

Could Lean Practices and the Theory of Inventive Problem Solving (TRIZ) Improve the Entrepreneurial Ecosystem of Small- and Medium-Sized Enterprises? [†]

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[†] Presented at the International Academic Symposium of Social Science 2022, Kota Bharu, Malaysia, 3 July 2022.

Abstract: The concept of a Lean Business Model (LBM) is derived from the Business Model Canvas (BMC), which is primarily focused on well-established businesses. However, in a competitive environment typified by Schumpeterian waves of creative destruction, new businesses in the entrepreneurial ecosystem face the strategic challenge of constantly adapting and evolving alongside well-established companies. This proposes that the threat of newcomer disruption may affect all types of organisations, including small- and medium-sized enterprises (SMEs), particularly small and young businesses. The presence of SMEs is one of the most crucial factors in the growth of Malaysia's economy. Although SMEs contribute significantly to the economy, do they provide a better entrepreneurial ecosystem? This study aims to conceptualise how the integration of lean business and the Theory of Inventive Problem Solving (TRIZ) might improve the entrepreneurial ecosystem in Malaysia. The development of this model will be conducted using a triangulation of qualitative data sources comprising document analysis, interviews, and archival records. The validity of the findings will be examined based on the dimensions of trustworthiness to ensure that data obtained are accurate and reliable. The anticipated results of this study may show the impact of a new hybrid between lean business and the TRIZ model on the Malaysian SMEs entrepreneurial ecosystem. This new model will provide fresh insights into ways to transform the entrepreneurial ecosystem in line with the National Entrepreneurial Policy (NEP) 2030. Furthermore, the SMEs can be strengthened for the purpose of expanding their proportion of Gross Domestic Product (GDP) and exports, not just locally but also globally.

Keywords: entrepreneurial; ecosystem; lean practices; small-medium enterprises; TRIZ



Citation: Anuar, A.; Zulfabli Hasan, M.; Fazali Ghazali, M.; Kuan Kheng, L.; Maruak Sadek, D.; Fadly Habidin, N. Could Lean Practices and the Theory of Inventive Problem Solving (TRIZ) Improve the Entrepreneurial Ecosystem of Small- and Medium-Sized Enterprises? *Proceedings* **2022**, *82*, 89. <https://doi.org/10.3390/proceedings2022082089>

Academic Editor: Mohamad Rahimi Mohamad Rosman

Published: 30 September 2022

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1. Introduction

Governments in some nations have focused on creating an entrepreneurial ecosystem to create high-potential entrepreneurs globally. Entrepreneurial ecosystems are distinct networks of interdependent individuals and relationships that, either directly or indirectly, assist in the emergence and expansion of new businesses [1]. The ecosystem's strength lies in its ability to allow many entities to share their knowledge, resources, and learning opportunities [2]. In fact, the introduction of the National Entrepreneurship Policies will intensify the need for necessary skills by enabling entrepreneurs to adapt to changing market conditions and disruptive technologies [3]. Research into how entrepreneurial firms network and what entrepreneurial ecosystems can offer is necessary to comprehend how

ecosystems function and reap their potential benefits for businesses [4]. The major challenge for governments around the world, however, is the shift from “traditional economy” to “new economy.” Entrepreneurs must, therefore, have “21st-century skills”, embrace business digitisation, and collaborate with other entrepreneurs in order to survive in this dynamic environment, particularly in small-to-medium-sized businesses.

Small- and medium-sized enterprises (SMEs) have begun implementing lean practices after realising they are one of the main drivers of global economic growth [5]. Lean management has been adopted by the majority of businesses across many industries to boost operational efficiency. However, a lot of them struggle with implementation due to various obstacles or difficulties, which have resulted in failures that can impede the lean implementation process [6,7]. Some of the obstacles to why the goal of lean practices cannot be reached are due to reasons such as cultural, human, and geographic factors [7]. In particular, decay and a return to the original way of doing business occur in 70% of lean implementations [8].

Although lean implementation efforts help businesses save time and money, working under these lean principles has a negative impact on work quality, since it prevents employees from expressing themselves [9]. A study conducted by [7] found 24 barriers (which are not specific to SMEs) in lean implementation. The main obstacles to the implementation of lean in Indian SMEs, according to [10], include lack of management commitment, leadership, and resources. However, identifying all the barriers to lean management has given a negative impact on employees’ job satisfaction. Thus, lean business models (LBMs) are a collection of practical strategies that were developed to address this need. LBMs support business owners in the process of validating their assumptions through market testing and early customer feedback [1]. It was proven in this study that when LBM was applied in digital entrepreneurship, the results demonstrated how a business model canvas (BMC) can benefit from lean principles in a digital context, and how these concepts can be integrated into an original lean framework to experiment with, validate, and then improve a business model.

