

## **Evaluating Employee Responses to the Lean Enterprise System at a Manufacturing Company in Cape Town, South Africa**

Bingwen Yan

Cape Peninsula University of Technology  
yanb@cput.ac.za

Keith Jacobs

Cape Peninsula University of Technology  
JacobsK@cput.ac.za

### ***Abstract***

*There is usually much reaction amongst employees when a new system is introduced in an organization. These changes are intended to improve performance but sometimes cause considerable controversy amongst the employees and management. This study examines the implementation of Lean Enterprise (LE) system and it attempts to analyze the reactions of employees at a manufacturing company (SMC.CO) in Cape Town, South Africa. Some of the questions that were asked in the research include the following: What benefits did employees perceive by the introduction of LE? How did employees respond to the implementation of the LE at SMC (in other words, did they welcome it or not)? A semi-structured questionnaire was utilized to determine the responses of employees with respect to the benefits of these innovative approaches of production with specific reference to LE. The finding of this study indicates that LE plays a significant role in a company.*

**Keywords:** *Lean Enterprise System, Employee Responses*

### **1. Introduction**

Companies routinely introduce new systems to enhance efficiency. In most cases employees, especially those at the lower levels of the organisation are not consulted about such changes. They are seen and treated as mere receptacles that have to implement what is put before them. In some cases innovations are well received; but often they are not, and rebellion follows. Those employees who embrace the innovation can reap great benefits, including reduced cost, raised productivity, and short lead times. Those who rebel can sometimes cause great damage, which often results in work stoppages and lost time. In other words, the human factor—the people involved, those who will drive the activity—is often ignored.

Industry must realize that the people who lead major enterprises have to be considered when any change, especially drastic change, is considered. In these times, when technology has seemingly begun to overshadow human beings, it is especially important to remember that people are still the developers of machines.

### **2. Background of the Study**

With the implementation of new operating systems within the company, employees might feel unappreciated and marginalized if not consulted about the implementation. Too often both management and consultants hurry to get the job done and may undermine the

importance of understanding employee feelings and attitudes [13]. The feelings and attitudes of employees may influence the course of the LE implementation. While employees' high zeal can assist the implementation of LE, employees with lower morale may interfere with the process of LE implementation. The employees sometimes react indifferently, or do not give full cooperation when they are not properly informed about pending innovations in companies. In this study, the LE has been implemented at SMC since 1999. The LE model (figure 1) was developed in 2003 by SMC as a structured way to improve company performance. Sustaining and expanding lean benefits requires a supportive system, a framework to "focus" the lean principles to be followed. The support is required until LE has been internalized by the organization and become self-sustaining. The LE model focuses the company's vision, production excellence, business process excellence, people excellence, and business excellence.



Figure 1. Lean Enterprise Model  
(Source: Author based on SMC's profile)

However, employee responses and reflections to the implementation of Lean Enterprise (LE) had not been previously analysed at SMC. With the above thoughts in mind, the researcher endeavored to elucidate what the employees' responses were in a particular company that introduced a new management system. The researcher went to SMC.CO and spoke to the key persons, the manufacturing manager and financial director, in this company and they agreed to assist in his research. They had not thought about this issue before and were therefore keen to discover what their employees' responses were, and whether or on what level the employees accepted the new system.

### 3. Problem Statement and Research Questions

This study is driven by the following research questions:

- What benefits did the employees perceive that they received through the introduction of LE?

- How did employees respond to the implementation of LE at SMC?

## 4. Literature Review

### 4.1. Human Factors

Human factors can play a significant role in an organization. Various perspectives emerge from the literature review on how human factors influence the Lean process. Sawhney and Chason (2005:76-79) concur with the postulate of several authors, inter alia [16]:

Lean is a knowledge-intensive process and as such relies heavily on the skills of the people and how they respond to changes [4]. The dependability and reliability of the workforce become more important because Lean introduces fragility into the system by stretching it and removing contingencies [19]. Further, Lean calls for a feeling of ownership of the process, and Lean implementation is based on the implicit belief that the workforce “naturally wants to work” [7]. Moreover, in the context of the Lean philosophy of minimizing waste of any kind, it is important not only to eliminate material waste, but also waste caused by human behavior. Behavioral productivity is as important as manufacturing productivity [5]. Lean also calls for flexibility and involvement of the workforce since it introduces more interdependencies between all “actors involved in the production process” [2].

