

Total Quality Management Integration in Manufacturing Industry: Insights from ABX Company Case Study

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Abstract

In today's dynamic business landscape, organizations face the imperative to continually refine their operational frameworks. An avenue often explored for this purpose is the integration of Total Quality Management (TQM) principles into business methodologies. However, recognizing the factors and hurdles inherent in TQM implementation is pivotal for achieving success in this endeavor. This study endeavors to pinpoint the critical success factors crucial for TQM integration, focusing on a metal stamping manufacturing entity, with ABX company serving as the primary case study subject. Findings from the study underscore several key elements essential for effective TQM implementation, including unwavering management commitment and leadership, a culture of continuous improvement, paramount customer satisfaction, active employee engagement, comprehensive training initiatives, and robust communication and teamwork protocols. Notably, management commitment and leadership emerge as the foremost determinant of successful TQM integration. Furthermore, the study delves into the various barriers and challenges encountered by the company throughout the TQM implementation process. These impediments are thoroughly examined through a SWOT analysis framework, elucidating the strengths, weaknesses, opportunities, and threats inherent in the TQM adoption journey. By shedding light on the practical application of TQM within a manufacturing context and elucidating the attendant challenges, this research contributes significantly to enhancing comprehension of TQM implementation dynamics.

1. Introduction

Since the early 1980s, quality has been a fundamental management concern for both large and small businesses, and it has grown critical to their success (Ahmad *et al.*, 2019). According to Juran, quality is separated into two categories (Juran, 1998). To begin, quality refers to product features that fulfil customer expectations and, as a result, provide customer satisfaction and freedom from defects-freedom from faults that necessitate redoing

work (rework) or result in field failures, customer discontent, and customer claims. Furthermore, quality refers to all the operations that a company undertakes to ensure that its product meets the needs of its customers. The concept of quality, on the other hand, is constantly evolving. According to Kaoru Ishikawa, quality is critical to customer happiness and must be specified thoroughly (Ishikawa, 1981). It is not enough to declare that the products are of high quality; we must pay attention to the quality of every aspect of the organisation, and he claims that customer expectations and requirements are always changing. Quality is not something that can be successfully accomplished in a short amount of time, particularly in industrial companies, production, or operation (Ahmad *et al.*, 2019; Ahmad *et al.*, 2016). As a result, organisations should strive for continuous development to achieve high quality.

In today's rapidly changing business world, organizations must continually enhance their procedures (Salleh *et al.*, 2018). Continuous improvement may be done by incorporating total quality management (TQM) and business excellence principles into all company activities (Kigozi, 2019). Although the quality management principle is valid, the techniques used to achieve the goals of quality improvement projects determine implementation success. Many businesses have struggled to put in place a TQM policy that works. Because the hurdles that make TQM policy implementation difficult resulted in different results than expected, several TQM programs have been abandoned (Powell, 1995). One of the main reasons for this is that businesses fail to define the areas they want to improve and the objectives they want to achieve by implementing TQM (Topalović, 2015). Thus, many of previous works have identified several critical success factors for TQM implementation (Salleh *et al.*, 2018; Khanna & Sharma, 2011). However, barriers and challenges that businesses and organizations have to face in the process of implementing TQM also among the hurdles that contributes to the fail for them to have a successful TQM implementation (Topalović, 2015).

Therefore, this study aims to understand on how TQM is implemented in a real working environment. An industry specialized in metal stamping manufacturing called ABX Sdn. Bhd. was selected as the main case study to be further investigated on they implement TQM into their practices. Besides, this study also aims to understand the barriers and challenges that the company had to face before, during, and after the implementation of TQM in the company. SWOT analysis also being addressed on how TQM can provide strengths, weakness, opportunities, threats to the business, it is hoped that through this study, we can understand better on how TQM plays it roles in business environment which pursue for growth and continuous improvement.

