Enhancing Startup Business Performance Through Iterative Strategies and Lean Programs: Insights from Capital Cities in Indonesia to Unlock Central Asia's Potential

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Abstract

This study investigates the influence of the startup ecosystem on startup business performance in Capital Cities (Jakarta, Bogor, Depok, Tangerang, and Bekasi), emphasizing the roles of iterative incremental strategies and lean startup programs. This study also examines the similarities between Central Asian countries like Kazakhstan, Uzbekistan, and the Indonesia region. Central Asian countries face unique challenges, including less mature ecosystems, regulatory hurdles, and cultural attitudes toward entrepreneurship. Using Partial Least Squares Structural Equation Modeling (PLS-SEM) on data from startups aged 1-10 years, the research reveals that these strategies significantly mediate the relationship between ecosystem support and startup success, enhancing market optimization, innovation, and sustainability. Startups achieve better financial and nonfinancial outcomes by effectively leveraging ecosystem structures through agile methodologies. By drawing on capital city experiences, Central Asian policymakers can improve startup environments through robust support structures, regulatory clarity, and education on agile methodologies. This research offers a model for enhancing startup business performance via ecosystem support and strategic agility, informing policy and program development in other regions.

Keywords: Startup Ecosystem, Lean Startup Programs, Iterative Strategies, Startup Business Performance

JEL: M13 **SGD:** SDG 8, Target 8.3, SDG 11, Target 11.c

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INTRODUCTION

The business ecosystem in which startups operate, which involves a variety of stakeholders such as investors, mentors, service providers, and regulators, impacts a startup's growth journey (Hillemane, 2020). The dynamic landscape of the startup ecosystem demands innovative and agile strategies to ensure sustained growth and success. In this context, Capital city (Jakarta, Bogor, Depok, Tangerang, and Bekasi) as well known as Jabodetabek region of Indonesia, has emerged as a notable example, showcasing how iterative incremental strategies and lean startup programs can significantly enhance startup business performance. In the Jabodetabek region, the interplay among these ecosystem characteristics results in an outcome of startup business performance (Alamanda et al., 2022). This study considers the complexities of the ecosystem's impact on performance, particularly assessing the roles of iterative incremental strategies and lean startups as mediators of the effect. startup business performance involves different dimensions: growth, innovation (Griva et al., 2023), and total and long-term performance sustainability (Tiba et al., 2021). It is a significant concern for ecosystem stakeholders (Cao & Shi, 2021). The startup business environment in Jabodetabek has grown exponentially over the past few years due to digitization and the Indonesian government’s effort to promote a vibrant digital economy (Supriadi et al., 2023).

Previous research has delved into various aspects of the startup ecosystem and its impact on startup business performance (Audretsch & Belitski, 2017; Bramwell et al., 2019; Eisenmann, 2020; Alamanda et al., 2022; Griva et al., 2023). Studies have highlighted the importance of growth, innovation, and sustainability as crucial dimensions of startup business performance, emphasizing the critical role of ecosystem stakeholders in nurturing these aspects (Griva et al., 2023; Supriadi et al., 2023). Startups rely on iterative incremental strategies to improve their outputs step by step based on user feedback to efficiently address the complexities of the market (Javanmardi et al., 2024). As a result, the approach helps startups refine their offering based on the feedback they receive from the users, reducing the risks associated with massive failures and creating a conducive environment for entering the market and growing within it (Alonso et al., 2023). Similarly, a lean startup involves a simplistic production process anchored on minimal capital products and changeable solutions.

However, the distinct contribution of these strategies and programs in capitalizing on the support of a startup ecosystem to enhance performances remains to be seen, particularly in the context of Jabodetabek (Supriadi et al., 2023). Given the unique socio-economic characteristics of Jabodetabek, such as high population density, heterogeneous consumer behavior, and rapid digital growth, the startups in this region enjoy exclusive benefits and factors that lower their performance (Audretsch & Belitski, 2017). Therefore, this study elucidates how iterative incremental strategies and lean startup programs can bridge ecosystem support and enhance performance, a vital insight for industrial practitioners and policymakers. Moreover, the Jabodetabek startup ecosystem is highly divergent in the availability of resources, incubation routes, and networking opportunities for startups (Supriadi et al., 2023). Thus, the differential success in iterative strategies and lean programs should be investigated.

Indonesia has established formal diplomatic relations with all Central Asian countries, often characterized by mutual respect and cooperation in international forums (Mooy, 2024). Central Asia, rich in natural resources, has the potential to diversify its economies beyond traditional industries such as oil, gas, and mining (Center for Policy Research and Development for the Asia-Pacific and Africa Region, 2016), including developing ecosystem startups. The startup ecosystems in Indonesia and Central Asian countries are still emerging but offer significant collaboration and shared learning potential. Indonesia, particularly in the Jabodetabek region, is witnessing growth in its startup ecosystem (Suwarni et al., 2020). Similarly, Central Asian countries like Kazakhstan, Uzbekistan, and Kyrgyzstan are also developing their startup landscapes (Baxtishodovich et al., 2017). Both regions face similar challenges, such as regulatory hurdles, access to funding, and building supportive infrastructure for startups. There is an opportunity for knowledge exchange and collaboration to address these challenges and leverage each other's strengths. Indonesian startups can consider Central Asia a gateway to Eurasian markets, while Central Asian startups can explore Southeast Asia through Indonesia's strategic location and economic potential.

