Toward a Quality Model for Enterprise Information Systems in Developing Countries: A Jamaican Case Study

Charlette Donalds, University of the West Indies, Mona, Jamaica, Kingstod 7, P: (876) 754-9153, F: (876) 977-3829, Email: charliemd@cybervale.com

Evan W. Duggan, University of Alabama, Dept of Information Systems, Statistics & Management Science, Culverhouse College of Business Administration, 367 Alston Hall, Tuscaloosa, Alabama 35487, P: (205) 348-7688, eduggan@cba.ua.edu

ABSTRACT

Several companies have made substantial investments in enterprise information systems (EIS) and some have reaped the expected benefits; however, EIS implementation failure rate is high and even those that are successfully deployed may produce a variety of post-implementation problems. Many studies have modeled quality attributes for information systems and some have particularized these to EIS. However, the contextual bases for these models are corporations in developed countries and therefore need revision to make them applicable to enterprises in developing countries like Jamaica that are less equipped to manage such complex implementations. In this paper, we examine quality attributes that pertain specifically to EIS success in developing countries and develop a model that we believe captures the parameters that influence the quality and success of such implementations. We then match the implementation experiences of five Jamaican companies to these parameters.

INTRODUCTION

Information technology (IT) innovations have allowed organizations to expand their global reach, causing small and large companies alike to compete beyond their national borders. As a competitive necessity, many small organizations in developing countries like Jamaica are forced to acquire advanced information systems (IS) such as enterprise information systems (EIS), described by Lee and Myers (2004) as large, complex, software packages that integrate several of an organization’s core IS around a common database. Once considered expensive giants, EIS are now used routinely in major corporations (first generation adopters) for transaction processing (Kumar & Hillegersberg, 2000). However, despite their increasing penetration in small and medium enterprises and in developing countries (Gable & Stewart, 1999) these systems provide considerable implementation challenges for these second generation adopters.

There has been a marked increase in EIS implementations over the past several years in corporate, government, and educational institutions (Esteves & Pastor, 2001). Over 30,000 firms worldwide (Lee & Lee, 2004) and more than 60 per cent of Fortune 500 companies in the US (Bernroider & Koch, 2000) have invested in them. Some organizations – 10 to 15 percent according to James and Wolf (2000) – experience popularly cited benefits such as improved competitiveness, organizational transformation, and greater customer responsiveness as a result of increased coordination of information flows, and greater business integration (Brown & Vessey, 2003; Markus & Tannis, 2000). However, others have experienced severe implementation failures resulting in abandonment before deployment and a variety of post-implementation problems (Lee & Lee, 2004). While notable failures have occurred in large corporations such as FoxMeyer Corporation (Scott, 1999) and Hershey (Scott & Vessey, 2002) and others, developing countries, because of less preparation for such systems, are more likely to encounter failure factors.

Scholars (Bertoa & Vallecillo, 2000; Carvallo et al., 2003; Esteves & Pastor, 2001; Murray & Coffin, 2001; Nah et al., 2001; Parr & Shanks, 2000; Sarker & Lee, 2000;) have proposed many modifications to existing IS quality and success models to account for EIS dissimilarities. However, most of these revisions reflect EIS implementation experiences in developed environments and may be inadequate to assess the quality requisites of smaller organizations in developing countries like Jamaica. These organizations have mostly transitioned to EIS from standalone applications without the preparation for integrated systems that MRP and MRP II systems afforded larger organizations. They are therefore severely challenged by the size and other scale-related complexities of EIS, the range of affected business processes, the number and diversity of stakeholders, and organizational readiness to absorb the impact of the changes these systems cause.

There is a glaring need to revisit these models from the distinct perspectives of developing countries. Our objective therefore is to make a contribution to research and practice in this area by offering a quality model specifically for EIS implementation in small economies such as Jamaica’s, which may be representative of economies in many developing countries. We then match the EIS implementation experience of five Jamaican companies to the parameters we propose in this model.

RISK-BEARING CHARACTERISTICS OF EIS

EIS are known by several names, such as enterprise resource planning (ERP) systems, enterprise systems (Davenport, 2000), total enterprise integration (Langenwalter, 2000), collaborative business solutions, Internet enterprise platforms, on-line interactive systems (Brown & Vessey, 1999), and ERP II systems (Bond et al., 2000). These names denote the all-encompassing, integrative nature of such systems - a feature which represents a significant deviation from traditional IS.

Many of the salient features of EIS are widely discussed in the literature and will not be further elaborated here. For our purposes, the interesting characteristics are those that are likely to elevate the risks of implementation failure for organizations in developing countries. For example, EIS span the boundaries of traditional functional organizational units (Parr & Shanks, 2000), exploiting cross-functional dependencies among business processes to manage value chain operations. This is both a blessing and a curse for organizations; they desire the benefit but must incur significant implementation risks to obtain it.

