The Efficacy of Lean Manufacturing on Organisational Performance. A Case Study of Zimbabwean Beverages Manufacturing Companies

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Abstract

The impact of Lean Manufacturing (LM) on organisational performance is an ongoing discussion globally. Zimbabwean companies have implemented LM tools for operational performance across various industries. The Beverage industry has also been identified to be focusing on initiatives such as developing products that are less expensive, sell better and faster for it to remain competitive and reclaiming market shares, sales revenue and profitable in today's global market. The primary goal of this study was to determine the efficacy and viability of lean manufacturing processes at Zimbabwean Beverages production plants. The study used a qualitative research methodology, which yielded in-depth, detailed and rich data from human viewpoints and experiences resulting in a realistic understanding that was interpreted using the participants' social and cultural context. A total of thirty participants were purposeful selected based on their knowledge of the phenomenon under investigation. Physical face-to-face interviews, Ms team interviews, and focus groups responded to semi-structured interviews in data collection. Document analysis was used to collect data. The study found out that Zimbabwean Companies have not fully adopted lean manufacturing because of scepticism from management on the cost involved and the fear of losing jobs by the shop floor workers. The study however unearthed that manufacturing companies would benefit from lean manufacturing principles performance. Overwhelming evidence availed was that by implementing lean tools such as JIT methods, the organizations would be able to cut waste, reduce inventory holding costs and develop supplier relationships. TPM and VSM were found to have the potential to improve productivity and quality. The study recommends that suitable training programs should be designed to provide management with knowledge and skills to apply the positive traits to incorporate the lean concept into the organizations. and through buy-in from shop floor workforce increase company performance.

Keywords: Lean Manufacturing, Just-In Time, Total Productive Maintenance, Value Stream Mapping, Company Performance

Introduction

Lean manufacturing is a philosophy and production process based on the thought of maximising customer value, minimising waste and establishing fast and reliable delivery

systems (Yuik & Perumal, 2020; Majava & Ojanpera, 2017). Lean manufacturing encourages innovation, and easy adaptation to consumer trends The intensity and complexity of industrial manufacturing and the desire for higher efficiency, greater flexibility, better product quality and lower cost have changed the face of manufacturing practice. For organisation to perform well and survive in today's competitive global marketplace, industries are increasingly focusing on their product quality with minimum wastage by use of available resources for better performance. Now more than ever before, competitive market, customers do not just prefer but demand from manufacturers to provide quality products in a timely fashion and at competitive prices. To satisfy customer requirement, manufacturer needs to plan necessary and optimise the use of organisational resources, and waste reduction to meet customer expectations. Numerous scholars have highlighted that the implementation of lean manufacturing results in enhanced productivity, reduced defects, increased efficient delivery times, increased product quality, increased capacity and machine availability which are key drivers to improved company performance (Maware, 2019; Abolhassani, Layfield, & Gopalakrishnan 2016; Chauhan, 2019; Shrafat & Ismail, 2019; Jasti & Kodali, 2019; Cirjaliu & Draghici, 2016).

Lean manufacturing is a production process based on the philosophy of maximising customer value, minimising waste and establishing fast and reliable delivery system. Lean manufacturing encourages innovation, and easy adaptation to consumer trends. The concept stems on the reduction of product variation and reduction in production waste through its element of lean six sigma. Reducing variation ensures product quality and conformity to set parameters and standards while waste reduction will reduce production costs. Goriwondo (2020) and Maware and Adetunji (2019) postulates that there is a relationship between lean manufacturing and company performance. Organisations are considering adopting lean manufacturing in order to gain sustained competitive advantage (Godinho et al., 2016). This has steered many manufacturing organisations to adopt the philosophy of lean manufacturing in order to eliminate waste and enhance sustained competitive advantage. Lean manufacturing can provide the motivation desirable to excel in the production through a variety of quality beverage products at low cost (Melton, 2005; Womack & Jones, 2003). However, according to Mlambo (2017) and Moyo (2017), most of the organisations in Zimbabwe have not yet realised the benefits of lean manufacturing.