The history of ABX Sdn. Bhd. started back in October 1993 when the company was incorporated in Malaysia as one of the businesses that supply and manufacture metal stamping products in our country. ABX is proud to mark its significant milestone in the industry of metal stamping as one stop organization to deliver quality products to the market. As producing metal stamping tools and dies are the heart and soul of the organization, ABX serve businesses from various industries nationwide with their commitment to achieve perfection. In view of the latter, it is the company mission and vision to emerge as the pioneer in the market by meeting every specification of their clients, with their adherence to world class standard and quality. Emphasizing on the notion of sustainability, ABX constantly change according to the dynamism of the market arena, thus necessitating their continuous investment in the latest technologies and research. It constitutes their promise to the clients that ABX have the capabilities to contribute to their value creation chain, thus deriving positive prospects in all business matrices. From the innovations to new breakthroughs, ABX are proud of the integral roles that they undertake to make business successes possible.

Being quality driven, the company has continuously invested on the newest in Metal Press Technology, fulfilling the needs and expectations of various industries. The integration of Computer Aided Designing enables ABX to produce and fabricate the required tooling and components effectively and efficiently. ABX Sdn. Bhd. take pride in their manufacturing facilities, ensuring that their power press and machining tools are well maintained and updated periodically for maximum precision.

ABX Sdn. Bhd. services ranges from metal stamping, tool and die fabrication, sheet metal fabrication to silk screen printing. ABX is now servicing a host of electronics, electrical, mechatronics and automotive manufacturers in the region. Their services include Design & Development, Prototype & Batch Production, Tool and Die Design & Fabrication, Silk Screen Printing, Diamond Cutting, Die Cutting, Ultrasonic Sealing, Tumbling, Tapping, Sub-Assembly Parts and Mass production. Among the product ranges produce by ABX.

2. Literature Review

2.1 Definition of TQM

TQM outlines a set of steps that businesses may take to achieve this, with the route to successful continuous improvement based on the use of strategy, data, and effective communication to embed quality into the culture and operations of the company (Khanna *et al.*, 2011). TQM focuses on the processes that businesses use to create their products, and it encourages them to describe those processes, monitor and analyze their performance on a

continuous basis, and utilize that data to drive changes. Furthermore, all workers, as well as all organizational departments, are expected to participate in this process. TQM's goals are to reduce waste and boost efficiency by guaranteeing that the organization's product (or service) is manufactured correctly the first time (Pratt, 2019). According to Powell (1995), quality management is an integrated management philosophy and set of practices that emphasize, among other things, continuous improvement, meet with customer's requirements, reducing rework, longer-range thinking, increased employee involvement and teamwork. Generally, continuous quality improvement process assumes and requires a team of experts together with the company leadership actively use the quality tools in their improvement activities and decision making process (Beshah & Berhan, 2017). Quality is a multi-dimensional construct (Ishikawa, 1981). Quality may be viewed in a variety of ways depending on the viewpoint. Essentially, latent numerous aspects of quality lead to various viewpoints on quality, which in turn influence quality approaches. The degree to which all dimensions of quality expected by consumers are met as a consequence of quality procedures gives the company competitive capacity.

2.2 Previous Study

Some previous studies have proven that the application of TQM effectively influences employee motivation, increases employee satisfaction and decreases interest in changing jobs, reduces costs and improves business performance, managerial performance (Maupa *et al.*, 2019), and improving the quality of human resources (Beshah & Berhan, 2017). Companies must constantly develop and increase their company performance and skills to succeed in a competitive and dynamic environment. The adoption of overall quality management is one of the primary factors of a company's survival in such conditions. In recent years, firm management has placed a greater emphasis on complete quality management, resulting in increased customer satisfaction and loyalty (Powell, 1995). For instance, a study by Topalović (2015) on the implementation of TQM on bank services shows that TQM implementation capable in helping business leaders to identify quality elements that need to be improved, to increase the level of customer satisfaction, and enhance their business.

