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The Role of Organizational Culture in the Implementation of Lean Tools Towards Operational Performance in an Aerospace Company

By

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ABSTRACT

The global marketplace has undergone a significant transition that characterizes industry in the twenty-first century. Delivering high-quality products quickly drives manufacturers to optimize their operations, manufacturing processes, and all potential supply chain nodes. This is due to intense global competition, quick technological change, advances in manufacturing and information technology, and discerning customers. To obtain a competitive edge, the pursuit of this optimization has increased the need for faster product creation, more flexible production, waste reduction, better process control, effective workforce use, and worldwide reach. The purpose of this research is to investigate the role of organizational culture in the implementation of lean tools toward operational performance in an aerospace company. The study is based on a survey conducted and data collected from an aerospace company located in Melaka. 346 targeted respondents from the aerospace company ranging from the executive to non-executive levels familiar with lean were involved in this study. SmartPLS 3.0 software was to test all the hypotheses. The findings indicated that lean tool implementation had a positive relationship with operational performance and organizational culture. However, organizational culture did not show any relationship with lean tools and operational performance. By offering information that will increase the success rate of lean tool implementation or make an aerospace firm more competitive, this study may benefit companies that are currently applying lean tools.

Keywords: Lean Tools Implementation; Operational Performance; Organizational Culture; Aerospace Company

INTRODUCTION

Lean is important to the well-being of organizations owing to its ability to encourage shared leadership and obligation; its stance to instill continuous improvement which guarantees that each employee contributes to the advancement process. This approach

acts as a guide to building an effective and strong organization that is always advancing, recognizing genuine issues, and settling them. According to Simbanegavi and Qutieshat (2022), lean is a significant approach to business as it safeguards competition and achieves better performance. Today the implementation of lean tools inside the delivery scene has been amazingly gathered inferable from its dynamite control in creating burn-through and time interim decrease (Hossain, 2015).

Current research has not yet evaluated the relationship between organizational culture in the aerospace industry and lean tool implementation toward operational performance. Given the paucity of data, a study is required to enable aerospace businesses to comprehend the role organizational culture plays in the implementation of lean tools (Adam et al., 2023).

This study, hence, was to identify any relationship between organizational culture type (Group, development, hierarchy, and rational culture), lean tool implementation (Pull system & Kanban, Total productive maintenance, 5S, Value stream mapping, Kaizen, and Total Quality Management) and operational performance (cost reduction, flexibility, lead time reduction and quality (Nawanir, Lim, and Othman, 2016).

Lean Tools Implementation

This study focused on six lean tools namely, the Pull System & Kanban, Total Productive Maintenance, Kaizen, 5S, Total Quality Management, and Value Mapping Stream to improve operational performance.

The Pull System is a blend of Kanban inventory skills, just in time and other similar systems (Christensen, 2013). It emphasizes the fact that implementing lean techniques is all about cutting waste and providing what is required in a timely manner. It is implied by just in time inventory that attempts are made to satisfy demand as it materializes. Kanban is the size used to establish the level needed to be on hand. It was initially created to execute Just in time manufacturing and control production between processes at Toyota factories in Japan. Kanban size is the amount of merchandise required to avoid production interruptions while in transit (Bednar et al., 2023)

Total Productive Maintenance (TPM) is an initiative, focusing on refining the overall effectiveness of equipment (OEE), including efficiency, quality, and accessibility. (Bamber et al., 1999). Total Productive Maintenance helps to develop a plan to make equipment maintenance (Independent maintenance) ownership of employees. The objective of Total productive maintenance program is to increase production as well as job satisfaction and morale (Bamber et al, 1999).

They rely on the idea that every modification will result in better performance if it is researched and created by teams. Kaizen aims to continually enhance the processes involved in product development (Womack and Jones, 1997). For Kaizen events, cross-functional teams are created to find problems that are generating waste before the problems are assessed and fixed (Modarress et al, 2005).