Although EIS are examples of commercial off the shelf (COTS) software, they have several distinguishing features that contribute to additional implementation risks not associated with traditional COTS applications. Many companies invest in these systems to effect organizational transformation that may require changes to business
Emerging Trends and Challenges in IT Management   851

Table 1. Typical EIS features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Explanation</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration</td>
<td>Multiple systems that together encompass the information needs of an entire organization</td>
<td>Most small organizations have not previously encountered systems of this size and scope</td>
</tr>
<tr>
<td>Configuration</td>
<td>Organizations implement business logic by setting software switches. This is a form of customization without “programming.”</td>
<td>Requires knowledgeable domain experts to partner with a variety of technocrats. Success, even competitive advantage, may be at stake; unfamiliar approach for developing countries</td>
</tr>
<tr>
<td>Industry Settings</td>
<td>ERP systems have many configuration tables than vendors developed templates of typical settings. “Best practices”—for different processes and industries, that ERP purchasers can use with or without modification.</td>
<td>Best practices typically reflect the industry practices of organizations in developed countries and are not as valuable for implementers in developing countries</td>
</tr>
<tr>
<td>Client-server architecture</td>
<td>ERP systems typically use a client-server architecture where the workload of information systems is distributed among a network of client computers and servers that provide specialized services.</td>
<td>Many developing countries are more experienced with centralized architectures. EIS Implementation forces acquisition of other technical competencies, thereby increasing failure factors</td>
</tr>
<tr>
<td>Common central database</td>
<td>The ERP system has a common central database that can be accessed and kept up-to-date by all implemented modules.</td>
<td>Data availability and competencies must be acquired and data conversion increases implementation risk</td>
</tr>
<tr>
<td>Stakeholder community</td>
<td>Cross-functional business processes and modules for the enterprise means larger than normal user community, and external consultants.</td>
<td>Collaboration and communication difficulties have caused many software failures; small corporations have no experience with such large, diverse implementation teams</td>
</tr>
<tr>
<td>User Involvement</td>
<td>Transfer of prior user involvement from requirement determination (pre-acquisition) to configuration stage (post-acquisition).</td>
<td>Entirely new concept and experience for most developing countries</td>
</tr>
</tbody>
</table>

Table 2. Salience of IS quality requisites

<table>
<thead>
<tr>
<th>Quality Attributes</th>
<th>Producer-oriented Software</th>
<th>COTS</th>
<th>EIS</th>
<th>EIS in Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Process</td>
<td>E</td>
<td>E</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Software Production Methods</td>
<td>E</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Software Functionality</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Vendor Characteristics</td>
<td>N</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Realizations of Product Fit with Requirements</td>
<td>E</td>
<td>E</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Organizational Specification</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Change Management</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Organizational Readiness</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>System Integration</td>
<td>E</td>
<td>E</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Risk Mitigation</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Stakeholder Collaboration</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>User Readiness</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

AN EIS QUALITY MODEL FOR DEVELOPING COUNTRIES

Despite several reports of low-quality IS (Brynjolfsson, 1993; CIO, 2001; Gibbs, 1994; KPMG, 1994; Mousinho, 1990; Niederman et al., 1991), there is no consensus on what constitutes software quality. Prescriptions for improving quality are often moderated by the perspec-

Copyright © 2006, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.
provides a listing of typical quality requisites that are considered in various IS delivery contexts and indicates the importance of each to implementation success, using the notations: E – essential; D – desirable; N – not significant, and P – pivotal.

Figure 1 further distills the information in Table 2 to denote the quality attributes that are pivotal to the delivery of successful EIS in developing countries.

IMPLEMENTATION EXPERIENCE OF FIVE JAMAICAN COMPANIES

In this limited research, we obtained information from five private and public sector organizations in Jamaica. These organizations had implemented EIS and were willing to provide the requested information. Several graduate students in a computer-based information systems course conducted face-to-face interviews with various employees including CIO’s and other executives, functional managers responsible for the implementation of the various EIS modules, project managers, and IT staff and perused project documents to acquire information related to the variables we highlighted in our EIS quality model.

While we did not attempt to obtain data for statistical analysis, we examined pre- and post- implementation as well as deployment issues that affected these organizations. The information we obtained from these five companies, allowed us to compare actual experiences with the theoretical propositions of the model as a precursor to more rigorous data collection and analysis in follow-up research. Our gleanings from these studies are condensed in Table 3, in which the companies are referred to as company A, B, C, D and E, in order to protect their identity.

CONCLUSIONS

Since their introduction, EIS have received a great deal of attention. However, most of the literature addresses implementations in developed countries. We have initiated some redress to this situation by analyzing the challenges faced by organizations in developing countries. They must contend with the large financial outlay, EIS size and complexity, simultaneous adoption of a variety of supporting IT, the scope of the business processes affected, changes to business process operations, the size and diversity of the stakeholder community, and the degree of collaboration required. Each parameter individually is unlike anything most of these organizations have ever experienced in software projects; their confluence in the same project magnifies the difficulty greatly.

The prerequisites for successful EIS implementations in developing countries therefore render the general models of IS quality and success inadequate, necessitating extensive revision to reflect the truly influential parameters in this context - organizational readiness for such ventures, and the high-level orchestration needed to effectively manage and enable modifications to cultural paradigms for organizational transformation, mitigate risks, foster collaboration, and provide the required governance. We have supplied such a model, which we intend to use, and offer to others, to guide further examination of this understudied phenomenon in future research.

REFERENCES


Copyright © 2006, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.
Emerging Trends and Challenges in IT Management


Copyright © 2006, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.
Related Content

Coopetition for Organizations
www.irma-international.org/chapter/coopetition-for-organizations/112371

A Comparative Study of Infomax, Extended Infomax and Multi-User Kurtosis Algorithms for Blind Source Separation
www.irma-international.org/article/a-comparative-study-of-infomax-extended-infomax-and-multi-user-kurtosis-algorithms-for-blind-source-separation/219807

Improving Dependability of Robotics Systems
www.irma-international.org/chapter/improving-dependability-of-robotics-systems/184381

Validation and Design Science Research in Information Systems
www.irma-international.org/chapter/validation-design-science-research-information/63275

Performance Measurement of Technology Ventures by Science and Technology Institutions
www.irma-international.org/chapter/performance-measurement-of-technology-ventures-by-science-and-technology-institutions/184182