Nevertheless, to ensure LBM has a strong capability to change the entrepreneurial ecosystem in Malaysian SMEs, the introduction of TRIZ comes into place, which can provide a systematic approach to decision-makers in solving such SMEs problems. In current years, TRIZ has appeared as a valuable tool for inventing and solving technological challenges, including a wide range of complexities [11]. As stated by [12], both lean and TRIZ are aiming to maximise the utilisation of available resources. The purpose of lean is to remove waste because waste indicates inefficiencies and counterproductive behaviours in the system. Indeed, the basic concepts of lean, namely waste reduction, increased value, and improved customer satisfaction, are relevant to SMEs, not only to large enterprises [5]. In TRIZ, the problem-solution frequently makes use of a resource that was previously considered a nuisance or a waste. The idea of TRIZ is based on a substantial study that examined hundreds of thousands of patents in a variety of sectors to uncover broad trends in inventive solutions as well as the distinctive qualities of the issues that these inventions have solved [13].

Similarly, the concept of lean in business, using TRIZ, can indeed help to improve the operational performance in the business setting [12]. However, how far can lean and TRIZ contribute to enhancing Malaysian SMEs entrepreneurial ecosystem? Will it contribute to a more dynamic and effective SME landscape, particularly in light of the recent unprecedented pandemic crisis? In light of the shortcomings of past studies, it appears this study is necessary. Therefore, this research aims to conceptualise how the integration of LBM and TRIZ might improve the entrepreneurial ecosystem in Malaysia. With this hybrid model, it contributes to the novelty of this research, whereby there is a dearth of research investigating LBM, TRIZ, and the entrepreneurial ecosystem simultaneously. This paper begins with descriptions of the entrepreneurial ecosystem, lean business, TRIZ, and using TRIZ in lean, and then continues with methods. Finally, conclusions and an outline of a potential future research agenda for the area are presented.

2. Literature Review

2.1. Entrepreneurial Ecosystem

A stable environment and working conditions are necessary for the growth of an entrepreneurial ecosystem [14]. This calls for a high level of engagement and collaboration readiness among all members of an entrepreneurial ecosystem. Supported by [15], entrepreneurial activities and entrepreneurs develop within a highly integrated and complex system with a variety of on-screen characters to move the entrepreneurial ecosystem. The networks by which small business owners and entrepreneurs interact with other fictional characters have thus been precisely described and explained by the term entrepreneurial ecosystem.

The entrepreneurial ecosystem has long been a topic of interest for researchers from financial geology, finance, business, and other disciplines, many of whom have attempted to justify the reasons and mechanisms by which some areas support more significant startup development than others. Moreover, the phrase, “entrepreneurial ecosystem” has been around for more than 20 years [16], but it started gaining widespread recognition with articles such as “How to Start an Entrepreneurial Revolution” by [17] and “Startup Communities” by [18,19]. Since then, a wide range of organisations and researchers have added to our understanding of entrepreneurial ecosystems and the components that make them up. An entrepreneurial ecosystem, according to [20], is made up of three elements: opportunities, talented people, and assets. [17] has broadened this definition by including governance, culture, capital markets, and clients with an open mind.

In his subsequent work, he has further discovered that the entrepreneurial ecosystem is “a set of interconnected components that cultivate entrepreneurial development such as leadership, culture, capital, markets, human aptitudes, and bolster” [21]. Utilising the five Cs: capital (financial asset), capability (business visionary and proprietor skillset), connection (resource and relationship network), culture (local communities’ recognition and support of business enterprise), and climate (administrative, financial improvement, and approach environment), the Center for Country Business enterprise completes an environment [22]. The proximity of large businesses, colleges, and advantageous suppliers is another factor that is thought to enhance an entrepreneurial ecosystem [23]. The presence or absence of these elements, as well as how well they work together, distinguishes different environments from one another and could have an impact on how robust an entrepreneurial ecosystem can be [24].

2.2. Lean Manufacturing (LM)

Krafcik, a researcher with the MIT International Motor Vehicle Program, coined the term “lean manufacturing”, after studying various international automotive practices [25]. In his point of interest paper, Krafcik has presented the term “lean” to depict a generation framework that employs fewer assets of the whole thing compared to mass generation [26]. In any case, numerous researchers characterised lean in unexpected ways. Subsequently, [27] examined lean perspectives and summarised the terminology that had been used to describe lean. Based on the survey findings, lean has been described as a method, a plan, a collection of standards, a group of instruments and strategies, a method, a conception, a way of thinking, a practice, a framework, a plan, a fabricating worldview, and a demonstration [26].

