

Issues Faced by Micro Businesses during COVID-19: The Integration of Lean Practices and TRIZ

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Abstract: This research illustrates the importance of micro-businesses in Malaysia and the country's economy. This is followed by the issues they face during COVID-19, including supply chain disruptions, profit loss and challenges in gaining financial aid, adjusting to online business, and retaining workers' motivation. To address these obstacles, the use of lean practices and TRIZ (Theory of Inventive Problem Solving) methodologies was suggested. Furthermore, past research on the issues that micro businesses face during COVID-19 and lean practices and TRIZ's potential to solve these issues are reviewed. Data collection will be conducted through semi-structured interviews, focus groups, observation, and document analysis, followed by data analysis through the thematic analysis method. Based on the qualitative analysis results, a model was suggested to demonstrate the association between the key themes emerging from the data. As the study unfolds, it is expected to unveil how lean practices synergize with TRIZ methodologies, enabling a dynamic and holistic response to the multifaceted challenges posed by the COVID-19 pandemic. By strategically aligning these two potent strategies, the model is poised to illuminate pathways toward enhanced operational efficacy, resilience in the face of supply chain disruptions, creative adaptation to the digital realm, and the nurturing of workforce motivation and engagement. As a conclusion, the integration of lean practices and TRIZ helps Malaysia's micro businesses enhance their operations and adjust to the issues in the current economic environment after COVID-19.

Keywords: *Micro Business, COVID-19, Lean Practices, TRIZ.*

1. Introduction and Background

The COVID-19 pandemic has led to unpredictable issues in micro-businesses in terms of financial sustainability, supply chain disruption, and workforce management (Sharma & Rai, 2023). Also known as micro-enterprises, micro-businesses denote small businesses with less than five employees and comparatively low capital investment. Nevertheless, these businesses have been essential in the global economy for many years as they create jobs, strongly contributing to employment, income, and economic growth. Overall, they are regarded as the backbone of the economy.

The World Bank (2020) stated that micro, small and medium enterprises (MSMEs) account for 90% of all enterprises, up to 50% of total employment, and 33% of GDP in numerous developing nations (Kilb & Mcwhirter, 2022). Based on the Small and Medium Enterprise Development Corporation (SMEDEC), micro-businesses in Malaysia constitute 98% of all registered businesses in Malaysia and over a third of the nation's employment. Micro businesses are crucial for Malaysia's economy (Andreastika et al., 2017). These businesses are also responsible for encouraging a stable economy and curbing unemployment. Currently, the government of Malaysia has applied a wide range of initiatives to aid the development of micro-businesses through financial assistance and training programs. These businesses have been targeted to increase the nation's GDP to 30% by 2020.

In Malaysia, micro businesses account for a large part of the economy, specifically 97.3% of all business establishments in 2019 (Seman et al., 2019). However, they receive a strong impact and obstacles from

COVID-19, which the government aims to manage. A decrease in profit is among the main issues in micro businesses during the pandemic. Specifically, the service and retail sectors have faced a decrease in demand after movement restrictions and decreased spending (Vinberg & Danielsson, 2021). The profit decrease is also attributed to lockdowns, which have disrupted business operations and services to customers. A study conducted by the small and medium enterprise development corporation (SMEDEC) in 2020 reported that micro businesses were the most affected group by the pandemic, with the majority reporting a decline in sales and revenue. Furthermore, the limitations in financial and technical resources lead to difficulties for micro businesses in adjusting to the changing market conditions and implementing successful approaches to manage crises (Devins et al., 2005). Despite the introduction of government support programs to financially aid the affected businesses, the program uptake is insignificant due to bureaucratic procedures and low awareness among micro-business owners (Topimin & Hashim, 2021).

Addressing the aforementioned issues, scholars and practitioners have proposed innovative solutions to assist micro businesses in recovering from the crisis (Fabeil et al., 2020). An example is the integration of lean practices and TRIZ, which are problem-solving methodologies implemented in many industries (Slim et al., 2021). Specifically, lean practices aim to identify and eliminate waste in business procedures, while TRIZ (Theory of Inventive Problem Solving) is a systematic innovation method emphasizing the application of inventive principles and patterns to mitigate complex issues (Al'tshuller, 1999).

