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Implementation of Total Quality Management (TQM) in Labour-Intensive Small and Medium-Sized Enterprises (SMEs): A Case Study of Footwear Manufacturing Company

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ABSTRACT

Globalization in 1990s provided opportunities for emerging economies such as India, to create niche markets in domains that required skilled labour and less technology. To stay ahead of open competition, some resorted to modern manufacturing practices that were popular in technology-intensive SMEs. This paper aims at providing insight in implementing Total Quality Management (TQM) as a manufacturing practice in labour-intensive SMEs by conducting a case study. The conditions that prevailed before, during and after the implementation of TQM are described in detail in this paper. Based on our case analysis, we identified the critical success factors (CSFs) that resulted in this poor deployment. This scenario prevailed in spite of sincere commitment from the top management. An attempt to mimic from technology-intensive SMEs in the labour-intensive manufacturing, did not result in a similar experience because the quintessential difference in the employee (manpower) education, training and nature of work are the key reasons for this performance. The introduction of TQM in a labour-intensive industry is different from technology intensive platform based industries. Therefore labour-intensive among the SMEs need to be considered differently and appropriate framework has to be developed for implementing TQM.

Keywords: Small and medium-sized enterprises; case study; total quality management; critical success factors.

1. INTRODUCTION

Increasing opportunities for expanding business has motivated small and medium-sized enterprises (SMEs) to increase both their capacity and productivity. In emerging economies, labour-intensive SMEs such as leather goods, garment and textiles, utilize skilled workforce with low technology awareness. In a quest to be globally competitive (Dangayach and Deshmukh, 2005), they seek to create niche markets (McAdam

and Kelly, 2002; Cagliano et al., 2001; Singh and Jain, 2007). These labour-intensive SMEs tend to leverage the cost arbitrage in the workforce and employ a large number of manual labour who are typically artisan. They also tend to have a low level of automation because artisans are traditionally skilled to perform the work. In their quest to be globally competitive, labour-intensive SMEs often hire consultants from other domains such as auto ancillary who had started this quest a little earlier in India and have developed a reasonable amount of knowledge capital. Owing to their cost and quality pressures from the demand side auto SMEs have a long experience in implementing TQM and other modern manufacturing initiatives.

2. LITERATURE SURVEY

Goh and Ridgway (1994) observed that applicability of TQM to SMEs were inappropriate as they are applicable to large companies only. Ghobadian and Gallear (1996) had contrasted the implementation of TQM in SMEs and in large organizations. Interestingly, most of the TQM implementation was based on context and experience of large companies and applied in the SMEs (Yusof and Aspinwall, 2000a). Husband and Mandal (1999) developed the conceptual model to improve the implementation rate by clearly understanding and interpreting the quality methods. Based on the CSFs, Yusof and Aspinwall (2001) developed a framework for bringing TQM into automotive SMEs.

Hansson and Klefsjo (2003) suggested that the core values should be supported by techniques and tools in quality culture. Lee (2004) emphasized in extensive training, employee involvement and management commitment at all levels in the organization after examining how TQM was introduced in Chinese SMEs. Gadenne and Sharma (2009) and McAdam *et al.* (2010) surveyed and identified several CSFs such as commitment of top management, involvement of employee, customer satisfaction, continuous improvement, selection of tools and techniques and the use of appropriate performance measures. Desai *et al.* (2012) analysed the CSFs of Six Sigma implementation based on the CSFs of TQM in manufacturing SMEs. Brkic *et al.* (2012) examined the impact of quality tools, application in business performance, such as financial, employee and operational. Kalpande *et al.* (2013) identified the weights of CSFs using AHP for the successful implementation TQM in SMEs. Kirkham *et al.* (2014) surveyed the extent to which TQM practices were implemented by SMEs. Samal *et al.* (2014) identified the CSFs of TQM in manufacturing SMEs. Kharub and Sharma (2015) presented a model based on the CSFs such as strategic factors, tactical factors, operational factors and quality tools and techniques.

There are plenty of discourses on studies of TQM implementation in technology intensive SMEs like automobile, electronics and other engineering. Some of the studies (Salaheldin, 2009 and Valmohammdi, 2011) surveyed labour-intensive SMEs including leather, garment and textile for implementation of TQM. They observed that surveys ought to have gone deeper into the analyses of cases in order to be able to validate generalized the implementation of TQM. However, they did not conduct case analysis.

