Key ingredients for the effective implementation of Six Sigma program

Jiju Antony and Ricardo Banuelas

Jiju Antony and Ricardo Banuelas are both at the Warwick Manufacturing Group, University of Warwick, Coventry, UK.

Abstract *Six Sigma is a business strategy and a systematic methodology, use of which leads to breakthrough in profitability through quantum gains in product/service quality, customer satisfaction and productivity. The concept of implementing Six Sigma processes was pioneered at Motorola in the 1980s and the objective was to reduce the number of defects to as low as 3.4 parts per million opportunities. For the effective implementation of Six Sigma projects in organisations, one must understand the critical success factors that will make the application successful. This paper presents the key ingredients, which are essential for Six Sigma implementation. These ingredients are generated from a pilot survey conducted in the UK manufacturing and service organisations.*

Keywords *Organizational change, Corporate culture, Business strategy*

Introduction

The concept of implementation of Six Sigma methodology was pioneered at Motorola in the 1980s with the aim of reducing quality costs, i.e. costs of not doing things right first time, costs of not meeting customer requirements, etc. After Motorola, other companies such as Texas Instruments, Allied Signal (or Honeywell today), Kodak, General Electric, Sony, etc. have claimed great savings as a result of the implementation of Six Sigma projects. However, Six Sigma stresses the application of statistical and problem-solving tools and techniques in a methodical and systematic fashion to gain knowledge that leads to breakthrough improvements with dramatic impact on the bottom-line results. While the original goal of Six Sigma was to focus on manufacturing process, today, marketing, purchasing, billing and invoicing functions are also embarked on Six Sigma strategies with the aim of continuously reducing defects throughout the organisation's processes.

Key ingredients are those factors that are essential to the success of the implementation of any quality improvement initiatives. The identification of such factors will encourage their consideration when companies are developing an appropriate implementation plan (Mann and Kehoe, 1995). For example, Henderson and Evans (2000) have identified the key components of successful Six Sigma implementation, such as upper management support, organisational infrastructure, training, application of statistical tools and link to human resources-based actions (e.g. bonuses, promotions, etc.). Even though many authors have advocated the success factors at various places of the literature, very little attempt has been made to validate them by empirical research. The objective of this research project is to determine the key ingredients for the effective implementation of Six Sigma programs in UK industry by means of a pilot study. The paper will also make an attempt to understand the common tools and techniques within UK industry currently practising Six Sigma philosophy.

Six Sigma and its fundamentals

Six Sigma has different interpretations and definitions for different people. It is a formal and disciplined methodology for defining, measuring, analysing, improving and controlling processes. The fundamental idea behind the Six Sigma

philosophy is to continuously reduce variation in processes and aim at the elimination of defects or failures from every product, service and transactional process (Hoerl, 1998). Six Sigma can be defined in both statistical and business terms. In business terms, Six Sigma is a business improvement strategy used to improve profitability, to drive out waste, to reduce quality costs and improve the effectiveness and efficiency of all operations that meet or even exceed customers' needs and expectations (Antony and Banuelas, 2001). In statistical terms, Six Sigma is a term that refers to 3.4 defects per million opportunities (DPMO), where sigma is a term used to represent the variation about the process average.

One key to the success of the Six Sigma program is the step-by-step approach or road map using define, measure, analyse, improve and control (DMAIC) methodology. The definition phase entails the definition of the problem and the definition of critical quality characteristics which are most important to customers. In the measure phase, select the most appropriate output quality characteristics to be improved and establish what is unacceptable performance or a defect for such characteristics. Once this is done, gather preliminary data to evaluate current process performance and capability. In the analysis phase, we need to analyse the root causes of defects or errors (the Xs or input variables). In the improvement phase, we need to reduce the defect rate or number of defects using simple but powerful statistical tools/techniques. For some processes, several rounds of improvements may be required to achieve a desired process performance or capability. In the control phase, we need to sustain the improvement that has been achieved from the improvement phase.

Real benefits of Six Sigma

Six Sigma accentuates financial returns to the balance sheet of an organisation. It has been so successful in many organisations where performance is significantly improved beyond that which can be obtained through other means. The following are the key benefits gained by Motorola, Allied Signal (Honeywell now) and GE (www.airacad.com/papers/Sixsigma.html) from the implementation of Six Sigma.

Motorola (1987-1994)

- Reduced in-process defect levels by a factor of 200.
- Reduced manufacturing costs by $1.4 billion.
- Increased stockholders share value four-fold.

Allied Signal (1992-1996)

- Reduced new product introduction time by 16 per cent.
- Reduced manufacturing costs by more than $1 billion.

General Electric (1995-1998)

- Company wide savings of over $1 billion.

Service and transactional processes.

- Reduced medication and laboratory errors and thereby improved patient safety (Buck, 2001).
- Reduced profit margin significantly in a community hospital and the estimated saving is more than $1 million per year (http://www.smartersolutions.com/).
- Significant savings in process timeliness, improvements in cash management and increased customer loyalty and satisfaction (Rucker, 2000).

Key ingredients of Six Sigma program: an overview

In order to manage and optimise the process output, it is important that we identify the key input variables which influence the output. The key ingredients of Six Sigma play an identical role of input variables to any process. This section briefly reveals the key ingredients that are necessary for the effective implementation of Six Sigma program. The first step was to carry out an exploratory study on the topic as similar studies were performed by authors such as Pande *et al.* (2000), Henderson and Evans (2000) and Eckes (2000). Moreover, it is also important to learn the importance of these success factors in a ranking or prioritised order, particularly in the UK industry. The relative weightings of critical success factors (CSFs) would assist people to understand what ingredients are essential for making Six Sigma process successful and what ingredients are not important to the success. It would also assist people in organisations to gain a better understanding of the process of Six Sigma implementation. The following CSFs are identified from the literature.

1. Management involvement and commitment

Any successful initiative like Six Sigma requires top management involvement and provision of appropriate resources and training (Halliday, 2001). The underlying principles of Six Sigma must be taught to senior managers within the organisation. Jack Welch, the CEO of GE, has strongly influenced and enabled the restructuring of the business organisation and changed the attitude of the employees towards Six Sigma (Henderson and Evans, 2000). Without the continuous support and commitment from top management, the true importance of the initiative will be in doubt and the energy behind it will be weakened (Pande *et al.*, 2000).

2. Cultural change

A successful introduction and implementation of Six Sigma requires adjustments to the culture of the organisation and a change in the attitudes of its employees. Employees have to be motivated and accept responsibility for the quality of their own work. It is worthwhile to note that when Six Sigma was initially rolled out at GE, employees were at first very uneasy at the thought of having to learn statistics. This was due to the misconception that Six Sigma is essentially a statistical

toolset. Today Six Sigma within GE is the way employees do their job in everyday life and it is nothing more than the mindset of people with the ultimate goal of "doing things right first time". The success of an organisation in both the local and overseas markets depends heavily on the culture of that particular organisation (Sohal, 1998). Six Sigma initiatives require the right mindset and attitude of people working within the organisation at all levels. The people within the organisation must be made known and be aware of the need for change. Companies that have been successful in managing change have identified that the best way to tackle resistance to change is through increased and sustained communication, motivation and education.

With a true cultural revolution in an organisation come two basic fears on an individual level: fear of change and fear of not achieving the new standards. To overcome fear of change in any industrial environment, the people involved must understand the need for change. It would be ideal to create a communication plan that would address why Six Sigma is important, and how the methodology of Six Sigma works in organisations (Hendricks and Kelbaugh, 1998). It is also essential to restructure the organisation to drive the culture change and make Six Sigma a part of everyday life. After implementation of Six Sigma projects, it is best to publish results, but these should not be restricted to just success stories but also admit and communicate stumbling blocks. This will help other projects in the pipeline to avoid the same mistakes and learn from mistakes.