Notably, the successful use of lean practices and TRIZ has taken place in many industries, including SMEs. Lean practices have been shown to boost effectiveness, cut costs, and improve consumer satisfaction in small and medium-sized firms (SMEs). Meanwhile, in another study conducted by Anuar et al. (2023), several SMEs have begun to enhance their operational performance by beginning a lean transformation, which takes a long time to effectively accomplish. Furthermore, the use of TRIZ has been found to improve innovation and product creation in SMEs (Caldera et al., 2019),

The integration of lean practices and TRIZ allows micro businesses to address the issues after COVID-19. To illustrate, lean practices assist in the optimization of procedures and reduction of costs, while TRIZ could offer a structured framework to innovatively identify and solve complex issues (Caldera et al., 2019). Despite the wide use of lean practices and TRIZ by many industries to increase effectiveness, decrease waste, and encourage innovation, there is an inadequate exploration into their implementation in the micro business context in the COVID-19 pandemic.

Besides, there is limited literature exploring the possible advantages of integrating lean practices and TRIZ for micro businesses during the pandemic. The issues faced by Malaysian micro-businesses during COVID-19 require further research. Thus, this research aims to investigate these issues and suggest an integration of the aforementioned methodologies to reach a solution. Following the extraction of empirical data from Malaysian micro businesses, this research aims to contribute to the literature on crisis management in micro businesses and offer practical suggestions for business owners and policymakers.

This review presents two contributions. Following the review of previous studies regarding the issues faced by micro-businesses in COVID-19, it is hoped that effective approaches to restoring these businesses could be identified. Overall, this review helps scholars gain a better understanding by integrating lean practices and TRIZ and improving micro businesses' operations and adaptability to the challenges in the current economic environment caused by COVID-19.

Therefore, the objective of the study is to unfold in a sequential manner, commencing with a thorough exploration of the existing literature pertaining to lean practices, TRIZ, and the micro business landscape in Malaysia. The structure of this article begins with a review of the existing literature on lean practices, TRIZ, and micro businesses in Malaysia. This is followed by the methods, research limitations, future research, and conclusion.

2. Literature Review

Lean Practices: Lean practices were originally proposed by Taiichi Ohno, an engineer at Toyota Motor

Corporation, in the 1950s (Ohno, 1988). Ohno developed the concept of "Lean" as a way to improve efficiency and reduce waste in manufacturing operations. He observed that most manufacturing processes were filled with waste and inefficiencies, and he developed a set of principles and techniques to eliminate this waste and improve productivity. Subsequently, Ohno's ideas went through formalization and gained popularity under the name "lean manufacturing" and have been utilized in numerous industries around the world (Shah & Ward, 2003).

Lean practices have been applied to other sectors and industries, such as healthcare, service industries, construction, and the government. The concepts of this methodology can be applied to any companies or sectors that are targeted towards effectiveness, waste reduction, and higher value for customers. The extension of lean practices to other sectors is mainly attributed to its status as a management philosophy that could be implemented in all categories of companies, notwithstanding the size or industry (Akanmu et al., 2022).

Currently, the interest in the use of lean practices in micro businesses has increased. It was found that its use could increase effectiveness, productiveness, and consumer fulfillment. Given that the use of lean practices in micro businesses is not a clear procedure, a number of issues were detected (Caldera et al., 2019). Several research works recorded limited resources and capacity in micro-businesses, leading to challenges in applying lean practices. Besides, the knowledge of lean practices among micro business owners is lacking, making the sustainability of lean practices challenging.

Value Stream Mapping (VSM) is one of the primary lean practices for visualizing and analyzing the flow of materials and data in production. The VSM could assist in the identification of bottlenecks and enhance the aforementioned flow. Another key lean practice is Kanban, which is a pull-based production control system employed to control this flow. Notably, Kanban could enhance the responsiveness and effectiveness of the production. Apart from that, Total Productive Maintenance (TPM) is another lean practice that could be applied for improved performance of production processes. TPM is a maintenance strategy that involves all workers in maintaining the tools and amenities. According to Ahmad et al. (2016), TPM could increase the availability and performance of the tools, decrease downtime, and improve product conditions.

To address the issues and increase the performance of micro-businesses, several research works suggested adapting lean practices to the demands and limitations of micro-businesses. This adaptation could include simplifying lean practices, providing training and support, and workers' involvement in the application. The implementation of lean management in SMEs recorded that lean practices increased the productivity, standard, and consumer fulfillment in these categories of companies (Burawat, 2019).

The literature on the application of lean practices in SMEs was reviewed, leading to the finding that these practices made the same improvements in the aforementioned aspects in these categories of companies (Acahanga et al., 2006). In investigating the association of lean practices and organizational performance, a wide range of methodologies was used in these research works, such as survey research, case studies, and systematic literature reviews. It was suggested from the results that the application of lean practices could improve supply chain management, operational performance, service delivery performance, effectiveness, standard, and lead time. However, among the challenges in implementing lean practices in healthcare are resistance to change, inadequate management support, and limitations in resources.

