Editorial: Competitive manufacturing in small and medium enterprises

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In response to increasingly intense global competition, organisations nowadays are undergoing massive transformations in the way they are structured, managed and operated. These massive transformations are evident with Small and Medium Enterprises (SMEs). In focusing their attention on satisfying their customers, SMEs are innovating their processes and practices to deliver products and services more quickly. They encounter difficulties in managing changes. These changes relate to customer order change, product design change, materials requirement change, purchase order change, production change, shipment schedule change and so on.

This special issue promotes the knowledge of best practices in Small and Medium Enterprises (SMEs) to gain competitive advantage in global manufacturing. It provides insights into both theories and practices to advance the knowledge and understanding of world class manufacturing (WCM) strategies/techniques in SMEs. Some of the papers included in this special issue are presented in the workshop on 'Information systems and competitive manufacturing in small and medium enterprises' jointly organised by The Hong Kong Polytechnic University and Brunel University, 22-23 December 1997, in Hong Kong. The aims and objectives of this special issue are to:

- Strengthen the capacities of SMEs to compete in the export market, by improving technological capabilities and trade potentials
- Simulate business relationships among SMEs, thus enhancing development, improving competitiveness and training for business growth
- Foster technical and economic cooperation among SMEs
- Assist, within the framework of national and regional cooperation, in the identification of technological needs for a variety of economic activities.

A range of best practices in manufacturing in addressing the theme of global manufacturing in SMEs is explored. Experiences in transforming the local view of an SME to a global view of effective international operations are included. This special issue has been aimed at benchmarking the experiences of best-in-class practices. The following are some of the key topics covered in this special issue:

- Agile Manufacturing
- Business Process Reengineering
- Technology management in manufacturing
- Supplier development
- Outsourcing

- Quality Management in SMEs
- Computer-integrated manufacturing in SMEs
- Networking among SMEs
- Performance measures in SMEs
- Transfer of best practice between individuals, organisations, sectors or countries
- University/industry cooperation
- Modelling and design tools for information systems development in SMEs
- Research methods applicable to the study of best practice adoption and assimilation

This special issue contains theoretical contributions emphasising different aspects of SMEs including virtual enterprises, networked organisations, learning organisations, surveys, activity based management, analysis tools, management succession and so on. A summary of papers included in this special issue is presented hereunder.

The management status of Japan's small and medium sized manufacturers is very critical at present. A major factor of this serious condition is the collapse of Japanese management systems, which have improved the state of small and medium sized manufacturers. It is advised that small and medium sized manufacturers should try to rectify the existing systems and have to consider globalising the market economy with the help of improved management policies and information networks. At this moment, however, making routes into global open markets in Japan is not so active. Ishikura and Yamamoto, in their paper 'Impact of information systems on Japanese small and medium sized manufacturers' present the conditions of Japanese small and medium manufacturers and solutions to overcome their problems. Greater attention is diverted towards the application of information highways in the development of these industries.

The paper 'The adoption of business process reengineering in SMEs: a diffusion of innovation approach', by Yung and Chan, explores how business process reengineering methodology is adopted to innovate the product development process for global manufacture, through the case of a Small Manufacturing Enterprise. Diffusion innovation theories to demonstrate the influence of variables at individual, organisational and environmental levels are analysed. Their analysis shows the problems of innovating processes in adopting rapid changes in the management of operations both in terms of justification of a BPR project and gaining support through the project. Yung and Chan conclude that the variables at all three levels are important to explain the adoption of BPR methodology with the environmental level being considered powerful in its impact. Based on their findings, they generalise the predictive power of rational models that focus on the individual level of analysis and urge more balanced methodologies to examine the joint impact of the three levels of analysis for process innovation development in SMEs.

Efficient and cost-effective management is important for the success of manufacturing companies in the competitive market, particularly for SMEs where investment in high technology upgrade requires stringent consideration. A Management Information System (MIS) can be developed to provide correct and timely information with the aim of supporting managers for decision making purposes. However, a cost-effective MIS for manufacturing of a generic nature is still in demand. Lau, in his paper

'A generic management information system for small and medium enterprises', describes a generic MIS which is proposed to be used as guidance for the development of a specific MIS in manufacturing activities particularly for small and medium enterprises. The author also covers the structure of the generic MIS and its interfaces with other systems in manufacturing. A real example to demonstrate its viability is also included.

The development of SMEs is one of the major features of the transition of the Russian Federation and the other new republics into a market economy. The private sector enterprises in Russia operate in highly unstable conditions, with an unsatisfactory financial market and often have a close relationship with public sector enterprises. The paper 'Managing operations in small and medium-sized Russian enterprises: an empirical research', by Gunasekaran, Opanasenko and Yli-Olli deals with the development and improvement activities of SMEs in Russia. This paper investigates the position of SMEs in Russia. Firstly, the paper presents the status of Russian SMEs by an industrial survey using a questionnaire in the St. Petersburg region. Secondly, it formulates a strategic framework to support Russian SMEs. The economy of Russia will largely depend upon the overall performance of SMEs as in all Western countries. Therefore, this report focuses on the problems for Russian SMEs in improving their competitiveness and hence moving towards a market economy.