3. Organisation infrastructure

In addition to top-management, there also needs to be an effective organisational infrastructure in place to support the Six Sigma introduction and development program within any organisation. The employees in an organisation practising Six Sigma are generally highly trained, have undergone rigorous statistical training, and lead teams in identifying, executing and managing Six Sigma projects. In many multinational corporations (such as GE, Motorola, Honeywell, etc.), Six Sigma initiatives are led by the CEO or vice-president, who is considered as the Six Sigma champion. This will be followed by the formation of master black belts, black belts, green belts and other team members who are individuals who support specific projects in their area (Harry and Schroeder, 2000). Apart from the belt system, Six Sigma program also requires project sponsors (or champions in some organisations) who provide guidance to the project team and find and negotiate resources and budget for the project. The timing and readiness of the organisation is also important. This is because Six Sigma effort requires a great deal of resources such as staff commitment, top management commitment, time, energy and costs, etc.

4. Training

It is critical to "communicate both the 'why' and the 'how' of Six Sigma as early as possible, and provide the opportunity to people to improve their comfort level through training classes" (Hendricks and Kelbaugh, 1998) before unleashing the employees into the world of Six Sigma. There is usually a hierarchy of expertise, which is identified by the "belt system". The belt system ensures that everyone in the organisation is speaking the same language. This makes the setting up and execution of Six Sigma projects much easier throughout the organisation. The curriculum in the belt system varies from organisation to organisation and consultant to consultant; however it needs to be provided by identifying the key roles of the people directly involved in applying Six Sigma. For example, the training for becoming a black belt within Motorola is a minimum of one year. In order to be accredited to black belt, candidates must complete an application form to demonstrate how they have met the requirements in both training and practice of Six Sigma (Ingle and Roe, 2001). In GE, the length of training is approximately 16-20 weeks. Qualification as a black belt is very important when employees are being considered for promotion. In general, it appears that GE has a more structured approach to training than does Motorola. Moreover, the length of training in GE is comparatively much shorter and therefore results in a greater number of accredited black belts. However, the black belt training in Motorola seems to be more flexible and potentially should result in a greater depth and breadth of expertise.

5. Project management skills

As Six Sigma is a project driven methodology, it is good practice for the team members to have project management skills to meet the various deadlines or milestones during the course of the project (Antony and Banuelas, 2001). Most of the projects on Six Sigma fail due to poor project management skills, setting and keeping ground rules, determining the meeting's roles and responsibilities (Eckes, 2000).

6. Project prioritisation and selection, reviews and tracking

There have to be proper criteria for the selection and prioritisation of projects. Poorly selected and defined projects lead to delayed results and also a great deal of frustration. Pande *et al.* (2000) provide three generic categories of projection selection criteria. These are:

(1) Business benefits criteria
- impact on meeting external customer requirement;
- financial impact;
- impact on core competencies.

(2) Feasibility criteria
- resources required;
- complexity;
- expertise available, etc.

(3) Organisational impact criteria
- cross-functional benefits;
- learning benefits, i.e. new knowledge gained about the business, customers and processes.

Project reviews must be conducted on a regularly scheduled basis to drive the projects to a successful completion and closure. Review process would enable the black belts and green belts to follow the Six Sigma methodology correctly. Six Sigma champions should use the project review process to understand what the black belts and green belts see as barriers to the progress of their projects. It is good practice to have a project tracking system to track all projects which are submitted for consideration, accepted for implementation, in progress and completed.

7. Understanding the Six Sigma methodology, tools and techniques

A healthy portion of the Six Sigma training involves learning the principles behind the Six Sigma methodology, i.e. DMAIC methodology. During the training, employees learn three groups of tools and techniques, which are divided into process improvement tools and techniques, leadership tools and team tools. For many Six Sigma projects, generally simple statistical tools or quality tools are more than enough to tackle the problem at hand. However, for greater breakthrough improvements in business processes, certain advanced statistical tools and techniques (such as design of experiments, statistical process control, regression analysis, analysis of variance, etc.) are needed.

In addition, there has to be a clear set of metrics that are used to measure process performance against customer requirements. Examples of metrics include defect rate, cost of poor quality, throughput yield, rolled throughput yield, etc. Accurate data are also required for analysing potential root causes and support the team's decisions.

8. Linking Six Sigma to business strategy

Six Sigma cannot be treated as yet another stand-alone activity. It requires adherence to a whole philosophy rather than just the usage of a few tools and techniques of quality improvement (Dale, 2000). It needs to be clear how Six Sigma projects and other activities link to customers, core processes and competitiveness (Pande *et al.*, 2000). Since the goal of every organisation is to make profits, Six Sigma projects make business processes profitable while attacking variability which leads to high scrap rate, high rework rate, low productivity, etc. In every single project, the link between the project objectives and the business strategy should be identified.

9. Linking Six Sigma to the customer

A key element of the success of Six Sigma program is its ability to link to the customers. Projects should begin with the determination of customer requirements (Harry and Schroeder, 2000). However Pande *et al.* (2000) argue that before customer needs can be met successfully, there has to be a good understanding of the organisation and its linkage to various business activities. The process of linking Six Sigma to the customer can therefore be divided into two main steps:

(1) Identifying the core processes, defining the key outputs of these processes and defining the key customers that they serve.
(2) Identifying and defining the customer needs and requirements.

An important issue here is the selection of critical-to-quality characteristics (CTQs). These CTQs must be identified quantitatively in the starting phase of the Six Sigma methodology. Quality function deployment is a powerful technique to understand the needs and expectations of customers and translate them into design or engineering requirements. In service industry, the customer requirements are often ambiguous, subjective and poorly defined.

10. Linking Six Sigma to human resources

Human resources-based actions need to be put into effect to promote desired behaviour and results. Some studies show that 61 per cent of the top performing companies link their rewards to their business strategies, while lower performing companies create minimal linkage (Harry and Schroeder, 2000). Across all GE businesses no one will be promoted without the full Six Sigma training and a completed project. This in itself is an impressive behaviour driver (Hendricks and Kelbaugh, 1998). Moreover, Jack Welch of GE requires the black belt managing the project to prove that the problems are fixed permanently (Conlin, 1998).

11. Linking Six Sigma to suppliers

Many organisations that implement Six Sigma find it beneficial to extend the application of Six Sigma principles to management of their supply chain. The concept that "everybody plays" created special challenges for General Electric Appliances (GEA). You cannot be a Six Sigma company without your suppliers participating in the culture change (Hendricks and Kelbaugh, 1998). The key element of successful integration of suppliers into Six Sigma is obtaining support up front from the highest levels of management in the supplier firm. Under Six Sigma philosophy, one way to reduce variability is to have few suppliers with high Sigma performance capability levels (Pande *et al.*, 2000).

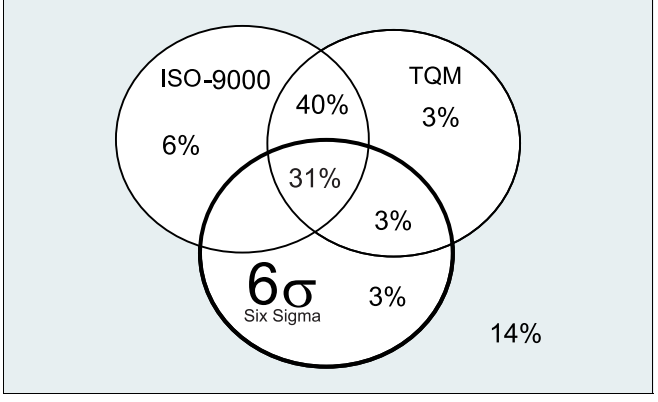
Research methodology and data collection

The research question for this pilot study was "how organisations in the UK prioritise these key ingredients?" The questionnaire developed in this study consisted of two main sections: the background of the company and the key ingredients. The first section was intended to determine fundamental issues such as the type of product or service made, the size of the company, whether a certified quality management system standard was held, the level of sigma

capability of the company, the common metrics used by the company for measuring performance, problem solving and quality improvement tools and techniques utilised by the company, etc. The second section consisted of 34 variables or statements, derived mainly from the literature and by means of a brainstorming session with a number of quality professionals within the university, who are familiar with the Six Sigma and other quality management philosophies. The process resulted in an instrument strongly grounded in the literature. After gathering 34 variables from the literature and brainstorming, the next step was to group them into 11 factor headings. Each factor consisted of about three variables or statements on average. Respondents were asked to rate their level of agreement to the statements or variables on a five-point Likert scale from 1 "not important" to 5 "crucial", with the middle denoted as "important". It was hoped that this would give an indication of the level of knowledge and understanding of Six Sigma. Moreover, the use of a Likert scale rather than a simple yes/no type of question in the questionnaire would provide a better perspective of the current Six Sigma practices in the UK industry.