2.3 Factors and Barriers in TQM Implementation

The success of an organization cannot be separated from the role of leaders in the organization. Leadership is the main key in management, and plays an important and strategic role in the survival of an organization (Maupa *et al.*, 2019). The leader is the originator of the goals and that builds organizational commitment. TQM gets great attention from top management, because it can improve performance in the organization (Topalović, 2015). TQM is a new business paradigm that focuses on customer satisfaction, employee participation, and continuous improvement in the quality of goods, services, people, processes, and the organization's environment in order to increase organizational competitiveness. Previous studies have identified several factors that contribute to the success of TQM implementation. For instance, Khanna & Sharma (2011) indicated that top management leadership, human resource management, supplier's quality management, customer focus, product design, training, and role of quality department were among the critical success factors in TQM implementation. Besides, Almurshidee (2017), organizational culture, strategic planning, and administrative planning are among the factors that influence TQM implementation in higher education. Whereas, Salleh *et al.* (2018), stated that management commitment and leadership, total customer satisfaction, employee involvement, continuous improvement, training, communication, and teamwork were among the critical success factors in TQM implementation. From here, there are various factors that influence the implementation of TQM from different business standpoint.

The process of implementing TQM often comes with problems and challenges that business or organization had to face along the process of implementation. According to Kigozi (2019), lack of leadership commitment, poor and ineffective leadership, lack of funding and resources, lack of morale and culture, resistance to change, lack of proper training, and ambiguity of TQM implementation are among the challenges faced in education institution. Besides, lack of commitment by management leaders in the effort of implementing TQM was considered the greatest challenge for a successful TQM implementation (Bugdol, 2020). Furthermore, Rick (2015) stated that changing an organization's culture is one of the most difficult leadership challenges for a successful TQM implementation as it involved an interlocking set of goals, roles, processes, values, communications, and practices.

2.4 SWOT Analysis

The SWOT framework was developed back in the 1960s and early 1970s by Albert Humphrey from the Stanford Research Institute (Leigh, 2009). SWOT which stands for strength, weakness, opportunities, and threat is a form of framework that was widely used to evaluate a business competitive position and to develop strategic business planning (Namugenyi *et al.*, 2019). SWOT analysis assesses internal and external factors, as well as current and future potential. Furthermore, a SWOT analysis is intended to provide for a realistic, fact-based, data-driven assessment of an organization's, initiative's, or industry's strengths and weaknesses. The organization must

maintain the accuracy of the study by avoiding preconceived notions or gray zones and instead focused on real-world scenarios. It should be used as a recommendation rather than a prescription by businesses (Dyson, 2004).

3. Methodology

3.1 Research Design

Research design refers to the framework of market research methods and techniques that are chosen by a researcher. In this study, the researcher used qualitative research design to conduct the study where a case study on a company named ABX Sdn Bhd was selected as the main focus. In this qualitative research design, the researcher concerned with establishing answers to whys and how of the phenomenon in question where therefore making this research as being subjective and not objective, and the findings are gathered in a written format opposed to numerical. The collection of data was primarily from interview session with the company personal positioned as top manager to ensure the answer reflects the company perspective of TQM implementation from the standpoint of the leadership and management of the company.

3.2 Data Collection

The study has been conducted through an online interview with top manager of ABX Sdn Bhd to identify on how TQM is implemented in this metal stamping manufacturing company. Unstructured interview was made with the company representatives but under the topic of TQM implementation such as factors, challenges and benefits from the implementation. Unstructured interviews generate qualitative data through the use of open questions. This allows the respondent to talk in some depth, choosing their own words. This helps the researcher develop a real sense of a person's understanding of a situation. The outcomes from the interview session were analyzed and elaborated in this report with reference on previous literature to assist in the writing process. Besides, the interviewee was asked to rank on several factor of TQM implementation based on her personal judgement on how the company show their commitment in the process of implementing TQM into practice in the company.

