九州大学学術情報リポジトリ
Kyushu University Institutional Repository

Identifying the Customer Complaints for Heavy Duty Transformers Made by Small Scale Industries and Resolve the Problems Using Six Sigma DMAIC Method

Neeru
Department of Mechanical Engineering, Amity University Rajasthan

Nitesh Singh Rajput
Department of Mechanical Engineering, Amity University Rajasthan

Patil, Arun
Department of Mechanical Engineering, Sanjay Ghodawat University

https://doi.org/10.5109/7162019

出版情報：Evergreen. 10 (4), pp.2528-2535, 2023-12. 九州大学グリーンテクノロジー研究教育センター
バージョン：
権利関係：Creative Commons Attribution 4.0 International

Identifying the Customer Complaints for Heavy Duty Transformers Made by Small Scale Industries and Resolve the Problems Using Six Sigma DMAIC Method

Neeru[1*], Nitesh Singh Rajput[1], Arun Patil[2]

[1]Department of Mechanical Engineering, Amity University Rajasthan, India - 303002

[2]Department of Mechanical Engineering, Sanjay Ghodawat University, Kolhapur, India 416118

*Author to whom correspondence should be addressed:
E-mail: neerukhola@gmail.com

(Received March 20, 2023; Revised December 18, 2023; accepted December 18, 2023).

Abstract: **Purpose**: In present paper the problems facing by customers of oil filled transformers, made by small scale industries located in Jaipur (Rajasthan) is discussed and then solutions are identified for the same.Six-Sigma DMAIC methodology is adopted for present research study. **Research Methodology**: the research methodology adopted for the present research work is that, conducting a survey, online questionnaire, internet data, information provided by companies are used for finding the key problems and then use different tools like Pareto chart, cause and effect diagram, Kano model analysis, SIPOC and others. **Research Findings**: The main conclusion of the present study was that by applying the DMAIC methodology for resolving the customers problems, Six Sigma play important role when stake holders are small scale industries and their customers. **Limitations**: Although Six Sigma is perfect tool for resolve the customer related problems but sometimes if data collection is not done properly then the results accuracy level is compromised. In present case data provided by companies have limited information for Six Sigma analysis, so separate survey is required for more data collection. **Importance of present work**: Six Sigma method is very helpful for manufacturing industries but when small scale industries specially making the oil filled transformers are selected, where limited work is reported by researchers from worldwide. In present paper the problems face by various customers. During their purchase and after some time of purchase. So this research work help to industries which come in this this production area, make more better working conditions in their premises.

Keywords: Six Sigma, DMAIC methodology, Small Scale Industries, Oil Filled Transformers, Customer Complaints

1. Introduction and Literature Review

The use of the Six Sigma technique is extensively employed following the development of computing technology, and in the modern period, the Six Sigma method plays an essential role for both the manufacturing and service industries. Six Sigma is capable of reducing the many problems that are associated with traditional enterprises[1,2,3]. Because of this, one of the most well recognized benefits of six sigma is that it can be applied to virtually every area, including the industrial sector, the service sector, medical centers, educational institutions, non-governmental organizations, and many more. Six Sigma is the most effective method for locating the faults and problems that bring down the overall performance of a certain industry. Whenever an industry decides to use Six Sigma, there are a few things that must be done in order to get the greatest possible results from Six Sigma. First and foremost, construct an appropriate data base that will assist in applying six sigma in specific industries, and second, implement six sigma regulations in industry in an efficient manner. The third step is to evaluate the level of progress made by Six Sigma in a subset of industries. Because experts in Six Sigma are so uncommon in small size sectors, it is especially important that businesses in this sector pay attention to the aforementioned three aspects. There are a number of studies that demonstrate how successful the outcomes are and how engineers may maintain control over production while still adhering to the parameters of Six Sigma when it is used in smaller-scale enterprises. This technique is ideal for companies that want to reap the benefits of Six-Sigma but don't want to undergo large structural changes as a result of the implementation[4,5,37,38].

