
Chapter 7

Identifying the Contribution of IT/IS Infrastructure to Manufacturing Agility

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Competitive environments are driving manufacturing organisations to react quickly to unpredictable changes and customer opportunities. To face these new challenges, manufacturing organisations require the support of information technology/systems in their operations. An information technology/systems infrastructure capable of coping with these changes is in part responsible for determining the level of contribution of information systems applications. Seven key characteristics of IT/IS-containing infrastructure were investigated in a survey. The application of factor analysis showed three main factors associated to IT/IS infrastructure. A series of attributes were associated to the identified characteristics of IT/IS for agility, enabling the development of a cascade-like model to facilitate the evaluation of IT/IS with special emphasis on infrastructure.

INTRODUCTION

The globalisation of markets in parallel with the enabling effects of information technology is creating a powerful set of forces that are dramatically changing the business environment. To survive in this new business environment, novel strategies are being employed to address the business needs of the organisation. In other words, manufacturing organisations are required to be agile. Agility means the capability of operating profitably in a competitive environment of continually and unpredictably changing customer opportunities (Goldman, Nagel & Preiss,

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1995). Organisations must retain core competencies and competitive advantage and complement them through cooperation with other organisations. Technology plays a key role in assisting organisations which are facing new challenges in their business environments. According to Reich et al. (1999) the main contribution of technology would be the acquisition, management, communication and reuse of information. Furthermore, information technology has been identified as a main component of manufacturing improvement programmes such as BPR (Business Process Re-engineering). In fact, information technology is fundamental to enabling the innovative redesign of core business processes. Smithson and Hirschheim (1998) claim that the key requirements for organisations to survive in a harsh environment are flexibility and speed of response to market changes, as well as the ability to innovate, in both product and process. High productivity remains essential and there is a constant need to improve product and customer service.

Spending on IT is irrelevant to winning in the market since all the technology is available to the competition (Randall, 1999). Moreover, there is growing evidence that an information technology/system fails to deliver its expected benefits (Strassman, 1997). This situation has motivated the development of different evaluation models for information systems, mainly focused on investment justification. Reich et al. (1999) identified inflexibility and insufficient openness as major causes of dissatisfaction. In fact, most companies turn to new technologies, in particular, information systems that will provide them with a competitive edge. Moreover, many authors have identified IT as source of change and also as a potential constraint or inhibitor (Benjamin, 1993; Broadbent and Butler, 1995; Davenport, 1993), particularly when the IT infrastructure is inappropriate and inflexible.

The selection of a set of measures and metrics for manufacturing organisations depends on the circumstances and the context faced in their business environment. This approach is related to the development of contingency models for evaluation of information systems. According to various studies (Willcocks, 1992; Serafeimidis and Smithson, 1999) the use of contingency models would assist in understanding the role and impacts (e.g., benefits, costs, risks, performance measures) of IT/IS.

Information technology/systems can affect business operations in diverse ways and the ultimate impact on business performance depends on various intertwined factors that can render IT/IS evaluation a difficult task (Giaglis, Paul & O'Keefe, 1999; Banker, Kauffman & Mahmood, 1993). The application of only financial techniques for assessing a particular IT/IS project is hindered by a difficulty in identifying and measuring the expected benefits of the proposed investment.

So far, the trend on information systems evaluation has been towards methodologies that incorporate technical/functional foundations (systems performance)

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