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Research Article

The implementation of lean tools toward operational performance in aerospace company

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ABSTRACT

The aim of this study was to investigate the relationship between lean tool implementation and operational performance, mediated by organizational culture in Aerospace Company. The aerospace company's 346 targeted respondents, who ranged in level from executive to non-executive and were knowledgeable about lean activities and operational performance, were surveyed using a questionnaire built on a Likert-scale rating system. 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 and make an aerospace firm more competitive, this study may benefit companies which are currently applying lean tools.

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

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1. INTRODUCTION

The Toyota Production System (TPS), which is considered to be its successor, is credited with first introducing lean tool implementation. TPS was the first system to function in accordance with the principles of lean manufacturing. Lean tools have been adopted by many businesses, particularly those in the aerospace sector, but not all have yet been successful. Today, the lean tool implementation inside the delivering scene has been amazingly gathered due to its dynamite control in creating burn through and time interim decrease (Hossain, 2015). By getting rid of any asset utilization that is inefficient or does not add to the value aim, lean tool implementation lowers cost in terms of process and approach (Skhmot, 2017).

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.

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This study, hence, was to identify any relationship between organizational culture type (Group, development, hierarchy, and rational culture), lean tools 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.

1.1. Lean Tools Implementation

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

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.

Total Productive Maintenance (TPM) is an initiative focusing on refining the overall effectiveness of equipment (OEE), including efficiency, quality, and accessibility. 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 a better performance if it is researched and created by teams. Kaizen aims to continually enhance the processes involved in product development (Womack & 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 & Thakkar, 2014). Additionally, it enables staff to maintain a good outlook, operate in an orderly environment, and put an end to negative thinking (working 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 & 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.

1.2. Operational Performance

Cost, quality, delivery, 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).

1.3. 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 that is including surprise and delight, creating new standards, anticipating needs, continuous improvement, 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 a coordinator, monitor, and organizer. 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).

2. DISCUSSION

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 of this study. The relationship between the variables were deemed essential as it would affect the decision making of a business. Fig. 1 shows the outcome of the structural model with t-values of 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. Fig. 1 has clearly shown 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 & 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 & Turco, 1989).

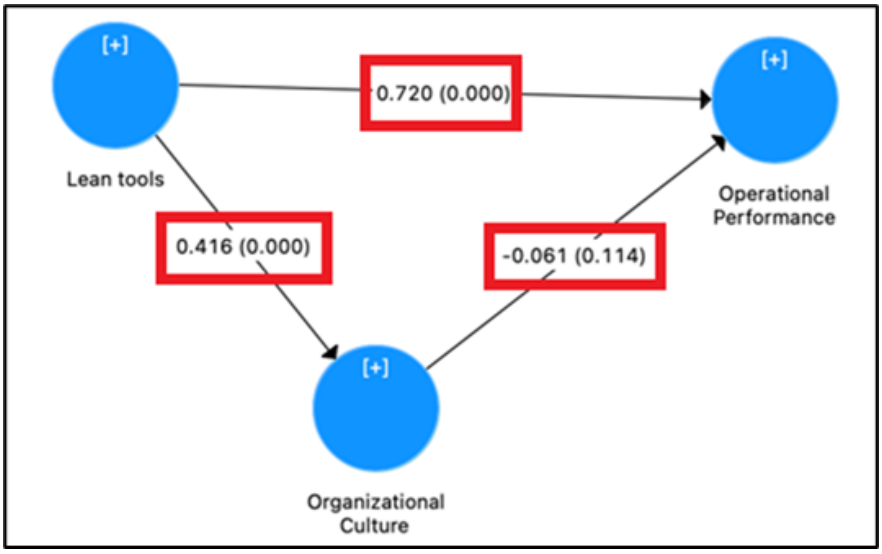

Fig. 1. The structural model with t-values

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Hypothesis 2 (H2) states that Lean tools implementation has a significant effect on organizational culture. Fig. 1 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 & Lee, 1995). When deploying lean tools, businesses should take these concerns into account (Chen & 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).

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 Fig. 1 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, the result is somehow consistent with the argument (Leithy, 2017). 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).

3. 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 and 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 the regulation, policy, and control.

Author Contributions:

Farah Nadhirah Md Lazi, conceptualizing the research idea, designing the study and overseeing the data collection process. Suraya Ahmad, was involved in data collection and analysis. Muhammad Imran Qureshi, contributed to the data analysis and interpretation of the results. Additionally, he contributed to revising the manuscript critically for important intellectual content.

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