Green Belt, Black Belt, and Master Black Belt are among the various qualifications for experienced engineers who wish to improve their skills in the Six

Sigma methodology. These qualifications are helpful for using Six Sigma in an efficient manner across all different types of businesses. The completion of Six Sigma regulations in certain industries is made easier with the assistance of these professional certificates. DMAIC[16,17,18] is the most frequent and successful approach for applying Six Sigma to any business, particularly any manufacturing industry. Six Sigma makes use of a number of different methodologies for conducting an accurate research on any process or industry. This method is employed for the current study in order to answer the issues that have been raised by the clients of the small scale sector[19-30,39].

2. Six Sigma Application in Manufacturing Industries

For the purpose of this study, the manufacturing industry that is now experiencing difficulties with its interactions with consumers has been chosen for analysis. The connection with the client is mostly dependent on the problems that are encountered by the customer and the subsequent solutions that are offered by the firm in a timely manner. After compiling this list of consumer concerns, we chose a subset of them to investigate further in this chapter[11,23,27,29,35,36]. In this section, the research that was conducted for the application of Six Sigma in the customer interaction measure is elaborated to assist the company in working on the capability of this phase of the compact enhancer development measure.When both the theoretical and practical parts of Six Sigma are accounted for in the research, implementation of the methodology becomes achievable. Therefore, the overview of the consumer complaints is included in this present article[31-34].

3. Research Study Approach

Transformers manufacturing enterprises, particularly small scale manufacturing industries, are having an issue with their clients connected to oil leaking while the warranty is still in effect. The primary challenge that businesses are up against is the fact that the appropriate answers to the issues that their clients are experiencing are, for the most part, not provided in a timely manner, and there is also a lack of appropriate data sources that can identify the root cause of the issue of oil leakage in transformers. Methods such as Six Sigma DMAIC (Define, Measure, Analysis, Improve, and Control) may effectively address all of these concerns and problems.

4. Phase-I: Define

During the define phase, the scope of the project that will be further investigated is chosen. The goal of the current effort is to enhance the degree of service that the company provides to its consumers, which will fall within the purview of the assistance level of the organization. The connection that exists between the employees and the customers is going to be one of the major factors that will be considered.

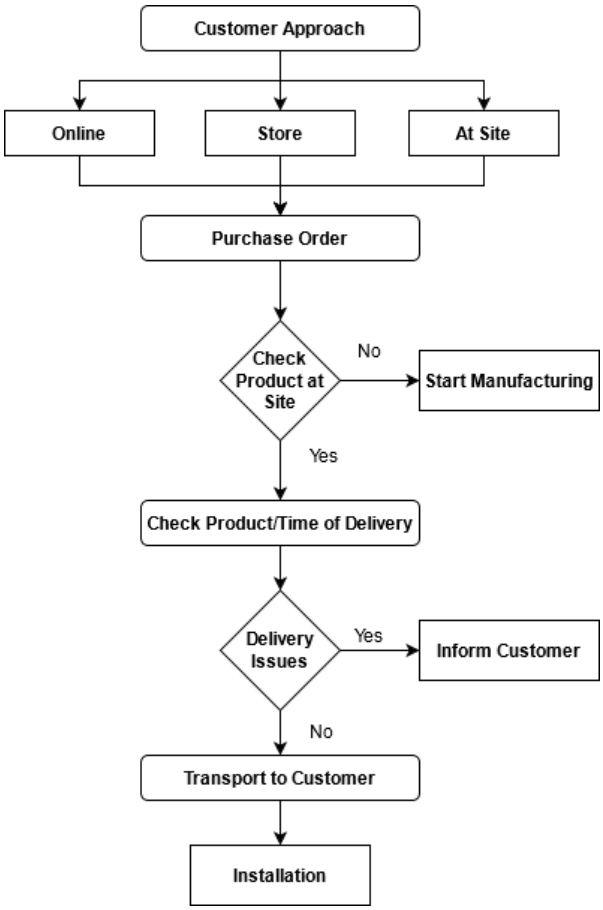

Fig. 1 Product delivery process flow chart

In addition to this, it will concentrate on the services that are currently being offered and the actions that are being made to satisfy the requirements of the customers. For example, what is the procedure or cycle for taking a request from a customer, what is the delivery measure, what services are offered for customer care, and so on. The cycle starts when a client makes a request, and it finishes when the client accepts the request he made, as shown in figure 1. A wide view on interaction measure proprietor, how sources of information are gathered, whom the cycle serves, and how it provides value may be provided by utilizing the method for SIPOC. The acronym SIPOC refers to the Supplier, the Input, the Cycle, the Output, and finally the Customer. Table 1 contained the SIPOC diagram that corresponded to the current investigation.

