
Technology Startups in Indonesia: Riding the Wave of Innovation and Investment

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ABSTRACT: The success and expansion of technology companies in Indonesia are examined in this study, with a particular emphasis on the role played by infrastructure, the entrepreneurial ecosystem, government assistance, innovation, and investment. A survey-based quantitative analysis was carried out on a sample of 226 technology startups from different industries. Partial Least Squares (PLS) and Structural Equation Modeling (SEM) were used to examine the connections between the previously listed components. The results show that government support, innovation, infrastructure, the entrepreneurial ecosystem, and investment are all significantly positively correlated. Startups' capacity to attract investment is positively impacted by improved infrastructure, a friendly entrepreneurial ecosystem, efficient government policies, and an emphasis on innovation. The significance of creating a favorable atmosphere for innovation and startup development in Indonesia is highlighted by these findings, providing crucial insights for policy-makers and investors in fostering a thriving tech sector.

Keywords: Technology Startups, Indonesia, Infrastructure, Entrepreneurial Ecosystem, Investment



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INTRODUCTION

With more than 270 million people living there and a thriving digital economy, Indonesia has undoubtedly emerged as a hub for IT startups (Haqqi, 2023; Hasyiyati et al., 2023; Laksmana & Permana, 2023). Indonesian startups benefit from the country's digital environment, which is bolstered by government initiatives including MSMEs going global and going digital (Annas & Meilinda, 2023; Judijanto, Destiana, et al., 2024). Startups must deal with legal difficulties such as financial transactions, intellectual property disputes, and licensing in addition to development prospects. The emergence of digital businesses like Gojek and Tokopedia demonstrates Indonesia's capacity for innovation and business. Startups in Indonesia are vital to the country's GDP because they leverage technology to address customer needs and propel economic growth in the digital economy.

The explosion of tech startups in Indonesia is evidence of the economic potential of the nation, which is fueled by a thriving startup scene, cutting-edge infrastructure, and encouraging government regulations. The growth of digital companies is being fueled by Indonesia's high internet penetration rate, which stands at 64.8% of the population (Laksana & Permana, 2023; Putella et al., 2023; Sutanto et al., 2024). Initiatives from the government, like boosting MSMEs' global competitiveness through the digital ecosystem, demonstrate a calculated approach to fostering entrepreneurship (Haqqi, 2023). Furthermore, fostering tech companies and enhancing human capital can help the nation reap the benefits of the digital economy, which emphasizes how crucial it is to foster an innovative environment (Bachtiar et al., 2022; Harsono, Indrapraja, et al., 2024). Prominent firms that have successfully gone public, such as Gojek and Tokopedia, serve as prime examples of the entrepreneurial energy and financial benefits of these endeavors (Harsono, Armin, et al., 2024; Palgunadi, 2023).

Due to several causes, including rising internet usage and younger demographics, Indonesia's startup environment has grown significantly (Putella et al., 2023; Susilatun et al., 2023). Indonesia's digital economy has fostered a thriving environment for startups because of its wealth of resources and diverse people capital (Haqqi, 2023). Nonetheless, there are still obstacles that startups must overcome to reduce the likelihood of failure, particularly about legal matters like labor relations, licensing, and intellectual property concerns (Judijanto, Mendrofa, et al., 2024; Ramadhana, 2023). Government initiatives, which offer assistance in the form of funding, mentoring, and market access, are crucial in enhancing the worldwide competitiveness of MSMEs in Indonesia via the digital ecosystem (Harsono, 2024; Laksana & Permana, 2023). To effectively collaborate and compete in a constantly changing market landscape, entrepreneurs must concentrate on creating and strengthening their business ecosystems if they hope to sustain this growth trajectory.

Nevertheless, with all of this promise, there is an urgent need to resolve important issues impeding Indonesia's startup potential. These issues include inadequate government assistance, deficiencies in the entrepreneurial ecosystem, infrastructure constraints, and impediments to innovation. To fully realize the economic and societal advantages that technology companies can offer Indonesia, it is essential to address these obstacles.

With the rise of internet firms like Gojek and Tokopedia, Indonesia's startup scene has expanded significantly (Nugroho, 2023; Safruddin et al., 2024). But legal obstacles including those about labor relations, licensing, and intellectual property pose a problem for businesses (Abdillah et al., 2024; Stevy et al., 2023). Furthermore, scaling is hampered by infrastructure flaws such as poor internet connectivity (Fkun et al., 2023; Suwaji & Harsono, 2024). The West Javan entrepreneurial ecosystem highlights the role that networks, finance, and policies from the government play in fostering entrepreneurship (Laksana & Permana, 2023). Startups' ability to grow is constrained by gaps in regulatory frameworks, financial availability, and mentorship networks, even with government backing (Annas & Meilinda, 2023; Yahya et al., 2024). Solutions include financial education initiatives, lowered collateral requirements, and expanded access to financial products have been put forth to address these issues. In general, overcoming these obstacles is essential to developing an innovative culture and allowing startups to prosper in Indonesia's dynamic tech sector.

The purpose of this study is to perform a thorough quantitative analysis of Indonesian technology startups, with an emphasis on comprehending the complex interactions that exist between

government support, the entrepreneurial ecosystem, and infrastructure. This study uses survey methods to identify the underlying causes of the growth and success of technology companies in Indonesia's changing environment.

