

Collaborative Alliance for the Implementation of Computer Integrated Manufacturing in Small and Medium Enterprises

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INTRODUCTION

For all small and medium enterprises (SMEs), the long term goal is to stay in business, grow, and make profit, especially for manufacturing SMEs that must understand the dynamic changes that are taking place in the business environment. For SMEs to remain competitive, they must deliver products to customers at the minimum possible cost, the best possible quality, and the minimum lead time starting from the product conception stage to final delivery, service, and disposal (Marri, Gunasekaran, Kobu, & Grieve, 2002). SMEs can achieve this goal by implementing computer integrated manufacturing (CIM). The aim of CIM is to produce the required amount of the product of acceptable quality at the right time. If CIM technologies are fully integrated, the SMEs can respond rapidly to changes in product design, demand, or mix. The high investment required for AMT implementation is becoming a major hurdle for SMEs to cross. This is due to lack of financial resources which has stalled the initiative in adopting CIM. Undoubtedly, this has caused a decrease in rate of adoption of CIM in SMEs. With the collaborative alliance, CIM can successfully be implemented in SMEs.

The technological aspects have great influence on SMEs to focus on what enterprises actually do in the areas. An enterprise must bring together people with the right technological knowledge, equipment with the right technological capabilities, and materials suitable for the purposes and the techniques to be applied at

each productive point. If failures occur anywhere in the process, they will be measured in loss of relevance of industry to the needs of the country, loss of productivity, loss of quality in the products produced, or some external cost such as pollution of the environment. As difficult as achieving this level of performance may be, the task facing the enterprise is still greater. Technology performance is not just performance at the moment; it must be sustained, and the sustenance is through creative destruction. Thus, the people, equipment, facilities, and processes in the enterprise must embody sufficient technological knowledge and flexibility to select wisely among alternative techniques available for each step in the process, to adapt technology to meet local circumstances and changes in local circumstances, and ideally to develop new technology when appropriate and necessary.

In today's competitive, global, business environment, managers of primary activities are increasingly under pressure to improve performance of their product/service packages and reduce costs to compete internationally. Consequently, firms have sought to integrate individual operational functions and externalize the focus of their management of operations beyond the firm boundary (Harland, Zheng, Johnsen, & Lamming, 2004). As a reaction to highly dynamic market challenges and taking advantage of the facilities offered by advances in the information and communication technologies, SMEs are increasingly operating in cooperative networked environments (Camarinha-Matos, Afsarmanesh, & Rabelo, 2003). Although

interfirm collaboration may take many forms, studies of collaboration show that a high number of them are focused on technological issues (Caloghirous, Ioannides, & Vonortas, 2003). Strategic alliances are not only trading partnerships that enhance the effectiveness of the participating firms' competitive strategies by providing for mutual resource exchanges (technologies, skills, or products). They are also new business forms that enable the partners to enhance and control their business relationships in various ways (Todeva & Knoke, 2005).

BACKGROUND

From the mid-1970s onward, many European governments began increasingly to support SMEs. This was based on a growing belief in SMEs' inherently superior innovatory potential on their employment creating potential and on their potential as an endogenous vehicle for regional economic renewal. By the early 1980s, many instruments were in place to support innovation by SMEs (Rothwell & Dodgson, 1992). From the 1980s, while public support for SMEs in general has continued, growing emphasis has been placed on a special subclass of SMEs, the new technology-based firm. SMEs in particular often require complementary inputs such as assistance with business planning, quality control, project assessment, and so on. Recent SMEs support initiatives are directed mainly towards technology development and transfer.

Networking is a specific type of relation linking a defined set of persons, objects, and events. No enterprise operates in a vacuum; various interest groups are involved: owners, employees, distributors, financiers, customers, suppliers, and authorities. Cooperation in a network may concern, for example, products, production, marketing, supplies, design, and planning, and even financing and management, depending on the needs and abilities of participants to the network. According to Paasche, Petterson, and Solem (1993), the main idea of network is that the participants are mutually dependent and benefit from the cooperation in the long run. A network can be considered as a kind of social innovation as Raatikainen (1994), presented Thorelli stress power as an element of a network. The power can be based on market share, financial factors, logistic system, knowledge, contracts, or trust.

According to Hakansson and Johansson (1990), joint values, language, culture, and concept from the basis of a network join the individuals and single enterprises into a network. The parties of a network may have technical, knowledge, social, administrative, and legal bonds. Ahopelto and Raatikainen (1994) stated that cooperation in design, planning, and joint learning can improve the mutual logistic coordination of partners. As stated by Rothwell (1992), innovation is seen increasingly as a multifirm networking process, involving close collaboration between companies and a consequent linking of technology-push and market-pull factors. In order to attain a global position, SMEs have to cooperate and put more effort into networking (Lindell & Karagozoglu, 1997).

The studies conducted by Devins and Kimbara (1995) and Vaux, Gomes, Grieve, Ezingear, Race, and Woolgar (1996) cover both high-tech and general industrial SMEs and suggest that one cannot generalize about the existence and importance of SME external linkages. Finally, Moore (1993), using case studies on 12 SMEs engaged in collaborative research ventures of various kinds, reveals that the firms felt that on balance the costs of these collaborations outweighed the benefits. A parallel set of concerns about the benefits of external links is raised by Oakey (1993) in relation to research and other collaborations between large and SMEs.

During and Kerkhof (1995) had mentioned that innovative SMEs are more willing to focus on strategic collaboration with other firms, also within the area of cooperative product design and development, whereas less innovative SMEs are only focusing on operational cooperation. The areas of linkage identified by Rothwell (1991) were contract-out research and development (R&D), joint R&D ventures, marketing relationships, manufacturing relationships, and links with educational establishments, other public sector bodies, and research associations. Affiliation with larger firms indicates greater financial success for SMEs. Firms with some affiliation tend to have higher profits and greater sales. Financial and technical support that flows through these channels of affiliation is apparently the reason for this discrepancy of success among SMEs. According to Shabbir (1995), assistance by the prime firms to subcontractors may be technical, managerial, or sometimes financial.

The particular challenge to the international strategy of SME is to overcome the conditions unique to SMEs

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