It was suggested from the research that consumer fulfillment could moderate the association of lean practices and service delivery performance in hotels. Following that, lean practices could improve organizational performance in small and medium-sized enterprises. Overall, the results indicated that the implementation of lean practices could significantly improve numerous industries, although the barriers to this implementation should be taken into account.

Theory of Inventive Problem Solving (TRIZ): The Theory of Inventive Problem Solving (TRIZ) was created by Genrich Altshuller, a Russian engineer and inventor, in the 1940s and 1950s (Esad & Cicek, 2023). Based on Altshuller's observation, common solutions to numerous technical issues are present, which were identified through the development of a systematic method (Altshuller, 1999). This was followed by the

identification of patterns and concepts applicable to solving various issues not only in the technical areas, but also in business, management, and other areas. After going through formalization as TRIZ, this methodology has been largely employed in numerous industries around the world.

The use of TRIZ could enhance the quality of manufacturing procedures by decreasing inadequacies, improving the condition, and boosting productivity. The effective integration of lean practices and TRIZ could be achieved through improved performance of small and medium-sized enterprises (SMEs) (Sojka, & Lepšík, 2020). It was found that this integration could lead to SMEs' improvement in terms of operational productivity, reduction of cost, and increase in profit. Meanwhile, Feniser et al. (2017) research found that applying TRIZ in SMEs could increase the company's innovation performance by producing new ideas and enhancing product design.

The contradiction matrix is among the primary instruments in TRIZ, which is employed for identifying and analyzing the main cause of an issue. In this case, the requisites or factors leading to the issue are identified. Based on a study in the Journal of Engineering Design, a contradiction matrix could enhance the condition of the problem-solving procedure and the efficacy of the produced solutions (Esad & Cicek, 2023). The 40 Inventive Principles is another instrument in TRIZ, which is a set of concepts that could be applied to develop new solutions to the corresponding issue. In addition, the use of these concepts could develop more innovative and successful solutions in comparison to traditional problem-solving approaches (Shie et al., 2022). Besides, the use of TRIZ-based heuristic models, Axiomatic Design, and other TRIZ tools was found to be effective in identifying and resolving contradictions, generating innovative ideas, and enhancing the overall system performance.

In summary, TRIZ is a problem-solving methodology that can help individuals and companies seek issues to be solved creatively and effectively. It comprises a set of instruments and approaches, including the contradiction matrix and 40 Inventive Principles that have been proven to successfully generate more efficacious and functional solutions in comparison to traditional problem-solving approaches.

Micro Businesses in Malaysia: The history of Malaysia's micro-businesses could have originated from the early phase of the nation's economic growth. In the 1950s and 1960s, the Malaysian government initiated an economic growth program to increase industrialization and reduce the reliance on exports of raw materials. This program subsequently contributed to the development of SMEs, which is crucial in the nation's economic growth.

In the 1970s and 1980s, the government provided continuous support to the development of SMEs through diverse programs and guidelines. These initiatives emphasized improved access to finance, training, and market prospects for SMEs (Rashid et al., 2022). In the 1990s, the government presented a new policy framework for supporting the growth of SMEs. This framework also highlighted the significance of SMEs as the primary factor leading to economic development and employment. Besides, the government made various measures to improve SMEs' competitiveness (Afsharghasemi et al., 2013)

In recent years, the Malaysian government provided continuous support to the development of SMEs and micro businesses through a wide range of initiatives. To illustrate, the government has aimed to boost the contribution of micro businesses to the nation's GDP to 30% by 2020 (Zaidi et al., 2023). This is followed by the implementation of diverse policies for supporting the development of micro-businesses by offering financial assistance, training programs, and market opportunities offered by Small and Medium Enterprises Development Corporation (SMEDEC)

Notably, the Malaysian government has carried out its crucial responsibility in supporting the development of the nation's micro businesses. The government's support to these businesses is provided through the following methods:

- Financial assistance: The Malaysian government has held numerous financial assistance programs to support the development of micro-businesses. To illustrate, the government offers loans and grants to micro businesses through establishments including the SMEDEC and Malaysia External Trade Development Corporation (MATRADE)

- Training and development programs: The Malaysian government has conducted numerous training and development programs for the development of micro-businesses. To illustrate, the government offers training programs through establishments including the National Entrepreneurial Group Economic Fund (TEKUN) and MATRADE.
- The government also offers access to training and development programs for the improvement of these businesses' expertise and competitiveness. This initiative is fulfilled through numerous training programs in the accounting, marketing, and business management fields.

