
Editorial

Purnendu Mandal*

Information Systems and Analysis Department,
College of Business, Lamar University,
P.O. Box 10033, Beaumont, Texas 77710, USA
E-mail: Purnendu.Mandal@lamar.edu

*Corresponding author

Pradip Kumar Ray

Department of Industrial Engineering and Management,
Indian Institute of Technology,
Kharagpur 721302, India
E-mail: pkr@hijli.iitkgp.ernet.in
E-mail: pkr@vgsom.iitkgp.ernet.in
E-mail: head@iem.iitkgp.ernet.in

To survive in today's competitive business environment, organisations should exhibit nothing but excellence in operations, dealing with customers and business planning. In a globalised economy as is now organisations, irrespective of their types and product profiles, should stay competitive and improve their market positions continuously. Efforts to improve quality are crucial in attaining these goals. Through improved process control and efficient resource utilisation, an organisation may be able to minimise its cost of production and services significantly. As quality improves, the competitive position of an organisation improves with better customer satisfaction, increased profitability and all the aspects of organisational performance, such as innovation, productivity, effectiveness and quality of work life.

Over the years, organisations of all types have realised the positive relationships between quality and productivity. As productivity increases, valuable resources, such as humans, machines and equipment, materials and capital may be utilised more effectively for production of defect-free goods and/or services with amount of wastes held at the minimum level. The competitive position as well as the financial health of an organisation is thus enhanced in the long run. In both quality and productivity fronts, in a given organisational context, a set of important issues need to be addressed. Researchers have proposed several approaches for measurement and evaluation of productivity, quality and their relationships at different functional units and levels of organisations ensuring a holistic and integrated framework for achieving excellence in organisational performance.

Globalisation leading to global outsourcing, strategic alliances and partnerships in order to be competitive in terms of price, quality, flexibility, dependability and responsiveness drives a strong demand for appropriate and situation-specific productivity and quality improvement tools, techniques and methodologies facilitating an organisation to effectively utilise the available resources for improving organisational performance

and competitiveness. In this context, productivity and quality management, being the integral components of organisations' operational strategies, has become an important issue in all types of organisations, including those characterised and significantly affected by the components of supply chain, e-commerce and product development processes. Consequently, proposition of novel and innovative tools and techniques for developing an effective productivity and quality management practices has become one of the issues of major concern for the researchers and practitioners.

Researchers and practitioners proposed and applied number of tools, techniques, approaches and methodologies to address quality and productivity issues. With organisations becoming complex, applications of all these tools and approaches may require a constant effort to upgrade them, in content and structure, to address the current industrial problems with primary objective to enhancing organisational performance. This special issue put emphasis on the development of tools and techniques and their application in various situations.

The main focus of this special issue has been on the competent policies and effective techniques and approaches for productivity and quality improvement. This will help academics, researchers and management practitioners, working in the field of productivity and quality, come up with various types of novel and innovative concepts and approaches for productivity and quality management. This special issue includes a total of 11 papers discussing a wide range of issues in productivity and quality. Each of these papers makes a unique contribution to the field of productivity and quality improvement. A brief overview of each paper is provided below.

Oke, Onabajo, Oyekeye, Oluwo and Adeoye applied quality function deployment (QFD) and value analysis (VA) tools to the design of an automobile in order to reduce wastes in manufacturing through an optimal design that satisfies customers' most important needs. Significant improvement was obtained with this application, which leads to cuts in manufacturing cost. da Silva's et al. methodology in the product design process was applied to determine the level of comfort enjoyed by users of automobiles. They analysed the components of the vehicle that relates to the determination of quality of an automobile. The results show that a few numbers of components strongly determine the level of comfort enjoyed by the customer while using the automobile.

Scheduling of workers in not-highly automated production lines is important, especially when the number of operators is less than the number of workstations. Neubert and Savino addressed this issue and they argued that finding an optimal distribution plan can increase the line throughput, managing the workforce and the workload in a better way. Their work focussed on the operator-scheduling problem for an electromechanical assembly line. Workforce distribution on the workstations was made with a centralised scheduling based on a mathematical model. The model could find the optimal distribution of workforce optimising fundamental parameters, such as man-hours, throughput, makespan and work-in-process.

