
Editorial: Productivity and quality in the 21st century

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Biographical notes: Angappa Gunasekaran is a Professor of Operations Management in the Department of Management at the Charlton College of Business, University of Massachusetts – Dartmouth in USA. He has 175 papers published in 40 different peer-reviewed journals. He has presented over 50 papers and published about 50 articles in conferences. He is on the editorial board of 20 journals and edits journals in operations management and information systems areas. He is currently interested in researching benchmarking, information technology/systems evaluation, technology management, logistics and supply chain management.

Welcome to the Inaugural Issue of IJPQM

I am pleased to introduce this inaugural issue of the *International Journal of Productivity and Quality Management (IJPQM)*. *IJPQM* proposes and fosters discussion on the theory and application of productivity and quality. *IJPQM* is a refereed journal that acts as a forum and source of information in the field of productivity and quality. This will help professionals, academics, researchers and practitioners, working in the field of productivity and quality in the emerging economy and society, to discuss the important ideas, concepts and disseminate information and to learn from each other's work. Productivity and quality are the two sides of the same coin. Hence, there is a need for integrated productivity and quality improvement strategies and techniques. Considering the globalisation of markets and operations, a journal focusing on productivity and quality is of utmost importance. The paradigm shift would lead to global outsourcing, strategic alliances and partnerships in order to be competitive in terms of price, quality, flexibility, dependability and responsiveness. This, of course, with no doubt places a tremendous pressure on organisations to develop suitable productivity and quality policies and methods in order to effectively utilise the available resources for improving organisational productivity and competitiveness.

New enterprise environments demand an appropriate, innovative, effective design and use of business systems to serve market needs. Productivity and quality are an integral component of organisations' operational strategies. Productivity continues to play an important role both at the macro- and micro-levels. At the micro-level, firms continue to use productivity as a performance measure to benchmark against the best-in-class companies with the objective of identifying best practices. Quality management has become an important part of management culture, particularly, in new enterprises which are characterised by supply chain, e-commerce and virtual enterprise environments. Designing and developing suitable strategies, techniques, tools and models for improving productivity

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and quality have become an essential function of researchers and practitioners in a networked global economy. New strategies, techniques and tools for productivity and quality management and improvements will be the main focus of this journal. *IJPQM* is to encourage further research in productivity and quality management and improvement areas.

Globalisation of market and operations forces companies to think again about their productivity and quality problems and, in turn, their overall organisational competitiveness. In order to be successful in this global market, organisations and partnering firms should dedicate themselves to improving productivity and quality in a collaborative and timely manner. Towards this, companies have undergone numerous changes over the years in terms of implementing new operations strategies, methods and technologies. To achieve world-class customer service, advanced productivity and quality management techniques supported by management commitment and good organisation, will provide the objective means of improving productivity and quality, and hence the overall organisational competitiveness. This directs the researchers and practitioners to closely look at productivity and quality improvement issues from a perspective of needs, issues and enablers. The modern managers' role has changed in the new economy and therefore, the corresponding productivity and quality management and improvements.

This inaugural issue of *IJPQM* contains 11 articles discussing a wide range of issues dealing with productivity and quality improvement. While no unifying theme for the articles exists, each makes a unique contribution to the extant literature in the field. A brief overview of the 11 papers is provided below.

Mass customisation denotes the ability to provide customised products and services at a comparable price and speed as the equivalent standard offerings. Management literature has suggested that the advent of mass customisation compels firms towards greater collaboration in the supply chain. However, evidence supporting this proposition remains anecdotal. The paper, '*Collaborating for customisation: an extended resource-based view of the firm*' by Squire, Cousins and Brown seeks to develop and test a model that addresses the question: *what are the benefits of buyer-supplier collaboration within the context of mass customisation?* The analysis indicates that buyer-supplier collaboration may have significant effects on the focal firm's flexibility, responsiveness and modularisation capabilities; three capabilities shown to be critical to mass customisation. The results provide empirical support for the original proposition and have important implications for 'mass customised' supply chains.

Most managers realise that their success is directly related to the effective and continual implementation of process improvements in their organisations. However, a major managerial problem has been the inability to successfully implement change in many firms. Research has shown that the effective application of team-oriented and data-focused total quality improvement tools is not sufficient to assure the efficacious implementation of change. Nor were teams that utilised solely the logic tools of the theory of constraints totally successful in implementing change in their organisations. That is, firms were more likely to achieve their improvement goals when they used a structured and repeatable method, rather than an *ad hoc* approach, for continuous improvement (CI). Viewing the situation from an operations management perspective, the paper, '*Productivity and quality improvement: an implementation framework*', by Reid presents a logical and well-structured framework for implementing the CI managerial philosophy to improve the productivity and quality of an organisation as a whole, as well as its work-performing processes.