This study aims to bridge the gap in the literature by examining the intermediary role of iterative incremental strategies and lean startup programs in enhancing performance within the Jabodetabek ecosystem. In particular, this research aims to draw parallels between Jabodetabek and the emerging startup ecosystems in Central Asian countries such as Kazakhstan and Uzbekistan. While rich in potential, these regions face unique challenges, including less mature ecosystems, regulatory hurdles, and cultural attitudes toward entrepreneurship. By adopting a quantitative research methodology, the study will analyze data collected from startups operating in this region to understand how these strategies can serve as catalysts for leveraging ecosystem support. The research seeks to provide insights that could assist startups in navigating the ecosystem more effectively, thereby contributing to the growth of the regional economy and informing policy development for a more vibrant and sustainable startup ecosystem.

LITERATURE REVIEW

2.1 Startup Ecosystem

Various studies conducted in recent years have elaborated on the importance of startup ecosystems in promoting the performance of startups. According to Isenberg (2011), a favorable business ecosystem can significantly improve a startup's survival and growth rates by providing essential resources such as capital, mentorship, and market access. Given that the nature of dynamics within startup ecosystems dramatically influences the success or failure of a startup, the choice of strategies adopted by the startup to navigate these ecosystems is equally crucial. Specifically, iterative and incremental strategies are identified as having a tremendous positive impact on a startup's ability to survive and thrive despite the nature of the environmental forces. These strategies, as elaborated in the Lean Startup concept by Ries (2011), posit that short iterations of product development through continuous testing and adjustment are crucial in supporting rapid responses to market demands. Blank (2013) also highlights this concept and urges entrepreneurs to use it as it helps to eliminate unnecessary processes and instead focuses more on consumer feedback. This paper also builds on other existing literature on startup ecosystems, including Isenberg (2011), Ries (2011), and Blank (2013), who lay a good foundation regarding the concepts of startup ecosystems and the creation of successful startups.

Entry into a strategic innovation ecosystem would mean several critical fronts that need regularization, including scanning for innovative technologies, appreciating market segmentation insights, seeking funded sources, and the ability to integrate into the ecosystem (Bramwell et al., 2019). Scanning for innovative technologies equips startups with the knowledge to fit in the existing competitive dynamics by ensuring the solution is aligned with the most current advancements (De Bernardi & Azucar, 2020). Market segmentation insight makes facilitating different customer groups more accurate and feasible (Yardley et al., 2016). On the other hand, exploring funding sources is a pragmatic approach to funding the financial capacity for sustained expansion. However, the capability to integrate into the ecosystem is a measure of a startup-related capacity to create complementary value and fit it into the system (Lütjen et al., 2019). Therefore, these original achieving strategies would position the startups strategically to ensure they access the necessary ecosystem-building resources for sustainability.

Getting an adaptive innovation strategy would involve business model adaptability, effective customer-centric design agility, experimental offer management, and stakeholder collaboration. Business model flexibility is essential to adapting to market feedback and responses (Andriyani et al., 2024); beyond that, product and service design agility focuses on aligning business products to customer expectations. Additionally, experimental offer management entails the testing and adjusting new products and market features to adapt to customer requirements. Lastly, stakeholder collaboration entails effective communication to ensure alignment (Hagen et al., 2019). These collaborative provisions are essential for sustained competitiveness. The dynamic ecosystem integration competence should include the capacity to reassess value creation, exact integrated operations, proactive knowledge sharing, and engaging provision across the ecosystem (Foss et al., 2023). Reassessing the startup's complementary subsistence measures and implementing operational changes promptly in response to the ecosystem dynamics promotes a culture where knowledge sharing is highly facilitated and has regular ecosystem engagements, which are vital for continued sustainable innovation. The engagements align the relationships, explore new opportunities, and appreciate ecosystem developments (Andriyani et al., 2024). This in-depth examination of strategic innovation ecosystem access, adaptive innovation strategies, and dynamic ecosystem integration offers a comprehensive view of how startups can navigate and thrive in complex innovation environments (Crnogaj & Rus, 2023).

2.2 Iterative Incremental Strategy

Given Blank's endorsement of iterative strategies to enable startups to limit waste and prioritize customer feedback, the reconstruction of such issues on a multitudinous, complicated customer landscape is bound to play an even more significant part (Blank, 2013). It is a logical segue to the role the lean startup programs have to play in leading startups to develop capabilities of their MVPs and pivot as required (Ries,2011). Thus, the case is not that startups must reduce niche and flexibility but instead create a comprehensive strategy for the complex consumer landscape. More in-depth insights into experimental design management and operational clarity are to be noticed. It is that active startups are in the contemporary consumer landscape, and connoting lean methodologies can be the answer to their demonstrated pace and innovation (Varma, 2015). The setup's exegesis revolves around experimentation that must be managed to eliminate waste and optimize productivity. Optimized learning depends on optimized experiments (Bao et al., 2013). Experiment planning requires that lean startups straightforwardly elucidate their hypotheses as genuinely testable scenarios. Startup experiments must be time-boxed into manageable iterations for quick and relevant learning (Fagarasan et al., 2021). As a parallel mechanism, startups must maintain a minimum quantity of iteration to limit a startup's discovery to its most critical assumptions. Startups must execute experimentation process management to be prepared for subsequent learnings.

