

The Role of Total Quality Management: SME

Felipe Andrade

Group of Construction Research and Innovation (GRIC), Department of Project and Construction Engineering (DPCE), Universitat Politècnica de Catalunya (UPC), Colom, 11, Ed. TR5, 08222 Terrassa, Barcelona, Spain, Email: and.49rad@upc.edu

Article Info	ABSTRACT
<p>Article history:</p> <p>Received : 19.07.2024 Revised : 21.08.2024 Accepted : 16.09.2024</p> <hr/> <p>Keywords:</p> <p>Business Efficiency; Process Optimization; Quality Control; Small and Medium Enterprises (SMEs); Total Quality Management (TQM)</p>	<p>All kinds of businesses – big or small – require to help in improving performance and getting better result from the business world that is so competitive today. Small and Medium Enterprises (SMEs) are often the backbone of many economies around the world and should adopt effective management strategy for survival and growth. One enterprise strategy which had been increasing in importance in recent years was Total Quality Management (TQM). In spite of the extensive knowledge about the holistic approach towards quality improvement, it has been a game ringer for a lot of SMEs, many of whom now have turned around operations, customer's satisfaction and overall towards driving their own business success. In the fast moving market dynamics, SMEs are finding it difficult to get a desirable level of quality products and services time and again due to change in the consumer's preferences. In this setting it is demonstrated that TQM is a strong weapon that enables such enterprise to meet and surpass customer demands as well as to optimize their internal processes. TQM gives SMEs the opportunity to play on same practical grounds as large organizations by fostering a culture of continuous improvement as well as member participation. This article also gets us deeper into the role of Total Quality Management in the performance improvement of SME's; its origins, principles, challenges of its implementation and the benefits. Next, we will consider how the philosophy of TQM, specifically as described by the quality management leader W. Edwards Deming, can be appropriately adapted and utilized within smaller enterprises. Our interest stems from wanting to add value to SME leaders by studying the practices, reasons and impacts of TQM in order to use it as a guide for SME leaders during quality management journey.</p>

1. Total Quality Management

Total Quality Management is an integrated framework of the organization's business managing that the quality concept is a focal point for all the operations of the organization. Whereas TQM differs from traditional quality control methods by taking into consideration all the activities of an organization involved in its activities from the product design and production and through to service to the end product. TQM is just a buzzword that can be explained as a quality concern of everybody in the organization, rather than of a project dedicated to quality control. The philosophy of the organization emphasizes continuous improvement, participation of employees, and data supported decision to give the most finest quality results. TQM is a 'post World War II phenomena' that can be traced to quality management theorists of the post World War II period, W. Edwards Deming, Joseph Juran, and

Philip Crosby. Thus, thought leaders came up with different frameworks or methodologies which became the foundation basis of modern TQM practices [1]-[4].

2. Key Principles of TQM

1. Organisational focus on Customer: TQMs base one of their primary focus the customers and how they provide and fulfil the needs and expectations of the customers.
2. Kaizen: This principle, i.e. Continuous Improvement in organizations process, product and service is also known as Kaizen by the Japanese.
3. Employee Involvement: The use of TQM recognizes that at all levels of an organization have something to offer to the attempts at continual quality improvement.
4. Outcome Based Management: In contrast to outcome based management, TQM aims at

- process productivity in getting to the desired destinations.
5. TQM sees the organization as an integrated system where all departments or function in the organization are used and combined as a network system and inputs from any of the departments or function in the organization are fed into units for processing and outputs from units come to group, to a different stage, finally with a final output.
 6. It should use strategic and systematic approach towards organization's overall strategy, and systematically across all operating areas in the organization.
 7. TQM Practices On Fact Based Decision Making: It is concerned with the use of data in statistical analysis for information making and information giving and improvement.

8. Quality goals and also initiatives have to be understood and accepted throughout the organization, as communication is the key.

In this, creating a culture of quality is created through certain principles which makes it end up to be a culture of quality within the organizations, during the end result this will affect all organizational processes through effective performance, customer gratification and competitive existence [5]-[9].

3. The Relevance of TQM for SMEs

Up to now, Total Quality Management has been associated with large organizations, although the principles and practice of TQM are in fact widespread among the small and medium enterprises. In fact, quite a number of SMEs are quite agile and flexible enough to respond favourably to TQM.