Table 1. SIPOC diagram for Customer relationship

Supplier	Input	Process	Output	Customer
(S)	(I)	(P)	(O)	(C)
Customer Care Customer Employee	Record Complaint via offline mode or Online Mode Discuss with Customer for more Better Working Plan Discuss complaint gathered by customers	Resolve Customer Issues and manage relationships	Final Closure of Complaint Final Approval from Customer	All Buyers/OEM Suppliers

VOC (Voice of Customer)

The sanctification of the customer relationship is the most crucial activity for every industry to do in order to expand in a favorable path. The vast majority of small-scale businesses are unable to succeed in this aspect of their operations because they do not have sufficient understanding of the VOC (Voice of Customers) standards. Figure 2 depicts the VOC in the form of a tree, which should help readers have a better grasp on the concept.

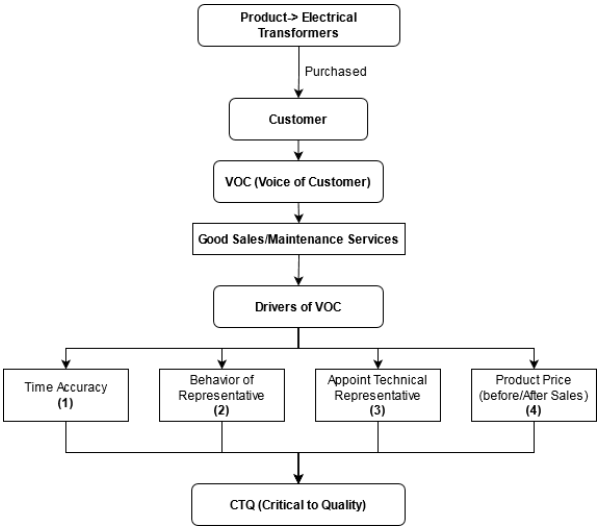

Fig. 2 VOC (Voice of Customers) for present study

Analysis of Critical to Quality (CTQ) must be performed in order to properly calculate VOC. The tree shape shown in Figure 3 is the optimal technique to use in order to get higher CTQ. Within the scope of the current research, an online survey was sent to an existing customer base in order to elicit their feedback on the quality of the company's services, beginning with the purchasing process and continuing far after the product was sold.

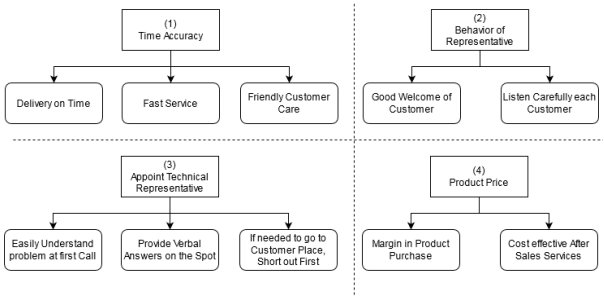

Fig. 3 CTQ for better VOC implementation

In order to determine whether or not the VOC claims made by the small-scale industry that manufactures oil transformers are accurate, a quick survey of customers who have purchased goods within the last year and are still covered by the warranty is carried out. This survey identifies two distinct categories, both of which contribute to the determination of the primary challenges faced by this small-scale sector. The primary question that will be asked in the VOC survey is "Is product Price satisfied the Product Quality and other measures?" This question will be posed to consumers who have just made a purchase that is still within the product's warranty period. The findings of this survey are depicted as a graph in figure 4, which can be seen below.

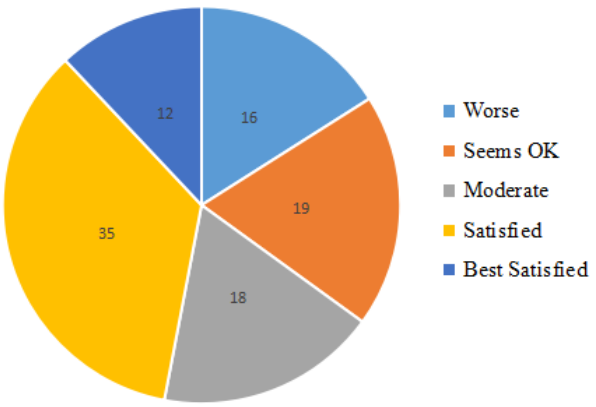

Fig. 4 Customer stratification survey after product purchase

5. Phase-II: Measure

In this part, the first step in discovering issues with consumers is to collect data from those customers, and after that information has been gathered, measurement may begin. The collecting of data is a process that takes a very long time, and several significant ways are utilized for this endeavor. The following methods are used for

Data Collection:

Data collection from direct Company Customer Complaint Center (very less accurate results)

Data Collection from direct Customers who purchased the product with company in last one year.