Operational clarity is necessary to execute optimal iterative strategies. In the process of transparency, every team member is notified of goals and the experimental framework they use, encouraging candid, honest communication and cooperative problem resolution (Bartel & Rockmann, 2023). On the other hand, in overlap clarity, members are given a clear description of their roles and contributions to the experimentation cycles, which contributes to minimizing confusion and streamlining the iteration process (Koch et al., 2024). This aspect is essential in determining focus and assisting in keeping delete and alignment disparities during startup conditions of change and uncertainty. Lean startup literature proposes a broader view of lean startup ground, representing a center on experimental design management and operation clarity. The concept entails executing iterative strategies for new firms in a timely and detailed manner to help them navigate rapidly changing and complex consumer markets. Through a comprehensive strategy focusing on detailed preparation of their experiments and open-door operations, startups can adapt to marketing feedback, alleviate resource waste, and accelerate innovation (Porter, 2024). These results prove that the Lean Startup approach remains the best way to train emerging businesses.

2.3 Lean Startup Program

Lean startup methodologies have been hailed for minimizing the development cycle surrounding minimum viable products and federating regular iterations. According to Silva et al. (2021) and Eisenmann (2020), Lean approaches radically enhance a startup's capacity to home in on the market's demand for a product and to accommodate itself to market conditions rapidly, thus uniquely pinning down these methods present significant challenges, as they call for a nuanced system of metrics that cuts across both process-oriented and result-oriented values. At the heart of the proposed evaluation process is a startup's ability to address problems; however, it is more heavily focused on dynamically and routinely identifying and responding to the market and operational problems that plague every Lean startup (Zahra, 2021). This ability focuses on a startup's ability to find, uncover implicit assumptions, and generate and evaluate viable, novel opportunities. The viability of these solutions relates to their proven ability to fill a customer's need while remaining novel and unfamiliar to competitors (Morosan & Bowen, 2022). Furthermore, assessing a startup’s data regarding its abilities to communicate effectively with investors and explain the value propositions of its products is critical.

Competitive analytical skills and networking capabilities are critical to a startup’s ability to navigate market challenges and lean on shared resources to make headway (Martínez-Peláez et al., 2023). Traditional metrics, including customer annual growth, revenue, profitability, customer retention cost, and margin efficiencies, at the final assessment, remain vital as they provide critical insights into a startup's market fit, financial acumen, and ability to turn investment into sustainable growth, and thus, its market viability. Modern entrepreneurship focuses on agile adaptation, customer-centric development, and an undergirding by a firm foothold in the market (Jameaba, 2023). It thus collectively puts together a pattern by which the Stakeholders may understand a startup's operational strengths and weaknesses, market stabilization abilities, and financial stability metrics.

2.4 Startup Business Performance

Eisenmann's insights emphasize the leanness of a startup in methods that help shorten the time of learning and iteration, playing significant roles in the startup world (Eisenmann, 2020). The investigation, therefore, should consider various forms of a startup's performance; it is not only based on how fast it works but also the entirety of financial and nonfinancial characteristics to understand a startup more concerning how the agility practices work to determine the startup's health and direction of growth. Huang et al. (2022) describe financial performance as including metrics of revenue growth, profitability, and capital efficiency, while the nonfinancial concerns market optimization, acquisition of customers, and innovation of products. These metrics give a whole picture of a startup's effectiveness and positioning in the market. Financial metrics comprise market optimization reflections, LTV enhancement, costs and cash management targets before revenue, and cost management (Eisenmann, 2020). These metrics, also identified by Al-Binali et al. (2023), give an analysis from the startup's money angle. These metrics help determine the profitability, market position, and how the startup can manage available resources for sustainability. Nonfinancial metrics will be product imitation, product differentiation, and product superiority. These nonfinancial metrics help determine a startup's superiority in the market according to its products, including the edge and quality of the products, which weighs more on the startup's ability to influence the customers through favorable products. Product imitation determines the various startups copying products and services and helps in determining where to act if the imitation seems to compromise the startup's products (Wang & Seidle, 2020). Product differentiation helps to address the issue of many startups producing similar products to the market, while product superiority determines how a startup's product is better than others (Jameaba, 2023). The comprehensive coverage of the nonfinancial metrics does not replace the startup's financial metrics but enhances the outcome of the other's performance metrics (Dossi & Patelli, 2010).

Based on the relationships outlined between the startup ecosystem, iterative incremental strategy, lean startup program, and startup business performance, the following hypotheses can be formulated:

H1: Adopting iterative incremental strategies mediates the relationship between the startup ecosystem and performance. This hypothesis suggests that the positive impact of a supportive startup ecosystem on startup business performance is partially due to the adoption of iterative incremental strategies.