Table 1: Key Elements of TQM Implementation in SMEs

TQM Element	Description	Impact on SME Performance
Customer Focus	Prioritizing customer satisfaction and needs	Improved loyalty and market competitiveness
Continuous Improvement	Ongoing effort to enhance processes and products	Increased efficiency and product consistency
Employee Involvement	Empowering staff at all levels	Boosted motivation and innovative capacity
Process-Centered Approach	Emphasis on streamlined workflows	Reduced errors and operational costs
Fact-Based Decision Making	Using data for informed strategies	Enhanced accuracy and accountability

A TQM approach will be advantageous to SMEs functioning in the modern day of dynamic business environment in the following ways:

Focusing on Quality Improvement in all areas of operation makes the SME more competent vis a vis larger organizations and other competitors.

SMEs implements TQM will improve the efficiency as a result of process optimization and the waste related to it is reduced which in turn lowers the costs and increases the organization profitability. Great Customer Satisfaction: SME's also can broaden their ties with their customers and increase their customer loyalty by putting customers and their expectations first.

Usage of employees in Employee Engagement: For the SME staff, relying on staff involvement and use of empowerment can lead to higher job satisfaction and productivity. TQM culture would keep the products, services, and process constantly innovative through the continuous improvement, that is, Continuous Innovation.

Sticking to high quality products and services is a great way for an SME to enhance its reputation in

the market place by luring more new customers and new business opportunities.

Data Driven Decision Making: SME leaders would be emphasizing more on data driven decision making than TQM which leads to better decision making on their strategies as well as operations in the SMEs. TQM implementation however will be an extensive and resource intensive process, but it has great value for SMEs. For these enterprises to be positioned to win and grow as they do in a very competitive business environment, adoption of the quality management principles puts them in place [10]-[14].

4. Applicability of Deming's Quality Philosophy to SMEs

W. Edwards Deming was one of the founders of the quality movement around the world and this program is one of his contributions to a modern TQM program. First of all, Deming's initial work was talked about widely in large manufacturing, but most of his principles and principles apply to all sectors with the SME.