Despite the remarkable development in the use of inter-organisational systems (IOSs) in supply-chain management, there is still limited knowledge regarding the factors that

motivate their adoption in manufacturing. Da Silveira and Cagliano in their paper, *'Antecedents of interorganisational systems adoption in manufacturing'*, investigate the role of structural elements of supply-chain management as antecedents of IOSs adoption. More specifically, they explore the extent to which variables, including foreign supply, direct material cost, number of suppliers, and supplier collaboration practices, explain variations in the adoption of dyadic IOSs, including EDI and extranets, and multilateral IOSs, including internet auctions, liquid exchanges, and private marketplaces. The study involves statistical analysis of data from 219 manufacturers of fabricated metal products, machinery, and equipment from 13 countries. The results indicate that dyadic IOSs relate to high-volume transactions with international suppliers, while multilateral IOSs relate to low-volume transactions with a limited number of suppliers.

Statistical process control (SPC) provides a methodology to distinguish quality problems due to common and specific causes. While it carries profound managerial implications, its theoretical foundations are vague. Lillrank and Kujala in their paper, *'Managing common and specific causes of quality problems in project-based organisation'*, reveal that it is based on assumptions of production processes consisting of identical repetition in closed or closable systems. Where these assumptions do not hold, SPC may not be applied directly. The applicability of SPC in non-repetitive processes and open systems, non-routine processes and project-based businesses is examined. Guidelines for adjusting the logic of common and specific causes for project-based businesses are proposed.

Experience shows many change initiatives fail to deliver. They are not always a total failure, but they get stalled, misdirected, or only partially achieve the required results. As the speed of change in the external environment increases by the minute, Oakland and Tanner set out to identify the common success factors for managing change. The main purpose of their paper, *'Quality management in the 21st century – implementing successful change'* was to examine the apparent gap between often seen approaches and 'best practice', the output being a helpful framework to support future initiatives. This led to an organisational change framework being developed, based on the experience of many organisations.

Despite some initial setbacks, the online grocery business is viable and growing. In the paper, *'Efficient allocation of online grocery orders'*, Scott and Scott discuss the industry's value proposition, its business models, the various quality issues faced by an e-grocer and the tradeoffs faced in the selection of a highly efficient fulfilment strategy. Brick and click grocers usually choose fulfilment from stores rather than distribution centres. However, store fulfilment is vulnerable to congestion and 'trolley rage' when pickers of online orders get in the way of traditional shoppers. Scott and Scott propose a management science model for efficient allocation of online grocery orders. The model shows the impact of delivery budget and overall utilisation on store congestion. Contrary to current practice, which typically allocates orders to the nearest store, their model shows the optimal solution. Practitioners can use the model to prevent customer dissatisfaction while researchers will find this study provides a basis for future model extensions and fine-tuning.

There are both sales and production centres in enterprises. The sales (demand) centre pursues the maximisation of revenue, whereas the production (supply) centre pursues the minimisation of cost. The problem is maximisation of the difference (profit), but is dependent on the cooperation of the two centres. This two centre model is first discussed in a job-shop model by Matsui, and becomes very important to the demand-to-supply management in the supply-chain management (SCM) age. In 2002, the two centre model is developed to a management game model (MGM) by Matsui, and the ellipse theory with

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pair-pole is found on the pair-matrix table. However, the discussion is somewhat limited manufacturing type. The paper, '*Management game theory: manufacturing vs service enterprise type*' by Matsui discusses the MGM model of service vs manufacturing type, and develops the MGM theory toward management strategy. First, the service vs manufacturing type MGM is defined, and the traffic accounting is introduced. Next, the service-type MGM is discussed on the existence of optimal traffic. Finally, the common ellipse theory is ascertained on the pair-matrix table, and the common usage is discussed under a strategic goal. In addition, a duality of produce-to-order and produce-to-stock systems is showed.

Cumulative sum (CUSUM) control charts dominate Shewhart control charts on the basis of average run length performance unless expected process shifts are large. As a result, most authors recommend they be used to monitor process quality unless expected shifts are large. On the other hand, several authors have shown that there are only small differences in costs between the two methods. Thus, if cost is the important criterion, which it is in most actual production environments, it may be useful to use a Shewhart chart instead of a CUSUM chart because of its smaller training cost and ease of design and application. Furthermore, other authors have shown that it may be preferable to simply search for an assignable cause of poor quality at regular intervals rather than use any control chart when cost is the criterion. Saniga, McWilliams, Davis and Lucas in their paper, '*Economic control chart policies for monitoring variables*' compare the costs of CUSUM control charts and a common Shewhart control chart, the \bar{X} chart, when one is monitoring a process where measurement is by variables and one is interested in controlling a process mean. They also determine the optimal regular search policy for each configuration of parameters. Their results indicate that there are identifiable regions where there is an overwhelming cost advantage to using CUSUM charts. Additionally, they find that there are identifiable regions where a \bar{X} chart can be employed without any substantial economic disadvantage. Finally, they identify regions where a regular search policy is less costly than a policy of using either a CUSUM or \bar{X} control chart.

