

ERP- A Brief Structure and Discussion of its Success and Failure

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Abstract - Enterprise resource planning (ERP) systems are increasingly being adopted by organizations in developing countries. As in developed countries, this adoption seems beset by significant rates of failure, leading to a large waste of investment and other resources. This paper seeks to understand why ERP failure occurs. In doing this, it moves beyond the factor lists that have so far dominated analysis. Instead, it makes use of the "design—reality gap" model. This conceptual framework aims to be comprehensive but also contingent; sensitive to the specific conditions of any individual client organization. The design—reality gap model is applied to a case study of partial ERP failure in a Vishal mega mart manufacturing to retailing firm. The model analyses the situation both before and during ERP implementation. It finds sizeable gaps between the assumptions and requirements built into the ERP system design, and the actual realities of the client organization. It is these gaps – and the failure to close them during implementation that underlies project failure.

The paper draws conclusions about good practice in ERP implementation relating to both risk identification and risk mitigation. But it also notes challenges existing in some developing countries contexts that may continue to constrain the effective use of enterprise resource planning systems.

Keywords- Enterprise resource planning, developed countries, Information system, one size fits all

I. INTRODUCTION TO ERP

Enterprise resource planning (ERP) can be defined as "a software system with integrated functions for all major business functions across an organization such as production, distribution, sales, finance, and human resources management. A single package typically replaces different previous packages [7]. Typical functionality is summarized in Figure 1, with the intention that it provides a single locus for real-time access to virtually all significant organizational data that only has to be entered once into the system. ERP is intended to deliver a significant improvement over the non-holistic nature of earlier organizational information systems. There are therefore reports of ERP systems providing benefits such as cost reductions, improved productivity, better managerial decision-making, and facilitation of process or structural change [4].

However, there are also frequent reports of ERP failure:

"In India and around all over the world number of ERP systems face resistance, and ultimately, failure" [3] "between 50 percent and 75 percent of U.S. firms experience some degree of failure. A survey done revealed that near about 70% of CEOs believed that ERP implementation has at least a moderate chance of hurting their business." However, developing countries look set to become the locus for a major expansion of ERP implementations yet, at the same time, reports have emerged of ERP failures in these countries including suggestions that developing country implementations face specific difficulties over and above those found in industrialized countries.

On the basis of this background this paper sets out in general terms to address the question of why ERP projects fail in developing countries. Following an explanation of the conceptual models and research approach used, it outlines a case study of ERP failure in a developing country. This is then analyzed using a new conceptual framework, looking at risk factors both before and after system implementation. On the basis of this model, some recommendations can be made for trying to move on from failure, or avoid it in other situations using the model as an analytical tool, though these may be difficult to achieve given the constraints that exist in certain developing country contexts. In the final section, conclusions are drawn about the value and practical and research implications of the new model.

II. RESEARCH FRAMEWORKS, FOCUS AND METHOD

This paper adopts a case study approach, focusing on an ERP project in Vishal mega mart. Vishal mega mart was selected as a typical developing country location for ERP implementation. Like many DCs, it has become a target for major ERP vendors looking for new sales growth locations. At the same time, ERP implementation projects in Vishal mega mart face problems and, in many cases, these projects can be classified as failures.

Our research therefore focused on two main questions:

How can the outcome of an ERP project be classified as a success or failure?

How can we understand why that ERP project outcome occurred?