Most of the studies deal with labour-intensive SMEs like Garment and Textile through cross-sectional surveys. However, there is a paucity of literature that analyses TQM implementation issues through case analysis in labour-intensive. This paper reports a case study in a labour-intensive SMEs, to implement TQM as a practice. It aims at providing insight in implementing Total Quality Management (TQM) as a manufacturing practice in labour-intensive SMEs by conducting a case study.

3. CASE RESEARCH METHODOLOGY

Case research method (Table 17.1) was used to conduct an exploratory depth of TQM understanding from a higher level to a lower level. As suggested in literature (Eisenhardt, 1989; Voss *et al.*, 2002; Yin, 1994), labour-intensive SME was considered as a whole unit for analysis by using holistic case. An unfocused exploratory study of data collection was carried out to examine the implementation process of TQM tools and its effect on productivity for the duration of six months, as the maximum permissible time was six months only. Case study protocol for data collection was constructed to improve the reliability of the case research. The protocol involves the following steps:

Firstly, information about the type of product manufactured, audit system, type of customer, production process, etc. was gathered; Secondly, implementation processes such as training and quality initiatives were studied; Thirdly, the impact of tools, techniques and performance measures on the end results was observed; Finally, the CSFs which affected the implementation of tools and techniques, and performance measures were analysed. The data collected was both quantitative and qualitative in nature. Multiple data collection methods were used to strengthen the triangulation and grounding of the effectiveness TQM tools and techniques. Data was collected through direct observation, archival sources and open-ended interviews with managers and supervisor by a single investigator. A detailed write-up was documented by using field notes. Tables and graphs were used to categorize the data.

Table 17.1
Process of case study research

Steps	*Description*
Type	Exploratory
Selection	Unfocused and Holistic
Instrument and Protocol	Observation; Archival; Open-ended interviews
Investigator	Single
Analysis	Within

3.1. Case study analysis of Footwear Manufacturing Company (FMC)

3.1.1. Description of FMC

FMC is a subsidiary of a family owned group of independent business units and has customers worldwide. This company has also been audited and certified as ISO 9001:2000. It is a leather footwear medium-sized manufacturer (Table 17.2).

Table 17.2
Characteristics of FMC

Description	*Characteristics of FMC*
Products	Footwear – Leather
Type	Medium
Employees	440

Description	*Characteristics of FMC*
Investment (Plant and Machinery)	> Rs. 50 Million
Process Type	Mass and Batch
Customers	More
Markets	UK and US
Ownership	Subsidiary of a family owned company
No. of Companies	10

3.1.2. Implementation Process

The implementation process is divided into three phases: Pre-implementation; implementation; and post implementation. In pre-implementation phases, this phase is about selected tools and techniques, planning, team formation and training before implementation of TQM. During implementation, the selected tools and techniques have to be implemented. In post implementation, it is more about understanding the CSFs for the successful implementation of TQM. After the changes were made through implementation of TQM in the production system, productivity registered a decrease (Figure 17.1).

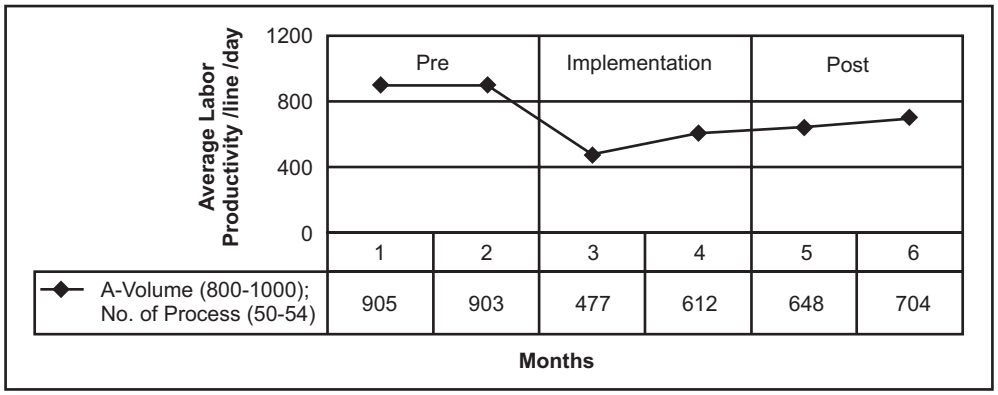

Figure 17.1: Impact of TQM on Results for each implementation phase

3.1.3. Pre-Implementation phase (two months)

Markets and Customers : FMC is a footwear manufacturer whose primary market is in Europe and America. The nature of each of the markets is different from each other in terms of the production volume, length of product life cycle, customer price, product design, production process and variety during period of observation.