Beatty in his article, '*The quality journey: historical and workforce perspectives and the assessment of commitment to quality*', reviews the international quality movement from historical and workforce perspectives. The impact of the USA, Japan, the European Community, and other regions is discussed, along with the Baldrige National Quality Program, the Deming Prize, ISO, TQM, and other such programmes. Organisational and individual commitment to quality are emphasised, as well as the importance of measuring such commitment to quality and establishing commitment to quality baselines and benchmarks at the early stages of implementing quality programmes. A highly reliable, valid instrument for measuring commitment to quality is then presented and made available to organisations for baseline and comparison purposes.

The paper, '*Determining product platform elements for mass customisation*' by Kim, Lee and Lee addresses the issue of how to determine the physical elements of a product which should be included in the product platform, called the product platform elements, for mass customisation. Two types of indices, namely, the similarity index and the sensitivity index, are proposed to determine the product platform elements from the mass and the customisation perspectives, respectively. The physical elements with a large similarity index and a small sensitivity index are selected as the product platform elements. The proposed methodology is demonstrated via a case study. The product platform developed in the proposed methodology should be useful in accommodating various customer tastes while maintaining the cost efficiency of mass production.

SCM manages and controls material flow, information flow, and cash flow in a business from the acquisition of raw materials to the delivery of finished products to its customers. An efficient supply chain plays an essential role in determining an organisation's success. In their paper, '*Integrated supply-chain management for efficiency improvement*', Chen, Ma and Shang combine system, coordination, and integration thinking to develop an integrated supply-chain management (ISCM) model – an 'X' model. Based on the 'X' model, they propose an implementation strategy for the ISCM. The proposed system improves a firm's efficiency and effectiveness. Empirical studies based on such implementations are discussed.

Invitation to IJPQM

IJPQM is a fully refereed journal, generally covering strategies, techniques and tools for productivity and quality management and improvements in the 21st-century manufacturing and service organisations. New productivity and quality management ideas, results and experiences are welcome to *IJPQM*. The main objective of the journal is to promote research and application of new strategies, techniques and tools of productivity and quality improvement and in turn the organisational competitiveness in the new economy and society. *IJPQM* aims to help professionals working in the field of productivity and quality, academic educators, industry consultants, and practitioners to contribute, to disseminate and to learn from each other's work. Global dimension is emphasised in developing appropriate strategies, tactics, operational policies and tools for productivity and quality enhancement. *IJPQM* aims to act as a forum for exchanging innovative ideas and sharing practical experiences in managing and improving productivity and quality.

The journal publishes original papers, review papers, case studies, empirical research, technical notes, and book reviews. Special Issues devoted to important topics in productivity and quality issues will occasionally be published. Productivity and quality improvement strategies, tactics and tools of both theoretical and practical nature are welcome. Articles that deal with productivity and quality issues in finance, government, health services, manufacturing, education, energy, mining, sports, and transportation are encouraged for *IJPQM*. The following are the list of topics (but not limited to) that would be considered for publication in *IJPQM*:

- a perspective view of needs, issues and enablers of productivity and quality management
- strategic alliances based on core competences
- problem areas and types of solutions
- techniques and tools for productivity and quality management
- productivity and quality improvement strategies
- link between competitiveness and productivity and quality improvement efforts
- measures and metrics
- benchmarking and best practices of productivity and quality improvement strategies

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- functional integration
- enterprise integration and management
- empirical research and case studies in productivity and quality improvements
- productivity and quality management software products
- Six-Sigma approach to productivity and quality improvement strategies
- business process reengineering
- design and implementation of productivity and quality management systems
- green productivity
- total productivity management (TPM)
- knowledge management vs productivity and quality
- productivity deployment function (PFD)
- IT/IS such as the internet, world wide web (WWW), electronic data interchange (EDI), e-commerce, radio frequency identification (RFID), and enterprise resource planning (ERP) in productivity and quality management functions and improvements
- total quality management (TQM)
- quality function deployment (QFD)
- productivity and quality standards
- statistical process control (SPC) and process capability analysis
- failure mode and effects analysis (FEMA)
- information technology
- continuous improvement
- productivity and quality supply chain and virtual enterprise environments
- small- and medium-sized enterprises
- environmental productivity and quality.

Academics and practitioners are invited to forward their contributions in productivity and quality improvement areas for possible publication in *IJPQM*. The journal also encourages papers on industrial experience or on the implementation of productivity and quality strategies and techniques. Potential editors are welcome for guest editing special issues in emerging areas of productivity and quality. Please direct all your communication to the Editor-In-Chief (agunasekaran@umassd.edu).

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