### 4.2. Lean Enterprise (LE)

The term “Lean” was first coined by Womack et al in *The Machine that Changed the World* [19]. It was also introduced as a manufacturing approach: “. . . compared to mass production it uses less of everything-half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of product.”

Lean principles may be applied to any organizational type and can be applied to all areas within the business [14]. Lean is a three-pronged approach incorporating a belief in quality, waste elimination and employee involvement, supported by a structured management system (Figure 2) [14].



Figure 2. Structured Management System [14].

From these initial concepts mentioned above, an array of researchers, academics, companies, and industries have developed an expanded vision of the values, behaviours and practices within enterprises that constitute a new and emerging expression of what it means to be an “LE” [20]. A commonly held definition of LE was described as: “a group of individuals, functions, and sometimes legally separate but operationally synchronized organisations” [14].

### 4.3. The Benefits and Problems of the Lean Implementation

According to Emiliani et al (2005:371), senior managers become interested in adopting Lean principles and practices because they result in many benefits, such as higher quality products and services, higher productivity, better customer focus, faster responses, and higher asset efficiency [6]. Heumans (2002:31) summarized the benefits and the immediate results are: reduced cycle time, fewer material handling errors, and improved labor productivity (Table 1) [10].

Table 1. Lean improvements lead to strategic benefits

Lean Improvement	Immediate Result	Business Benefit
One-piece flow work cells	Reduced production cycle time	On-time delivery
Improved flow between operations through internal JIT	Reduced work-in process	Less space required
<i>Kanban</i> systems	Fewer material handling errors	On-time delivery
External supplier JIT	Reliable material sourcing	On-time delivery to manufacturing
Setup & changeover reduction	Shorter production runs possible	Reduced raw materials quantities
Total productive maintenance	Less production downtime	Greater production flexibility
First-time quality	Inspection eliminated	Quality to customers assured
Employee involvement	Improved labor productivity	Improved quality of product

Source: Author based on Heumans (2002:31). Leading the Lean Enterprise [10].

Smeds (1994:66-82) concluded that the positive attitude towards development and innovation has been preserved in the plant, and "Lean" ideas are spreading further in the company, which amplifies the transition to a Lean enterprise [17]. Many companies that have adopted Lean manufacturing principles modeled after the Toyota Production System (TPS) have been able to enhance their competitive position [1]. However, not all the perceptions of Lean production are positive. Lean production systems could be viewed through a Marxist lens as being exploitative and inducing high pressure on the shop floor workers [11]. Lean production is de-humanizing and exploitative [18] and it maintains that JIT could lead to higher work intensity and stress levels among line operators [7]. Lean production practices can underline work intensity and increase stress [12].

### 4.4. The Employees’ Responses to the JIT System

The JIT production system is a highly integrated production, sales and distribution system leading to continuous flow through the whole supply chain, and it reduces waste and improves quality in all business operations [3]. The implementation of any new program in an organisation requires support from most departments in the company [9]. Employees like the JIT environment better than the batch-processing environment, and management can successfully make organisational changes necessary to implement JIT without negatively affecting employee attitudes [8]. For example, in a batch-processing environment, an employee's primary responsibility is to achieve a high output on a single task, employees have the security of knowing what their job is each day and seeing all the work-in-process sitting around indicates there is work to be done; under JIT, not only is work-in-process greatly reduced, but also employees do not know what they will be doing each day [8]. The effects of a two-phase introduction of JIT manufacturing practices on job characteristics and psychological wellbeing [15], this shows that the employees saw themselves as having greater control related to the timing or pacing of their tasks and the methods used to carry them out. Employees should be encouraged to view JIT as an opportunity to improve the company's competitive position as well as an opportunity to secure greater job security for themselves [9].