H2: The engagement with lean startup programs mediates the relationship between the startup ecosystem and performance. Like H1, this hypothesis posits that the benefits of a supportive startup ecosystem on the performance of startups are channeled through their engagement with lean startup programs.

METHODOLOGY

This quantitative study aims to elucidate the influence of the startup ecosystem on startup business performance in the Jabodetabek area, highlighting the mediating roles of iterative incremental strategy and Lean Startup methodology. Given the study's focus on the interplay between ecosystem characteristics and startup success, Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected for data analysis. This decision was informed by PLS-SEM's robustness in handling complex models and its applicability in emerging fields where theoretical underpinnings may not be fully established (Hair et al., 2019). This methodological choice is particularly relevant to the research problem due to its flexibility in exploring and validating theoretical constructs and its capacity to manage small to medium sample sizes, thereby allowing for the practical assessment of relationships within the startup ecosystem.

The research population comprised startups operating within the Jabodetabek region—Jakarta, Bogor, Depok, Tangerang, and Bekasi—spanning a developmental range of 1 to 10 years. This range was chosen to include diverse business maturities, from nascent startups to more established entities, thereby providing a comprehensive view of performance across different lifecycle stages. A random sampling technique was employed to ensure equitable representation of startups across various sectors and stages of growth. This methodological approach mitigates selection bias and ensures that the findings reflect the broader startup landscape in Jabodetabek (Estrada-Lavilla & Ruiz-Navarro, 2024).

The specificity of PLS-SEM as the chosen analytical tool stems from its suitability in exploring the nuanced effects of ecosystem support mechanisms on startup outcomes. This approach enables the examination of direct effects and allows for the investigation of indirect effects through mediators like iterative incremental strategies and Lean Startup methodologies. Consequently, this method aligns perfectly with the research's aim to dissect the complex mechanisms through which the startup ecosystem influences performance, making it a fitting choice for addressing the research question within the unique socio-economic context of the Jabodetabek region.

Measurement Instruments:

1. Startup Business Performance: Measured using a combination of financial (market optimization, lifetime value (LTV) enhancement, effective cash flow management, pre-revenue cost management) and nonfinancial metrics (product imitation, product differentiation, product superiority).
2. Startup Ecosystem: Assessed through variables such as access to strategic innovation ecosystem (innovative technology scanning, market segmentation insight, funding source exploration, ecosystem integration proficiency), adaptive innovation strategy (business model adaptability, customer-centric design agility, experimental offer management, comprehensive stakeholder communication), and dynamic ecosystem integration (value creation reassessment acuity, operational adjustment precision, proactive knowledge sharing, regular ecosystem engagement).
3. Iterative Incremental Strategies: evaluated based on experimental design management (experiment planning precision, iteration duration definition, iteration quantity assurance, experiment progress planning) and operational clarity (process transparency, overlap clarity).
4. Lean Startup Programs: Measured by the level of engagement with comprehensive problem-solving effectiveness (problem sensitivity consistency, reliable information analysis, idea generation and selection fidelity, product development, and evaluation reliability), strategic communication, and network engagement (investor engagement competency, solution communication proficiency, market analysis delivery, strategic partnership articulation), and growth and financial performance metrics (annual customer growth, revenue metrics, profitability analysis, customer acquisition cost).

Data was collected using a structured questionnaire, Likert scale, and open-ended questions for quantitative and qualitative information. Data was collected using a structured questionnaire, Likert scale, and open-ended questions for quantitative and qualitative information. These questionnaires were distributed widely among the 100 Jabodetabek startup community on LinkedIn, incubator/accelerator programs, and entrepreneurship events. The selection of 100 respondents for a study utilizing PLS-SEM is justified by the methodological advantages of PLS-SEM in handling smaller sample sizes, the exploratory nature of the research, practical limitations, and the specific requirements of the study's model complexity (Hair et al., 2019).

Upon collection, data were imported into SMART PLS for analysis, following the following procedural steps to ensure rigorous evaluation of the hypothesized model. The reliability and validity of the constructs were evaluated. For reflective constructs, we examined internal consistency reliability (using Cronbach's Alpha and Composite Reliability), convergent validity (using Average Variance Extracted - AVE), and discriminant validity (using the Fornell-Larcker criterion and HTMT ratio). For formative constructs, we assessed the significance and relevance of the indicators' weights and their collective content validity. The structural model was evaluated by examining the path coefficients to understand the strength and direction of the relationships between constructs. Bootstrap resampling was utilized to test the statistical significance of these path coefficients. Additionally, the model's explanatory power was gauged through the R2 values of endogenous constructs, and the predictive relevance was assessed using the Q2 value for models with predictive aims. Although traditional fit indices standard in covariance-based SEM are not applicable in PLS-SEM, we paid close attention to the model's overall explanatory power and predictive relevance, ensuring the model's adequacy in capturing the complexities of the hypothesized relationships. The selection of PLS-SEM and SMART PLS for data analysis is driven by their ability to provide insightful, reliable, and applicable research findings, especially in scenarios characterized by complex relationships, exploratory research aims, non-normal data, and smaller sample sizes. This methodology supports developing and testing theoretical models, offering a robust framework for advancing knowledge across a wide range of fields.