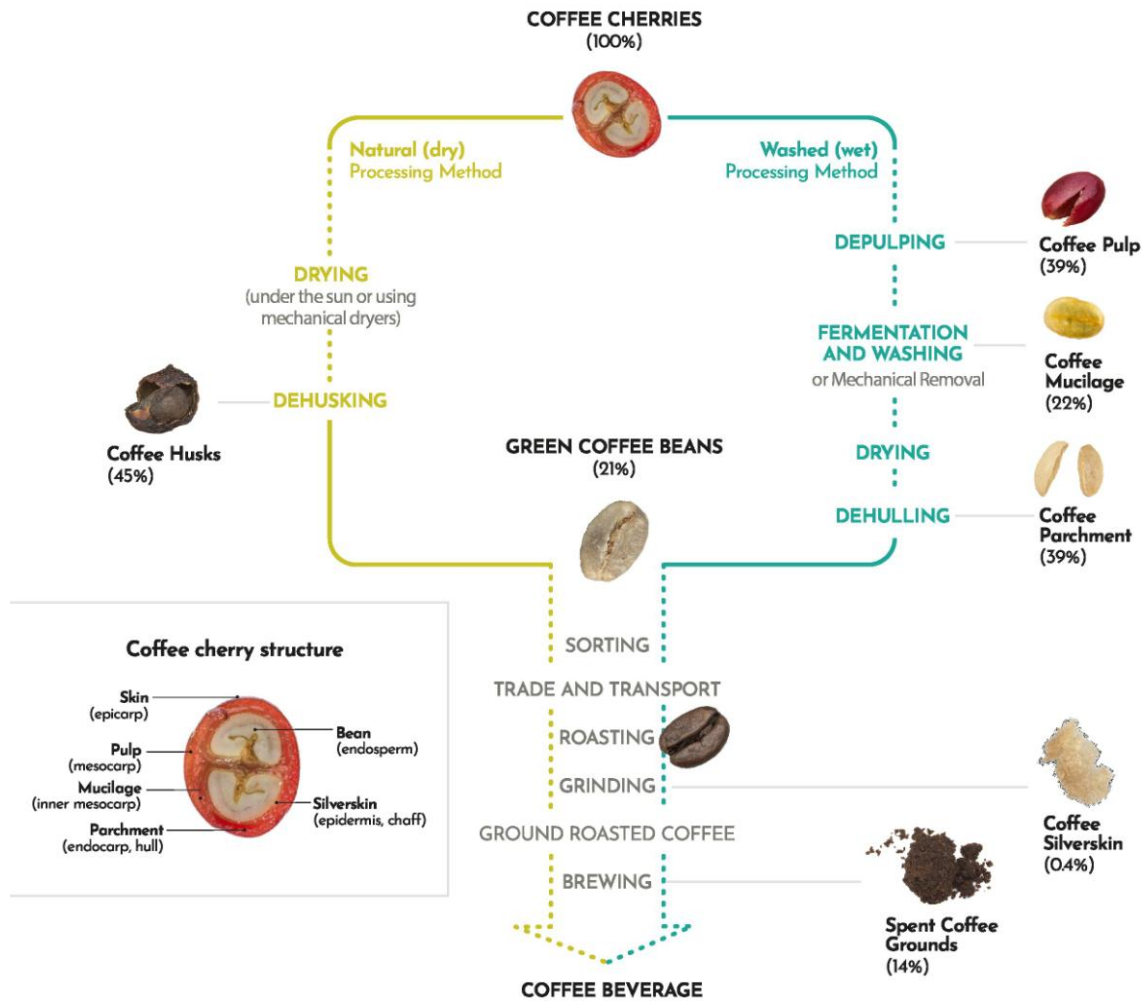


Fig 1. Gives details of his 14 points for management.

Deming largely spoke about the 14 points of his quality philosophy for management. This allows the organizations implementing TQM principles to have a core roadmap to follow as this establishes the bases to guide one in successfully implementing TQM.

Establish and maintain constancy of purpose toward product and service leadership and undertake programmes for product and service improvement. It must be adopted that the new philosophy of quality and continuous improvement.

End of inspection based only on quality, and use the quality of the product from the get go. Stops the practice of being awarded the business by price alone and starts to reduce your total cost. Improvement of the production and service system constantly and quite never ending.

Skills on the job get institute training. Institute leadership to help people and machines to do a better job. To facilitate good two way communication you must drive fear out. It makes it easier to break down barriers amongst

departments and staff areas. We need to kill our slogans, exhortations and targets. Numerical quotas for the workforce should be thrown out the window and numerical goals for managements should be done away with.

Removal of barriers which diminish the pride in craftsmanship. To work on instituting an aggressive program of self education and education program. To achieve the transformation we must turn put everybody in the company to work. Most of these points are more readily applicable for a large company, but they can be easily adapted and used very well with SME as well. For instance, small companies that are applying their operations and quality culture could make use of continuous improvement, leadership development and departmental barriers [15]-[19].

5. Deming's Philosophy for SMEs

Deming's quality philosophy that seeks to improve service quality as well as significantly reduce waste, however, should be remembered by SMEs because of the uniqueness and peculiar constraints

of such organizations. SMEs can adapt and adopt Deming's principles as follows: This means being focused on Long Term Vision (i.e. Actions of Constancy of Purpose) as taught by Deming when SMEs adopt the idea of the constancy of purpose. Providing On-The Job Learning and Skill Development: There is nothing that the SMEs cannot spend some priority on on the job learning and skill development even with limited resources spent to formal training Programs. Deming's plea for driving out fear and encouraging conversation can be much better managed by smaller size of many SMEs that can spare for direct management and worker communication.

As large scale quality initiatives cannot take place for lack of capacity, it immunises SMEs to stay continuously improving their main processes. Produce Quality Products and Services as a Whole: SMEs can enhance the quality of all their product or even more, through forging relationships with suppliers based on quality, not just price. Leadership: Lean thinking can encourage

SMEs to make their agility work with them to improve and innovate in the unremitting atmosphere of constant betterment.

SME Leaders need to Lead by Example and personalise the principles of quality management in their organisations to impact the organisations at senior levels.

TQM has the power to lead significant performance and competitiveness improvements for SMEs by cleverly adapting Deming's quality philosophy to such context [20]-[23].