By reviewing the literature regarding the benefits of Lean implementation and the employees' response to the JIT system, the researcher learned that the human factor certainly plays a significant role in any organization, specifically in a manufacturing company. The understanding of the researcher with regard to JIT and Lean manufacturing is as follows: Simply put, JIT is a comprehensive management system placing emphasis on eliminating waste, reducing cost, and enhancing a firm's competitiveness; Lean manufacturing focuses on reducing inventories and using the exact amount of resources, such as space, inventory and employees required to achieve high performance.

## **5. Research Method**

This case study utilized a quantitative research approach. A case study is defined as an empirical phenomenon within its real-life context, especially when the boundaries between phenomenon and context are clearly evident [21].

SMC.CO is located a few kilometers from the university campus and therefore easily accessible. All 82 employees at SMC were chosen as the sample for this research.

The questionnaire was designed by following the Likert scale style. It consists of two major parts: a personal profile of the respondent and questions relating to their decision-making mechanisms. The questionnaire contained questions that identified what employees thought about LE, and it used the item-total correlation-formulation to calculate each index, such as mean, range, and standard deviation.

The data have been analyzed using the Statistical Package for Social Sciences (SPSS), version 16.0. The data analysis through SPSS generated the results of descriptive statistics such as frequency, mean, standard deviation, etc. These distributions showed the frequencies of employees' responses and percentages for each of the items in the questionnaire with regard to the LE implementation at SMC. In addition, Kruskal-Wallis Tests and Chi-Square were used to test for significant differences (Alpha level = 0.05). The full results of the study are reported in the next section.

## **6. Results and Discussion**

The researcher handed out 82 questionnaires and received back 54 completed questionnaires (66% response rate). It took almost three weeks to collect the questionnaires. The final number of respondents was 54. Two of these were unusable because they were totally spoilt. Thus only 52 questionnaires were analysed in this research. The response results are given below:

### 6.1. Descriptive statistics for sample

The biographical characteristics of the respondents are presented in graphical format below.

Results depicted in Figure 3 indicates that 67% (n = 35) of the sample was male, while only 33% (n = 17) was female.

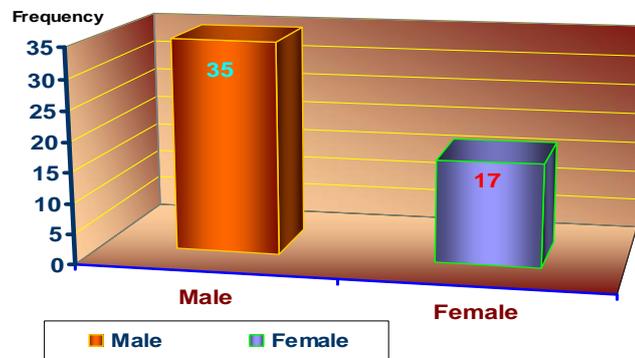


Figure 3. Gender

In Figure 4, respondents with qualifications higher than Grade 9 were in the majority (n = 34, that is 60%), while respondents with lower than Grade 9 qualifications comprised 35% (n = 18) of the sample.

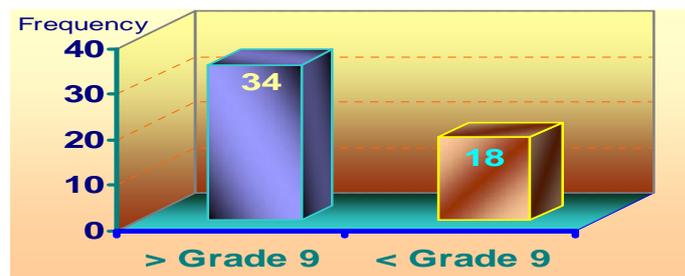


Figure 4. Educational level

From Figure 5, it can be inferred that the majority of the respondents, that is 32 are younger than 40 years of age, while a further 20 respondents are older than 40 years of age.

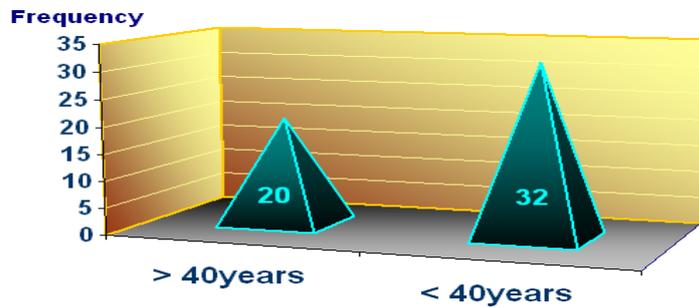


Figure 5. Age

Results in Figure 6 indicates that the majority of the respondents, that is 81% (n = 44) were shop-floor employees, while management comprised 15% (n= 8) of the respondents. Two respondents, that is 4%, did not indicate their job title.