The target respondents for the survey were the quality directors, chief executive officers, managing directors, project managers, quality managers or black belts, since they are directly involved in the process and have first-hand knowledge and experience of Six Sigma projects in their businesses. A postal survey was used for gathering data due to the advantage that the designed questionnaire could be sent to a large number of organisations in a limited time. A total of 300 questionnaires were sent to large organisations with over 1,000 employees and higher turnover. The response rate from the companies was about 15 per cent (i.e. 45 companies). However, just 37 per cent of these companies (i.e. about 16 companies) were applying the principles of Six Sigma. Figure 1 depicts the percentage of the companies that are implementing Six Sigma, total quality management (TQM) and ISO 9000. As can be seen from Figure 1, many companies that implement Six Sigma have also implemented both ISO 9000 and TQM. Moreover, 71 per cent of the responding companies have implemented ISO 9000 and TQM and just 14 per cent of the companies have not achieved any quality status.

Figure 1 — Percentages of ISO 9000, TQM and Six Sigma status



The largest group of respondents in the survey included master black belts, quality managers and project managers. The results of the survey also showed that the majority of the companies (i.e. more than 70 per cent) have recently adopted Six Sigma initiatives (i.e. between one and three years). Moreover, less than 10 per cent of the companies involved in the survey have been involved in Six Sigma initiatives for more than three years.

The results of the survey also revealed that more than 50 per cent of the companies involved in Six Sigma initiatives are working at three or less than three Sigma capability level. Also, 20 per cent of the companies do not know their actual Sigma capability level. Two companies are operating their core business processes between four and five Sigma capability level. One company is operating its critical processes at five Sigma capability level on average.

The most common metrics used in companies practising Six Sigma principles include process capability indices (both C_p and C_{pk}), defect rate, costs of poor quality (COPQ), percentage of scrap, first time yield (FTY) and number of customer complaints. In addition to the metrics, the survey also looked at the most common tools and techniques employed by the companies which have been practising Six Sigma. The results are shown in Figure 2.

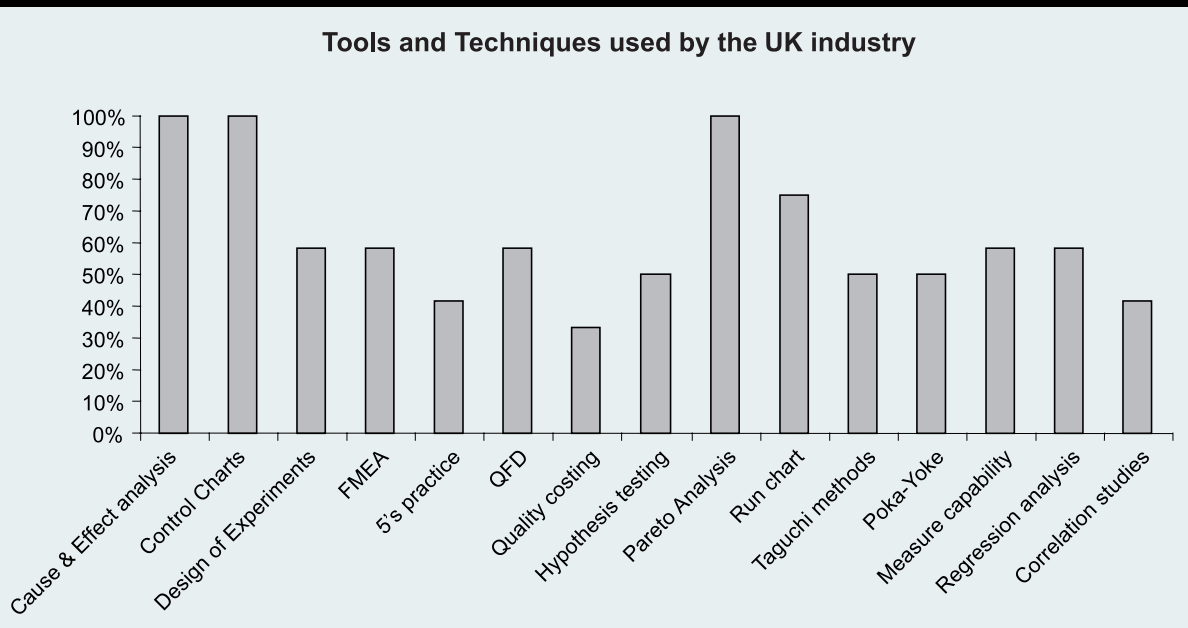
The most commonly used tools include cause and effect analysis, Pareto analysis, control charts and run charts. It was found that many companies are not using more powerful techniques such as design of experiments, Taguchi methods, quality function deployment, failure mode effect and criticality analysis, 5-S practice, Poka-Yoke and statistical process control. In other words, the more powerful techniques are less commonly used in these organisations.

The companies practising Six Sigma were asked about the financial benefits from Six Sigma projects. The analysis of the results showed that 75 per cent of the companies have gained financial benefits (i.e. more than £100,000 per annum) as a result of Six Sigma implementation. It was also interesting to note that 17 per cent of the companies do not estimate the savings from Six Sigma projects. These companies were selecting projects based on issues with no impact on the business goals or strategies.

Analysis of key ingredients for success of Six Sigma program from pilot survey

In this research project, the Cronbach's alpha test was carried out because it is most widely and commonly used in the internal reliability for a set of questions. Generally, an alpha of 0.60 or higher is thought to indicate an acceptable level of internal consistency (Black and Porter, 1996). All the factors in

Figure 2 — Tools and techniques in companies practising Six Sigma



the survey instrument have a Cronbach alpha coefficient of above 0.6. The alpha coefficients were also improved for some factors (e.g. cultural change, training, etc.) by the elimination of uncorrelated variables. Content validity, construct validity and criterion-related validity tests were also performed on the survey instrument (Badri *et al.*, 1995). The results of each test were satisfactory. The respondents were asked to rank the 11 factors according to a five-point Likert scale (1 = least important, 2 = less important, 3 = important, 4 = very important and 5 = crucial). The scores were added together and then divided by the number of observations per factor to determine the mean score of each factor. Figure 3 illustrates the mean scores of each factor, the higher the score, the greater the importance of the factor.

It can be seen from Figure 3 that four factors F1, F5, F6 and F9 have mean scores more than 4. These factors are management involvement and commitment, linking Six Sigma to customers, linking Six Sigma to business strategy and understanding of Six Sigma methodology respectively. Factors F2 (organisation infrastructure) and F11 (project prioritisation and selection) were also regarded to be very important as the mean scores of these two factors are very close to 4. Table I presents the ranking of the 11 key ingredients in ascending order.