To produce leading conceivable value and diminish non-value, organisations need to include exercises and producers connected to distinctive lean manufacturing (LM) standards, tools, and methods. In any case, numerous organisations discover it is challenging and troublesome to do that effectively. Within the setting of SMEs, LM activities posit advanced challenges. The concept of LM has been broadly connected to benefit the industry as a whole for a long time. The central thought of LM is to construct a shared belief and special way of working that exceedingly guarantee responsiveness to customers’ requests while continually cutting fetches and disposing of squanders all through the organisation [27]. Furthermore, ref. [28] have acknowledged that SMEs are still hesitant to use LM despite the

potential benefits and tangible results. Many companies are concerned that implementing LM will waste time and money.

Some researchers claim that large companies are more likely than SMEs to implement complete LM programmes [29–31]. In addition, ref. [28] also have recognised the fact that SMEs are still unsure of the value of LM execution and the tangibleness of the outcomes and benefits they might realise. The majority of these businesses worry that adopting LM will cost them time and money. According to [32], the successful selection of LM ventures in SMEs necessitates prior associational stability and affirmation of economics, human resources, courses, special activities, crucial arranging, and compensation mechanisms. [33] has asserted that SMEs should begin using less expensive and fundamental LM tools such as 5S, Kaizen, and visual control. Once that is accomplished, they can move on to more unconventional tools such as Kanban and small part sizes. He made it clear that the workforce practices and human mentality are what influence LM practices the most. In this way, the SMEs must start by increasing their staff members' awareness of the needs and nature of LM.

Several earlier exploration studies have shown how lean practices affect business performance. According to [34–36], lean emphasises throughput development, waste lessening, and resource proficiency, which improves business performance through cost reduction. Waste reduction leads to increased productivity and lowers costs for the business, which raises returns on assets [37]. A company's quality reputation can also increase market acceptance and turnover [38]. To support a business' cost-effectiveness and sustainable growth, total quality management (TQM), Kaizen, just-in-time (JIT), and other lean practices are implemented [34,37]. One TQM practice that has an indirect relationship with financial performance in SMEs is lean implementation [39]. In a previous study, ref. [40] looked at the effects of lean practices on the financial, market, and operational performance of manufacturing SMEs. The results supported the notion that combined lean practices improve the performance of SMEs as a whole.

2.3. Lean Business

Similar to LM, the lean business concept develops business procedures that produce more value for clients while speeding up performance, reducing waste, and balancing material, informational, and monetary flows. Lean business, in its most basic definition, is a company that maximises value while reducing waste. Although it takes a lot of effort and time to complete, the outcome is a certain success. Moreover, lean startup techniques are receiving more and more attention in the entrepreneurial communities [41,42]. Lean startup techniques have also been incorporated into some entrepreneurial programmes [43]. Conceptual essays have explained how lean startup fits into recent and past academic debates [44].

Additionally, it is evident that effective lean implementation is complex and multifaceted, incorporating a variety of elements that have an impact on success, including the implementation strategies employed and the tools and techniques utilised, as well as the organisational support and managerial skills observed [45]. Lean is a very broad concept that can be applied everywhere. However, it still rests on five guiding principles: value, value stream, flow, pull, and perfection [46]. It is crucial to note that this study did not focus solely on the effects of lean in organisations. However, its goal is to imagine how LBM and TRIZ incorporated might enhance Malaysia's entrepreneurial ecosystem.

2.4. TRIZ Approach

One of the most effective invention methodologies is TRIZ (Theory for Inventive Problem Solving), a method with a scientific foundation and empirical underpinnings that was initially developed for the analysis of the global patent database [47]. TRIZ (pronounced "trees"), is a collection of problem-solving methods. TRIZ is based on several universally applicable innovation principles and techniques. The TRIZ method has been used for decades by large multinationals such as Hewlett-Packard, Boeing, and Samsung

to develop new products, optimise processes, and better understand market developments and trends [48]. TRIZ has developed into a term that encompasses a wide range of creative ideas, methods, and tools that are frequently applied to the resolution of challenging issues. According to [49], the development of TRIZ was prompted by the failure of alternative approaches that were already in use to provide suitable answers for designing and creating effective technological functionalities of both small- and large-scale magnitudes.

In the 1950s, Genrich Altshuller, a Soviet naval patent clerk, created the foundation for TRIZ. Altshuller realised as he organised the patents that there were only so many ways that problems could be solved, and problems in various industries had been solved in similar ways. After sifting through countless patents, he discovered that each of the inventions he saw in these patents could be explained by one (or more) of 40 principles. The contradiction that had existed in the technology's development was also resolved by each of these principles, he observed (i.e., an item has to be strong but light). A total of 38 potential attributes that might result in paradoxes were revealed by Altshuller. He created a method for solving problems based on these realisations [12].