Data collection from direct Customers who purchased the product with company in last five year.

These three steps help to make two different analysis for the measure step, the first data collection is based on the survey Question "**Is product Price is satisfied the Product Quality and other measures**". The results of this survey analysis is present in figure 4.

Next survey question for this measure task is "The **Service provided by company during Product Purchase and after Sales**". The result of this survey is present in figure 5 for present investigation.

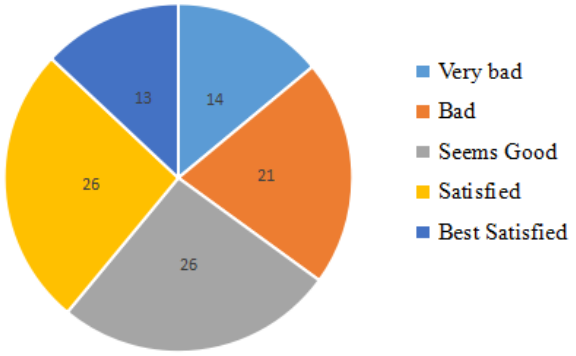

Fig. 5 VOC analysis for Company Service survey

Figure 5 shows that the majority of consumers are content with the level of service they have received; but, 12% of customers report receiving very poor service from the firm, which should serve as a warning to the organization.

SMART Metrics:

Simple, Measurable, Actionable (Decision making to handle all complaints), Related (Resolve all Customer demand), and Timely Delivery are the five tenets of a good customer service experience. In this section, a data measurement is carried out, the results of which show several significant aspects connected to customer complaints. The SAMART metrics have chosen Opportunity and Defects as two of their keywords to focus on.

Opportunity in this context refers to the product being delivered to the consumer within the allotted amount of time. Any kind of damage done to the goods, any delay in the delivery time, any hidden charges applied to the clients, and any lack of after-sales service are all considered to be faults. The numerous customer complements may be seen in table 2, organized according to Opportunity and faults.

Table 2 Different type of Complaints

Different Complaints	Frequency	Percentage
Refund Policy	932	31.72
Delivery Related Issues	716	24.37
Behaviour of Representative	416	14.15
Product is not same as discussed	320	10.89
Customer care center operation	271	9.22
Installation Charges	195	6.63
Maintenance after warranty period	88	2.99
Total	2938	100%

As can be seen in the chart, the majority of customer complaints concern the firm's refund policy, which was not well received by clients, and around 32% of clients are unhappy with the service provided by the company. After then, clients started having troubles with the delivery, and now 25% of customers are unhappy with the service because of delivery-related problems. It is conceivable that the CORONA illness epidemic is the source of this complainant's issues.

After the product's warranty term has expired, the majority of customers are content with the maintenance that is provided. There are some users who believe that the installation fees are significantly more. Approximately ten percent of clients have the opinion that the goods they received is different from what was described to them by salesmen when they made an inquiry about the product. The comparison of two firms based on any significant performance metric is also included in this section (Company A-main participant, Company B for reference only)

The comparison between these two firms is carried out in accordance with certain performance measure index characteristics, which may be found in table 3.

Nature of the Products/Quality: evaluates the quality of the products that are being made available to customers..

Delivery Time: gauges the level of great conveyances.

Communication with Customer: gauges the results of the correspondence with the client.

Customer Call Center Time Period: tracks the turnaround time on client support calls and in-shop fix of client claimed stock. At the point when individuals have an issue, the more they stand by, the more terrible it gets.

Damage by Vendor: Measure the inbound harm by seller and steps taken by the provider (or driver) to determine the issue.

Inventory Level: gauges the exactness of stock estimation frameworks.