The idea of lean manufacturing was first introduced in the middle of the 20th century by Toyota Production System (TPS) in Japan (Ohno, 1998). Its main aim was to improve product quality, reduce inventory cost, eliminate waste and constant optimization of the production process (Ohno, 1998; Womack & Jones, 2003). After its implementation, Toyota Company's revenue and market share grew by more than 10% within ten years, (Womack & Jones, 2003). Toyota company was facing challenges of product cost reduction initiatives, complacency, which had quality problems that weakens their competitive advantage, growth in market share, top-down decision-making gap and losing its position of being the global market leader in the automobile industry (Rogstad 2010; Womack & Jones 2003; Ohno, 1998). According to Ohno (1998), Naicker (2017), Goriwondo (2020) and Mapfaira, et al (2018), adopting lean manufacturing was a turnaround point at Toyota company as it stemmed a drastic improvement in productivity.

According to Alyousef (2019), value stream mapping allowed Toyota to remove nonessential steps that that were not valued by customers while maintaining the production process. Not only Toyota has implemented lean manufacturing, but other global companies use this philosophy and worked well for many years now. According to Williams (2010), Nike is one

of the top international companies where lean manufacturing is producing superior results. Nike's commitment to driving faultless and innovate product design execution is remarkable (Williams, 2010). The organisation has been able to integrate profoundly ingrained lean manufacturing workplace principles with innovation that is cultural norm in the organisation, by making today better (lean) and design the future (innovate). Other international companies which have adopted lean manufacturing include, Kimberley-Clark Corporation, Caterpillar Inc, Intel, Textron, Parker Hannifin, John Deere and Ford. A common set of achievements from these companies are waste reduction, decrease in defects, fuelling growth and innovation. In China embracing lean manufacturing allowed their businesses to increase competitiveness. First Automotive Works (FAW) the prototype of Ford production system and Shanghai Automobile Industry Corporation (SAIC) in China adopted lean manufacturing and introduced Just-in-Time (JIT method and the company managed to reduce work-in-process by 70% (Tong & Huatuco 2018). This enhanced the companies to use cost focus as a tool for sustained competitive advantage. Most companies in China are beating competition globally by producing less cost products and services (Tong & Huatuco 2018).

Erasmus (2020) postulates that organisations in Africa that have pioneered the implementation of lean manufacturing are doing well in terms of growth, shareholder maximisation and customer satisfaction. In his words, Kim-Fay (2019) Managing Director of East Africa Limited, at Retainment Improvement Africa Breakthrough Summit, stated that, "We have been able to reduce wastage in our product process, optimise stocks and reduce frequent machine downtime with lean manufacturing practices". Brahmbhatt (2020) Group Managing Director of Blowplast Limited, in Kenya highlighted that they have been able to reduce inventory holding costs, reduce receivable days and run many costs saving projects through the internal culture of lean manufacturing. Ellis (2018), the managing director of Bolux Milling Group in Botswana, Businge (2018), the Managing Director of Oryx Energies in Uganda indicates that lean manufacturing has been very useful to any organisations that seeks to improve performance, output and profitability.

However, some companies continue to perform badly even after implementing lean manufacturing. Vermaak (2008), Moyo (2017) and Mlambo (2017) concurred that some of the causes of failures of lean manufacturing include resistance to change by employees, high training costs and high capital injections that is required. A good example of lean manufacturing failure is at AMES Engineering South Africa (Alony, 2010). They implemented lean manufacturing and resulted in a shift of costs from production line to administration coupled with high interest rates of borrowed funds which were used to acquire advanced machinery that support lean manufacturing. The rate of adoption in Africa is still very low because of weak capital base and lack of knowledge to realise the effectiveness and positive results that comes through the implementation of lean manufacturing (Moyo 2017; Mlambo, 2017). The Zimbabwean economy has continued to decline over the past ten years (Mlambo, 2017). This has been attributable to high inflation rate, high costs of inputs, foreign currency shortages, poor infrastructure and lack of related and supporting industries (African Development Bank, 2021; World Bank, 2021). This has also led the performance of Beverage industry to decline, sales volumes, for instance at Delta Beverages, the main player, from 58,645 hectolitres a year in 2016 to 45,654 hectolitres a year in 2021, market share decline from 70% in 2016 to 58% in 2021 and profit margins declined from 64% in 2016 to 52% in 2021 and a further reduction to date (Makamure, 2023). Beverage companies have been facing a serious in growth. While there could be a myriad of challenging causing this downward trend in the beverages performance, this study endeavours to look at the effectiveness of lean manufacturing on company performance in the beverage industry. In his address dubbed,