6. Challenges and strategies for implementing TQM in SMEs

The potential for Total Quality Management in the context of the small organization is great but all this potential opens up a difficult commitment for implementing in small organizations. Therefore, in order for a SME that have elected to chart a course on the journey of TQM to be able to understand these challenges and anticipate some prelude to address the same.

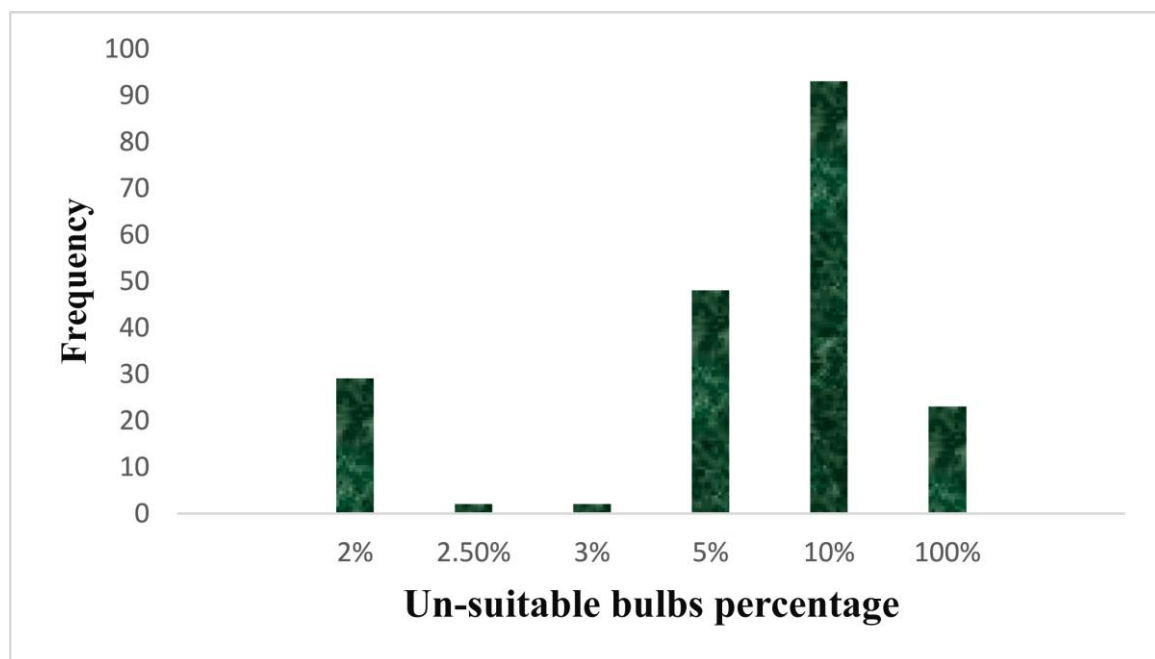


Fig 2. TQM Implementation for SMEs: Common Challenges.

Finances: It has limited financial resources and workforce and expertise which have widened the

gap that a lot of SMEs cannot afford in comprehensive quality management initiatives.

Table 2: Comparative Outcomes: SMEs with and without TQM Practices

Performance Metric	SMEs with TQM Practices	SMEs without TQM Practices
Customer Retention Rate (%)	85%	60%
Defect Rate (%)	2.50%	8.70%
Employee Turnover Rate (%)	10%	25%
Operational Efficiency Score	High	Moderate
Market Growth (Year-on-Year)	12%	5%

Resistance to Change: Some organizations are less resistant to change than others, and in this case, smaller organizations are sometimes less resistant to change as the employees and management are located in that smaller organization. **Knowledge Gap In The Area of TQM Implementation:** Knowledge gap in TQM Formation may come from SMEs have no quality management professionals occupying in their staffs.

Short Term Focus: Due to the nature of SMEs, they are often under pressure to amicably attend to the current business needs and sometimes do not have time to concentrate on long term quality improvement work. Typically in smaller Moreno Enterprises (SMEs), the formal quality management systems and processes are difficult to implement as it is more informal organizational structure, therefore.