3.3 Data Analysis

The researcher had used the descriptive content analysis to examine the data collected from the interview session with the company personal with the aim of summarizing the informational contents of these data with respect to the research question which encompassed on the area of how TQM in implemented in the company, challenges and barriers during the implementation, SWOT analysis based on the implementation of TQM, and others.

4. Results and Discussion

4.1 Rank of Factors Based on Importance

Table 1 shows the ranking of critical success factors of TQM that were implemented in the metal stamping company based on the interview made with the company personnel. Based on the interview with the company representative, management commitment and leadership towards implementing TQM is the most critical success factors towards TQM implementation, followed by total customer satisfaction, employee involvement, continuous improvement, training, communication, and teamwork.

Table 1 Ranking of critical success factors in TQM implementation

Critical success factors	Ranking
Management Commitment and Leadership	1
Total Customer Satisfaction	2
Employee Involvement	3
Continuous Improvement	4
Training	5
Communication	6
Teamwork	7

4.2 Case Study in the Company Based on TQM Implementation

Management commitment and leadership; In the company, management commitment and leadership are demonstrated through the establishment of formalized process within the departments and as a whole business operation. At ABX, frequent meetings among managers and their employees were made to ensure that business objectives and goals are aligned with each other among their workers. Over time and in combination, a leader's commitments shape a business's identity, define its strengths and weaknesses, establish its opportunities. Commitments provide important benefits inside an organization as well. They give employees a clear sense of focus and help them prioritize and coordinate their actions.

Total customer satisfaction; At ABX, they serve numerous customers whether within Malaysia or international customers who looks for metal stamping component products. To ensure customer satisfaction is able to be attained the highest, the company is committed to become the most supportive and reliable vendor, compliance to the customer requirements, and local statutory rules and regulations. Besides, the company also continuously invest in improvement in their product quality through effective implementation of Quality Management System (QMS) and Environmental Management System (EMS) through periodic reviews and active participation of the Management and every employee. Furthermore, it was the policy of the company to provide products and services that meet the continuous needs of its client while ensuring the profitability of its operations.

Continuous improvement; To ensure continuous improvement in the company is able to achieve, the company strongly adhered to the PDCA concept idea in their business processes. PDCA (Plan-Do-Check-Act) is a four-stage iterative method for improving processes, products, and services, as well as addressing problems. It entails methodically evaluating potential solutions, analyzing the outcomes, and applying the ones that have proven to be successful [11]. Through such implementation throughout the business process whether in metal stamping works or in the management office, the company able to ensure that their workers are constantly improving towards a better degree of working culture while ensuring quality outcomes able to be gained.

Training; Another critical factor for successful TQM implementation is training. When it comes to investing in the future of manufacturing firms, the obvious decision is to go all-in on digital transformation to stay competitive. Companies must, however, engage in labour optimization in addition to a digital strategy. And the best way to do it is through a well-planned, strategic manufacturing training programme. The skills gap in manufacturing is expanding, and the workforce isn't entirely equipped for Industry 4.0. A factory training programme is a corporate approach for providing new skills to employees in order to satisfy the demands of their job. Companies develop a curriculum so that employees may get the skills they need to succeed in their professions, increase production, provide a safer working environment, and keep up with technological advancements in manufacturing.

Communication; It serves as a critical connection between all TQM components. The sender and receiver must have a mutual comprehension of each other's concepts in order to communicate. TQM success necessitates communication with and among all members of the company, suppliers, and consumers. In the effort of ensuring communication is effective within the company, they constantly conduct meetings among their managers from different department to ensure their businesses were operating well and in-paced. It is no doubt that problems tend to happen along the way whether with customers or within the business entity, thus, effective communication between the business leaders and their worker are essential to curb the issues in an effective way.