The market in U.K comprises of low volume, high variety products and requires skilled production with creative product design, long product life cycle and high customer price. Its customers place greater emphasis on conforming to quality than the U.S customers who are most sensitive to pricing, but have a huge volume of product demand (Table 17.3). A supplier, who wants to bargain in terms of price, may lose the order. On-time delivery is a must for both the markets. Delayed shipments will mandate the use of expensive air freight instead of sea. The company has lost customers because of its inability to deliver quality products on time. Analysis of causes for these pointed towards an inefficient production system as the primary reason. Assembly operations were generally centralized and organized as flow-lines

Table 17.3
Characteristics of Market for FMC

Characteristics	*Market*	
	U.S	*U.K*
Volume	High	Low
Variety	Low	High
Product life cycle	Short	Long
Customer price	Low	High
Quality Demanded	Low	High
Product delivery	On-time	On-time

FMC has less or no emphasis on implementation of TQM. Quality means conformance to specification. However, globalization and open competition have forced FMC to implement TQM. One of its international customers laid a significant pressure to implement TQM. FMC is easily pressurized by international customers, *e.g.* requirement of ISO 9000, QS 9000, EMS, etc. FMC implemented TQM because of customer's insistence. Though FMC is certified with ISO 9001:2000, practices were missing. The ISO audit system essentially served as a marketing tool to get the order from the customer. Manufacturing was merely based on thumb-rules. ISO 9001:2000 existed only to the extent of satisfying ISO audit requirements. There was no critical examination of the processes in vogue. ISO was used for a cosmetic purpose, *viz*, for impressing potential buyers/customers. The spirit of ISO was missing.

3.1.4. Organizational Structure

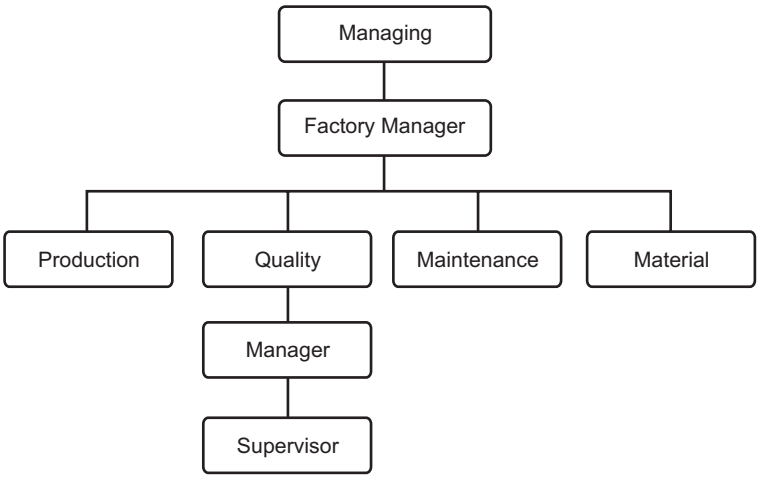

Figure 17.2: Organizational Structure for FMC

The customer needs are translated to other departments of organization by top management. They wanted to achieve a high level of quality in the entire levels of organization. Division of activities is limited in FMC because of the low degree of specialization that result in lack of expertise in TQM initiatives. This condition persuaded FMC to go for outside assistance from automobile consultants to implement TQM in its production line. Amidst all these difficulties, top management of FMC tried to emulate the TQM

practices of auto-industry through benchmarking. Once benchmarking was done, a quality team was formed with a process manager and three supervisors (Figure 17.2). The responsibility of quality team was to find defects and inform the production supervisor on the assembly line. Most of FMC employees are blue collars in the company except the top management. This brings a big mismatch in understanding new initiatives between the top level and other levels in the organization. It is very difficult to translate their need to entire level of organization by top management. The personnel authority of production department is mainly high because of a few decision makers in FMC. More generalist some staff may cover more than one department.