RESULTS

From the survey results, most of the respondents who participated were women (59.8%). Meanwhile, the age group that participated the most was the 21 - 25 years age group (46.23%). The details are presented in Figure 2.

4.1 The Measurement Model and The Structural Model

The Full Structural Model path diagram's (Figure 1) use of color coding and numerical indicators provides a clear and intuitive visual representation of the relationships between variables and the reliability of their measures within the study. This approach facilitates a more straightforward interpretation of the model's structure. It underscores the variables' robustness, evidenced by the factor weight values exceeding the threshold of 0.50, indicating strong validity.

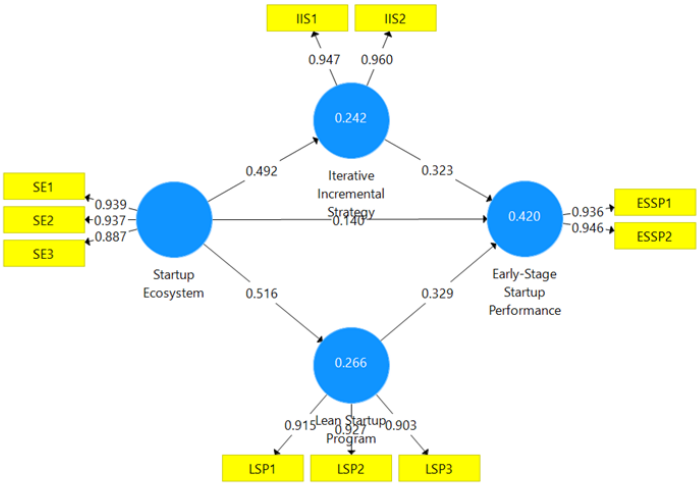

Fig. 1: Full Structural Model Image (PLS Algorithm)

Source: Author's Work (2024)

Outer Model

The measurement model (outer model) is a model that connects latent variables with manifest variables. The measurement results of the measurement model (outer model) are evaluated through confirmatory factor analysis (CFA by testing the validity and reliability of latent constructs). The measurement model test consists of convergent validity, discriminant validity, and reliability tests.

Convergent validity relates to the principle that a construct's measures (manifest variables) should be highly correlated. The rule of thumb usually used to assess convergent validity is that the loading value must be more than 0.7 for confirmatory research, and the loading value between 0.6-0.7 for exploratory research is still acceptable. The Average variance extracted (AVE) value is still acceptable and must exceed 0.5. However, for research in the early stages of developing a measurement scale, a factor loading value of 0.5-0.6 is still considered sufficient (Hair Jr et al., 2019). Meanwhile, the reliability test was carried out to test the instrument's accuracy, consistency, and precision when measuring constructs with composite reliability. The rule of thumb usually used to assess construct reliability is that the CR value must be greater than 0.7 for confirmatory research, and a value of 0.6-0.7 is still acceptable for exploratory research.

Convergent validity is carried out to test the level of accuracy of items used to measure the research object. In this study, a loading factor test was used. Figure 1 provides information regarding the loading factor value for each manifest variable. The loading factor value of several indicators for the latent variable shows >0.7; thus, all indicators are declared valid. The AVE values of each variable are Startup Business Performance (0.886), Iterative Incremental Strategy (0.910), Lean Startup Program (0.837), and Startup Ecosystem (0.849). It can be concluded that the three latent variables have an AVE value greater than 0.5. So, all variables are declared valid when explaining the latent variables, showing that manifest variables meet the AVE requirements.

Next is discriminant validity, which can be seen from the cross-loading factor correlation with the construct and the comparison of AVE with latent variable correlation. Suppose the correlation of the construct with the primary measurement (each indicator) is more significant than the size of the other constructs. In that case, it is said that the variable has high discriminant validity. The cross-loading values are presented in Table 1. Based on the PLS software results table, the cross-loading factor correlation value for each latent construct for the corresponding indicator is higher than for other constructs, so it can be concluded that the indicators used to measure the latent variable have met the requirements. Based on the results of the Fornell-Lacker Criterion, all root values for each variable are higher than the correlation, so it can be concluded that the model has good discriminant validity.

Table 1. Cross-Loading Test Results

	Startup Ecosystem	**Iterative Incremental Strategy**	**Lean Startup Program**	**Startup** Business **Performance**
SE1	0.939	0.467	0.545	0.497
SE2	0.937	0.461	0.485	0.445
IIS1	0.436	0.947	0.421	0.476
IIS2	0.499	0.960	0.433	0.548
LSP1	0.463	0.369	0.915	0.498
LSP2	0.436	0.353	0.927	0.487
LSP3	0.513	0.498	0.903	0.512
ESSP1	0.44	0.49	0.479	0.936
ESSP2	0.443	0.524	0.547	0.946

Reliability testing in Partial Least Square (PLS) can use two methods, Composite Reliability (CR) and Cronbach's Alpha, which are presented in Table 2. From the test results, the Composite Reliability (CR) value is more significant than 0.7, and Cronbach's Alpha value is more significant than 0.6, so it can be concluded that the data is reliable. This shows that all indicators are consistent in measuring each variable.