Less Market Power: On a general basis, SMEs have fewer abilities to try to sway the suppliers and also customers in the worth chain to place quality enhancement in place up the chain. **Lack of Sophisticate Data Collection and Analysis Tools to Measure Impact:** It would be difficult for

organizations to measure results compared to the sophisticated data collection and analysis tools available in a large organization [24]-[26].

7. Successful TQM Implementation for SMEs!!!

Nevertheless, TQM can be successfully implemented by SME's with appropriate adapted strategies according to their own context: Pilot Projects or Focused Improvement Initiatives in Certain Areas are the Way to Begin with TQM.

Partner with Industry Association or Quality Management Consultants: If so you would like to hire one, you may be able to pick up from industry association or quality management consultants who already have the knowledge of and hints to your distinctive industry. **Communicate 1st to the Whole Company and 2nd to the Frontline People:** Communicate first to the whole company the benefits of TQM, and involve first the frontline people at all levels of the improvement efforts. **Adapt TQM Tools and Techniques:** This entails adapting TQM tools in a simplistic form so that they can be implemented in a manner that is easy to achieve in SME context.

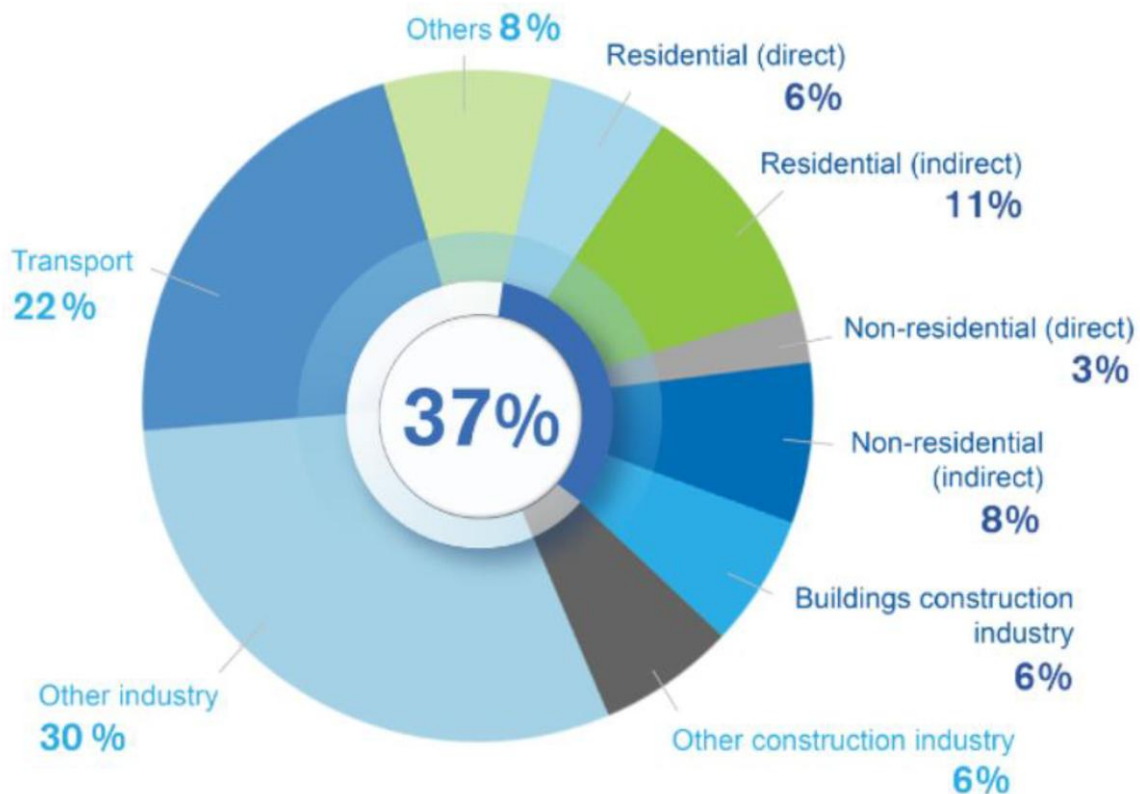


Fig 3. TQM analysis

Train your People: Invest in training and education of your people focusing on developing internal quality management capabilities through targeted training programs and knowledge sharing initiatives. **Customer Focus:** Use the expertise of the SME to perform close customer contact to learn

about customer needs and instant feedback regarding fixing the quality problem.