3.1.5. Training

The necessity of TQM implementation is to resolve the problem of high attrition rate of the labour and significant level of absenteeism that causes a fall in production and defaulting on customers' delivery schedules. FMC planned to form a process control team, implement quality tools and train them on it. Training and staff development of FMC are more likely to be ad hoc, small scale and less specified training budget. A one-day training program on seven quality tools was conducted for the quality team by an expert from an automobile company. The training was conducted by using unfamiliar examples pertaining to the automobile sector.

3.1.6. Systems and procedures

FMC has a low degree of standardization and formalization. However, a simple system of FMC allows flexibility in TQM implementation that can respond fast to customer needs. Activities and operations are not governed by formal rules and procedures. Even there is no implementation of time and method study and lack of knowledge persists in a simple layout of FMC. The conveyor was demanded by customer as work handling was more. FMC has been trying to hire diplomas and engineers. It can be very easy for them to understand the TQM implementation. FMC has a medium degree of standardization and formalization in system and procedures like process chart and their description, as the customers demanded it. In order to improve the standardization and formalization in system and procedures, the basic quality tools were implemented. So tools and techniques improved the standardization and formalization in system and procedures. FMC sought to improve its processes by reducing the defect rate through offline and online process control. Courses of action were mentioned, but the manner of implementation was not described. Simple quality tools such as checklist and graphs (Bar, Line and Pie) were implemented as quality initiatives. Based on problem solving steps (Besterfield *et al.*, 2003) and PDCA cycle, the following quality tools (McQuater *et al.*, 1995) were selected.

1. Identification of problem – Pareto analysis, Control chart and Checklist.
2. Description of process – Flow chart and Histogram.
3. Analysis of process – Pareto analysis, Histogram and Cause-Effect analysis.
4. Development and implementation of the alternative solution – Flowchart.
5. Monitoring the solution – Checklist.
6. Evaluation of the solution – Checklist, Control chart and Scatter diagram.

3.1.7. Culture and behaviour

Operations and behaviour of employees are influenced by owners'/managers' ethos and outlook because most of them are blue collar employee. In FMC, top management sent orders to the production team to implement SPC. Without formal training and understanding what has to be done, the production team started to implement the SPC in FMC. After a couple of months, a one-day training program on seven quality tools was conducted for the quality team by an expert from an automobile company.

The attitude of managers is a barrier for TQM implementation in FMC who had been less optimistic in TQM implementation. Moreover, the mind-set of the manger is that the processes are unique, traditional and standardized requiring no change, whatsoever, to any process.

3.1.8. Implementation phase (two months)

Data on the occurrence of defects was collected through checklist on a hourly basis, based on which a Pareto chart was drawn. Based on the parameters of machine, week-wise variable control chart was constructed. Every week, the quality team sent reports to the production and maintenance department for taking corrective action. The customer demanded the use of Flow chart to appraise their processes for manufacturing new and existing product. The customer also demanded that reports on their use be sent to them. Although various quality tools were implemented, throughput alone was considered as a measure of performance. Other measures such as quantity sent for rework, defect rate, process quality and number of units scrapped were largely ignored. WIP inventory, measured by doing a physical count, was used only to check the products available in the assembly line. Performance did not show any improvement after the implementation of TQM. The implementation of quality tools and the consequent changes to the production system was followed by a decrease in labour productivity from 700-1000 units per day to 500-700 units per day (Table 17.4). In order to improve production, the number of shifts was increased, without an adequate number of workers. More supervisors and inspectors were needed.

Table 17.4
Impact of TQM on production and manpower deployment

Description	*Actual*	
	Before	*After*
Units Produced/line/day	700-1000	500-700
Assembly line	4	6
Supervisor	8	18
Inspector	8	24

3.1.9. Post Implementation phase (two months)

Based on our analysis of various CSFs pertaining to implementation of TQM, we infer the following factors and its reason.