Teamwork; In a manufacturing environment, a strong feeling of collaboration can help to reduce the number of accidents and maintain optimum output. A team's caring approach might help an injured worker regain confidence in his or her ability to return to work. By combining skills and resources, a wider range of complicated challenges may be addressed. Problems are exposed to a wider range of skills, knowledge, and experience. Through participatory decision-making, the strategy fosters morale and ownership.

4.3 Implementation of Quality Control (QC) in Work Process

To further understand the general work process in ABX, an illustration of work process or the company manufacturing flow chart is shown in the following Fig. 1. Based on the figure, once the incoming raw material comes to the company, it will undergo some inspection before it can be stored in the company storage. Then, the material will undergo production setup for mass production. In this stage, various activities involved. It is noted that in each step, there are quality control being done to ensure the product able to meet their highest quality standard. Next, the material will undergo second mass production (if required) to finally produce their finished goods. The finished good will now being packed and will again go under final quality control stages for any scrap, rework and sorting before it goes for delivery to the customer. From the illustration in figure below, the company is highly implemented quality approach in their work process to ensure that the final output or finished goods are in high quality and adhering to the product standards.

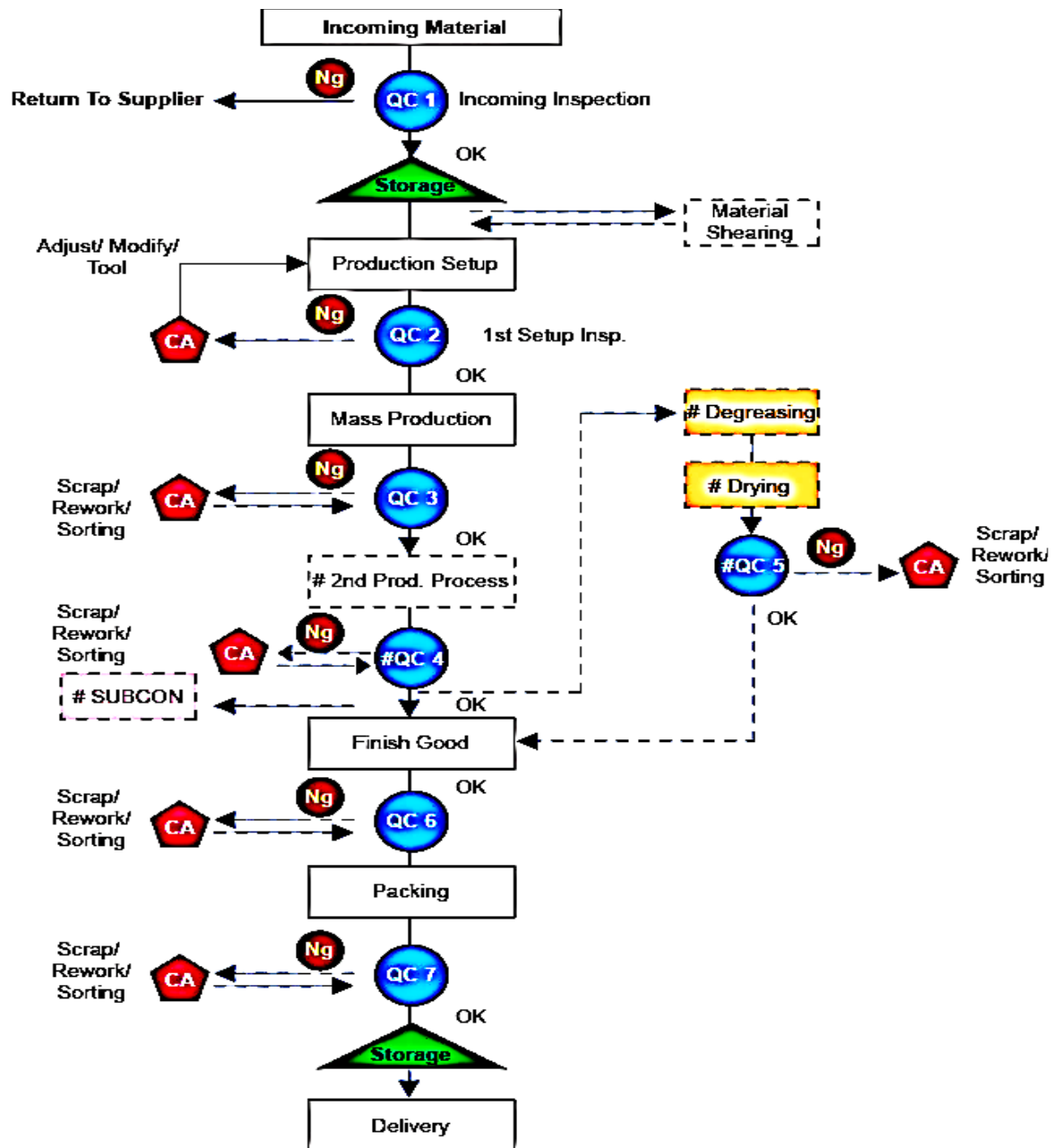


Fig. 1 Process flow in ABX Sdn Bhd.

4.4 Barriers During TQM Implementation

From the interview made with the company’s personnel, there are several challenges that the company had to face in the process of putting total quality management into practice within the business operation. There are 5 barriers identified from the interview which worth to be emphasized in this report for further understanding on the challenges that a business may has to deal when putting TQM into work practice. First and foremost, commitments from the business leaders and management towards the effort of implementing TQM was stated quite significantly. According to Khanna & Sharma (2011), it is the top management that will have to demonstrate their commitment in quality. Sometimes TQM