Chapter 7
A Decision Support System for ERP Implementation in Small and Medium-Sized Enterprises

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ABSTRACT
This study investigates the implementation of Enterprise Resource Planning (ERP) systems in Small and Medium-Sized Enterprises (SMEs) and the role played by certain Critical Success Factors (CSFs) in implementation. Based on primary data collected, the relationship between the variables of time, cost, and achievement is formulated for each CSF. A simulation model based Decision Support Systems (DSS) is developed to assist resource allocations in ERP implementation, such as time and budget allocated to address each CSF. The DSS also facilitates making decisions to achieve more desired performance, measured by higher achievement, lower cost, and shorter implementation time. By drawing upon this model, the authors forecast how SME can better utilise and prioritise different CSFs and resources by choosing the best implementation strategy before real life implementation, thus saving time and money.

INTRODUCTION
The adoption and implementation of Enterprise Resources Planning (ERP) systems have increased in the recent decade, due to increased competition, globalisation and need for greater visibility into business functioning. ERP systems provide seamless integration of information flow and business processes (Deep et al., 2007) across functional areas within an organisation and manages, through integration, different aspect of business including production planning, purchasing, manufacturing, sales, distribution, accounting and customer service (Schneider and Bowen, 1995).

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The development of ERP systems has enhanced and revolutionised the way many organisations function by making them more productive, competitive and integrated. However, despite all the benefits, ERP implementation is still a very time consuming, detailed and complicated process. Due to the complexities, average implementation cost is 178% more and implementation period is 2.5 times longer than anticipated (Wang et al., 2006). Around 66 to 70% of ERP projects fail to achieve the implementation objectives (Liang and Xue, 2005) well known examples of such failure include Whirlpool, Hershey, Waste Management, Inc., and W. L. Gores and Associates (Wanatabe and Hobo, 2004). Failed implementation results in loss in revenues, productivity, and operational effectiveness. For SMEs’ due to lack of resources, a failed implementation can be catastrophic and may lead to bankruptcy.

To facilitate SMEs implementing new ERP systems, this chapter identifies the Critical Success Factors (CSFs) and roles played by CSFs in successful implementation. To study the CSFs identified and facilitate resource allocation (time and budget) in ERP implementation, a Decision Support System (DSS) is developed by combining a simulation model and a number of regression models (one for each CSF). A comprehensive literature is reviewed for ERP implementation in next section, followed by a section discussing the need for a DSS by SMEs, and research methodologies adopted in developing such a DSS. The findings from empirical work and the DSS are then present, and conclusion and recommendations for future are summarised in the last section.

**Enterprise Resource Planning Systems**

ERP systems are configurable information systems packages that integrate information and information based process within and across functional areas in an organisation (Van Hillegersberg et al., 2000). ERP systems and their application, is not limited to physical computer integration rather it is a cross-organisational system integration that covers a wide spectrum. ERP system integrates all information and processes of an organisation into a consolidated system that addresses how people and organisation access, gather, store, summarize, interpret, and use information.

**Evolution of ERP Systems**

The history of the ERP Systems can be traced back to Material Requirement Planning (MRP) systems from 1960s when the focus was on the inventory control including managing demand and ordering (Davenport, 1998). Early versions of MRP program software were simple but useful application for planning and scheduling material for complex manufacturing processes. The ability of the planning systems to systematically and efficiently schedule all part of manufacturing process was an important step forward for more productivity and quality. By 1980s with advancement of technology and growing need for more advance planning systems led to the development of a second generation of manufacturing resource planning (MRP II). The emergence of MRP II was attributed to the fact that MRP was incapable of responding to the rapidly changing environment (Barker, 2001). MRP II was considered a step forward since it utilizes advanced software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution. However MRP II program were complex and expensive and they required a large technical staff and resources such mainframe computers to support the application and since MRP II runs’ on different operating systems for each unit, it failed to become a real enterprise wide systems (Chung and Snyder, 2000) (see Figure 1).

To overcome the issue of department functioning in silos and to enhance the integration inside the organisation, a new application called Enterprise Resource Planning (ERP) evolved in 1990s