Labor Cost after sales: evaluates the total cost of all stockroom work, including benefits, in the organization. This is a level that is established as a percentage of the cost of the item that was obtained in addition to the cost of the merchandise that was carried.

Safety measures in manufacturing plant: determines whether or not the working environment is safe. The method that is most commonly used is to count the number of days or staff hours that have passed without an accident.

Table 3 Performance measures among two companies (Benchmark)

Performance Measure Index	Company A	Company B
Nature of the Products/Quality	3	4
Delivery Time	2	5
Communication with Customer	4	2
Customer Call Center Time Period	5	3
Damage by Vendor	3	4
Inventory Level	4	2
Labor Cost after sales	4	3
Safety measures in manufacturing plant	3	4

The performance measure index are divided into five point scale which is as follow:

Table 4 Performance index scale

1	2	3	4	5
Very Low performance	Low Performance	OK Performance	Good Performance	Best Performance

As seen in table 3, four performance measure index are lower for company A when compare with Company B. The worse performance measure index for company is delivery time when compare with company B.

6. Phase-III: Analysis

Before any examination on COMPANY-overall A's performance can be carried out, we need to first identify the primary factors that have led to the organization's predicament. This should be accomplished by adopting a Pareto Chart to target all of the "easy pickins," or areas that take minimal effort to solve the few major problem areas. After identifiable proof has been gathered from the primary locations, a further in-depth study will be conducted in order to fix each and every problem at its fundamental level. This may be performed through the utilization of the Ishikawa Diagram and the investigation of the 5 Whys.

Pareto Chart Analysis

Pareto chart analysis for the present study was present in figure 6 in which highest rated customer complaint is first ranks and least customer complaint is low ranks as seen in figure 6.

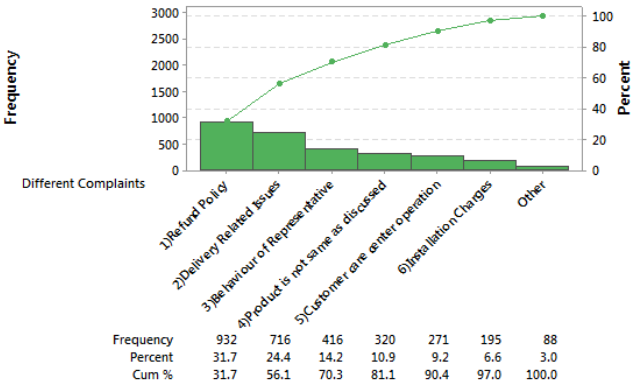

Fig. 6 Pareto Chart analysis for Company A

Cause and Effect Diagram

The cause and effect diagram for present study was present in table 5, in which each sections of cause and effect diagram is discussed and the same is present in figure 7 for the present investigation.

Table 5 Cause and Effect Diagram

Personnel	
Cause	Effect
Lack of Training to Employees Less Experience Expert for Customer Care	Delivery Related issues
Method	
Cause	Effect
Lack of Planning for Delivery	Late delivery of product
Machines	
Cause	Effect
Lack of Automation in plant	Late delivery/damaged Product
Management	
Cause	Effect
Lack of proper return policy	Poor customer relationship
Environment	
Cause	Effect
Customer call center low performance Department wise poor communication Less effective expert advice Staff bad behaviour	Poor Customer Relationship

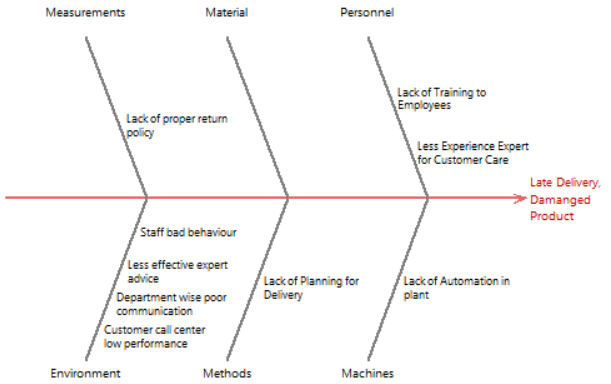

Fig. 7 cause and effect diagram

5 Why analysis

By using this method researcher identify the root problems involved with the customer complaints in oil filled transformers. The final analysis of the five WHY is present in table 6 for present investigation.