"Legal reforms to buttress 4IR adoption", the Minister of Postal and Courier Services, Muswere (2021) hypothesised that "in this era organisations not taking a lead in implementing lean manufacturing are seen by poor performance, reduction in profit, losing customers, and losing pace to compete and move with fast consumer choices" (Chronicle Newspaper, 19 February 2022). Many industries and sectors are now ambitious to implement lean manufacturing and advanced technology in their value chain processes. Most companies in Zimbabwe are now embracing lean manufacturing, as it is evidenced in the mining companies like Mimosa, Unki Mine and Zimplats who have pioneered lean manufacturing with advanced technology (Moyo, 2017)

In this study, the researchers explored a scenario where Zimbabwean Beverage Manufacturing companies are experiencing a decline in sales, with each year bringing lower of units sold. This is according to the statistics by Beverages Annual Report, (2023). To this date the organisations have lost significantly on the market share and profit margins. Having reviewed some studies, the researchers found that very little research has been carried out on the efficacy of lean manufacturing on company performance in the Beverages sector. Even though the sector is implementing other competitive strategies like promotions (huge discounts), massive advertisements (newspaper, television, road show campaigns), product differentiation and employee retention to re-gain competitive advantage and improve company performance, the organisations are still losing profitability and market share, hence the decision to carry out this study to explore the efficacy of lean manufacturing on company performance. It is envisaged that the adoption of lean manufacturing could be a turnaround strategy hence, the research objectives were to determine lean manufacturing tools that can be used to sustain competitive advantage, explore lean management models suitable for the beverage industry, find out the suitable lean management models to be implemented and find out what strategies these organisations can adopt to enhance the efficacy of lean manufacturing as a model for improved performance.

Research Methodology

This study depended on personal interviews and focus groups discussions from purposively selected personnel with experience and knowledge in the industry. The qualification criteria for participation were that an organisation owned a manufacturing beverage plant and is a well-known established brand that has been in existence for at least five years. The researchers collected data from the respondents in the selected sample as they were key individuals in decision making at their organisations. Through these data generation methods, the researchers were able to interpret the views, feelings and opinions of participants on the subject under study. The advantage was that it encouraged interaction and allowed the facilitator to explore unanticipated issues (Czaja & Blair 2005). Wolfson (2007) said that focus groups create an open discussion and brainstorming that provides understandings into public discourse. According to Montoya (2016), more than 30 respondents in qualitative studies reach a point of saturation and hence the researchers were guided and ensured that they used 30 respondents for the study, thus, to avoid saturation. The researchers prepared an interview guide which consisted of four sections namely opening questions, transition questions, key questions, and closing questions as recommended by (Castillo-Montoya, 2016). To guarantee reliability, trustworthiness and rigour were employed following the dictates of Lincoln and Guba (1985) to ensure credibility, dependability, transferability, and confirmability as this is the norm in qualitative studies. To analyse data, the four-step procedure to content analysis was employed and this included decontextualization, recontextualization, categorisation, and compilation (Bengtsson, 2016). Data was grouped according to their meaning, patterns, and regularities.

Results and discussion

Most of the interviewees indicated that they were familiar with lean manufacturing. For instance, MM1 said that *'lean manufacturing is a kaizen concept aimed at continuous improvement'*. EX1 added that *'lean manufacturing is a production concept designed to reduce waste, improve product quality and increase delivery efficiency'. FGX stated that 'lean manufacturing is a philosophy of advanced manufacturing technology that aims to enhance sustained competitive advantage by improve quality, reducing production waste by eliminating waste and delivery exact product that is needed by the customer'.*

During the data collection phase, the researchers noted that most of respondents had heard about lean manufacturing and hence the credibility of the research was guaranteed. The above responses agree with Maware (2019), Abolhassani, Layfield and Gopalakrishnan (2016) and Chauhan (2019) who coined that lean manufacturing is a concept of production that aimed at improving product quality, reduce defects, increased efficient delivery times so as to enhance company performance. Furthermore, the respondents believed that lean manufacturing has the potential to improve product quality, reduce inventory costs, reduce production waste and optimize company performance.