It was not surprising that management commitment and involvement has been identified as the most important ingredient (or factor) as most authors of Six Sigma (Eckes, 2000; Harry and Schroeder, 2000; Pande *et al.*, 2000) agree with this. This finding would support the key ingredients of other quality initiatives such as BPR and TQM (Dale, 1994; Al-Mashari and Zairi, 1999). The results of the analysis have also revealed that many Six Sigma projects are selected based on their impact on business performance, profitability and customer satisfaction. The ingredients which are ranked low in this survey are F8, F4 and F7 (i.e. linking Six Sigma to suppliers, training and linking Six Sigma to employees). It is important to note that these ingredients (or factors), although ranked low, are still considered as important drivers of Six Sigma programs in organisations. In the UK industry, training on Six Sigma is not extensive or limited, due to inadequate budget and probably lack of understanding of the benefits of Six Sigma among top management personnel.

Conclusions and directions for further research

Six Sigma has been considered as a strategic approach to improve business profitability and achieve operational excellence through the effective application of both statistical and non-statistical tools/techniques. This paper presents the key ingredients for the effective introduction and implementation of Six Sigma program in organisations. These CSFs were then tested in the UK organisations in the form of a pilot study. From the analysis, it was found that "management commitment and involvement" is the most important ingredient and "linking Six Sigma to employees (human resources)" is the least important ingredient for the Six Sigma program. The results of the key ingredients in descending order of importance are arranged in the following manner:

(1) Management commitment and involvement.
(2) Understanding of Six Sigma methodology, tools and techniques.
(3) Linking Six Sigma to business strategy.
(4) Linking Six Sigma to customers.
(5) Project selection, reviews and tracking.

Figure 3 — Key ingredients from the analysis of pilot study

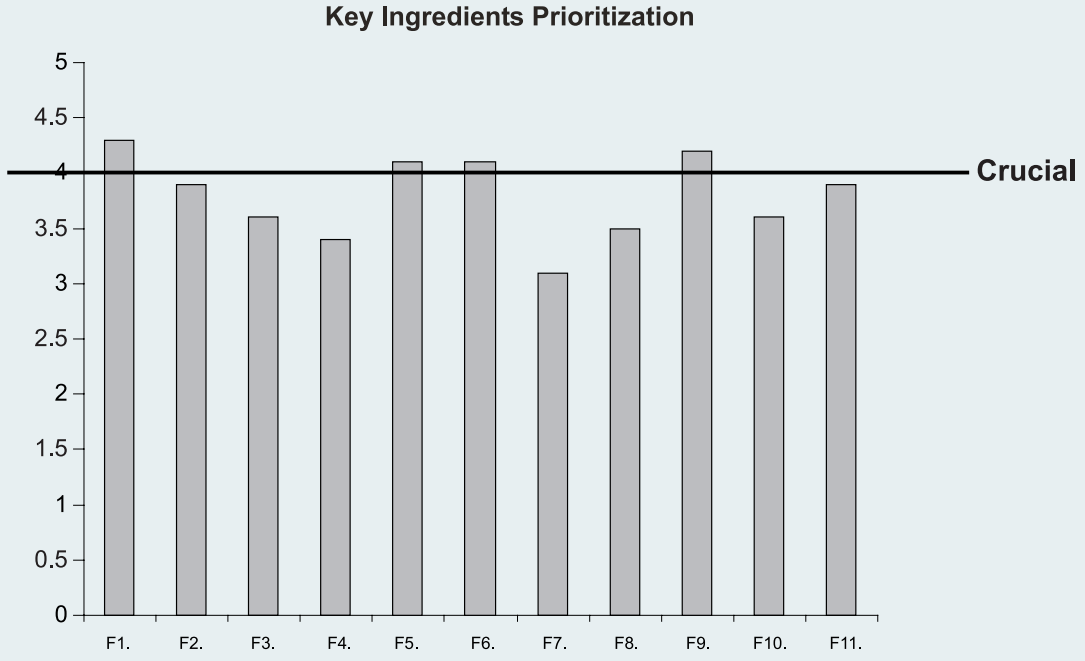


Table I — Ranking analysis of key ingredients for Six Sigma program from the pilot study

Ranking	Factor number	Factor	Average	Standard deviation
1	F1	Managing involvement and commitment	4.3	0.6749
2	F9	Understanding of Six Sigma methodology	4.2	0.6726
3	F6	Linking it to a business strategy	4.1	0.8403
4	F5	Linking it to customers	4.1	0.8973
5	F11	Project prioritization and selection	3.9	0.7906
6	F2	Organisational infrastructure	3.9	0.9992
7	F3	Cultural change	3.6	0.8842
8	F10	Project management skills	3.6	0.9413
9	F8	Linking it to suppliers	3.5	1.1536
10	F4	Training	3.4	0.8012
11	F7	Linking it to employees	3.1	0.8853

(6) Organisational infrastructure.
(7) Cultural change.
(8) Project management skills.
(9) Linking Six Sigma to suppliers.
(10) Training.
(11) Linking Six Sigma to employees (human resources).

This research project was conducted with some boundaries such as the number of companies, available resources, areas of industry, etc. For further research, studies with more available resources and involvement of more companies from different sectors shall be taken into account. Owing to the time limitation, a postal survey was carried out for this research. According to Gillham (2000), the scaled questions have disadvantages because respondents often do not use the whole scale, whatever response they tick, we do not know why a particular response was chosen. It would therefore be ideal if semi-structured interviews could also be conducted in organisations, as it would enable us to have a deeper understanding of the Six Sigma practices in the UK organisations. The survey described in the paper was targeted for large multi-national companies and no small and medium enterprises (SMEs) were included in the study. Therefore it is quite important to understand the tools and techniques SMEs use within the Six Sigma approach for quality improvement. Moreover, it is important to answer the question of how Six Sigma is useful for SMEs and what ingredients will make the application of Six Sigma principles successful within SMEs. ■

References

Al-Mashari, A.Y. and Zairi, M. (1999), "BPR implementation process: an analysis of key success and failure factors", *Business Process Management Journal*, Vol. 5 No. 1, pp. 87-112.

Antony, J. and Banuelas, R. (2001), "A strategy for survival", *Manufacturing Engineer*, Vol. 80 No. 3, pp. 119-21.

Badri, M.A., Davis, D. and Davis, D. (1995), "A study of measuring the critical factors of quality management", *International Journal of Quality & Reliability Management*, Vol. 12 No. 2, pp. 36-53.

Black, S.A. and Porter, L.J. (1996), "Identification of the critical factors of TQM", *Decision Science*, Vol. 27 No. 1, pp. 1-21.

Buck, C. (2001), "Applications of Six Sigma to reduce medical errors", *ASQ Congress Proceedings*, Milwaukee, WI, pp. 239-42.

Conlin, M. (1998), "Revealed at last: the secret of Jack Welch's success", *Forbes*, Vol. 61 No. 2, January.

Dale, B. (2000), "Marginalisation of quality: is there a case to answer?", *The TQM Magazine*, Vol. 12 No. 4, pp. 266-74.

Dale, B. (1994), *Managing Quality* (Ed.), Prentice-Hall, London.

Eckes, G. (2000), *The Six Sigma Revolution*, John Wiley & Sons, New York, NY.

Gillham, B. (2000), *Developing a Questionnaire*, Continium, London.

Halliday, S. (2001), "So what exactly is Six Sigma?", *Works Management*, Vol. 54 No. 1, p. 15.

Harry, M. and Schroeder, R. (2000), *Six Sigma: The Breakthrough Management Strategy Revolutionising the World's Top Corporations*, Doubleday Currency, New York, NY.

Hendricks, C.A. and Kelbaugh, R. (1998), "Implementing Six Sigma at GE", *The Journal of Quality and Participation*, Vol. 21 No. 4, pp. 48-53.

Henderson, K.M. and Evans, J.R. (2000), "Successful implementation of Six Sigma: benchmarking General Electric Company", *Benchmarking: An International Journal*, Vol. 7 No. 4, pp. 260-81.

Hoerl, R.W. (1998), "Six Sigma and the future of the quality profession", *IEEE Engineering Management Review*, Fall, pp. 87-94.