Kannan, Sivasubramanian and Jayabalan proposed a new method for assembly work with skewed quality characteristics in components. As the quality of a product depends upon the quality of the assembly, the contributing quality characteristics of the mating parts play a major role. A good amount of research has been carried out to improve the quality of assembly using selective assembly, when the contributing quality characteristics confirms to normal distribution. However, in reality, the contributing quality characteristics of a component will have some skewness, which will make the models proposed by earlier researcher not suitable for practice. They proposed a new

method, which ensures that all the components of the mating part population is used and at the same time there is minimum variation in the assembly even there is skewness in the dimensional distribution of the mating parts. Genetic algorithm (GA) is used to find the number of components in selective group combinations for a given clearance variation.

Low cost automation (LCA) and poka yoke philosophy principles were studied by Gamberini, Gebennini, Rimini, Spadaccini and Zilocchi,. These principles assure good results when applied to manufacturing processes with a high incidence of human operators, with a low availability of time for solution implementation and with expensive effects associated with errors in executing operative procedures. The case of a manufacturing line for heat exchangers is presented. Operative tools are redesigned in accordance with both low cost automation and poka yoke philosophy principles. It emerges that LCA and poka yoke solutions adopted induce consistent improvements in line productivity.

Mukherjee and Ray argue that the search for optimal or near-optimal path conditions for multistage grinding processes (where each stage is a grinding machine of specific type and technology) in mass-scale (or inline layout) manufacturing environment still remains a critical and difficult task for researchers and practitioners. Two different assumptions (each stage as isolated or independent system; all the stages as a single overall system with their possible interdependency) may be considered to determine optimal process setting conditions. The computational run results show the relative superiority of tabu search over GA to determine near-optimal solutions for the both assumptions. The results also indicate that near-optimal path conditions differ significantly from near-optimal path conditions under both assumptions.

Resource limitations may pose challenges to the identification and prioritisation of the improvement opportunities for many organisations. Woolford proposed the development of a decision support tool, based on the analytic hierarchy process and a self-assessment tool for evaluating current performance, which can effectively and efficiently identify and prioritise improvement opportunities for annual improvement planning. The decision support tool can be easily automated to facilitate implementation.

The success stories of Six Sigma applications are usually reported for large organisations like General Electric and in the manufacturing setting. Implementation of Six Sigma in service processes and for smaller organisations poses a different set of challenges. Natarajan and Morse address the challenges and opportunities in the context of an actual application of Six Sigma principles to a core service process in a mid-sized organisation.

The paper by Lazreg and Gien highlights the synergy between Six Sigma and maintenance excellence (ME) approach and integrates them into one model. Linking ME and Six Sigma leads to an improved model of the organisation of the maintenance function, enables reduction of variations in the process, eliminates the occurrence errors and reducing the time cycle for the maintenance process. The analysis shows that these two approaches can be coupled using QFD technique. Five QFD-oriented matrices are then developed to deploy the needs of maintenance, improvements, regulation of the dysfunctions, implementation plan and monitoring plan. The integrated model supports the progressive improvement and helps the organisation define its improvement priorities and reach new levels of competitive strength.

Anand and Kodali argue that managers of many organisations have not understood clearly how the performance measures of in their organisations are affected by lean

manufacturing (LM) initiatives. The authors reviewed the literature related to LM, simulation literature and explored how value stream mapping (VSM) could be used. The work describes a shop floor case for an automotive company where LM was implemented. The application of QUEST simulation software for developing simulation models for both current and future state VSMs are also discussed. The models would be helpful to managers in analysing the impact of various LM elements on the performance measures of their organisation.

Mandal and El-Houbi discussed the role of information technologies in quality and business performance. Implementation of large information systems, such as enterprise resources planning systems, has been the prime enforcer of best practices in many organisations; thus, ensuring quality in business operations. The management of information has become a strategic necessity for quality improvement and organisational performance. Their work highlights various approaches to information management at strategic level. With the help of a national survey of US manufacturing companies, the paper identifies the domain of influences and improvements rendered by information strategies in business performances.

Understanding the gaps in asset performance and taking corrective and preventive measures for the improvement of asset performance is extremely important for competitive advantage in the marketplace. Six Sigma and other statistical tools are currently being used by various asset intensive companies for reducing costs and risks from operational and business perspectives. Chattopadhyay and Varma examine the applicability of Six Sigma approach for ensuring effective management of physical assets.

We would like to thank all the authors for submitting and revising papers for the special issue. Our immense sense of gratitude and sincere thanks also extend to the reviewers for their helpful, constructive and extremely valuable comments and suggestions about the papers, which has tremendously helped in maintaining and improving the quality of the papers published in this special issue. Last but not the least, we express our sincere appreciation to Prof. Angappa Gunasekaran, the Editor-in-Chief of *IJPM*, for the invitation, continuous support and assistance.