The major objective of 5S is to decrease time wasted searching for equipment (Patel and Thakkar, 2014). Additionally, it enables staff to maintain a good outlook, operate in an orderly environment, and put an end to negative thinking (working in an irregular workplace). However, it takes time for employees to accept or become accustomed to new items in their workplace to change their perspective.

TQM is a systematic approach to the overall management of an organization. The emphasis is on continually enhancing production quality to achieve high customer satisfaction through continuous improvement of internal practices. The implementation of TQM in all departments enables communications across groups of various specializations from different departments to function as a team (Halim et al, 2019. TQM is normally required to be carried out by all divisions of an organization. TQM, indeed, is a comprehensive approach used in most industries to evaluate continuous improvement and is recognized as a factor that can increase quality.

Value Stream Mapping is often cited as a technique that can be used to decide which tools to use to reduce waste in specific circumstances (Hines and Rich, 1997). By enhancing production flow, lowering inventory, and saving time, the VSM tool may help save expenses. Value stream mapping is intended to assist managers in locating waste in all their operations so that it may be eliminated.

Operational Performance

Cost reduction, quality service, lead time reduction, and flexibility are the key operational performance indicators that distinguish the operational capacities of various firms (Miller and Cardinal, 1994). The components are considered the best overall metrics of operational success in an investigation of the relationship between manufacturing strategy and its impact (Baqlah, 2017).

Cost Reduction is a kind of technique intended to increase an organization's profitability or by hoping to achieve a favorable outcome that benefits the financial statement's bottom line while avoiding significant harm to the business. A smart cost reduction focuses on how to manage an organization's damage because cutting costs is mostly about lowering expenses for the business. Additionally, it is said that cost reduction increases an organization's profitability because doing so results in higher earnings with no additional modifications needed (Elston et al., 2018).

Quality Services To enhance performance it is crucial to provide high quality services. Organizations can achieve this by gaining an understanding of customer expectations incorporating quality considerations into the service delivery process effectively managing information implementing the principles of Total Quality Management and encouraging innovation. By doing so, they can enhance service quality and overall operational performance.

Lead time reduction is a crucial component of process improvement since it inevitably raises the topic of how to eliminate waste, unneeded tasks, and waiting times from various processes (Skhmot, 2017). We can concentrate our improvement efforts by searching for possibilities to cut down on lead times. The process will be better

controlled if lead time is cut by decreasing waste and waiting time since lead time reduction can also cut down on lead time variance. Therefore, from the perspective of the consumer, there is a double positive effect: in addition to lower lead times, delivery accuracy often also improves.

Flexibility refers to lean tools' capacity to react quickly and cost-effectively to shifting production needs and requirements (Kaschel et al., 2006). Given that lean tools do work in highly changeable and unpredictable situations, this skill is becoming more and more crucial for the design and operation of lean tools. System designers and managers must be aware of the many types of flexibility and ascertain how much flexibility is necessary to achieve a particular level of performance. According to Stevenson (2012), flexibility is the capacity to adapt to change. Product, volume, routing, equipment, labor, and supply changes could also occur. It might also demonstrate how responsive, flexible, and agile a company is.

Organizational Culture

Organizational culture might be characterized as fundamental assumptions, principles, and modes of communication that affect the social and psychological climate of an organization. In short, organizational culture is “the way things are done around here” and is divided into Development, Group, Rational, and hierarchy (Salma et al, 2019).

The common values, opinions, and conduct of a group of individuals inside an organisation is referred to as group culture. Although the search results do not offer a thorough analysis of group culture, they do indicate that group culture can impact the success of implementing lean tools (Salman et al., 2019).

Development culture refers to an organizational culture that focuses on improvement, flexibility, growth, innovation, and adaptation. The search results suggest that development culture can impact the success of implementing various strategies and practices, such as TQM, new product exploration, and collaborative governance reform. A culture that can adapt to changes and promote innovation is essential for successful implementation (Salma et al., 2019).