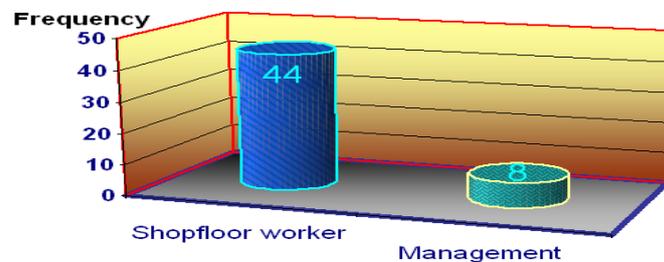


Figure 6. Job title

Figure 7 provides an overview of the race of the sample. It is evident that the majority of the respondents, that is 87% (n = 40) were Coloured, while 9% (n = 4) were Black and only 2 respondents, that is, 4%, were White.

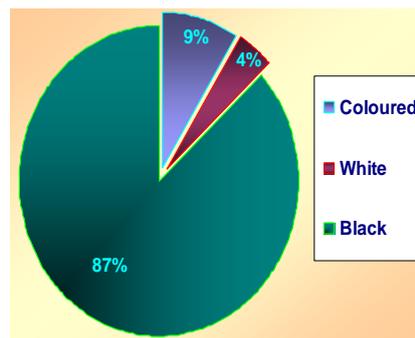


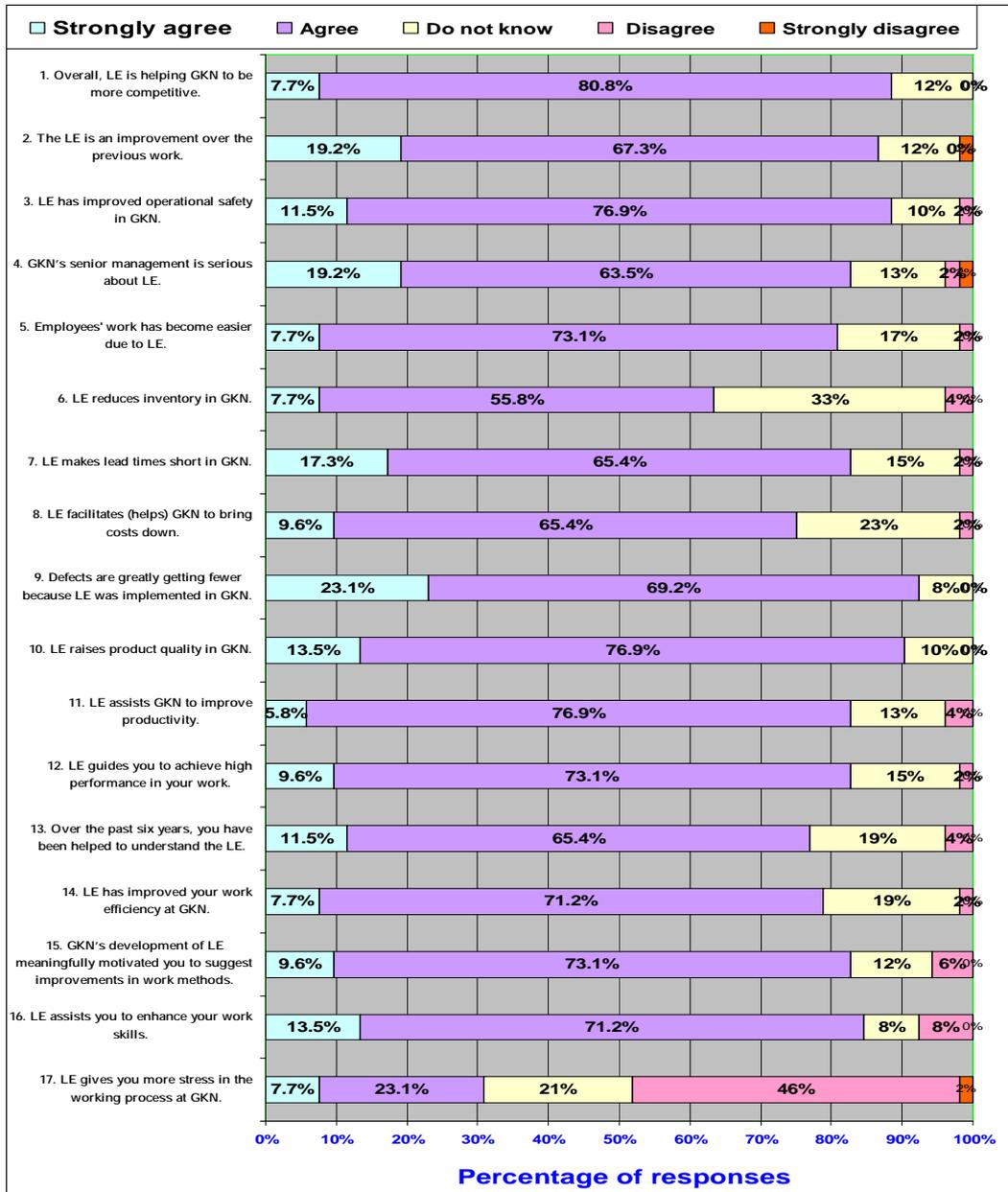
Figure 7. Racial classification

## 6.2. Descriptive statistics for the self-administered questionnaire

An important part of responses in the questionnaire was where the employees were required to explain why they had chosen a particular score from the numerical ranking 1—5.

All the comments were analysed through the Statistical Package for Social Sciences (SPSS) and shown in Table 2.

Table 2. Percentage of Responses



According to Table 2, responses to questions 1 to 16 indicated that most of the employees agree that the LE method as a system which reaps significant benefits for the company. These benefits were affirmed by the employees at SMC. This demonstrates that, if LE method is used correctly to address production problems, operational performance will improve.

Overall, total responses have shown positively from question 1 to 16 besides 17. However, it indicated that LE did not affect employees negatively in terms of work intensity

and stress. According to the total counts of responses, 70.1% (401) agreed, 12.9% (74) strongly agreed, 15% (86) did not know, 1.6% (9) disagreed, and 0.3% (2) strongly disagreed.

The results above indicate that the majority of the respondents were positive about the contribution of the introduction of LE into their enterprise, with the majority of them responding in the affirmative with respect to improvements in productivity, quality and operational safety.