Table 6 Five Why Analysis

Different Complaints	Improve Measures
Refund Policy	Make detailed policy with each terms and conditions related to product Provide Detailed training on Refund Policy to all Representatives
Delivery Related Issues	Use Industry 4.0 tools for make control on production
Behaviour of Representative	Provide training to all representatives to behave humble with all customers Local Tradition can help to resolve this problem
Product is not same as discussed	Give final list of inventory to all staff/salesmen who interact with customers Use IT software for better inventory control
Customer care center operation	Recruit trained staff for Call Center work
Installation Charges	There is no much changes required for installation charges
Maintenance after warranty period	Already work better, so no need of any change

On the basis of five Why analysis it is concluded that management is not very much interested in requirement of the best level staff and that is the reason which create major problems with customers relations.

7. Phase-IV: Improve

In this phase, all of the causes that were discussed in the analysis phase are brought up again, and it is now time to present the main control indicators that will help to resolve the issues that have been occurring in company A. The results of the improve phase are detailed in table 7, which is also included in this phase.

Table 7 Improve measures for present study

Why Questions	Reasons
Why customer complaints high ?	Less automation of the manufacturing plant is one of the major reason
Why quality of product is low?	Quality testing department is less effective and not manage relationship with customers
Why industrial Training Program not run in Plant?	Less interest in training by management
Why not appoint high level expert for finding the product issues?	Less interest by management
Why staff not stay for long time in company?	HR cell is not active

8. Phase-V: Control

The Six Sigma-DAMIC technique is complete with this stage as its last step. Within this part, the enhancements are broken down and analyzed for clearer comprehension. Both chart analyses point to the fact that a shift in the working environment in a company may lessen the number of customer complaints, and that this shift had an effect of more than fifty percent, which is a significant milestone for the development of the firm.

9. Conclusion

Although the implementation of Six Sigma in small scale companies has been helpful to a variety of industries, when small scale firms, particularly those that make oil filled transformers, are chosen, researchers from all over the world have found minimal success with their work. In this article, we will discuss the challenges that a variety of clients experience. During the moment of purchase and for some time after the transaction has been made. Therefore, the results of this study effort will assist the enterprises that operate in this industrial region in creating more favorable working conditions within their facilities. The findings of the survey indicated that, in comparison to multinational corporations, smaller businesses had far more room for development in the area of customer service. The approaches of Six Sigma can be of assistance in resolving this issue in an efficient manner.