It is also noteworthy that the micro business sector in Malaysia is progressive, which is attributed to diverse elements, including economic conditions, guidelines, and technological developments. Thus, taking the most current data and research into account is crucial in investigating the micro business sector in Malaysia.

Toyota Production System House: The Toyota Production System (TPS) House is a model created by Toyota Motor Corporation, which represents its production system (Ohno, 1988). The model consists of two pillars, namely Just-in-Time (JIT) and Jidoka, followed by a basis of constant enhancement (kaizen) and respect for individuals (Chiarini et al., 2018). JIT emphasizes the production of goods or services in the needed amount at the required time, while Jidoka emphasizes the identification of inadequacies and halting the production line to avoid the production of defective goods. Furthermore, there has been wide adoption of TPS House by manufacturing organizations worldwide to enhance effectiveness, decrease waste, and increase the standard (Liker & Morgan, 2006). Its concepts are also applicable to non-manufacturing industries and micro businesses, specifically in the COVID-19 pandemic.

By combining lean practices including JIT and Jidoka with TRIZ (Theory of Inventive Problem Solving), micro businesses could enhance their procedures and recognize new prospects for development in the pandemic. Lean practices could also assist businesses in reducing waste, improving productivity, and responding to changing demands, while TRIZ could assist businesses in generating innovative solutions to complex issues (Azadegan et al., 2013).

In conclusion, the TPS House offered a valuable framework for micro businesses' adaptability to the obstacles emerging COVID-19 pandemic. The integration of lean practices and TRIZ allows micro businesses to increase their strength and competitiveness in a frequently evolving business environment.

3. Research Methodology

To maintain the exploratory and subjective nature of this study, an interpretive approach was employed, making the engagement with the actors important in gaining an understanding of the meaning. Kaptein and Dalen (2000) stated that exploratory studies are suitable for interpretive investigation, with actors being highlighted in the phenomena investigation.

Qualitative Research Design: This research employed a qualitative research design to determine the obstacles of micro-businesses during COVID-19 and suggest the integration of lean and TRIZ to solve issues in micro-businesses. A qualitative research design is suitable for this research as it enables a thorough investigation into the experiences, viewpoints, and meanings of the respondents. Notably, this method is effective in gaining an understanding of a complex situation that aims to further understand the subject under study instead of testing a hypothesis. The selection of this approach was attributed to the delicate subject matter of philosophical beliefs and this research nature.

Sample and Data Collection: Participants will be involved through purposive sampling, ensuring that they have undergone the situation under study. The inclusion criteria comprised the development of micro-businesses of over one year, the business registration under the Companies Commission of Malaysia, and its location in the Northern Region. Another factor considered in the selection of subjects is the level of knowledge or experience, availability for interviews, willingness to participate, and ability to communicate freely and truthfully. Data will be collected through semi-structured interviews, focus groups, observation, and document analysis. This process was audio-recorded and transcribed verbatim.

Data Analysis: The data will be analyzed through a thematic analysis approach. Thematic analysis is a flexible and iterative process that involves the identification and organization of patterns and themes in the data. Furthermore, the analysis involves the following steps: (1) familiarising with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report (Vaismoradi et al., 2013).

4. Proposed Model

Based on the findings of the qualitative analysis, a model is proposed to illustrate the relationships between the key themes emerging from the data. The model is an integration of lean practices and TRIZ to offer a visual representation of the condition under study.

The Integration of Lean and TRIZ: The integration of lean practices and TRIZ for the improvement of micro-businesses could be made in the following ways:

- Lean practices are focused on identifying and eliminating waste in business processes, which may include unnecessary steps in production, excess inventory, or excessive production. Meanwhile, TRIZ is a problem-solving methodology involving inventive concepts to seek solutions to complex issues. The integration of lean practices and TRIZ allows micro businesses to find waste and employ TRIZ concepts to seek innovative solutions to remove it.
- TRIZ could also be employed to find possible roadblocks in the implementation of lean practices. To illustrate, when a micro business is facing challenges in carrying out lean manufacturing procedures due to limited space, TRIZ could be employed to seek inventive solutions, including the reconfiguration of the workspace or the implementation of a virtual manufacturing procedure.
- Lean practices and TRIZ could also be combined to improve quality control. Lean practices emphasize continuous improvement and waste reduction, while TRIZ could be used to identify and eliminate sources of defects or quality issues in a product or service.
- Another method of integrating lean practices and TRIZ is the use of lean principles to streamline processes, while TRIZ is used to identify opportunities for innovation. To illustrate, a micro business could employ lean principles to reduce the time taken to produce a product, followed by the use of TRIZ to identify the methods of adding new features or functionality to the product to distinguish it from competitors.