Mann, R. and Kehoe, D. (1995), "Factors affecting the implementation and success of TQM", *International Journal of Quality & Reliability Management*, Vol. 12 No. 1, pp. 11-23.

Pande *et al.* (2000), *The Six Sigma Way: How GE, Motorola and Other Top Companies are Honing their Performance*, McGraw-Hill Professional, New York, NY.

Rucker, R. (2000), "Citibank increases customer loyalty with defect-free processes", *The Journal for Quality and Participation*, Vol. 23 No. 4, pp. 32-6.

Sohal, A. (1998), "Assessing manufacturing/quality culture and practices in Asian companies", *International Journal of Quality & Reliability Management*, Vol. 15 No. 8/9, pp. 920-30.

This article has been cited by:

1. Hans-Peter de Ruiter, Joan Liaschenko, Jan Angus. 2015. Problems with the electronic health record. *Nursing Philosophy* n/a-n/a. [CrossRef]
2. Ang Boon Sin, Suhaiza Zailani, Mohammad Iranmanesh, T. Ramayah. 2015. Structural equation modelling on knowledge creation in Six Sigma DMAIC project and its impact on organizational performance. *International Journal of Production Economics* **168**, 105-117. [CrossRef]
3. Alessandro Laureani, Jiju Antony. 2015. Leadership characteristics for Lean Six Sigma. *Total Quality Management & Business Excellence* 1-22. [CrossRef]
4. Rameshwar Dubey, Angappa Gunasekaran, Stephen J. Childe, Samuel Fosso Wamba, Thanos Papadopoulos. 2015. Enablers of Six Sigma: contextual framework and its empirical validation. *Total Quality Management & Business Excellence* 1-27. [CrossRef]
5. Vishal Singh Patyal, Maddulety Koilakuntla. 2015. Infrastructure and core quality practices in Indian manufacturing organizations. *Journal of Advances in Management Research* **12**:2, 141-175. [Abstract] [Full Text] [PDF]
6. Díaz-Castellanos Elizabeth Eugenia, Díaz- Ramos Carlos, Barroso-Moreno Luis Alberto, Pico-González Beatriz. 2015. Desarrollo de un modelo matemático para procesos multivariables mediante Balanced Six Sigma. *Ingeniería, Investigación y Tecnología* **16**, 419-430. [CrossRef]
7. Chad Laux, Mary Johnson, Paul Cada. 2015. Project barriers to Green Belts through critical success factors. *International Journal of Lean Six Sigma* **6**:2, 138-160. [Abstract] [Full Text] [PDF]
8. Anupama Prashar. 2015. Six Sigma adoption in public utilities: a case study. *Total Quality Management & Business Excellence* 1-28. [CrossRef]
9. Abel Ribeiro de Jesus, Jiju Antony, Herman Augusto Lepikson, Carlos Arthur M. Teixeira Cavalcante. 2015. Key observations from a survey about Six Sigma implementation in Brazil. *International Journal of Productivity and Performance Management* **64**:1, 94-111. [Abstract] [Full Text] [PDF]
10. Chandrakanth G. Pujari, Seetharam K.. 2015. An Evaluation of Effectiveness of the Software Projects Developed Through Six Sigma Methodology. *American Journal of Mathematical and Management Sciences* **34**, 67-88. [CrossRef]
11. Mazen Arafah. 2015. Selecting the Six Sigma Project: A Multi Data Envelopment Analysis Unified Scoring Framework. *American Journal of Operations Research* **05**, 129-150. [CrossRef]
12. Zhen He, Yujia Deng, Min Zhang, Xingxing Zu, Jiju Antony. 2015. An empirical investigation of the relationship between Six Sigma practices and organisational innovation. *Total Quality Management & Business Excellence* 1. [CrossRef]
13. Maneesh Kumar, Khawaja Khurram Khurshid, Dianne Waddell. 2014. Status of Quality Management practices in manufacturing SMEs: a comparative study between Australia and the UK. *International Journal of Production Research* **52**, 6482-6495. [CrossRef]
14. Ravi S. Reosekar, Sanjay D. Pohekar. 2014. Six Sigma methodology: a structured review. *International Journal of Lean Six Sigma* **5**:4, 392-422. [Abstract] [Full Text] [PDF]
15. Sara Hejazi, Yair Levy. 2014. The Role of Responsibility Factors of Reducing Inefficiencies in IS Projects on Six Sigma Certification in Service Organizations. *International Journal of Information Systems in the Service Sector* **4**:10.4018/IJISSS.20120701, 1-28. [CrossRef]
16. Marianne Torkko, Nina Katajavuori, Anu Linna, Anne Mari Juppo. 2014. The Utilization of Quality KPIs in the Pharmaceutical Industry. *Journal of Pharmaceutical Innovation* **9**, 175-182. [CrossRef]
17. Eleanor Doyle, Damien McGovern, Stephen McCarthy. 2014. Compliance–innovation: integrating quality and compliance knowledge and practice. *Total Quality Management & Business Excellence* **25**, 1156-1170. [CrossRef]
18. Sultan A. Alarifi, Amr Alamri. 2014. HPT and Six Sigma: Is There a Difference That Matters?. *Performance Improvement* **53**:10.1002/pfi.2014.53.issue-7, 14-22. [CrossRef]
19. Peter Cronemyr, Magnus Eriksson, Sebastian Jakolini. 2014. Six Sigma diplomacy – the impact of Six Sigma on national patterns of corporate culture. *Total Quality Management & Business Excellence* **25**, 827-841. [CrossRef]
20. Marly Monteiro de Carvalho, Linda Lee Ho, Silvia Helena Boarin Pinto. 2014. The Six Sigma program: an empirical study of Brazilian companies. *Journal of Manufacturing Technology Management* **25**:5, 602-630. [Abstract] [Full Text] [PDF]