References

1) Al-Mishari, S. T., & Suliman, S. (2008). Integrating Six-Sigma with other reliability improvement methods in equipment reliability and maintenance applications. Journal of Quality in Maintenance Engineering, 14(1), 59–70. https://doi.org/10.1108/13552510810861941
2) Anand, R. B., Shukla, S. K., Ghorpade, A., Tiwari, M. K., & Shankar, R. (2007). Six sigma-based approach to optimize deep drawing operation variables. International Journal of Production Research, 45(10), 2365–2385. https://doi.org/10.1080/00207540600702308
3) Andersson, R., Eriksson, H., & Torstensson, H. (2006). Similarities and differences between TQM, six sigma and lean. TQM Magazine, 18(3), 282–296. https://doi.org/10.1108/09544780610660004
4) Antony, J., Kumar, M., & Tiwari, M. K. (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(8), 633–646. https://doi.org/10.1243/095440505X32418
5) Antony, J., Kumar, M., & Madu, C. N. (2005). Six sigma in small- and medium-sized UK manufacturing enterprises: Some empirical observations. International Journal of Quality and Reliability Management, 22(8), 860–874. https://doi.org/10.1108/02656710510617265
6) Arnheiter, E. D., & Maleyeff, J. (2005). The integration of lean management and Six Sigma. The TQM Magazine, 17(1), 5–18. https://doi.org/10.1108/09544780510573020
7) Barbosa, B., Pereira, M. T., Silva, F. J. G., & Campilho, R. D. S. G. (2017). Solving Quality Problems in Tyre Production Preparation Process: A Practical Approach. Procedia Manufacturing, 11(June), 1239–1246. https://doi.org/10.1016/j.promfg.2017.07.250
8) Barbosa, G. F., de Carvalho, J., & Pereira de Souza, C. H. (2014). Deployment of a laser projection solution for stripes plotting based on Six Sigma DMAIC methodology applied to aircraft painting shop. Production and Manufacturing Research, 2(1), 697–711. https://doi.org/10.1080/21693277.2014.943432
9) Bauelas, R., & Antony, J. (2004). Six sigma or design for six sigma? TQM Magazine, 16(4), 250–263. https://doi.org/10.1108/09544780410541909
10) Bhanpurkar, A., Bangar, A., Goyal, S., & Agrawal, P. (2012). Implementation of Six Sigma Program for Lean Manufacturing “To reduce the rework waste in Transformer manufacturing unit by eliminating defect of leakage from bushings in oil filled transformers. International Journal of Mechanical and Industrial Engineering, 1(3), 197–202. https://doi.org/10.47893/ijmie.2012.1039
11) Bhanpurkar, A., Bangar, A., Goyal, S., & Agrawal, P. (2012). Implementation of Six Sigma Program for Lean Manufacturing “To reduce the rework waste in Transformer manufacturing unit by eliminating defect of leakage from bushings in oil filled transformers. International Journal of Mechanical and Industrial Engineering, 2231, 197–202. https://doi.org/10.47893/ijmie.2012.1039
12) Bunce, M. M., Wang, L., & Bidanda, B. (2008). Leveraging Six Sigma with industrial engineering tools in crateless retort production. International Journal of Production Research, 46(23), 6701–6719. https://doi.org/10.1080/00207540802230520
13) Chakrabarty, A., & Tan, K. C. (2007). The current state of six sigma application in services. Managing Service Quality, 17(2), 194–208. https://doi.org/10.1108/09604520710735191
14) Chen, S., Fan, S., Xiong, J., & Zhang, W. (2017). The Design of JMP/SAP Based Six Sigma Management System and its Application in SMED. Procedia Engineering, 174, 416–424. https://doi.org/10.1016/j.proeng.2017.01.161
15) Chung, Y. C., Hsu, Y. W., & Tsai, C. H. (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 and Business Excellence, 19(6), 595–607. https://doi.org/10.1080/14783360802024408
16) Costa, J. P., Lopes, I. S., & Brito, J. P. (2019). Six Sigma application for quality improvement of the pin insertion process. Procedia Manufacturing, 38(2019), 1592–1599. https://doi.org/10.1016/j.promfg.2020.01.126
17) Costa, L. B. M., Godinho Filho, M., Fredendall, L. D., & Ganga, G. M. D. (2020). The effect of Lean Six Sigma practices on food industry performance: Implications of the Sector’s experience and typical characteristics. Food Control, 112(January), 107110. https://doi.org/10.1016/j.foodcont.2020.107110
18) Cunha, C., & Dominguez, C. (2015). A DMAIC Project to Improve Warranty Billing’s Operations: A Case Study in a Portuguese Car Dealer. Procedia Computer Science, 64(00351), 885–893. https://doi.org/10.1016/j.procs.2015.08.603
19) Davison, L., & Al-Shaghana, K. (2007). The link between six sigma and quality culture - An empirical study. Total Quality Management and Business Excellence, 18(3), 249–265. https://doi.org/10.1080/14783360601152269
20) Desai, D. A., Kotadiya, P., Makwana, N., & Patel, S. (2015). Curbing variations in packaging process through six sigma way in a large-scale food-processing industry. Journal of Industrial Engineering International, 11(1), 119–129. https://doi.org/10.1007/s40092-014-0082-6
21) Ehie, I., & Sheu, C. (2005). Integrating six sigma and

theory of constraints for continuous improvement: A case study. Journal of Manufacturing Technology Management, 16(5), 542–553. https://doi.org/10.1108/17410380510600518