Focus group discussion concurred that lean manufacturing enhanced competitive advantage of companies through a cost focus strategy, efficiency and innovation. For instance, Moyo (2017), stated that lean manufacturing enhances competitive advantage through the reduction product costs and improved quality. This concurred with Womack and Jones (2003) and Erasmus (2020) who assert that lean manufacturing primarily is aimed to improve quality, reduce waste, improve efficiency, and profitability. Twenty-five percent of the respondents believed lean manufacturing may lead to high fixed costs through depreciation, running and maintenance costs that is associated advanced technology. This is also supported by Al-Janabi (2018), who stated that lean practices are characterised by high technology that requires huge investment in repairs and maintenance.

Data from the respondents showed that majority of management believed that lean manufacturing was advantageous to manufacturing companies while a few believed lean manufacturing was associated with high capital requirements that would be difficult for the organisation to achieve the required rate return. The worker representatives were indifferent on the efficacy of lean manufacturing on company performance, probably due to lack of education. All, in-depth face to face and focus group discussions respondents agreed that Zimbabwean Beverage companies were not fully using lean manufacturing in their value chain processes. Executive management and senior management both agreed that the organisations are hesitant to implement lean manufacturing due to high cost associated with it. All focus groups interviewed reported that the organisations lack management commitment to implement lean manufacturing.

For instance, SM2 assumed that *"collectively as management, I think we lack commitment to explore the effectiveness of embedding lean manufacturing to our business strategy".* This angle which was put forward by SM2 was confirmed by SM3 who stated that: *"We have no budget sacrificed for technical developments towards automation of production systems and innovation. Management is not putting efforts to continuous improvement and innovation".* FGY and FGZ focus groups concurred with other face to face interviews who lamented that the beverages companies were also facing a challenge of poor infrastructure to implement lean

manufacturing. This was emphasized by EX1 who had this to say, *"The railway line which used to feed coal from Hwange Colliery Company is now dilapidated and cannot sustain line philosophy as it requires reliable transport infrastructure".* From the data above, the researchers concluded that there was a critical transport infrastructure to be addressed to successfully implement lean practices. The situation confirms literature by Moyo (2017) who argues that businesses in Zimbabwe are facing challenges of reliable and poor infrastructure (transport, network and electricity) to be able to compete at the global level. The above can be attributed to Al-Janabi (2018), Phogat and Gupta (2018), Moyo (2017) and Goriwondo (2020) studies in that organisation may be faced with lack of management commitment, high implementation costs and lack of technical knowhow to implement lean manufacturing.

The study found out that investment on lean manufacturing may not be promising the required level of returns by shareholders and this might be one of the reasons why the organisations are reluctant to implement the technique. This was further emphasized by EX2 who said that payback period and NPV for lean manufacturing investment might not be attractive to shareholders. The nominal investment amount required for lean manufacturing may not yield the required rate of return hence the reluctance for adoption. This means that the capital investment appraisal for lean manufacturing may not reach the required rate of return by shareholders. On the same issue, focus group (FGX and FGY) discussions revealed that all beverage companies faced challenges of employee resistance if they tried to implement lean manufacturing, an idea reiterated by SM1 who admitted that implementing lean strategies will result in uncertainty among employees as it will be largely automated and results in job losses of some employees. Furthermore, through group discussions (FGZ) data revealed that lean implementation often leads to layoffs and job cuts, making employees perceive these processes in a negative light resulting in employees depending on trade unions support. They further lamented that, trade unions and their worker leadership may mobilise employees to resist if the philosophy will negatively affect them. Information deduced from the above data was that workers fear change (fear of the unknown), and fear change (uncertainty)

The study also sought to establish which lean manufacturing tools the beverage organisations could adopt in order to improve company performance. Management agreed that VSM, JIT, TPM and TQM have the potential to improve company performance. Focus group FGY and FGZ asserted that JIT and TQM are critical tools of operating lean manufacturing. EX2, SM1 and SM4 indicated that the Kaizen concept could be useful. In support of this thinking was ACC2 who stated that: *"The concept of continuous improvement is needed. We cannot be viable if we continue with our traditional way of doing business".* Further to that, SM2 concurred by saying, *"Lean manufacturing cannot be effective without JIT and VSM".* From the data obtained that, management are aware that lean manufacturing can be a turnaround strategy if adopted successfully as all respondents agreed that it leads to continuous improvement. This confirms what the studies by Ezzahra, et al (2018) and Alyousef (2019), found, concluding that, JIT eliminate waste by removing stock holding costs while VSM eliminate waste by removing nonessential steps that are not valued by the customer.

