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The effect of information technologies on TQM: An initial analysis

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Abstract

Information technology (IT) and total quality management (TQM) have significantly impacted on most organizations and each has been widely researched. However, there is little well-founded empirical research on the relationship between the two, particularly in the way in which TQM is influenced by IT. This paper presents an investigation of such relationships through a survey of the largest industrial companies based in Spain. The data indicate that the most intensive users of IT perceive a bigger impact on their TQM dimensions.

Keywords: Information technology; Total quality management; Empirical study

1. Introduction

It is frequently argued that IT is a very important factor in increasing productivity and reducing costs (Bessen, 2002; Kagan, 1994; Kotha and Swamidass, 2000; Torkzadeh and Doll, 1999a; Weston, 1993), although some studies show contradictory results (Mahmood and Mann, 1993; Swamidass and Kotha, 1998a; Willcocks and Lester, 1997). Evidence of positive and significant returns from IT investment can be found in Brynjolfsson and Hitt (1996), Dewan and Min (1997), and Kelley (1994), while Loveman (1994), Powell and Dent-Micalef (1997) and Strassmann (1997) found that IT had no significant effect on productivity or competitive advantage. Using country-level data, Dewan and Kraemer (2000) found that IT investments have a positive and significant effect on GDP output in developed countries but not in developing ones.

Manufacturers and service providers seeking continuous improvements in business performance apply various means for improving quality, reducing costs and increasing productivity. These include total quality management (TQM), total productive maintenance (TPM), business process re-engineering (BPR), manufacturing resources planning (MRP), just-in-time (JIT), etc. Weston

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Table 1
Key elements of TQM reported by Ahire et al., Flynn et al., Saraph et al., MBNQA and EFQM

	TQM models				
	Saraph et al.	Flynn et al.	Ahire et al.	MBNQA	EFQM
Top management support	Role of divisional top management and quality policy	Top management support	Top management commitment	Leadership	Leadership
Customer relationship	—	Customer involvement: customer interaction	Customer focus	Customer focus and satisfaction	Customer satisfaction
Supplier relationship	Supplier quality management	Supplier involvement	Supplier quality management	Process management	Resources
Workforce management	Employee relations	Workforce management	Employee involvement Employee training	Human development and management	People management
Employee attitudes & behaviour	Employee relations	Workforce Management	Employee empowerment	Human development and management	People management
Product design process	New product quality	Product design	Design quality management	Process management	—
Process flow management	Process management / operating procedures	Process management	SPC usage	Process management	Process
Quality data and reporting	Quality data and reporting	Quality information: feedback	Internal quality information usage	Information and analysis	—

(1993) claims that all these interventions rely on IT, since they act as a feedback mechanism to users who are keen to measure productivity and, in addition, they also serve as the means to obtain rapid and more accurate information, improve communication links, and facilitate the implementation of advanced tools, systems and modelling techniques. There is little doubt that applications of IT affect all sections and functions of a company, therefore, it is argued that IT also must affect TQM. This paper examines the way in which TQM is influenced by IT and the role of IT in TQM interventions.

Before considering the influence of IT on TQM it is necessary to define what is meant by the term TQM. We used the TQM dimensions identified by Ahire et al. (1996), Flynn et al. (1994) and Saraph et al. (1989) to identify the key TQM dimensions used in this study (see Table 1).

Accordingly, eight key TQM dimensions were identified: top management support, workforce management, employees' attitudes and behaviour, customer relationship, supplier relationship, product design process and process flow management. Fig. 1 offers a brief description of each TQM dimension.

In recent years quality award programme such as the European Quality Award (EFQM, 1998) and the Malcolm Baldrige Award (MBNQA) (NIST, 1995), have brought attention to quality