### **6.3. Perceptions Regarding the Implementation of LE at SMC**

In general, the findings show that most employees' responses to and reflections on, LE are positive. Many of the benefits of the implementation of LE were addressed above, and all of these benefits were described in the literature review. These included: raising competitiveness, a shorter lead time, improving productivity, raising quality, cost cutting and saving, enhancing operational safety, achieving high performance, improving work skills, raising work efficiency, and motivating employees' initiatives.

For example, in Table 2, in response to question 1, 80.8% employees agreed and 7.7% strongly agreed that LE is assisting SMC to be more competitive. According to the comments made in response to the questionnaire, a high number of employees believe that LE makes SMC's product quality better than that of their competitors. One of the shop floor workers responded: "LE makes the quality of the production number one, because LE helps SMC to reduce cost of scrap, improves operational efficiency". Some of the employees believe that if everyone follows LE completely, SMC will be an excellent company. In response to question 2, 67.3% employees agreed the LE is an improvement over the previous work, 19.2% strongly agree, 12% do not know.

Some employees believe that a lot of improvements due to the implementation of LE, such as time and cost cutting. Other employees agree that PPM (the rate of scraps) has improved a lot; staff and managers comment that LE really makes management easier. In response to question 3, 76.9% employees agreed and 11.5% strongly agreed that LE has improved operational safety at SMC. Ten percent did not know, and 2% disagreed. Many employees believe that accidents and injuries have reduced tremendously as LE established a safe environment for the employees.