The study also sought to understand how TPM could be used to enhance a sustainable competitive advantage. SM2 explained that manufacturing industry cannot do well if they do not TPM in their practices. This was also confirmed by FGZ who lamented that equipment maintenance ensures the success of on organisation. SM2 revealed that TPM focuses on maintenance of plant and machinery. Furthermore, TPM ensures maximum machine efficiency, factory efficiency and increased capacity utilisation. This was confirmed by EX1 and EX2 who articulated that TPM does not wait for a breakdown in order service and maintain

machinery. They also mentioned that TPM reduce maintenance costs, ensure product availability, reduces accidents at workplace and result in customer satisfaction. These sentiments agree with studies by Mitrogogos (2018) who stated that Total Productive Maintenance is capable of reducing breakdowns, at the same time ensuring customer satisfaction.

The study further sought to find out how JIT practices could improve company operational performance. All the respondents on both in-depth interviews and focus group discussions revealed that they were familiar with JIT practices as an inventory management method in which goods are ordered, received or produced when there is an existing order or demand to fulfil. EX1, ACC1, and ACC2 agreed that revealed that JIT reduces inventory costs, chances of getting expired stocks and frees capital that can be used for other short-term viable investments, at the same time EX1 and ACC1 added that, JIT may result in interrupted production. All focus groups confirmed the same opinions above. These correlated with literature by Al-Janabi (2020), who stated that JIT practices eliminate waste by removing stock holding costs, insurance costs, obsolescence and prevent over production. In pursuit of more details about the efficacy of JIT on company performance, the study requested the respondents to give their views about the efficacy of JIT as a lean tool at their companies. All the respondents confirmed that JIT was not being implemented. Majority of the in-depth face to face interviews revealed that the organisations are missing out on the benefits of JIT practices which include improving company performance by eliminating inventory holding costs that will reduce production costs and enhance costs focus marketing strategy (Perez & Torees, 2019; Chanda, 2017). However, EX1, ACC1 and ACC2 were of the view that JIT will result in stock outs and may affect the business by failing to meet customer orders. This can be attributed to Maldonada-Macia (2016) as well as Phogat and Gupta 4(2018) studies which revealed that JIT increases the risk of running out of stock and put high dependency on suppliers which may be difficult to sustain business in a vagaries economy

The study asked about the likely contribution of VSM on company performance in the beverage sector. The interviewed marketers and managers concurred that VSM is customer centred and may result in improved processes, efficiency, identify waste (unnecessary steps), identify bottlenecks and improve end-product quality. This was further endorsed by focus group FGY who said that VSM means that production is limited to what the customer wants and therefore no room for unwanted products. The above were equally further explained by MM3, who said in her words; *"Value stream mapping enhances customer satisfaction. Customers are health conscious nowadays, as organisations we need to go into the market get what customers expect from us, then develop products as per their expectations, like some customers wants zero sugar drinks".* The above data is in line with literature by Ortiz (2016), who highlighted that VSM helps organisation to identify waste and provide centre point for future growth.

The study further asked what critical success factors and strategies that the Beverages companies could implement to enhance the efficacy of lean manufacturing. EX1 concurred with other respondents who revealed that to effectively implement lean manufacturing, there must be management commitment and leadership buy-in and adequate sponsorship. All the focus group discussions articulated the same thoughts. This confirms the studies by Jordan (2008) and Khoza (2021), who postulates that lean implementation demands change management and must be supported and financed from the top. The study also reveals that change in organisational culture, training and evaluation are critical in the implementation of lean manufacturing. This was revealed by focus groups FGY and FGX and confirmed in-depth interviews. The point was further explained by EX1, who said that that to successfully