Table 2. Composite Reliability (CR) and Cronbach's Alpha Test Results

	Cronbach's Alpha	**Composite Reliability**
Startup Business Performance	0.872	0.940
Iterative Incremental Strategy	0.901	0.953
Lean Startup Program	0.903	0.939
Startup Ecosystem	0.911	0.944

Through its rigorous testing for convergent and discriminant validity and reliability checks, the outer model analysis demonstrates a solid foundation for the constructs used in this study, ensuring that they accurately represent the theoretical concepts intended to be measured. The high values of AVE and CR across all variables attest to the quality and relevance of the measurement instruments and reinforce the confidence in the model's ability to capture the nuances of the startup ecosystem's impact on performance. Furthermore, surpassing threshold values for both convergent validity and reliability indicates a strong internal consistency within constructs, thereby providing a robust basis for examining the relationships posited in the study's hypotheses.

Inner Model

The measurement of this structural model is to test the influence of one latent variable on other latent variables. Testing is carried out by looking at the path value to see whether the influence is significant; it can be seen from the t value's path value (the t value can be obtained by booth strapping). Figure 2 shows the booth strapping results carried out in this research. The multicollinearity test is used to test whether there is a very significant relationship between the independent variables. Techniques that can be used to detect multicollinearity include examining the correlation matrix. According to Hair et al. (2014), a VIF (Variance Inflation Factors) value above 5 indicates the presence of collinearity symptoms in the research model. The VIF score of Startup Ecosystem--> Startup Business Performance is 1.541; Startup Ecosystem-->Iterative Incremental Strategy is 1.000; Startup Ecosystem-->Lean Startup Program is 1.000; Iterative Incremental Strategy--> Startup Business Performance is 1.415; and Lean Startup Program--> Startup Business Performance is 1.462. Therefore, there is no multicollinearity in the data.

Through the coefficient of determination (R2) value contained in Table 2, sub-structure 1 has an R2 value for the Iterative Incremental Strategy variable of 0.242, which shows that the Iterative Incremental Strategy variable can be explained by 24.2% by the Startup Ecosystem variable. Substructure 2 has an R2 value for the Lean Startup Program variable of 0.266, which shows that the Lean Startup Program variable can be explained by 26.6% by the Startup Ecosystem variable. Meanwhile, sub-structure 3 has an R2 for the Startup Business Performance variable of 0.420, which shows that the Startup Business Performance variable can be explained by 42.0% by the Startup Ecosystem and Iterative Incremental Strategy variables.

Table 2. R-square Results

	R Square
Iterative Incremental Strategy	0.242
Lean Startup Program	0.266
Startup Business Performance	0.420

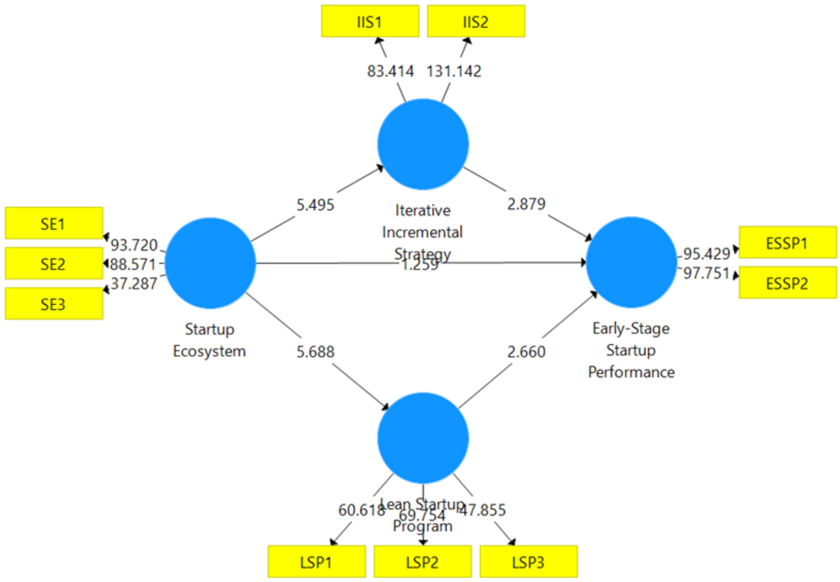

Fig. 2: Inner Model

Source: Author's Work (2024)

The structural model is evaluated by paying attention to the Q2 predictive relevance model, which measures how well the model produces the observation values. Q2 is based on the coefficient of determination of all dependent variables. The Q2 quantity is 0 < Q2 < 1; the closer the value is to 1, the better the model. The calculation results show that the Q2 value = 0.677 and is close to 1, proving that the structural model has an excellent goodness-of-fit model. To validate the model, goodness of fit (GoF) is used. This GoF index is a single measure used to validate the combined performance of the measurement model (outer model) and structural model (inner model). Based on the calculation results, the Gof value is 0.519, so the goodness of fit (GoF) model is included in the medium GoF category.