21. Richard McLean, Jiju Antony. 2014. Why continuous improvement initiatives fail in manufacturing environments? A systematic review of the evidence. *International Journal of Productivity and Performance Management* **63**:3, 370-376. [Abstract] [Full Text] [PDF]
22. Carley Sutton. 2014. The Evolution of Human Sigma. *Journal of Quality Assurance in Hospitality & Tourism* **15**, 115-133. [CrossRef]
23. Paulo Augusto Cauchick Miguel, Marly Monteiro de Carvalho. 2014. Benchmarking Six Sigma implementation in services companies operating in an emerging economy. *Benchmarking: An International Journal* **21**:1, 62-76. [Abstract] [Full Text] [PDF]
24. Can Öztürker, İbrahim Şahbaz, Zeynep Karaarası Öztürker, Mehmet Tolga Taner, Şükrü Bayraktar, Gamze Kağan. 2014. Development of a Six Sigma Infrastructure for Trabeculectomy Process. *American Journal of Operations Research* **04**, 246-254. [CrossRef]
25. Hisham Alidrisi. 2014. Prioritizing Critical Success Factors for Six Sigma Implementation Using Interpretive Structural Modeling. *American Journal of Industrial and Business Management* **04**, 697-708. [CrossRef]
26. Jami L. DelliFraine, Zheng Wang, Deirdre McCaughey, James R. Langabeer, Cathleen O. Erwin. 2014. The Use of Six Sigma in Health Care Management. *Quality Management in Health Care* **23**, 240-253. [CrossRef]
27. İbrahim Şahbaz, Mehmet Tolga Taner, Üzeyir Tolga Şahandar, Gamze Kağan, Engin Erbaş. 2014. Elimination of Post-Operative Complications in Penetrating Keratoplasty by Deploying Six Sigma. *American Journal of Operations Research* **04**, 189-196. [CrossRef]
28. Marianne Torkko, Anu Linna, Nina Katajavuori, Anne Mari Juppo. 2013. Quality KPIs in Pharmaceutical and Food Industry. *Journal of Pharmaceutical Innovation* **8**, 205-211. [CrossRef]
29. Lucila M.S. Campos. 2013. Lean manufacturing and Six Sigma based on Brazilian model "PNQ". *International Journal of Lean Six Sigma* **4**:4, 355-369. [Abstract] [Full Text] [PDF]
30. Cyndy B. Levtzow, Monte S. Willis. 2013. Reducing Laboratory Billing Defects Using Six Sigma Principles. *Laboratory Medicine* **44**, 358-371. [CrossRef]
31. Kuo-Liang Lee, Yang Su. 2013. Applying Six Sigma to Quality Improvement in Construction. *Journal of Management in Engineering* **29**, 464-470. [CrossRef]
32. Peter Cronemyr, Mikael Danielsson. 2013. Process Management 1-2-3 – a maturity model and diagnostics tool. *Total Quality Management & Business Excellence* **24**, 933-944. [CrossRef]
33. Manoj Dora, Maneesh Kumar, Dirk Van Goubergen, Adrienn Molnar, Xavier Gellynck. 2013. Food quality management system: Reviewing assessment strategies and a feasibility study for European food small and medium-sized enterprises. *Food Control* **31**, 607-616. [CrossRef]
34. Ayon Chakraborty, Tan Kay Chuan. 2013. An empirical analysis on Six Sigma implementation in service organisations. *International Journal of Lean Six Sigma* **4**:2, 141-170. [Abstract] [Full Text] [PDF]
35. Vasileios Ismyrlis, Odysseas Moschidis. 2013. Six Sigma's critical success factors and toolbox. *International Journal of Lean Six Sigma* **4**:2, 108-117. [Abstract] [Full Text] [PDF]
36. Sanjit Ray, Prasun Das, B. K. Bhattacharyay, Jiju Antony. 2013. Measuring Six Sigma Project Effectiveness using Fuzzy Approach. *Quality and Reliability Engineering International* **29**, 417-430. [CrossRef]
37. Bernard Kornfeld, Sami Kara. 2013. Selection of Lean and Six Sigma projects in industry. *International Journal of Lean Six Sigma* **4**:1, 4-16. [Abstract] [Full Text] [PDF]
38. Nurul Fadly Habidin, Sha'ri Mohd Yusof. 2013. Critical success factors of Lean Six Sigma for the Malaysian automotive industry. *International Journal of Lean Six Sigma* **4**:1, 60-82. [Abstract] [Full Text] [PDF]
39. Pedro Marques, José Requeijo, Pedro Saraiva, Francisco Frazão-Guerreiro. 2013. Integrating Six Sigma with ISO 9001. *International Journal of Lean Six Sigma* **4**:1, 36-59. [Abstract] [Full Text] [PDF]
40. Ayon Chakraborty, Michael Leyer. 2013. Developing a Six Sigma framework: perspectives from financial service companies. *International Journal of Quality & Reliability Management* **30**:3, 256-279. [Abstract] [Full Text] [PDF]
41. Sushil Kumar, P.S. Satsangi, D.R. Prajapati. 2013. Improvement of Sigma level of a foundry: a case study. *The TQM Journal* **25**:1, 29-43. [Abstract] [Full Text] [PDF]
42. Sushil Kumar, P.S. Satsangi, D.R. Prajapati. 2013. Optimization of process factors for controlling defects due to melt shop using Taguchi method. *International Journal of Quality & Reliability Management* **30**:1, 4-22. [Abstract] [Full Text] [PDF]

43. Bernard J. Kornfeld, Sami Kara. 2013. A Framework for Developing Portfolios of Improvements Projects in Manufacturing. *Procedia CIRP* **7**, 377-382. [CrossRef]
44. Jami L. DelliFraine, Zheng Wang, Deirdre McCaughey, James R. Langabeer, Cathleen O. Erwin. 2013. The Use of Six Sigma in Health Care Management. *Quality Management in Health Care* **22**, 210-223. [CrossRef]
45. Maha Yusr, Abdul Rahim Othman, Sany Sanuri Mohd Mokhtar. 2012. Assessing the Relationship among Six Sigma, Absorptive Capacity and Innovation Performance. *Procedia - Social and Behavioral Sciences* **65**, 570-578. [CrossRef]
46. Ruben Pinedo-Cuenca, Pablo Gonzalez Olalla, Djoko Setijono. 2012. Linking Six Sigma's critical success/hindering factors and organizational change (development). *International Journal of Lean Six Sigma* **3**:4, 284-298. [Abstract] [Full Text] [PDF]
47. Sunil Sharma, Anuradha R. Chetiya. 2012. An analysis of critical success factors for Six Sigma implementation. *Asian Journal on Quality* **13**:3, 294-308. [Abstract] [Full Text] [PDF]
48. Alessandro Laureani, Jiju Antony. 2012. Critical success factors for the effective implementation of Lean Sigma. *International Journal of Lean Six Sigma* **3**:4, 274-283. [Abstract] [Full Text] [PDF]
49. Ayon Chakraborty, Kay Chuan Tan. 2012. Case study analysis of Six Sigma implementation in service organisations. *Business Process Management Journal* **18**:6, 992-1019. [Abstract] [Full Text] [PDF]
50. Abbas Saghaei, Hoorieh Najafi, Rassoul Noorossana. 2012. Enhanced Rolled Throughput Yield: A new six sigma-based performance measure. *International Journal of Production Economics* **140**, 368-373. [CrossRef]
51. Paulo Augusto Cauchick Miguel, Eduardo Satolo, João Marcos Andrietta, Felipe Araújo Calarge. 2012. Benchmarking the use of tools and techniques in the Six Sigma programme based on a survey conducted in a developing country. *Benchmarking: An International Journal* **19**:6, 690-708. [Abstract] [Full Text] [PDF]
52. Whee Yen Wong, Chan Wai Lee, Kim Yeow TshaiSix Sigma in IT Processes, IT Services and IT Products: A Fact or a Fad? Six Sigma beyond Manufacturing in IT Processes, IT Services and IT Products 524-531. [CrossRef]
53. Andrea Chiarini. 2012. Risk management and cost reduction of cancer drugs using Lean Six Sigma tools. *Leadership in Health Services* **25**:4, 318-330. [Abstract] [Full Text] [PDF]
54. I. Reid, J. Smyth-Renshaw. 2012. Exploring the Fundamentals of Root Cause Analysis: Are We Asking the Right Questions in Defining the Problem?. *Quality and Reliability Engineering International* **28**:10.1002/qre.v28.5, 535-545. [CrossRef]
55. Subashini Suresh, Jiju Antony, Maneesh Kumar, Alex Douglas. 2012. Six Sigma and leadership: some observations and agenda for future research. *The TQM Journal* **24**:3, 231-247. [Abstract] [Full Text] [PDF]
56. Murat Tanik, Ali Sen. 2012. A six sigma case study in a large-scale automotive supplier company in Turkey. *Total Quality Management & Business Excellence* **23**, 343-358. [CrossRef]
57. Alexandros G. Psychogios, Loukas K. Tsironis. 2012. Towards an integrated framework for Lean Six Sigma application: Lessons from the airline industry. *Total Quality Management & Business Excellence* **23**, 397-415. [CrossRef]
58. S. Karthi, S. R. Devadasan, R. Murugesh, C. G. Sreenivasa, N. M. Sivaram. 2012. Global views on integrating Six Sigma and ISO 9001 certification. *Total Quality Management & Business Excellence* **23**, 237-262. [CrossRef]
59. Denyse Julien, Phil Holmshaw. 2012. Six Sigma in a low volume and complex environment. *International Journal of Lean Six Sigma* **3**:1, 28-44. [Abstract] [Full Text] [PDF]
60. Colm Heavey, Eamonn Murphy. 2012. Integrating the Balanced Scorecard with Six Sigma. *The TQM Journal* **24**:2, 108-122. [Abstract] [Full Text] [PDF]
61. Javad Mehrabi. 2012. Application of Six-Sigma in Educational Quality Management. *Procedia - Social and Behavioral Sciences* **47**, 1358-1362. [CrossRef]
62. Andrea Chiarini. 2011. Japanese total quality control, TQM, Deming's system of profound knowledge, BPR, Lean and Six Sigma. *International Journal of Lean Six Sigma* **2**:4, 332-355. [Abstract] [Full Text] [PDF]
63. Ji Hyun Cho, Jae Hoon Lee, Dong Geun Ahn, Joong Soon Jang. 2011. Selection of Six Sigma key ingredients (KIs) in Korean companies. *The TQM Journal* **23**:6, 611-628. [Abstract] [Full Text] [PDF]
64. Bernard J. Kornfeld, Sami Kara. 2011. Project portfolio selection in continuous improvement. *International Journal of Operations & Production Management* **31**:10, 1071-1088. [Abstract] [Full Text] [PDF]
65. Maneesh Kumar, Jiju Antony, M.K. Tiwari. 2011. Six Sigma implementation framework for SMEs – a roadmap to manage and sustain the change. *International Journal of Production Research* **49**, 5449-5467. [CrossRef]
66. Florian Johannsen, Susanne Leist, Gregor Zellner. 2011. Six sigma as a business process management method in services: analysis of the key application problems. *Information Systems and e-Business Management* **9**, 307-332. [CrossRef]