Chung, Pak and Ng, in their paper 'Adaptation of quality function deployment for process reinvention in SMEs' propose an approach for SMEs to reinvent their manufacturing processes. Quality Function Deployment (QFD) as a best practice has been benefiting many leading manufacturers in Japan and the USA. However, there are still many SMEs such as those in Hong Kong, having difficulty in adopting best practice to enhance their competitiveness in the world market. It is argued that organisational innovations could be made when a team of voluntary workers is assembled to share their experiences. It is understood that people involved may not be willing to work together due to conflicting interests. The authors articulate the key roles and activities for a successful industrial and academic collaboration to support action learning through QFD adaptation. This approach has been validated with a case study in a local SME and should be able to be replicated for another reference site.

Leung, Leung, Chan and Ng, in their paper 'A path towards the adaptation of quality function deployment in SMEs – a case study' share their experience of involvement in the adaptation of Quality Function Deployment (QFD) in an SME in Hong Kong. The idea was put forward and initiated by the Manufacturing Department of their University and the Industry and Technology Development Council (ITDC) of the Government of the Hong Kong Special Administrative Region, China. Due to the disorientation of the management personnel regarding the costs and skills involved, the adaptation of QFD was partially discarded. Through a series of training workshops and statistical experiments, their team managed to establish a rapport with the Quality Assurance team in the company. Their confidence, awareness and skills were gradually built, statistical thinking was also fostered through collaboration. As a result, the management was convinced and they agreed on the full implementation of QFD.

Total quality management provides a sound foundation upon which small and medium enterprises can compete and grow in the global arena. Solis, Ragu-Nathan and Subba Rao, in their paper 'The best quality management practices in small and medium enterprises: an international study', report a survey based research that was conducted in five countries (USA, India, China, Mexico and Taiwan) to assess the quality management

practices in small and medium size companies. Their findings reveal that very high levels of common quality practices exist in terms of top management support, strategic quality planning, customer orientation and quality citizenship. However, common weaknesses among the top quality companies exist in relation to the human resources aspects of quality management. Their findings provide a potentially valuable benchmark for SMEs in the countries studied by identifying the best practices of the top quality companies, as well as identifying areas of quality practices for improvement. It is hoped that the findings of this study will have implications in improving the level of quality practices for SMEs across a range of countries.

The paper, 'Growth of a small manufacturing enterprise and critical factors for success' by Tam, Lee and Chung, explains how a new start-up company has evolved from an SME to become a global company. It analyses the growth strategy of the company over a nine-year period. The company took several important decisions to be able to create new competencies. The evolution of the company is analysed and discussed in a period of six stages. A conceptual model for competency building is formulated and discussed. Such a model is applicable to other SMEs to repeat its growth path.

The manufacturing sector in general and the small manufacturer in particular are faced with fierce national, regional and global competition. Trade alliances, such as NAFTA, which has been entered into by the USA will add to this competitive burden. Modernisation of manufacturing facilities through the infusion of computerised manufacturing and information processing technology has become imperative in this environment. A body of research is only now beginning to be developed for the identification of the issues and considerations that impede or facilitate modernisation of small-scale manufacturing. The research conducted by Kunnathur, Ragu-Nathan and Ariss, in their paper 'Adoption of modern technology in small manufacturing firms: a study of issues and concerns' is an attempt to contribute towards filling the gap in understanding of small manufacturing issues and concerns.

SMEs involved in manufacturing are often characterised by their manufacturing of a limited number of products involving relatively simple technology. Because of this they are vulnerable to competition. The paper 'Use of design interpretation for developing next generation products by SMEs' by Sivaloganathan and Shahin, describes a simple methodology to develop the next generation of these products in SMEs which employ the latest technologies to the advantage of the customer. Design interpretation is a methodology to analyse the designs of current products and extract the design information at different levels of abstraction. These are then used to develop the product and solution concepts of the next generation product. Illustrative examples are given to explain the use of the methodology. Finally, a case study on the development of a balancing machine is also given.

Many companies in Hong Kong are moving towards global manufacturing. Most of them are SMEs and need to compete in terms of *prompt delivery* against other global companies. They increase their competitive advantage by shortening the order fulfilment leadtime, reducing their production costs and managing the proximity of distribution. Information systems development as a vehicle to reinvent their business processes can increase competitiveness. Companies may collaborate with universities in industrially sponsored projects helping staff to acquire new skills. The universities may take a leading role in assembling the best practices for transfer to their industrial partners. In the process of transfer for assimilation, the academics share a mental model of professional development with executives in the SMEs. Chung, in his paper 'Reference site

methodology for exploitation research in small and medium enterprises' discusses the above issues in detail.

The paper 'The planning and control of manufacturing SMEs' by Rahimifard and Newman, describes a production planning and control structure specifically tailored for the needs of small to medium manufacturing enterprises. It identifies the deficiencies with the existing hierarchical production planning and control systems to meet the challenges of such enterprises and specifies the major requirements for their effective planning and control. Based on these requirements, the authors present a novel distributed real-time planning and control structure. This planning and control structure is built upon the use of 'team based manufacturing' concepts which aim to reinforce the autonomous and cooperative attributes of various production entities, providing greater flexibility and agility within modern human centred small to medium manufacturing companies.

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