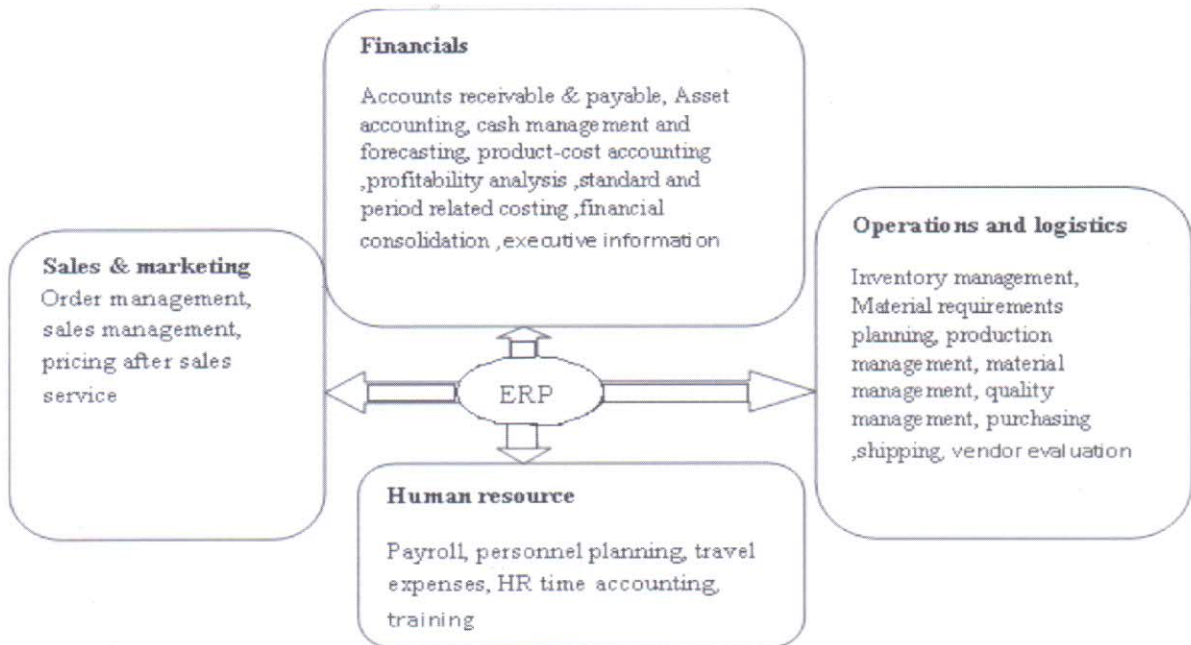


Fig. 1 Module Functionality Overview of an ERP System [2]

In addressing the first question, of outcome classification, a number of earlier ERP studies provide no clear basis for their assessment of success or failure. Of those that do, we can adapt identifying three approaches to outcome classification: focus on project process such as whether the ERP project is delivered on time and on cost [4], focus on organizational impact such as savings in staff time/cost, or improvements in decision quality; and focus on user satisfaction. A number of studies combine the first two approaches but our interest in answering our first question was in outcome, not process. We therefore looked for a way to combine the second two approaches.

One way to do this was to use [1] model of information systems (IS) success. Although mentioned by a number of the ERP studies in our review this model had not been systematically applied. Yet not only does it provide a way to combine the two key outcome measures used in earlier ERP studies; it provides a more comprehensive picture of ERP success and failure by incorporating six outcome elements in all, as summarized in Figure 2:

- *System quality* relates to the desired features and characteristics of the information system itself.
- *Information quality* concerns the characteristics of the information produced by the System.
- *Use and user satisfaction* are concerned with the interaction between the information produced by the system and the recipients.
- *Individual impact* relates to the extent to which the information produced by the system influences or affects management decisions.

Organizational impact measures the effect of the information produced by the system on Organizational performance.

This model could answer our first question by helping to evaluate and classify ERP success or failure. But we also wished to understand why the particular outcome (argued in this case to be failure) occurred. To address this second question, we drew together two different strands of thinking.

III. ANALYSIS OF THE ERP LITERATURE

Analysis of the ERP literature cited above and other information systems project research indicated that seven dimensions – summarized by the ITPOSMO acronym – are necessary and sufficient to provide a comprehensive understanding of design—reality gaps:

- I**nformation (data store, data flows, etc)
- T**echnology (both hardware and software)
- P**rocesses (the activities of users and others)
- O**bjectives and values (through which factors such as culture and politics are manifest)
- S**taffing and skills (both the quantitative and qualitative aspects of competencies)
- M**anagement systems and structures
- O**ther resources (particularly time and money)

Putting these dimensions together with the notion of gaps produces the model for understanding success and failure of information systems, including ERP. In specific terms, then, this paper will use this model to analyze why one particular ERP project in one particular developing country failed. The paper's main contribution, then, is in applying the design—reality gap framework, and in demonstrating its analytical and practical value, including the derivation of recommendations for practice.

IV. RESEARCH METHODOLOGY

A single case study design was adopted since it allows analysis of information systems phenomena in depth, providing the richness of description and understanding necessary to properly analyze ERP failure. The case chosen is ERP implementation in a medium-sized Vishal mega mart a manufacturing to retailing company. Here, we utilize two different types of triangulation. First, triangulation of methods that combined analysis of organizational documentation, observation by sitting with different staff to see their use (or non-use) of the ERP system, and a set of semi-structured interviews. Second, triangulation of sources, with the interviews conducted with three different groups: the external ERP consultants (two), senior internal managers associated with the ERP project (two), and internal company employees at both management and shop floor levels who were ERP system users (four).