22) Erbiyik, H., & Saru, M. (2015). Six Sigma Implementations in Supply Chain: An Application for an Automotive Subsidiary Industry in Bursa in Turkey. Procedia - Social and Behavioral Sciences, 195, 2556–2565. https://doi.org/10.1016/j.sbspro.2015.06.447
23) Ertürk, M., Tuerdi (Maimaitiaili. Tuerdi), M., & Wujiabudula, A. (2016). The Effects of Six Sigma Approach on Business Performance: A Study of White Goods (Home Appliances) Sector in Turkey. Procedia - Social and Behavioral Sciences, 229, 444–452. https://doi.org/10.1016/j.sbspro.2016.07.154
24) Fahey, W., Jeffers, P., & Carroll, P. (2020). A business analytics approach to augment six sigma problem solving: A biopharmaceutical manufacturing case study. Computers in Industry, 116, 103-153. https://doi.org/10.1016/j.compind.2019.103153
25) Furterer, S., & Elshennawy, A. K. (2005). Implementation of TQM and Lean Six Sigma tools in local government: A framework and a case study. Total Quality Management and Business Excellence, 16(10), 1179–1191. https://doi.org/10.1080/14783360500236379
26) Gaikwad, L. M., Sunnapwar, V. K., Teli, S. N., & Parab, A. B. (2019). Application of DMAIC and SPC to Improve Operational Performance of Manufacturing Industry: A Case Study. Journal of The Institution of Engineers (India): Series C, 100(1), 229–238. https://doi.org/10.1007/s40032017-0395-5
27) Gijo, E. V., & Scaria, J. (2014). Process improvement through Six Sigma with Beta correction: A case study of manufacturing company. International Journal of Advanced Manufacturing Technology, 71(1–4), 717–730. https://doi.org/10.1007/s00170-013-5483-y
28) Girmanová, L., Šolc, M., Kliment, J., Divoková, A., & Mikloš, V. (2017). Application of Six Sigma Using DMAIC Methodology in the Process of Product Quality Control in Metallurgical Operation. Acta Technologica Agriculturae, 20(4), 104–109. https://doi.org/10.1515/ata-2017-0020
29) Gupta, V., Jain, R., Meena, M. L., & Dangayach, G. S. (2018). Six-sigma application in tire-manufacturing company: a case study. Journal of Industrial Engineering International, 14(3), 511–520. https://doi.org/10.1007/s40092-017-0234-6
30) Haikonen, A., Savolainen, T., & Järvinen, P. (2004). Exploring Six Sigma and CI capability development: Preliminary case study findings on management role. Journal of Manufacturing Technology Management, 15(4), 369–378. https://doi.org/10.1108/17410380410535071
31) Shahriari, Bahareh, Akbar Hassanpoor, Abdolrahim Navehebrahim, and Saeed Jafarinia. "A systematic review of green human resource management." (2019): 177-189.
32) Yusei Masaki. Evergreen Joint Journal of Novel Carbon Resources Sciences & Green Asia Strategy, Vol. 3(2), 59-67 (2016). doi.org:10.5109/1800873
33) Masahito Tanaka. Evergreen Joint Journal of Novel Carbon Resources Sciences & Green Asia Strategy, Vol.4(4), 1-7 (2017). doi.org:10.5109/1929724
34) Gupta, Vivek, and Arvind Jayant. "A novel hybrid MCDM approach followed by fuzzy DEMATEL-ANP-TOPSIS to evaluate Low Carbon Suppliers." (2021): 544-555.
35) Rajput, Nitesh Singh, and Arun Patil. "Reducing Oil Leakage in Heavy Duty Transformers Made in Small-Scale Manufacturing Industry Through Six Sigma DMAIC: A Case Study for Jaipur." Evergreen Journal, 10(1) 196-211 (2023). doi.org:10.5109/6781070
36) Masaki, Yusei. "Characteristics of industrial wastewater discharged from industrialized provinces and specific industrial sectors in china based on the official statistical reports." Evergreen Journal, 3(2) 59-67 (2016). doi.org:10.5109/1800873
37) Bhasin, Niti, Rabi Narayan Kar, and Neha Arora."Green disclosure practices in India: A study of select companies." Evergreen Journal, 2(2) 5-13 (2015). doi.org:10.5109/1544075
38) Kimura, Rikio. "'Social or Business' or 'Social and Business': Problematique of the Hybrid Structure of Community-based cotourism in Cambodia." Evergreen Journal, 4(2/3), 38-49 (2017). doi.org:10.5109/1929664
39) Bhadu, Jagdish, Jaiprakash Bhamu, and Praveen Saraswat. "An Analytic Hierarchy Process (AHP) Approach for Prioritizing the Industries 4.0 Technologies (I4. 0T).", Evergreen Journal, 10(2), 667-675 (2023). doi.org:10.5109/6792813