Rational culture is characterized by a dynamic and creative working environment. The leaders play a role as innovator, entrepreneur, and has a visionary leadership. The success of the organization is defined within the quality improvement strategy which includes surprise and delight, creating new standards, anticipating needs, continuous improvement and finding creative solutions (Salma et al., 2019).

Hierarchical culture is characterized by a formalized and structured work environment. Procedures play a key role, even decide what people do. Leaders play a role as coordinators, monitors, and organizers. Efficiency, timeliness, consistency, and uniformity are the values that are crucial in this culture. Success can be gained by means of error detection, measurement, process control, systematic problem solving, and quality tools (Salma et al., 2019).

METHODOLOGY

The choice of research approach naturally depends on the defined research problems and the data needed to solve them. In this study, after comparing two research approaches, a quantitative approach has been chosen. Researchers have reviewed the related literature and thereby forming our research hypotheses. Researchers are trying to explain the link between lean tool implementation, operational performance, and organizational culture adoption with numbers and based on the data that can be quantified.

The questionnaire is composed of three sections, which include 72 objects designed to measure three main structures. The first construct is linked to the introduction of lean tool implementation, the second construct is operational performance, and the third construct is correlated with the organizational culture. Before describing the three sections, the questionnaire included a summary letter clarifying the intent of the study, stating that participation is voluntary and ensuring the participant's privacy and that the answers are confidential.

This research has utilized simple random sampling to collect the data. Simple random sampling is an extensively used sampling method in scientific research. Simple random sampling is selected for populations that are highly homogenous, where the members of the research are randomly selected to participate in the research (Bhardwaj, 2019).

Based on this research, the overall population is 3500 employees, which was identified by the CTRM human resources department. As mentioned earlier, sample random was adopted to select the sample of respondents. Based on the Krejcie and Morgan table, the targeted sample is 346. The researcher distributed the questionnaire to 670 respondents to achieve the objective of the research. Out of 670 questionnaires distributed, 354 were returned, and 346 were used for the final analysis. The questionnaires were distributed for 4 months to respondents in CTRM.

The procedures applied to analyze the data to tackle and answer research questions and hypotheses in this study range from correlation analysis to an advanced analysis using SEM. This study applied structural equation modeling (SEM), as it allows us to include unobservable variables that are measured indirectly by indicator variables. SEM via SmartPLS version 3 was engaged in examining the research questions and evaluating the proposed hypotheses. These methods of statistical analysis will be further described in the subsequent sections.

DISCUSSION

The bootstrapping technique can be used to determine t-values, standard errors, p-values, Beta coefficients, and confidence intervals, to evaluate the smartPLS 3.0 estimation results. It is to assign a level of significance to each hypothesized relationship (Hair et al, 2017). To determine the hypothesized relationships between the variables, the bootstrapping technique in Smart PLS software was used to ascertain the t- value for the path coefficients in this study. The relationship between the variables was deemed essential as it would affect the decision making of a business. Figure 6

shows the outcome of the structural model with t-values for each relationship.

The research model recommends three hypotheses among the variables. Hypothesis 1 (H1) states that Lean Tool implementation has a significant effect on Operational Performance. Figure 6 clearly shows 0.720 of path coefficient and 0.000 of p-value, with p-value < 0.05. These values indicate that hypothesis H1 has been accepted.

The results of the present study provide further confirmation of earlier studies (Khanchanapong et al, 2014). The implementation of lean tools is an effective strategy for realizing strategic goals at the operational level (Singh and Ahuja, 2014). Several authors have put forward several rational considerations (Abdel-Maksoud et al, 2005). Lean tools are often used in a workshop and linked to an operation (Rahman et al., 2010). Operational performance is reflected by some internal properties within a manufacturing system that are influenced by the production practices implemented (Bartezzaghi and Turco, 1989).

Hypothesis 2 (H2) states that Lean tools implementation has a significant effect on organizational culture. Figure 6 demonstrates the outcomes for the structural model, showing that the organizational culture's path coefficient for lean tools is 0.416 with p-value of 0.000, with p-value < 0.05. Hence, H2 is accepted.