implement lean manufacturing it must first be prepared to change organisational culture. Lean manufacturing will bring new ways of doing business. Employees must be equipped with the relevant skills and knowledge to perform as expected". The above sentiments are in line with the studies by Khoza (2021), who postulates that it is critical for any organisation implementing change to have visible management, adopt change management models such as Kotter's 8 step change model, ADKAR change model, The McKinsey 7-S model and Kubler Ross change management framework. EX1 further explains that management must continually re assesses and improve strategies to minimise economic and other waste in the organisation. ACC2 said that the organisation must have performance reviews where actual will be compared to target and variances investigated for timeous correction. EX2 revealed that rewards and recognition from management will encourage employees to put more effort on lean principles on their daily activities. Expressing similar thought was MM2 who said every strategy needs employee involvement and rewards for high performers. many uneducated employees occupying lower grades, and these may resist change. This agrees with Al-Janabi (2018)'s study in which he found that communication was vital for any organisation to successfully implement change, where team members know what must be done and when it should be done. FGZ also indicated that, it is vital to include trade unions, worker leadership and worker representative when introducing lean philosophy as a business strategy and it will ensure maximum support from lower-level employees. This notion confirms literature that says employees can depend on trade unions to address any conflict that arise because of lean implementation, which cannot be resolved by management (Khoza, 2021).

Conclusion and recommendations

Based on the research findings, those with a thorough understanding of lean manufacturing said that it enhances product quality, customer satisfaction, delivery efficiency, product variance, and production waste elimination. However, most organisations did not use lean manufacturing or JIT processes, according to the evidence. Furthermore, the research unearthed that JIT procedures can be adopted to reduce inventory holding costs, avoid rejects or reworks, and focus on creating the correct product for the customer. As a result, JIT is one of the important instruments of lean manufacturing that can help beverage manufacturers to improve their performance. It's also safe to assume that lean manufacturing encourages creativity, innovation, and continual improvement. Furthermore, VSM has not been adopted by Zimbabwean Beverage companies based on the evidence gained from the study, but it has been evidenced that it can be utilized to eliminate waste by eliminating processes in the value chain that are not valued in the customer's perspective. VSM can also assist the company by producing the exact product that the customer requires. Furthermore, it appears that the majority of the respondents believe VSM will have a favourable impact in organisation performance. It has also been discovered that TPM is a critical tool for manufacturing companies to improve operational performance, according to the report. TPM has been cited to increase quality, decreases product shortages, eliminates delays, and ensure that optimum machine efficiency is reached. Furthermore, data obtained shows that TPM lowers machine malfunctions, accidents, and downtime. The respondents' expertise and thoughts on lean philosophy adoption and implementation provide useful lessons that will serve as a guidepost for decision makers and shareholders. Based on the findings and conclusions the study recommends that the beverage manufacturing companies need to fully implement the lean manufacturing strategy. This can be accomplished by integrating lean thinking into a larger business plan. Lean manufacturing has been shown to improve organizational performance based on evidence collected. The adoption goes hand in hand with an emphasis on lean implementation in terms of investment and hence the need for companies to ensure that suitable

training programs are in place to provide personnel with the necessary abilities to operate lean tools and principles. JIT, TPM, VSM, TQM, 5s, Kaizen, and Standard work are some of the tools mentioned. These are critical lean tools and procedures, but employees have little understanding of how they work. It also suggests that there be collaborative worker involvement, which is accompanied by skill development, in order to promote staff retention. Accordingly, organisations should gain top management support and leadership buy-in for implementation projects. Leadership is essential to influence others and guarantee that goals are reached, and objectives are met. In order to inspire, motivate, and influence employees, they must be charismatic in their approach. Leaders must be willing to live a lean lifestyle, and if they do not, the good shift will not spread to their people. Furthermore, the study advises the organizations to guarantee that the urgent need for change is created and communicated before moving on to the implementation stage. This must be clearly stated to employees so that they perceive lean implementation as a necessity. These must be conveyed to employees prior to the start date. The Lean champion must begin sharing and soliciting thoughts and suggestions from shop floor employees. It is also critical for leaders to establish a forum for constructive criticism. The research recommends that the organizations engage unions and worker representatives at all levels to overcome resistance to change. The engagement's goal is to develop commitment, help them comprehend the fundamental topic of the lean program, and replicate the initiative's expected conclusion. The participation of union officials is critical in reaching shop floor employees, as it reduces both overt and hidden resistance. The program's collective ownership should be made explicit, with strategic goals serving as the engine for long-term competitive advantage.

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