations in the United Kingdom and Scandinavia. They found differences in how the ERP system should be implemented to take into account different legislative requirements in each country; they did not find any significant cultural differences. However other researchers (van Everingdon and Waarts, 2003) using Hofstede's (1983) model of cultural differences studied the adoption of innovation, in particular ERP systems, across different European cultures. They found that national culture does impact on the adoption of ERP systems and more specifically that there would be a negative impact in countries with higher levels of uncertainty avoidance, masculinity, and power distance. (explain these?)

Some authors argue that these cultural differences are further exacerbated when comparisons are made between eastern and western countries (Martinsons, 2004; Huang and Palvia, 2000). Liang et al (2004)

goes further and addresses the applicability of western designed ERP systems to China. They argue that these systems are based on “rule based” mature economies rather than relation based governance systems like China. However the leading ERP system, developed by a German company (SAP), accounts for approximately 33% of the China ERP market (Martinsons, 2004) and has had a 95% increase in sales over a 12 month period (McBride, 2004). Sheu et al. (2003) noted there was confusion between western and eastern name formats. It was not the inability of the system to cope with the formats but rather a lack of understanding about the format it self. Wu and Wang (2002) compared the implementation of locally developed ERP systems to foreign developed ERP systems in Taiwan and the impact on user satisfaction. As would be expected, they found significantly higher satisfaction for the local system as it would reflect the local user preferences. Davison (2002) supports this divide between east and west by arguing that the majority of ERP vendors are western and therefore don't support various aspects of eastern culture. He uses simplistic examples to support his argument such as the automatic allocation of numbers by the system which maybe offensive homonyms. Also, how the majority of reports in ERP systems tend to be online while Asian workers prefer paper based reports.

Carton and Adam (2003), although recognising the importance of global standardisation, stress the importance of incorporating local differences. They believe that central standardisation of the ERP system can “wreak havoc” in local operations and see this upheaval as not being beneficial to the local operations or the global corporation.

6 CONCLUSION

Most of the literature addresses the impact of potential cultural differences on ERP implementations. However a distinction needs to be made between the implementation of ERP systems versus the use of these systems. The cultural issues identified need to be seen as a consideration during implementation rather than a barrier to implementation and use. However a balance needs to be reached between the level of centralisation and localisation. We would argue that this is not due the ERP systems inability to support local processes but more a lack of understanding of how an ERP system can be configured to support the cultural differences between company's different country operations. This results in companies adopting a centralised architecture to improve coordination and control. However with an increased understanding of the capabilities of an ERP system, companies will move to a hybrid strategy, as identified by Clemmons and Simon (2001), to take advantage of local opportunities through the use of localised processes. This will be done in such a way to still enable the efficient flow of information throughout the corporation.

This review of literature has focussed on the use of ERP systems to support global operations. Although many challenges to these implementations have been identified in the literature, this paper has focused on the issues of centralisation versus localisation. Table 2 provides a summary of the challenges to global ERP implementations and the supporting literature.

Table 1: Challenges to global ERP Implementations.

Challenges	Research
Alignment of Global Strategy and IT strategy	Light, 1999; Clemmons and Simon, 2001; Koch, 2001; Markus and Tanis, 2000; Ives and Jarvenpaa, 1991; Madapusi and D'Souza, 2005
IT Solution Selection	Davison, 2002; Ghosh 2002; Wu and Wang 2002; Ives and Jarvenpaa, 1991;
International Data Sharing	Hanseth et al, 2001; Soh et al, 2000; Huang and Palvia 2001 Sheu et al, 2003; Soh et al., 2000; Robinson, 2000; Ghosh, 2002; Sahay, 2003; Ives and Jarvenpaa, 1991;
Culture	Huang and Palvia, 2001; Zhang et al, 2003; Kay, 1998; van Everingdon and Waarts, 2003; Davison, 2002; Liang et al, 2004; Sheu et al, 2003; Reimers, 2003; Ghosh, 2002; Ives and Jarvenpaa, 1991;
Local Business Processes	Soh et al, 2000; Ghosh, 2002; Ives and Jarvenpaa, 1991; Carton and Adam, 2003
International Cooperation	Sheu et al, 2003; Ghosh, 2002; Ives and Jarvenpaa, 1991;
Technological Infrastructure	Markus et al, 2000; Ghosh, 2002; He, 2004; Ghosh and Gosh, 2002;
Resource Availability	He, 2004; Ghosh, 2002;

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