Despite these positive responses, a few comments were made negatively, such as insufficient training, and LE is not fully implemented in all cells. For instance, there are employees who felt that there is no improvement because some employees are still making simple quality mistakes.

Responses to question 17 focused on whether LE resulted in greater work intensity and increased stress. Surprisingly, the comments indicate that 23.1% employees agree, 7.7% strongly agree, 21% do not know, 46% disagree, and 2% strongly disagree. Obviously, the numbers who disagree were much higher than the numbers who agree. However, the literature review gave the opposite viewpoints to the reality expressed above.

Several authors contended that Lean can be an important factor of work intensity and stress. In order to clarify this issue at SMC, the researcher later utilized the quantitative method to demonstrate the work stress that exists at SMC. Therefore, both positive and negative responses can reflect the employees' original perspectives in different ways due to the LE. It also derives the quantitative components needed to identify and test the results in this research.

## **7. Conclusion and Recommendations**

The employees' responses showed that the LE implementation had a generally positive. The finding of this study indicates that LE plays a significant role in company's performance.

The overall benefits from the implementation of the LE included the following: enhanced company competitiveness, reduction of costs, a shorter lead time, elimination of waste, and improved product quality. Essentially, the researcher found that increased work intensity and stress to which employees referred were not necessarily reflected in their responses to other questions. The employees' work became more regular due to the implementation of the LE, and employees believe that the LE is assisting their work in the correct way at SMC.

The organization should consider establishing an internal monitoring body to evaluate the efficacy of LE. Management support is crucial in this regard, and corporate strategy and written policies underpinning LE play a significant role as well. It should be noted that the findings pertain specifically to the organization at which this research was undertaken. This small sample is a consequence of the size of the organization as well as of the exploratory nature of the study and the restrictions on its nature.

## 8. Recommendations for future research

Although employees were overwhelmingly positive about the benefits of the introduction of LE at SMC, the stress induced by its introduction warrants further attention, since coping with organizational restructuring, business process re-engineering, and change are important considerations confronting a multitude of organizations. Organizations with larger workforces are generally perceived to be more progressive, which could possibly account for some of the positive responses in the present study. A similar study should be conducted comparing similar industries with each other, involving a larger sample.

## References

- [1] Beachum D. 2005. Lean manufacturing beefs up margins: *pull systems, takt time, and one-piece flow benefit the operation of a powder coating system*. Metal Finishing. [Online]: <http://www.sciencedirect.com>. 27 October 2005.
- [2] Biazzo, S., Panizzolo, R. 2000. The Assessment of Work Organisation in the Worker's Perspective. *Integrated Manufacturing Systems*, 11(1), 6-15.
- [3] Chandra, S., Kodali, R. 1998. Justification of just-in-time manufacturing systems for Indian industries. *Integrated Manufacturing Systems*. MCB UP Ltd, 9(5):314-323. [Online]: <http://www.emeraldinsight.com/10.1108/09576069810230428>. 5 March 2006.
- [4] Drew, J., McCallum, B., Roggenhofer, S. 2004. *Journey to Lean: Making operational Change Stick*. New York: Palgrave Macmillan.
- [5] Emiliani, M.L. 1998. Continuous personal improvement. *Journal of Workplace Learning*, 10(1):29-38.
- [6] Emiliani, M.L., Stec, D.J. 2005. Leaders lost in transformation. *Emerald Group Publishing Limited*. pp370-387. [Online]: <http://www.emeraldinsight.com/10.1108/01437730510607862>. 26 October 2005.
- [7] Forza, C. 1996. Work Organisation in Lean Production and Traditional Plants: What are the differences? *International Journal of Operations & Production Management*, 16(2), 42-62. MCB UP Ltd. [Online]: <http://www.emeraldinsight.com/10.1108/01443579610109839>. 28 December 2005
- [8] Groebner, D. F., Merz C. M. 1994. The Impact of Implementing JIT on Employees' Job Attitudes. *International Journal of Operations & Production Management*. MCB UP Ltd, 14 (1): 26 – 37. [Online]: <http://www.emeraldinsight.com/10.1108/01443579410049289>. 26 October 2005.
- [9] Gupta, Surendra. M., Al-Turki, Yousef A.Y., Perry, Ronald F. 1999. Flexible Kanban system. *International Journal of Operations & Production Management*. MCB UP Ltd. 19 (10): 1065-1093. [Online]: <http://www.emeraldinsight.com/10.1108/01443579910271700>. 6 March 2006.