fails due to there being gap between the management’s rhetoric about their intentions to TQM and the reality of implementation. Secondly, lack of continuous training and education also among the barriers in the process of TQM implementation. Based on Beshah & Berhan (2018), without proper TQM training, the whole process is doomed to failure as TQM aims to educate employees and managers to be more positive and committed to the process. Thirdly, inadequate use of empowerment and teamwork also among the barriers. A good teamwork within the company is essential. Without proper empowerment and teamwork within the organization, the business may receive more delay and less effective solution. Teamwork in the organization is vital as it provide more permanent improvements in processes and operations. Besides, poor planning or lack of understanding of TQM will result in poor results

from the implementation of TQM. The reason is because, without a proper plan and goals, the business will work in blind without proper direction and what to expect in future. Thus, industry leaders should pave the way in making a better planning, so that the TQM implementation will results in positive ways to the business. Other than that, the company representative also highlighted on the problem associated with inability to change the organizational culture. An organization's culture is deeply embedded in the system and is therefore extremely difficult to change [16]. Last but no mean least, ineffective measurement techniques and lack of access to data and result are among the problems faced by the company during the implementation of TQM.

4.5 SWOT Analysis Based on TQM Implementation

In this section, the researcher had interviewed the company’s personnel regards to SWOT dimensions through the implementation of the Total Quality Management. The implementation of TQM in a company indeed has its own strengths, weakness, opportunities, and threats that comes along the way for a business who wish to implement and uphold quality culture in their business activity. In instance, the implementation of TQM in the company provides strengths to the company the prospect of high growth, endurance against economic crisis, ability in producing unique products while following the demand of the market and provide the business a simple and approachable management structure to ensure the business quality policy can be attained well as shown in Table 2.