Use Technology: Investigate how technology of this sort can be leveraged to provide the best of such technology solutions at the cheapest rates, like cloud quality management systems, or data

analytics tools, etc. Quality Leadership: Develop and then implement quality management plan of action that creates (implements) end results to improve the quality of production.

Achievable Quality objectives based on SME resources and capabilities are set on an ongoing and incremental basis. Reward quality improvement efforts, celebrating the success and keeping the motivation and momentum for TQM implementation. If SMEs possess these strategies and put them to their own context, they can overcome TQM implementation challenges and gain the benefits from quality management practices.

The Technical Quality Management (TQM) and its impact on Small and Medium Enterprise Performance. For SMEs and their participation in TQM initiatives, their investment is justified only if an appropriate judgment is made based on the significant impact of TQM on overall performance, which can only be derived through measuring and quantifying the same. Although identifying the results of quality improvement efforts for SMEs is a rough task, there are some unique KPIs and methodologies that can assist the SME in searching how its TQM program is effective or not.

Customer complaint rate, resolution time, prevention, appraisal and failure costs (cost of quality). A satisfied and engaged employee scores

- Measure of the number of improvement initiatives implemented

- Time to market for new products or services

Reducing non value added activities.

- Savings from partnership with suppliers

It is of paramount importance for SMEs to provide proof of the success of Total Quality Management (TQM) in order to legitimise their investment in the initiatives in the TQM. Although the measuring of the effects of improvement efforts of TQM can be difficult, especially for smaller organizations, there are several key performance indicators (KPIs) and methodologies through which an SME can evaluate the impact of its TQM programs.

8. CONCLUSION

Implications of quality implementation: Qualitative analysis is made using the balanced scorecard approach which utilizes a set of quality oriented metrics spread across various dimensions (financial, customer, internal process and learning and growth dimension) to give a review of how TQM affects. Key Performance Indicators: Quantify improvements in 2 essential spaces: before and after TQM implementation.

Benchmarking: Such points of difference in between industry standards or best in class organizations can be studied against the SME's quality performance to point out the areas where

the SME's quality performance is great or poor and to monitor difference.

Return on Quality (ROQ) Analysis: Calculating financial return to quality improvement investment (the cost of the quality improvement initiatives versus improvements in quality), the answer is: We spend how much in order to get how much in terms of quality improvements. Suitable criteria for assessing TQM maturity and effectiveness are the elements of such quality awards programs as quality awards program, Malcolm Baldrige National Quality Award. Customer Feedback analysis: The process of collecting, analysing and systematically collecting and analysing customer feedback to measure the result of quality improvement on customer satisfaction and loyalty. Statistical Process Controls: Carry out statistical analyses to determine how close the key processes are to the quality specifications and methods of improving these. Regular survey of employee surveys is done for the purpose of keeping track of the compliance of employee with TQM principles and with the organization's quality culture as perceived by them. Besides this, an SMEs can measure and evaluate how far the progress of its TQM initiatives has been taken along and further identify and find more areas to improve as well as benefits of quality management to its stake holders.

REFERENCES

1. Moeller, J. The EFQM excellence model. German experiences with the EFQM approach in health care. *Int. J. Qual. Health Care* 2001, 13, 45–49.
2. Laurett, R.; Mendes, L. EFQM model's application in the context of higher education. *Int. J. Qual. Reliab. Manag.* 2019, 36, 257–285.
3. Medne, A.; Lapina, I.; Zeps, A. Sustainability of a university's quality system: Adaptation of the EFQM excellence model. *Int. J. Qual. Serv. Sci.* 2020, 12, 29–43.
4. Chesbrough, H.; Rosenbloom, R.S. The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. *Ind. Corp. Chang.* 2002, 11, 529–555.
5. Magretta, J. Why business models matter. *Harv. Bus. Rev.* 2002, 80, 86–92.
6. Buer, S.V.; Strandhagen, J.O.; Chan, F.T.S. The link between Industry 4.0 and lean manufacturing: Mapping current research and establishing a research agenda. *Int. J. Prod. Res.* 2018, 56, 2924–2940.
7. Byrne, B.M. *Structural Equation Modeling with Mplus: Basic Concepts, Applications, and Programming*; Routledge: London, UK, 2013.
8. Pittala, Chandra Shaker, et al., "Novel methodology to validate DUTs using single