V. ERP INFORMATION QUALITY

In terms of data accuracy, the integrated nature of ERP systems means that inaccurate data entered into one ERP module can "infect" the operations of linked modules. This was certainly the case in Beta because of poor quality data entry by company staff. The ERP project manager complained, "Some employees do not understand the value of the data and the importance of being careful when entering data into the system. There is a lot of wasted time and effort in tracing and correcting each mistake". Alongside the problems with data accuracy, there were also reported problems with the quality of the information being produced by the ERP system, particularly the content and format of management reports. For example, Beta's accounts manager stated, "the system failed to provide us with all the kinds of reports that we expected to be provided with". With the internal IT staff and external consultants unable to find a way round this, "we solved the problem by including the old Crystal Reports software in the ERP system menu to provide us with the needed reports as my employees have a good experience in using this software".

VI. ERP USE AND USER SATISFACTION

This combined dimension was seen to be made up from a number of sub-elements for evaluation User

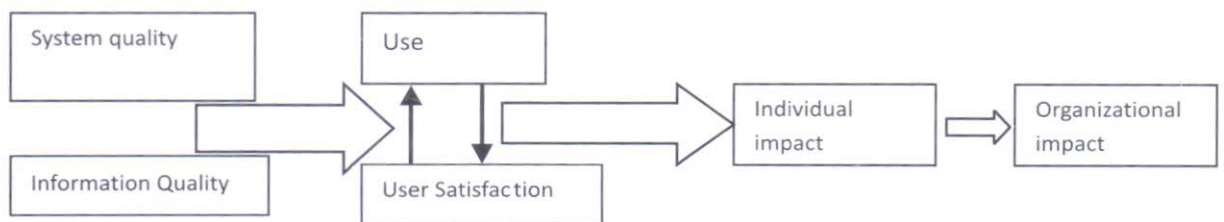


Fig. 2 Model of Information Systems Success/Failure Determination [8]

involvement and participation: beyond brief consultant interviews for a few, users reported that they had not been encouraged to participate in the implementation process. As one member of the IT staff indicated, "There was no role for the users in the implementation process; they were placed on the sidelines watching what is happening".

Perceived usefulness of the system: responses from interviewees were mainly negative and often (see later) phrased implicitly in terms of design—reality gaps, such as the comment of one of the sales staff: "I think the problem is with the system itself; it is not designed for us. Many of the things that we used to do by using the old ways cannot be done by the new system". The only partial exception was the accounts department where the manager reported a more neutral overall perception: "my employees have no big problems with using the new system. The main problem is with the inaccurate data we receive from other departments".

Levels of use: interview and observation indicated that only a small number of staff was actually using the system, mainly re-keying data from the still-running old systems into the ERP system for the purposes of reporting to the Alpha Holdings head office. Overall levels of system use were therefore low.

Alongside these specifics, interviewees were – in general terms – highly dissatisfied with the eMAG system.

VII. CONCLUSIONS AND IMPLICATIONS

Developing country expenditure on ERP and other enterprise systems is growing, and these systems can undoubtedly deliver benefits to organizations in developing countries [6]. However, high failure rates continue to block the delivery of such benefits. Research to date, though, often appears partial, focusing on only some aspects of system outcome and/or focusing only on certain specific implementation factors. This research therefore sought to identify conceptual models that would provide a more holistic perspective, and that would answer two questions.

First, how can the outcome of an ERP project be classified as a success or failure? Here, we made use of DeLone & McLean's model; one that is fairly well-known in IS research generally but which does not appear to have

been used very much to date in ERP research. We demonstrated that it provides an appropriate framework for data gathering, analysis and presentation in relation to the outcome of an ERP project; and a framework that can be integrated easily with Heeks' three-way outcome categorization of total failure, partial failure, and success in order to provide a final classification.

Our second question asked how we can understand why a particular ERP project outcome occurred. For this, we described development of the design—reality gap model and showed how it can be used to analyze why one particular ERP system largely failed. Its explanation is that ERP systems fail due to too large a gap between ERP design and client organization reality; a gap that remains unclosed during implementation, and which exists on several dimensions.

Some of those specific dimensions echo individual factors that earlier studies have identified. However the design—reality model represents a progression beyond those studies because it is more systematic and comprehensive; drawing together all the separate factors of which earlier work has typically only focused on one or two items. It is more dynamic; helping to track the changing risks and likelihood of success or failure over a project's lifespan. It is more analytical, explaining the root cause of difficulties in a consistent manner for all factors, and through reference to a strong theoretical foundation that draws on ideas such as inscription from the literature on sociology of technology. And it is also more contingent, avoiding the implicit "one-size-fits-all" ideology that underpins some earlier ERP analyses and, instead, allowing sensitivity not just to different national settings but to different organizational settings; a sensitivity that is particularly apposite for work on developing countries.

We therefore particularly hope that this new model will be used by other researchers and by practitioners as a means to understand, and act on, the processes of ERP implementation. Our own interest and application of the model has been in a developing country context. However, there is no a priori reason why the model would not also be applicable to ERP or other IS applications in industrialized countries.

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