- [10] Heumans B. 2002. Leading the lean enterprise. *Industrial Management*; Sep/Oct 2002; 44, 5; ABI/INFORM Global. [Online]:  
<http://proquest.umi.com/pqdweb?did=222373981&sid=2&Fmt=4&clientId=48290&RQT=309&VName=PQD>. 6 March 2006.
- [11] Hines, P., Rich, N. 2004. "Learning to evolve: a review of contemporary lean thinking". *International Journal of Operations & Production Management*, 24 (10): 998. Emerald Group Publishing Limited. [Online]:  
<http://www.emeraldinsight.com/10.1108/01443570410558049>. 9 December 2005.
- [12] Klein, J. 1989. The human cost of manufacturing reform. *Harvard Business Review*, March-April, pp.60-66.
- [13] Koo, H., Koo, L.C., Tao, F K. C. 1998. Analysing employee attitudes towards ISO certification. *Managing Service Quality*. 8(5): 312-319. MCB UP Ltd published. [Online]:  
<http://www.emeraldinsight.com/10.1108/09604529810235772>. 6 march 2006.
- [14] Lucansky P., and Burke R. 2003. What is Lean Enterprise? *Supply Chain Planet International Limited published*, London. [Online]: <http://www.supplychainplanet.com>. 24 October 2005.
- [15] Mullarkey. S., Jackson. P.R., Parker. S.K. 1995. Employee reactions to JIT manufacturing practices: a two-phase investigation. *International Journal of Operations & Production Management*, 15(11): 62-79. MCB University Press. [Online]: <http://www.emeraldinsight.com/10.1108/01443579510102909>. 26 March 2006.
- [16] Sawhney R., Chason S. 2005. Human Behavior Based Exploratory Model for Successful Implementation of Lean Enterprise in Industry. *Performance Improvement Quarterly*, 18(2):76-96. [Online]:  
<http://cpi.utk.edu/publications/piq.pdf>. 12 March 2006.
- [17] Smeds Riitta. 1994. Managing Change towards Lean Enterprises. *International Journal of Operations & Production Management*, MCB University Press.14 (3): 66-82. [Online]:  
<http://proquest.umi.com/pqdweb?did=878211&sid=2&Fmt=3&clientId=48290&RQT=309&VName=PQD>. 31 Oct. 2005.
- [18] Williams, K., Harlam, C., Williams, J., Cutler, T., Adcroft, A., and Johal, S. 1992. "Against lean production", *Economy and Society*, 21 (3):321-54.
- [19] Womack, J. P., Jones, D. T., and Roos, D. 1990. The machine that changed the world. New York, NY: Macmillan Publishing Company.
- [20] Womack, J. P., and Jones, D.T. 1996. Lean thinking. New York, NY: Simon & Schuster.
- [21] Yin, R. K. 2003. "CASE STUDY RESEARCH: Design and Methods". 3rd Edition. SAGE Publications Ltd.

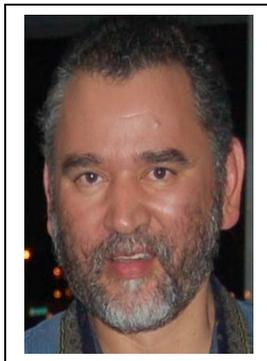
## Authors



Author profile:

### **Bingwen Yan**

Bingwen Yan is the lecturer and a member of the Faculty Research Committee at Cape Peninsula University of Technology, South Africa.



### **Keith Jacobs**

Keith Jacobs is currently the Associate Dean in the Engineering Faculty at the Cape Peninsula University of Technology, South Africa. His portfolios include the management of Quality Assurance in the faculty, as well as Service Learning, Student Development and Governance. Mr. Jacobs also serves on the Standards Generating Body for the Engineering Council of South Africa. His research interests are in the area of New Product Development and the role this process plays in the sustainability of Small and Medium Engineering Enterprises.