- access structure," *2021 5th International Conference on Electronics, Materials Engineering & Nano-Technology (IEMENTech)*, Kolkata, India, September 24-25, 2021, pp. 1-5.
9. Field, A. *Discovering Statistics Using IBM SPSS Statistics*, 4th ed.; SAGE Publications: Thousand Oaks, CA, USA, 2013. 54. Pallant, J. *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*, 7th ed.; Routledge: London, UK, 2020.
10. Gunasekaran, A.; Subramanian, N.; Ngai, W.T.E. Quality management in the 21st century enterprises: Research pathway towards Industry 4.0. *Int. J. Prod. Econ.* 2018, 207, 125–129.
11. The Shingo Model—Shingo Institute—Home of the Shingo Prize. Available online: <https://shingo.org/> (accessed on 27 June 2022).
12. Kelly, S.; Hines, P. Discreetly embedding the Shingo principles of enterprise excellence at Abbott Diagnostics manufacturing facility in Longford Ireland. *Total Qual. Manag. Bus. Excell.* 2019, 30, 1235–1256.
13. Lynn, G.S.; Skov, R.B.; Abel, K.D. Practices that Support Team Learning and their Impact on Speed to Market and New Product Success. *J. Prod. Innov. Manag.* 1999, 16, 439–454.
14. Curtis, C.C. *New Product Development Cycle Time: Investigation of Cycle Time and Accounting Measures, Determinants of Cycle Time and the Impact of Cycle Time on Financial Performance*; University of New Haven: West Haven, CT, USA, 1993.
15. Olaleye, B.R.; Akkaya, M.; Emeagwali, O.L.; Awwadd, R.I.; Hamdane, S. Strategic Thinking and Innovation Performance; The Mediating Role of Absorptive Capabilities. *Rev. Argent. De Clínica Psicológica* 2020, 29, 2030–2043.
16. P. Ashok Babu, V. Siva Nagaraju, and Rajeev Ratna Vallabhuni, "8-Bit Carry Look Ahead Adder Using MGDl Technique," *IoT and Analytics for Sensor Networks*, Springer, Singapore, 2022, pp. 243-253.
17. Arend, R.J. The business model: Present and future-beyond a skeumorph. *Strateg. Organ.* 2013, 11, 390–402.
18. Brady, N.; Bates, A. The standards paradox: How quality assurance regimes can subvert teaching and learning in higher education. *Eur. Educ. Res. J.* 2016, 15, 155–174.
19. Raisinghani, M.S.; Ette, H.; Pierce, R.; Cannon, G.; Daripaly, P. Six Sigma: Concepts, tools and applications. *Ind. Manag. Data Syst.* 2005, 105, 491–505.
20. Arnheiter, E.D.; Maleyeff, J. The Integration of Lean Management and Six Sigma Lally School of Management & Technology. Rensselaer Polytechnic Institute, Hartford. *TQM Mag.* 2005, 17, 5–18.
21. Fonseca, L.; Amaral, A.; Oliveira, J. Quality 4.0: The EFQM 2020 Model and Industry 4.0 Relationships and Implications. *Sustainability* 2021, 13, 3107.
22. Gollamandala Udaykiran Bhargava, Vasujadevi Midasala, and Vallabhuni Rajeev Ratna, "FPGA implementation of hybrid recursive reversable box filter-based fast adaptive bilateral filter for image denoising," *Microprocessors and Microsystems*, vol. 90, 2022, 104520.
23. EDB Singapore. The Singapore smart industry readiness index. In *Catalysing the Transformation of Manufacturing*; EDB Singapore: Singapore, 2018.
24. Toma, S.-G.; Marinescu, P. Business excellence models: A comparison. *Proc. Int. Conf. Bus. Excell.* 2018, 12, 966–974.
25. Wolniak, R. The level of maturity of quality management systems in Poland-Results of empirical research. *Sustainability* 2019, 11, 4239.
26. Davari, A.; Rezazadeh, A. *Structural Equation Modeling with PLS*. Tehran; Jahad University: Ahvaz, Iran, 2013; Volume 215, p. 224.