3.1.10. Appropriate use of tools and techniques

Some quality tools such as Pareto analysis, Checklist, Flowchart and Variable control charts, Graph (Pie, Run) were implemented (Figure 17.3). Checklist and Pareto analysis were used for about six months on on-line production as per the quality team's request, and the results were sent to the managers. Control charts were implemented, as the maintenance department needed the report to present to the manager about some critical processes. The flow chart was implemented because the customer demanded them to appraise their process of new and existing product and send the report about some critical processes. Graph (Pie, Run) was used for about six months on some inspections. Most of the tools were implemented at the insistence of manager, maintenance department or customer. Sustained implementation over a long period of time did lead to an increase in productivity but not substantially. If the customer or manager had insisted upon the implementation of other tools, those would also have been used. Though recording of all process elements and their critical examination happened, the further steps leading to the development and definition of better process and their implementation did not happen. Problems occurring in the line were fixed, but these were not documented. Tools and techniques were used to fix immediate problems in a reactive manner. Whenever such a hasty implementation resulted in failures, the new practice was generally abandoned within a couple of months and their support for the quality team would be withdrawn. Tools used in large automobile industries were directly applied to labour-intensive SMEs without understanding either the domain of labour or the scale of operations in such industries. The tools became an additional burden to the shop floor managers who found it difficult to understand. Some quality tools such as Pareto analysis, Checklist, Flowchart and Graph (Pie, Run) were found as appropriate tools in FMC.

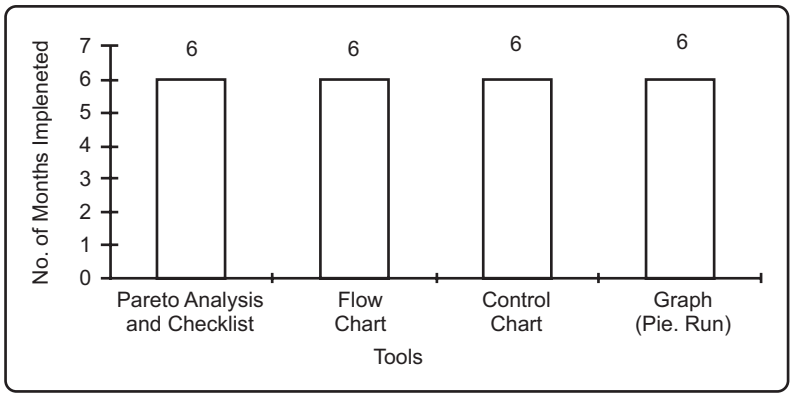

Figure 17.3: Application of tools during implementation process of TQM

3.1.11. High top management commitment

During each phase of implementation, top management had been more committed in terms of providing financial and human resources, recruitment of technical expertise and so forth (Figure 17.4). Top management had been trying to have an engineer as supervisor, which is a paradigm shift in FMC. Top management of FMC had wasted lots of time and money on resources without a planned implementation process and appropriate tools. Lack of sufficient training had reduced the support from shop floor management during the post implementation phase. The concept of TQM implementation was misunderstood by top management that reduced the importance of layout on the grounds that only customer satisfaction,

management commitment, continuous improvement matters. This was the reason for decrease in productivity. Eventually, top management regarded that "TQM would not work in FMC" and again shifted to the traditional way of manufacturing practices and most tools and performance measures were primarily documented to show off and impress potential customers as a marketing purpose than to improve the processes. They were actually unable to go beyond documentation after six months of implementation because of lack of the implementation process.

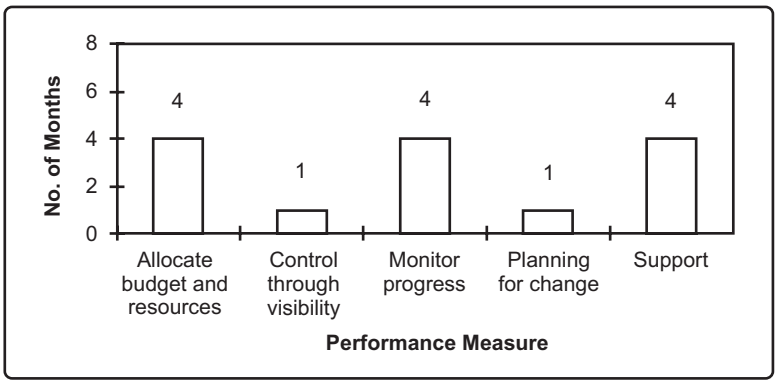

Figure 17.4: Top management commitment during implementation process of TQM

3.1.12. Insufficient training

Training conducted was insufficient as supervisors were not educated, and lacked technical and management skill to identify performance measures or to select productivity improvement tools. The pedagogy adopted, the unrealistic short time provided for training and the lack of domain expertise among the trainers resulted in inadequate and inappropriate training. Tools and techniques were directly implemented with minimal knowledge and without any pilot study. Such attempts eventually ended in failure.