67. Yun-na Liu, Kang LiDeploying Six Sigma in Motorola supply chain HR management —Exemplified by Motorola ISC DL workforce strategies 1366-1369. [CrossRef]
68. Yun-na Liu, Kang LiApplication of Six Sigma methodology DMAIC in HR project management —A case study of Motorola SC HR DSS project 1340-1343. [CrossRef]
69. Alessandro Brun. 2011. Critical success factors of Six Sigma implementations in Italian companies. *International Journal of Production Economics* **131**, 158-164. [CrossRef]
70. Xiaona Wang, Yezhuang Tian, Yanjiang Cheng, Chunhong Li, Yaqin HaoThe relationship among organizational learning, quality method integration and performance 57-60. [CrossRef]
71. Yvonne Lagrosen, Rana Chebl, Max Rios Tuesta. 2011. Organisational learning and Six Sigma deployment readiness evaluation: a case study. *International Journal of Lean Six Sigma* **2**:1, 23-40. [Abstract] [Full Text] [PDF]
72. Yahia Zare Mehrjerdi. 2011. Six-Sigma: methodology, tools and its future. *Assembly Automation* **31**:1, 79-88. [Abstract] [Full Text] [PDF]
73. T.Y. Lee, W.K. Wong, K.W. Yeung. 2011. Developing a readiness self-assessment model (RSM) for Six Sigma for China enterprises. *International Journal of Quality & Reliability Management* **28**:2, 169-194. [Abstract] [Full Text] [PDF]
74. Wayne Aaberg, Carla J. Thompson. 2011. Combining a human performance model and a Six Sigma model to assess performance in a military environment. *Performance Improvement* **50**:10.1002/pfi.v50.1, 36-48. [CrossRef]
75. Paulo Augusto Cauchick Miguel, João Marcos Andrietta. 2010. Outcomes from a descriptive survey of Six Sigma management practices in Brazil. *International Journal of Lean Six Sigma* **1**:4, 358-377. [Abstract] [Full Text] [PDF]
76. Sunil Sharma, Anuradha R. Chetiya. 2010. Six Sigma project selection: an analysis of responsible factors. *International Journal of Lean Six Sigma* **1**:4, 280-292. [Abstract] [Full Text] [PDF]
77. M.G Kanakana, J.H.C Pretorius, B Van WykLean six sigma framework to improve throughput rate 862-866. [CrossRef]
78. X.P. Tracy Zou, W.B. Lee. 2010. A study of knowledge flow in Six Sigma teams in a Chinese manufacturing enterprise. *VINE* **40**:3/4, 30-403. [Abstract] [Full Text] [PDF]
79. K. Jeyaraman, Leam Kee Teo. 2010. A conceptual framework for critical success factors of lean Six Sigma. *International Journal of Lean Six Sigma* **1**:3, 191-215. [Abstract] [Full Text] [PDF]
80. Jami L. DelliFraine, James R. Langabeer, Ingrid M. Nembhard. 2010. Assessing the Evidence of Six Sigma and Lean in the Health Care Industry. *Quality Management in Health Care* **19**, 211-225. [CrossRef]
81. B. J. Hicks, J. Matthews. 2010. The barriers to realising sustainable process improvement: A root cause analysis of paradigms for manufacturing systems improvement. *International Journal of Computer Integrated Manufacturing* **23**, 585-602. [CrossRef]
82. Amine Ayad. 2010. Critical thinking and business process improvement. *Journal of Management Development* **29**:6, 556-564. [Abstract] [Full Text] [PDF]
83. Karin Schön, Bjarne Bergquist, Bengt Klefsjö. 2010. The consequences of Six Sigma on job satisfaction: a study at three companies in Sweden. *International Journal of Lean Six Sigma* **1**:2, 99-118. [Abstract] [Full Text] [PDF]
84. Breffni M. Noone, Karthik Namasivayam, Heather Spitler Tomlinson. 2010. Examining the application of six sigma in the service exchange. *Managing Service Quality: An International Journal* **20**:3, 273-293. [Abstract] [Full Text] [PDF]
85. Mohamed Gamal Aboelmaged. 2010. Six Sigma quality: a structured review and implications for future research. *International Journal of Quality & Reliability Management* **27**:3, 268-317. [Abstract] [Full Text] [PDF]
86. M. Tkáč, Š. Lyócsa. 2010. On the evaluation of Six Sigma projects. *Quality and Reliability Engineering International* **26**:10.1002/qre.v26:1, 115-124. [CrossRef]
87. Luca Cagnazzo, Paolo Taticchi, Alessandro Brun. 2010. The role of performance measurement systems to support quality improvement initiatives at supply chain level. *International Journal of Productivity and Performance Management* **59**:2, 163-185. [Abstract] [Full Text] [PDF]
88. Peter Cronemyr, Lars Witell. 2010. Changing from a product to a process perspective for service improvements in a manufacturing company. *The TQM Journal* **22**:1, 26-40. [Abstract] [Full Text] [PDF]
89. Xingxing Zu, Tina L. Robbins, Lawrence D. Fredendall. 2010. Mapping the critical links between organizational culture and TQM/Six Sigma practices. *International Journal of Production Economics* **123**, 86-106. [CrossRef]
90. Gang Niu, Daniel Lau, Michael PechtImproving computer manufacturing management through Lean Six Sigma and PHM 1-7. [CrossRef]