The integration of lean practices and TRIZ could increase the efficiency, innovation, and competitiveness of micro-businesses in their respective markets. By combining the focus on waste reduction and continuous improvement with the problem-solving principles of TRIZ, micro-businesses can seek innovative solutions to complex problems and improve the quality and streamline processes.

5. Conclusion

This study aims to propose an effective method to address the challenges of micro-businesses and propose an integration model of lean practices and TRIZ to address the challenges in micro-businesses in SMEs. Lean practices and TRIZ are the methods with the potential to solve some of these challenges. Given that many of the issues faced by Malaysian micro-businesses during the pandemic have led to the loss of sales and profits, this situation has a particularly negative impact on micro-businesses. To illustrate, obtaining financial assistance is a challenge as government assistance programs were created primarily for large businesses and SMEs, leading to the difficulty faced by many micro-entrepreneurs in accessing them. Furthermore, micro businesses with inadequate digital skills, technologies, and infrastructure for selling and delivering services online are struggling to adapt to the online business environment. They also find the procurement of goods and parts needed for operation challenging due to the supply chain disruptions caused by the epidemic. This is followed by challenges in maintaining employees' morale due to many of them facing unemployment or being forced to work from home.

The theoretical and managerial implications of this research are significant for micro businesses operating during COVID-19. The expected results of this research offer noteworthy insights into the obstacles in micro businesses and provide guidelines for addressing these obstacles by integrating lean practices and TRIZ. This

study involved both managerial implications for micro-business managers and theoretical implications for studies on innovation and business resilience. The practical and theoretical implications of this research will be thoroughly elaborated in the following sections.

Theoretical Implications: Some theoretical implications are present in the expected results of this research. First, the integration of lean practices and TRIZ would offer a framework for the improvement of micro-business procedures and the development of innovative solutions to complex issues during COVID-19. This condition indicates that the application of lean practices and TRIZ does not only take place in manufacturing industries but also in non-manufacturing industries and micro businesses.

This research emphasized the significance of constant enhancement and flexibility in inconsistent and frequently changing business environments. Micro businesses with the ability to adapt at a fast rate and enhance their procedures have a higher possibility of survival during crises.

Third, this research offers insights into the obstacles in micro businesses during COVID-19, which include interference with supply chains, consumer's changing behavior, and financial limitations. With insights into these obstacles, researchers and practitioners may further create targeted interventions for supporting micro-businesses during crises.

Managerial Implications: The expected findings of this study also have several practical implications for managers of micro businesses. First, managers should consider incorporating lean practices and TRIZ into their operations to increase productivity, decrease waste, and innovatively develop solutions to complex issues. This action could involve a reconsideration of traditional business models and procedures to improve adaptability to fluctuating market conditions. Second, managers should make their improved and flexible operations their priority. This measure may require training and development programs for workers to encourage a culture of constant learning and enhancement. Third, managers should be supported by the government and non-governmental companies to solve the issues emerging after COVID-19, in which financial aid, training and development programs and access to new markets and supply chains may be involved.

It can be concluded that the integration of lean practices and TRIZ offers a noteworthy framework for micro businesses' adaptability to the obstacles of COVID-19. It is suggested from theoretical implications that lean practices and TRIZ may be employed in various industries, while managerial implications elaborate that managers should make improved and flexible operations their priority and obtain support from external sources. Thus, this article contributes to the review of past research regarding the obstacles in micro businesses after COVID-19. It is also hoped that successful methods of microenterprise recovery will be identified.

In general, this review may improve researchers' understanding of how lean methods and TRIZ can be used to strengthen micro businesses' operations and responses to the challenges of the economic situation emerging after COVID-19. To ensure that these factors are in line with national and international requirements, advances, and technological progress, cooperation between policymakers, administrators, and businesses is essential. In this case, effective mechanisms should be developed to promote cooperation among ministries, agencies, and law enforcement. Subsequently, a space could be created for testing the TRIZ integration method and lean principles that are compatible with advancing modern technologies and the emergence of new forms of global trade.

Future studies are suggested to empirically examine how the integration of TRIZ and lean principles could improve operations in many industries and help companies adapt to the current economic climate. It is also recommended that future research works are statistically conducted, with a focus placed on respondents from multinational companies in Malaysia or other countries.

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