2.5. Using TRIZ in Lean

Lean can benefit from the addition of TRIZ. In the context of lean, TRIZ can be used to identify solutions to problems that might not otherwise be discovered [12]. Finding solutions that make use of resources that are already on hand but might otherwise be considered waste (or “muda” in lean) is a strong suit of TRIZ. Furthermore, by examining a specific process and its function within a larger system and figuring out how it can be used ideally for both to be balanced, TRIZ's ideal final result could aid in the development of future state maps. Finally, TRIZ's problem-defining techniques, such as removing jargons, could be very helpful in developing the current state map, because there are many aspects of any problem situation that have not been sufficiently explored in terms of context and definition. The “9-Window” exercise from TRIZ, for instance, could help put a company's position in the market into context and show others how crucial it is to collaborate with the “super system” of distributors and the “subsystem” of suppliers. Additionally, this exercise aids in outlining the company's past and future. This background information would be very helpful in creating a current state map because it could provide a quick overview of the company to those who are unfamiliar with it [12]. To strengthen the entrepreneurial ecosystem in Malaysian SMEs, this research tries to incorporate the lean business model and TRIZ approach.

3. Methodology

The present research aims to develop a lean business model using the TRIZ approach with the purpose to improve the entrepreneurial ecosystem in Malaysian SMEs. The study will use a qualitative approach (subjectivism) that can address the research questions to meet its goal. It was decided that using an interpretive description of a phenomenon and subjective nature of reality will be the best approach. This study will be conducted using the case study method by [50], to better understand the nature of a qualitative approach. The research design for this study is anticipated to be conducted in a number of ways, including: (1) case study protocol; (2) data collection method; (3) determining the unit of analysis and sampling method; (4) qualitative data analysis; and (5) validity and reliability.

This research will use purposive sampling to obtain all information for the entrepreneurial ecosystem from a group of experts who are working in various SMEs, specifically those who are practicing lean and TRIZ in the organisations. Indeed, they are most readily available and are in the best position to provide the information required. This sampling technique is most appropriate when the topic entails the use of small samples and the subjects are best selected according to the judgment of the researchers [51]. Data will be collected from six companies located in the northern region of Peninsular Malaysia, which includes Kedah and Penang. There are two companies from Kedah state, namely the Al Haddad Mfg. Sdn Bhd and Ideal Healthcare Sdn. Bhd. Another four companies are located in Penang, namely the CG Global

Profastex Manufacturing Sdn Bhd, Herbagus Sdn Bhd, Dee Noon Corporation Sdn Bhd, and Puncak Bumi Utama. Thus, the researcher will gather information from well-known people who have extensive business experience in SMEs. A completely different circumstance pertains to the case study's data collection. The researcher needs to accommodate the interviewees' schedule and availability when interviewing key informants. The nature of the interview is much more semi-structured, and the subject may not always cooperate by answering the interviewer's questions.

The participants involved during the interview session will consist of SMEs entrepreneurs and members of TRIZ organisations and lean units. The interview will be conducted face-to-face, where the interviewer will seek out views, ideas, and opinions on the principles of and understanding of the notion of this principle from the business owners of SMEs. The face-to-face interview is notionally effective to accumulate the information and also to upsurge the collaboration between respondents and interviewers [52]. Furthermore, it has long been asserted that face-to-face interviews offer a stronger foundation for developing a strong rapport between the researcher and the participant.

4. Conclusions and Policy Implications

This study aimed to conceptualise how the integration of LBM and TRIZ might improve the entrepreneurial ecosystem in Malaysia. It is anticipated that a company that adopts both lean and TRIZ will reap the greatest benefits, increase the size of the market, and strengthen its overall competitiveness and sustainability for entrepreneurial ecosystems in the future. Indeed, policymakers, government, and corporate sectors need to play their role to ensure that these are in line with global needs, technology, and developments. One of the essential elements of the entrepreneurial ecosystem is policy, which directs the establishment and implementation of research institutions, regulatory mechanisms, and laws to set the direction and vision of entrepreneurship in the nation. In this regard, effective mechanisms should be pioneered to form cooperation between ministries, agencies, and enforcement bodies to make room for the trial of new business models to be in line with the development of today's Internet and communication technologies as well as the evolution of new commerce globally. Future research will look empirically at how the integration of LBM and TRIZ can improve the entrepreneurial ecosystem in various sectors such as education, food, construction, and others. Moreover, it is suggested to conduct this research quantitatively by focusing on the respondents from multi-national companies in Malaysia, or it can be other countries as well.

Author Contributions: Conceptualisation, A.A.; methodology, L.K.K.; writing—original draft preparation, A.A., M.Z.H., M.F.G., L.K.K., and D.M.S.; writing—review and editing, A.A. and N.F.H.; funding acquisition, A.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by UITM KEDAH BRANCH, grant number 600-UITMKDH (PJ1.5/4/1(2/2021)).

Institutional Review Board Statement: Not Applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The researchers would like to acknowledge the UiTM Kedah branch for the financial funding of this research through Geran Dana Penyelidikan Khas (DPK).

Conflicts of Interest: The authors declare no conflict of interest.

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