The interplay between the use of lean tools and organizational culture is especially difficult since different countries have different traditions, labour densities, and levels of development, industrialization, education, land expenses, and other issues (Chang and Lee, 1995). When deploying lean tools, businesses should take these concerns into account (Chen and Tan, 2011). As a prerequisite to the use of lean tools, cultural support for their deployment is advised (Puvanasvaran et al, 2014). The aerospace sector is undergoing unprecedented change and for a company to survive in this competitive environment, it must raise quality while lowering costs (Aragon-Sanchez et al., 2003). Industry leaders are embracing lean tool implementation to retain and improve competitiveness because of the current environment (Crute et al, 2003).

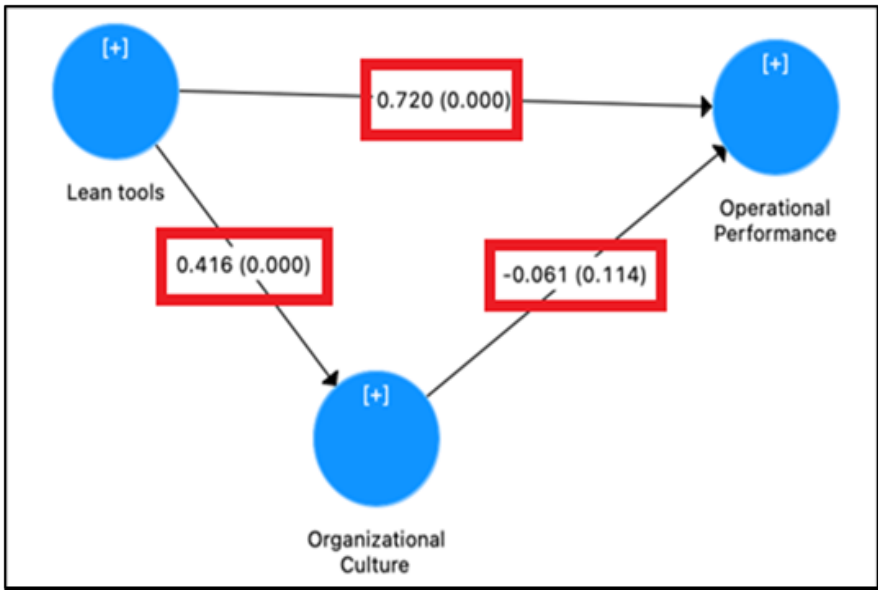

Figure 1: The structural model with t-values

Moving forward to hypothesis 3 (H3), it states that Organizational Culture does not have a mediating effect on the relationship between Lean Tools implementation and Operational Performance. The path coefficient in Figure 6 of Organizational Culture → Operational Performance is reported as -0.061 and the p-value is 0.114, with p-value < 0.05. Hence, hypothesis H3 has been rejected.

There is evidence from research indicating there is a positive correlation between organizational culture and operational performance (Cura, 2018). However, some recent empirical evidence has suggested that there is no such link between operational performance and organizational culture, and the result is somehow consistent with the argument (Leithy, 2017). There is no evidence for the claim that there is a link between operational performance and organizational culture (Rashid and Shah, 2016). Furthermore, both work-related attitudes and work behaviour are linked to organizational performance, and the structural equation model appears to have erased the link between operational performance and organizational culture (Nikpour, 2017).

CONCLUSION

In conclusion, this study utilizes six lean tools to investigate the relationship between organizational culture type (group, development, hierarchy, and rational culture) and the deployment of the six lean tools (Pull system & Kanban, Total productive maintenance, 5S, Value stream mapping, Kaizen, and Total Quality Management). The findings yield that lean tool implementation has a positive relationship with operational performance or organizational culture. However, organizational culture does not show any relationship with lean tools and operational performance. These results offer managers some useful perspectives on how to improve the quality and productivity of their operational performance. The aerospace corporation may take actions to lessen machine setting time, machine downtime, and waste because of regulation, policy, and control.

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