4.2 Hypothesis Testing

The hypothesis in this research will be tested using path coefficient values and t values to see whether there is a significant influence. The path significance test results also show the parameter coefficient's value (original sample). The parameter coefficient shows the significance value of the influence of each research variable (Table 3). In this study, researchers used a confidence level of 95%. The following conclusions can be drawn based on the Path Coefficient and T-statistics in Table 3.

Table 3. Path Coefficient

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Note
Startup Ecosystem -> Iterative Incremental Strategy -> Startup Business Performance	0.159	2.494	0.013	H_1 Accepted
Startup Ecosystem -> Lean Startup Program -> Startup Business Performance	0.170	2.410	0.016	H_2 Accepted

The resulting statistical T value of 2.494 is greater than the t table value (1.96), and the P-value is 0.013 < 0.05. Thus, the results of hypothesis testing H1 are accepted, which means that the incremental iterative strategy has an effect in mediating the startup ecosystem on startup business performance. The following result is that the resulting T statistic value is 2.410, more significant than the t table value (1.96), and the P-value is 0.016 < 0.05. Thus, the results of the

H2 test are accepted, meaning that the Lean Startup Program Mediates the Startup Ecosystem on Startup Business Performance. The acceptance of both hypotheses underscores the significant roles that iterative incremental strategies and lean startup programs play in enhancing the performance of startups within the Jabodetabek ecosystem. These findings not only validate the theoretical models proposed but also highlight the practical importance of integrating these methodologies into the strategic planning of startups to leverage ecosystem support effectively.

The structural model's analysis, incorporating the assessment of path values, multicollinearity, R2 values, and Q2 predictive relevance, provides a comprehensive evaluation of the relationships between latent variables, demonstrating the robustness and reliability of the research findings. The absence of multicollinearity ensures that the model's estimates are reliable and that the independent variables uniquely contribute to explaining the dependent variables without undue overlap. Furthermore, the satisfactory levels of R2 and Q2 values not only indicate a moderate to strong explanatory power and predictive relevance of the model but also affirm the substantive impact of the startup ecosystem on both the iterative incremental strategy and startup business performance, validating the theoretical framework underpinning the research.

DISCUSSION

The iterative incremental strategy plays a pivotal mediating role in the relationship between the startup ecosystem and startup business performance (Blank, 2013). This nuanced interplay suggests that the adaptive and responsive nature of iterative incremental strategies significantly influences how the benefits of a startup ecosystem translate into tangible startup success (Varma, 2015). By mediating the influence of the startup ecosystem on startup business performance, iterative incremental strategies underscore the importance of a methodical and flexible approach to startup development. This mediation highlights that the ability to systematically design, execute, and refine experiments, coupled with transparent and efficient operational processes, is crucial for translating the ecosystem's rich resources and strategic advantages into enhanced performance outcomes. Therefore, embracing iterative incremental strategies facilitates effective adaptation to and integration with the dynamic startup ecosystem and significantly boosts a startup's performance by leveraging financial and nonfinancial metrics for sustained competitive advantage (Eisenmann, 2020).

In the context of Indonesian startups, the mediating role of iterative incremental strategies in translating the benefits of the startup ecosystem into performance gains is particularly significant. With its vibrant and growing startup ecosystem, Indonesia offers a unique set of opportunities and challenges that highlight the importance of these strategies (Muthukannan et al., 2021). Indonesian startups measure performance through financial metrics like market optimization, lifetime value enhancement, and cash flow management, which are crucial for navigating the country's diverse and competitive market. Nonfinancial metrics such as product innovation, differentiation, and superiority are equally important, given the need to stand out in a crowded marketplace. Indonesian startups operating in sectors ranging from fintech and e-commerce to ed-tech and health tech require these comprehensive performance metrics to capture their holistic impact and market standing.

The Indonesian startup ecosystem is characterized by access to strategic innovation ecosystems that include vibrant technological developments, insightful market segmentation, diverse funding sources, and robust ecosystem integration skills. The adaptive innovation strategy is vital, focusing on business model adaptability and customer-centric design agility, reflecting the dynamic (Romero & Molina, 2011) and diverse consumer base in Indonesia (Winaya et al., 2023). Additionally, dynamic ecosystem integration, involving proactive knowledge sharing and regular engagement, is essential for navigating the fast-evolving Indonesian market landscape. The iterative incremental strategy's mediating role becomes crucial in the Indonesian context, where the ecosystem's richness in resources and opportunities can only be fully leveraged through systematic, flexible, and responsive strategic frameworks. By focusing on experimental design management and operational clarity (Harms & Schwery, 2020), Indonesian startups can better adapt to consumer needs, anticipate market trends, and navigate the intricacies of local and global competition. This strategic approach facilitates startup growth and innovation within Indonesia's dynamic ecosystem and positions Indonesian startups for tremendous success on the international stage, leveraging their unique strengths and the supportive ecosystem to achieve sustainable competitive advantages (Kuo et al., 2022).