3.1.13. Less importance of layout

After implementation of TQM, FMC became process-oriented at the expense of flow. There was a decrease in productivity because improper layout was imitated from automobile companies with no understanding of their relevance to the labour-intensive industry. Automobile industry is significantly different from labour-intensive companies in several aspects. Further, the literacy levels of employees on the shop floor are often very low to understand the concept of layout because labour-intensive SMEs are more influenced by top management. They followed direct orders from the top management. This had a cascading effect. Poor space utilization further led to space wastage and movement of the workers while handling work, which in turn resulted in an increase in productivity time. Supervision and inspection were needed on the higher side. During the sixth month of implementation, the quality team members were often used as production supervisors to overcome the scarcity of supervisors. While increased occupancy of space required more supervisors and quality inspectors, the high attrition rate did not permit the same. This resulted in more inspection owing to the revised layout that increased the geographical spread of the operations. There was difficulty in supervision owing to a larger area under surveillance. There was a large communication gap for resolving problems between supervisors owing to the revised layout that increased the geographical spread of the operations.

3.1.14. Attitude problems

The attitude of managers and supervisors was a barrier for TQM implementation within a company who had been less optimistic in TQM implementation (Taylor, 1997) because quality team as young was given more priority than older production department and also most of the performance measures and tools were used to control the production department by the quality department. So managers created an obstacle to implement tools and technique. Resistance to change for implementation of TQM is also high. The mind-set of the manager was that the labour-intensive processes are unique, traditional and standardized and required no change in the process. The attitude of the work force, including supervisory staff was entirely oriented towards taking corrective actions after the final stage of inspection. There was no thought of preventive action at some stage of the process. Top management recruited lots of engineers for it, but the most of the engineers were unable to sustain in the labour-intensive manufacturing environment because of attitude problems.

3.1.15. Less usage of performance measure

Rework was considered as a vital part of the process involving skilled workers and supervisors and was a scheduled activity for most of the weekends. Ideally, rework should have served as a good performance measure for productivity improvement. Most of the performance measures and tools were used by the quality department to control the production department. Performance measures such as defects per day were used primarily to blame the production team. So there was a lack of support from the production department. Top and senior level management did not empower them to acquire data, to identify the root cause and to resolve the problems in various production departments. There was no sign of empowering workers and any motivation to improve productivity. There was a lack of archival data as no data on rework, scrap, causes of defects or how they were resolved. This situation was mainly because the metrics were mainly based on daily production records such as throughput. Some of the performance measures such as product quality, process quality and some of the tools were used more to impress the customer.

4. FINDINGS AND CONCLUSIONS

Inappropriate usage of performance measures, insufficient training, lack of support to quality team, improper layout and unfavourable attitude of managers are among the other barriers identified for implementation of TQM in labour-intensive SMEs. Imitation of TQM prevalent in technology-intensive SMEs such as automotive ancillary by labour-intensive SMEs appears to be one of the causes of failure. These labour-intensive SME executives tend to mimic the auto SMEs' initiatives without understanding the context of implementation. It is extensively reported in literature (Massa and Testa, 2004) that the traditional benchmarking promotes imitation because there is a paucity of research on TQM for SMEs among various labour-intensive SMEs resulting in inappropriate imitation.

Most of the studies cite the commitment from the top management as the main reason for the success of TQM in SMEs. Our study shows that there are other factors that can lead to failure, even when the top management is committed to the cause. Managements attempting to implement TQM need to be fully aware of the determining aspects of their respective businesses and tailor the guidelines to their specific contexts. This requires the managements be conscious of the essence of TQM as a management philosophy.

Most of the studies pointed out that SMEs have to strive for adaptation than imitation, directly from technology-intensive SMEs. However, they have only shown cross-sectional studies. This study provides a detailed understating of how and why for failure of TQM implementation because of imitation from the technology-intensive SMEs. Implementation process of TQM in a labour-intensive industry is different from technology-intensive platform based industries. Therefore labour-intensive among the SMEs need to be considered differently and appropriate framework has to be developed for implementing TQM. This study found that the selection of tools and techniques and the importance of the layout are the CSFs.

The implementation framework with simple appropriate tools and technique has to be designed for top management to provide sufficient training with small incremental learning on how-to-do for labour-intensive SMEs. This can help to scale down and adapt TQM implementation for labour-intensive SMEs. The limitation of study is size of one that is very small to generalize the findings. It has to be validated by additional case studies and a few more labour-intensive SMEs.

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