Table 2 *SWOT analysis*

Internal and External Key Factors	Indicators
S: Strengths	High growth
	Endurance against economic crisis
	Unique product
	Simple management structure
W: Weakness	Low awareness of production quality
	Lack of capital
	Lack of work culture
O: Opportunities	Lack of infrastructure facilities
	Increase product prices
	High demand for products
T: Threats	Availability of needed resources
	Imported products
	Competition with large and multinational companies
	Increase in fuel prices
	A political situation that is not conducive

4.6 Discussion

Based on the SWOT analysis, there are several suggestions and recommendations that can be implemented by the metal stamping company in providing ways for a much better quality and continuous improvement culture within the business operation. First and foremost, the strengths that TQM brings towards the business provides an insight for the business leaders in the company to emphasize fore in adopting and creating quality culture into the business practices. It is important for the business leaders or the management of the company to show their commitment in quality approach in the business. This is because, employees need to see clear evidence that the company as represented by the management is genuinely committed towards cultivating quality business environment. In fact, their support is necessary to access resources such as funding for worker training and others. Besides, the company can invest in provide a good quality infrastructure which means primarily sustainable company infrastructure that was designed and created to reduce economic, social, and ecological risks. For manufacturing company that heavily used raw materials made of metal, proper and organize storage is one of the approaches to provide a much conducive working environment. Furthermore, considering the opportunities for higher demands from the market due to quality product produced, the company can further branch out or reaching for a much a higher customer’s market to gain a strong position against their competitor especially from the related metal industry. Last but no mean least, it is suggested for the company to develop a

quality workplace culture which capable to be adhere by most of their workers. This is because, it capable to link the company culture with things like employee engagement, happiness, productivity, retention rate, and more.

This study is important as it allows us to assess the importance of implementing TQM into practice within the business firm for business growth and sustainability. Identification of contributing successful factors towards TQM implementation, allows businesses to focus and invest more in the area that is lacking and requires further attention. TQM has been identified as one of the crucial principles in any manufacturing or service sector as it emphasizes the idea of creating products and service that is done right the first time while adhering to the business quality policy. For ABX, the process manufacturing of metal stamping in no doubt had its significant importance in supplying metal parts for their customers which therefore emphasize the accuracy and quality of the end products for their customers. To attain the business policy, TQM can be referred to and used as the business principle to ensure that the business is entailed and correct position in supplying products and services to their customers and vendors. Besides, this study also signifies the barriers and challenges that one had to face during the implementation of TQM. These challenges to be addressed are capable to help other businesses to understand what to expect when it comes to implementing TQM in the business activity as it can be considered the most common barriers that being faced by most of the businesses around the world who wish to employ quality culture in their business.

5. Conclusion

In this study, we had explored how TQM is implemented in a metal stamping manufacturing company where ABX Sdn Bhd is chosen as the case study and how it influences the business in making decisions while providing the best metal product's quality to their customers while ensuring the quality culture in the company is adhered by the workers. It is well-acknowledged that TQM implementation is capable of bringing tremendous beneficial effects whether to the employees or the organization as a whole. Investment in developing a quality culture in any business is indeed often to cost the management a lot, however, considering the return of investment and how it can help the business to grow and sustain itself in the market especially in the prospect of quality adhering management, the benefits are much higher and more significant. By having all employees focus on quality management and continuous improvement, companies can establish and uphold cultural values that create long-term success for both customers and the organization itself. TQM's focus on quality helps identifies skills deficiencies in employees, along with the necessary training, education, or mentoring to address those deficiencies. From the study, it has been identified that the commitment of management towards TQM implementation was the highest successful contributing factor towards TQM implementation in the company. Thus, for ABX to uphold a quality culture within the business, their management should play their role well and show significant attraction and interest in making quality principles into their work practices while nurturing core values around quality management and continuous improvement.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design:** Md Fauzi Ahmad, Chan Shiau Wei; **data collection:** Md Fauzi Ahmad; **analysis and interpretation of results:** Md Fauzi Ahmad, Chan Shiau Wei, Ahmad Nur Aizat Ahmad, Hamrila Abdul Latip, Nurulizwa Rashid; **draft manuscript preparation:** Md Fauzi Ahmad, Chan Shiau Wei, Ahmad Nur Aizat Ahmad, Hamrila Abdul Latip, Nurulizwa Rashid. All authors reviewed the results and approved the final version of the manuscript.*

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