In Central Asian countries such as Kazakhstan, Uzbekistan, and Kyrgyzstan, the iterative incremental strategy's mediating role is equally important but requires a tailored approach to address specific challenges (Murzakulova, 2021). These countries face unique issues, including less mature ecosystems, regulatory hurdles, and cultural attitudes toward entrepreneurship (Luthans & Ibrayeva, 2006). Central Asian countries can benefit from Indonesia's lessons by fostering a supportive ecosystem that promotes innovation and flexibility, creating policies encouraging experimentation and iteration, and providing startups with the necessary resources. Addressing regulatory and cultural barriers through iterative incremental strategies allows for gradual adaptation and alignment with local norms. Adopting comprehensive performance metrics, including financial aspects like market optimization and nonfinancial metrics like product innovation, can help Central Asian startups navigate their unique market landscapes. By systematically integrating these metrics into their strategic frameworks, Central Asian startups can better leverage their ecosystems to achieve significant performance gains.

The lean startup program serves as a crucial mediator in the relationship between the startup ecosystem and startup business performance, facilitating the translation of ecosystem advantages into measurable outcomes (Zahra, 2021). This mediation is particularly pertinent in bridging the resources and opportunities presented by the startup ecosystem with the tangible success metrics of startups (Morosan & Bowen, 2022). The mediation effect of lean startup programs is evident in how they enable startups to harness the ecosystem's rich resources and strategic advantages, translating these into improved performance. Through a focus on problem-solving, strategic communication, and a rigorous approach to growth and financial metrics, lean startup programs equip startups with the tools necessary to iterate quickly, adapt to changes (Jones et al., 2021), and achieve superior market fit and differentiation (Andersén, 2021). It not only enhances the performance in the short term but also positions them for long-term success by aligning their operations closely with the dynamic demands of the market and the broader ecosystem. In essence, lean startup programs provide the framework within which startups can effectively convert ecosystem resources into competitive advantages, driving innovation, growth, and financial sustainability.

The mediation of lean startup programs in translating the Indonesian startup ecosystem's resources into tangible startup business performance gains underscores the importance of agility, responsiveness, and customer orientation (Kurniawan et al., 2021). By leveraging these programs, Indonesian startups can better harness the ecosystem's potential, adapting rapidly to market changes and customer feedback, thereby securing a competitive edge. This approach improves immediate financial and nonfinancial performance metrics and positions Indonesian startups for sustainable growth and innovation in the face of local and global challenges.

Central Asian startups can similarly benefit from lean startup programs, though they must consider regional specifics to maximize impact (Silva et al., 2021). Implementing lean startup programs tailored to their unique market conditions, including addressing specific regulatory environments and cultural attitudes towards entrepreneurship, can facilitate better adaptation to their ecosystems and enhance performance. Effective communication and a focus on growth metrics are essential, and lean startup programs can facilitate better market fit and differentiation by encouraging startups to iterate based on customer feedback and market demands (Humble et al., 2020). This strategic approach can drive both short-term and long-term success. By fostering a culture of continuous improvement and innovation, lean startup programs can help Central Asian startups achieve sustainable growth, aligning their operations with the dynamic demands of the market and leveraging ecosystem resources to secure competitive advantages and drive financial sustainability.

CONCLUSION AND RECOMMENDATIONS

This research reveals the pivotal role of iterative strategies and lean startup programs in harnessing the Jabodetabek startup ecosystem's resources for substantial performance gains, underlining these methodologies as indispensable for navigating its complexities. Promoting agility, responsiveness, and customer-centric development is critical for startups aiming for a market fit and a competitive edge in Indonesia's fast-evolving market. The findings demonstrate that startups applying these strategies achieve superior outcomes in financial and nonfinancial metrics, including market optimization, lifetime value, cash management, and product innovation, attributing these gains to their rapid adaptability to consumer demands and market shifts through feedback and data-driven decisions. The vibrant Indonesian ecosystem, rich in innovative technologies, market insights, and strategic partnerships, offers a fertile environment for startup growth.

The critical roles of iterative incremental strategies and lean startup programs in enhancing startup business performance within the Jabodetabek ecosystem provide valuable insights for Central Asian countries. By adopting similar strategies, Central Asian startups can unlock their potential, fostering supportive ecosystems, implementing adaptive and lean methodologies, and focusing on comprehensive performance metrics. The study advocates for policymakers, investors, and startup founders to bolster frameworks and programs that facilitate ecosystem integration and encourage lean and iterative methodologies, significantly enhancing startup success rates and contributing to the vibrancy and competitiveness of the Indonesian startup landscape. The research emphasizes the need to improve support structures like incubators and accelerators and underscores the critical importance of giving startups access to training and resources in these methodologies. This approach can facilitate significant growth and innovation, with collaborative efforts and knowledge exchange between Indonesia and Central Asian countries further strengthening their respective startup ecosystems, driving innovation and economic growth.

Future studies could expand the research scope by conducting comparative analyses between startups in Jabodetabek and other Indonesian regions or countries. Future studies would help understand the universality or specificity of the observed effects of iterative strategies and lean programs on startup business performance. Investigating the impact of iterative strategies and lean programs across different startup sectors (e.g., fintech, ed-tech, health tech) could uncover sector-specific insights, challenges, and opportunities, providing more nuanced recommendations for practitioners.

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