91. Chuni Wu, Chinho Lin. 2009. Case study of knowledge creation facilitated by Six Sigma. *International Journal of Quality & Reliability Management* **26**:9, 911-932. [Abstract] [Full Text] [PDF]
92. Rupa Mahanti, Jiju Antony. 2009. Six Sigma in the Indian software industry: some observations and results from a pilot survey. *The TQM Journal* **21**:6, 549-564. [Abstract] [Full Text] [PDF]
93. Maneesh Kumar, Jiju Antony, Alex Douglas. 2009. Does size matter for Six Sigma implementation?. *The TQM Journal* **21**:6, 623-635. [Abstract] [Full Text] [PDF]
94. Behnam Nakhai, Joao S. Neves. 2009. The challenges of six sigma in improving service quality. *International Journal of Quality & Reliability Management* **26**:7, 663-684. [Abstract] [Full Text] [PDF]
95. M Kumar, J Antony. 2009. Multiple case-study analysis of quality management practices within UK Six Sigma and non-Six Sigma manufacturing small- and medium-sized enterprises. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture* **223**, 925-934. [CrossRef]
96. Ayon Chakrabarty, Tan Kay Chuan. 2009. An exploratory qualitative and quantitative analysis of Six Sigma in service organizations in Singapore. *Management Research News* **32**:7, 614-632. [Abstract] [Full Text] [PDF]
97. Satya S. Chakravorty. 2009. Six Sigma programs: An implementation model. *International Journal of Production Economics* **119**, 1-16. [CrossRef]
98. Rene Cordero, Steven T. Walsh, Bruce A. Kirchhoff. 2009. Organization technologies, AMT and competent workers. *Journal of Manufacturing Technology Management* **20**:3, 298-313. [Abstract] [Full Text] [PDF]
99. Jung-Lang Cheng. 2009. Six Sigma and TQM in Taiwan: An empirical study of discriminate analysis. *Total Quality Management & Business Excellence* **20**, 311-326. [CrossRef]
100. Paulo Augusto Cauchick Miguel, João Marcos Andrietta. 2009. Benchmarking Six Sigma application in Brazil. *Benchmarking: An International Journal* **16**:1, 124-134. [Abstract] [Full Text] [PDF]
101. S. V. Deshmukh, R. R. LakheDevelopment and Validation of an Instrument for Six Sigma Implementation in Small and Medium Sized Enterprises 790-797. [CrossRef]
102. Samia M. Siha, Germaine H. Saad. 2008. Business process improvement: empirical assessment and extensions. *Business Process Management Journal* **14**:6, 778-802. [Abstract] [Full Text] [PDF]
103. Maneesh Kumar, Jiju Antony. 2008. Comparing the quality management practices in UK SMEs. *Industrial Management & Data Systems* **108**:9, 1153-1166. [Abstract] [Full Text] [PDF]
104. Hongbo WangA Review of Six Sigma Approach: Methodology, Implementation and Future Research 1-4. [CrossRef]
105. Xingxing Zu, Lawrence D. Fredendall, Thomas J. Douglas. 2008. The evolving theory of quality management: The role of Six Sigma. *Journal of Operations Management* **26**, 630-650. [CrossRef]
106. Roger Hilton, Margaret Balla, Amrik S. Sohal. 2008. Factors critical to the success of a Six-Sigma quality program in an Australian hospital. *Total Quality Management & Business Excellence* **19**, 887-902. [CrossRef]
107. Ying-Chin Ho, Ou-Chuan Chang, Wen-Bo Wang. 2008. An empirical study of key success factors for Six Sigma Green Belt projects at an Asian MRO company. *Journal of Air Transport Management* **14**, 263-269. [CrossRef]
108. Vivian W.Y. Tam, Khoa N. Le. 2008. On using the Gaussian and hyperbolic distributions to improve quality in construction. *Journal of Engineering, Design and Technology* **6**:2, 112-123. [Abstract] [Full Text] [PDF]
109. Yi-Chan Chung, Yau-Wen Hsu, Chih-Hung Tsai. 2008. An empirical study on the correlation between Critical DFSS success factors, DFSS implementation activity levels and business competitive advantages in Taiwan's high-tech manufacturers. *Total Quality Management & Business Excellence* **19**, 595-607. [CrossRef]
110. Atarod Goudarzlou, Tan Kay ChuanUsing six sigma in new service development 1-6. [CrossRef]
111. Natcha Thawesaengskulthai, James D.T. Tannock. 2008. Pay-off selection criteria for quality and improvement initiatives. *International Journal of Quality & Reliability Management* **25**:4, 366-382. [Abstract] [Full Text] [PDF]
112. J Antony, M Kumar, A Labib. 2008. Gearing Six Sigma into UK manufacturing SMEs: results from a pilot study. *Journal of the Operational Research Society* **59**, 482-493. [CrossRef]
113. Silvia Helena Boarin Pinto, Marly Monteiro de Carvalho, Linda Lee Ho. 2008. Main quality programs characteristics in large size Brazilian companies. *International Journal of Quality & Reliability Management* **25**:3, 276-291. [Abstract] [Full Text] [PDF]
114. Preeprem Nonthaleerak, Linda Hendry. 2008. Exploring the six sigma phenomenon using multiple case study evidence. *International Journal of Operations & Production Management* **28**:3, 279-303. [Abstract] [Full Text] [PDF]

115. U. Dinesh Kumar, David Nowicki, José Emmanuel Ramírez-Márquez, Dinesh Verma. 2008. On the optimal selection of process alternatives in a Six Sigma implementation. *International Journal of Production Economics* **111**, 456-467. [CrossRef]
116. Maneesh Kumar, Jiju Antony, Frenie Jiju Antony, Christian N. Madu. 2007. Winning customer loyalty in an automotive company through Six Sigma: a case study. *Quality and Reliability Engineering International* **23**:10.1002/qre.v23:7, 849-866. [CrossRef]
117. Ching-Chow Yang, Tsu-Ming Yeh. 2007. An Integrated Model of Hoshin Management and Six Sigma in High-Tech Firms. *Total Quality Management & Business Excellence* **18**, 653-665. [CrossRef]
118. Andreas N. Andreou, Nick Bontis. 2007. A model for resource allocation using operational knowledge assets. *The Learning Organization* **14**:4, 345-374. [Abstract] [Full Text] [PDF]
119. Ayon Chakrabarty, Kay Chuan Tan. 2007. The current state of six sigma application in services. *Managing Service Quality: An International Journal* **17**:2, 194-208. [Abstract] [Full Text] [PDF]
120. Jiju Antony, Frenie Jiju Antony, Maneesh Kumar, Byung Rae Cho. 2007. Six sigma in service organisations. *International Journal of Quality & Reliability Management* **24**:3, 294-311. [Abstract] [Full Text] [PDF]
121. Andreas N. Andreou, Annie Green, Michael Stankosky. 2007. A framework of intangible valuation areas and antecedents. *Journal of Intellectual Capital* **8**:1, 52-75. [Abstract] [Full Text] [PDF]
122. Young Hoon Kwak, Frank T. Anbari. 2006. Benefits, obstacles, and future of six sigma approach. *Technovation* **26**, 708-715. [CrossRef]
123. Johannes Freiesleben. 2006. Communicating six sigma's benefits to top management. *Measuring Business Excellence* **10**:2, 19-27. [Abstract] [Full Text] [PDF]
124. Rodney A. Stewart, Clinton A. Spencer. 2006. Six-sigma as a strategy for process improvement on construction projects: a case study. *Construction Management and Economics* **24**, 339-348. [CrossRef]
125. Jiju Antony. 2006. Six sigma for service processes. *Business Process Management Journal* **12**:2, 234-248. [Abstract] [Full Text] [PDF]
126. J Antony, M Kumar, M K Tiwari. 2005. An application of Six Sigma methodology to reduce the engine-overheating problem in an automotive company. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture* **219**, 633-646. [CrossRef]
127. Rodney McAdam, Shirley-Ann Hazlett, Joan Henderson. 2005. A CRITICAL REVIEW OF SIX SIGMA: EXPLORING THE DICHOTOMIES. *International Journal of Organizational Analysis* **13**:2, 151-174. [Abstract] [PDF]
128. Jiju Antony, Craig Fergusson. 2004. Six Sigma in the software industry: results from a pilot study. *Managerial Auditing Journal* **19**:8, 1025-1032. [Abstract] [Full Text] [PDF]
129. Jiju Antony. 2004. Some pros and cons of six sigma: an academic perspective. *The TQM Magazine* **16**:4, 303-306. [Abstract] [Full Text] [PDF]
130. Ismail Sila, Maling Ebrahimpour. 2004. An Examination of Quality Management in Luxury Hotels. *International Journal of Hospitality & Tourism Administration* **4**, 33-59. [CrossRef]
131. Milé TerziovskiThe Effects of Six Sigma Quality (SSQ) on Innovation and Organisational Ambidexterity in a High Operating Cost Environment 252-267. [CrossRef]
132. Kijpokin KasemsapApplying Lean Production and Six Sigma in Global Operations 44-74. [CrossRef]