Technology Startups in Emerging Economies

Scholars and policymakers alike have paid close attention to the growth of technology companies in emerging economies. Due to their large populations, developing middle classes, and rising internet usage, nations like Indonesia are becoming hubs for start-ups using technology to solve regional and global issues (Acs & Stough, 2008; Agarwal & Audretsch, 2001). Academics have emphasized the critical role that tech startups play in fostering innovation, generating jobs, and bolstering economies in developing nations. Policymakers and investors must comprehend the distinct dynamics of technology startups in emerging economies to fully leverage their potential for sustainable development.

Infrastructure and Technology Adoption

Technology businesses that want to succeed must have access to strong infrastructure since it will allow them to make use of digital platforms, reach a wider audience, and offer consumers cutting-edge goods and services. Research has shown how crucial infrastructure is for promoting technology adoption and entrepreneurship, including internet access, transportation networks, and logistics (Group, 2016; Waverman et al., 2005). The availability and dependability of infrastructure is crucial in determining the course taken by technology entrepreneurs, particularly in developing nations like Indonesia where infrastructure development is still in progress.

Entrepreneurial Ecosystem

An entrepreneurial ecosystem consists of several components, such as a talent pool, finance availability, networks of mentors, legislative framework, and cultural perspectives on entrepreneurship. Scholarly investigations have underscored the importance of an entrepreneurial environment that provides assistance to companies and cultivates an innovative culture (Isenberg, 2010; Spigel, 2017). An active entrepreneurial ecosystem has developed in Indonesia, which is marked by the existence of venture capital companies, incubators, accelerators, and a burgeoning population of tech-savvy business owners. Startups hoping to prosper in Indonesia's cutthroat market must comprehend the workings of the entrepreneurial ecosystem.

Government Support for Startups

Through policies and programs aimed at stimulating innovation, facilitating access to capital, and lowering regulatory barriers, governments play a crucial role in assisting technology businesses. Studies have demonstrated the beneficial effects of government support initiatives, including grants, tax breaks, and incubation centers, on the development and prosperity of new businesses (Acs et al., 2009; Mian et al., 2016). The government of Indonesia has launched many programs to encourage innovation and entrepreneurship, such as funding programs, investment incentives, and the creation of laws that are conducive to startups. Regulators and entrepreneurs alike must comprehend how government assistance shapes the startup ecosystem.

Hypothesis Development

H1: Infrastructure positively influences the success and growth of technology startups in Indonesia.

Prior research has emphasized the significance of infrastructure in enabling technology adoption and entrepreneurship, encompassing internet access, transportation networks, and logistics (Group, 2016; Waverman et al., 2005). Better infrastructure gives emerging businesses the tools and connections they need to grow, enter new markets, and draw in capital.

H2: The entrepreneurial ecosystem positively affects the success and growth of technology startups in Indonesia.

Scholarly investigations have underscored the importance of an entrepreneurial ecosystem that fosters success, marked by networks of mentors, financial accessibility, and a favorable legislative framework (Isenberg, 2010; Spigel, 2017). Businesses that are part of a helpful ecosystem are in a better position to overcome obstacles, get resources, and take advantage of expansion prospects.

H3: Government support positively influences the success and growth of technology startups in Indonesia.

Research has demonstrated that supportive government policies and initiatives—like grants, tax incentives, and regulatory reforms—are essential for fostering innovation and startup development (Acs et al., 2009; Mian et al., 2016). Government assistance programs can give new businesses the funding and legal protections they need to succeed in the cutthroat marketplace.

H4: Innovation positively impacts the success and growth of technology startups in Indonesia.

According to (Porter, 1985) and (Christensen, 1997), innovation is widely acknowledged as a critical factor in the success of startups since it helps them stand out from the competition, add value for their clients, and maintain a competitive edge. Long-term success and investment are more likely for startups that emphasize innovation in their business models, market strategies, and product development.

METHOD

Research Design

This study uses a quantitative research approach to look at the variables affecting Indonesian technology firms' growth and success. Infrastructure, the entrepreneurial ecosystem, government support, innovation, and investment will all be analyzed about one another using structural equation modeling (SEM) with partial least squares (PLS). SEM-PLS is an excellent technique for investigating the intricate interrelationships between latent variables and observable variables, which makes it a perfect fit for examining the complexity of the startup ecosystem. 226 technology firms operating in Indonesia across a range of industries, including e-commerce, fintech, health tech, and education tech, make up the study's sample. The study will utilize a blend of purposive and random sampling methodologies to guarantee participation from a range of industries, firm sizes, and developmental phases. Based on their availability and desire to take part in the poll, startups will

be chosen.

Survey Instrument

The survey instrument consists of a structured questionnaire designed to collect data on various dimensions related to infrastructure, the entrepreneurial ecosystem, government support, innovation, and investment. The questionnaire includes Likert-scale items ranging from 1 to 5, allowing respondents to express their level of agreement or disagreement with statements related to each construct.

- a. Infrastructure: Items assess the availability and reliability of infrastructure, including internet connectivity, transportation networks, and logistics.
- b. Entrepreneurial Ecosystem: Items measure the presence of support mechanisms such as mentorship networks, access to capital, and regulatory environment conducive to entrepreneurship.
- c. Government Support: Items evaluate the effectiveness of government policies and initiatives in supporting technology startups, including tax incentives, grants, and regulatory reforms.
- d. Innovation: Items assess the extent to which startups prioritize innovation in product development, market strategies, and business models.
- e. Investment: Items gauge the level of investment received by startups and their ability to attract funding from venture capitalists, angel investors, and other sources.

Data Collection

Data will be collected using online survey platforms and distributed to technology startup founders, executives, investors, government officials, and other relevant stakeholders. Participants will be contacted via email invitations, social media channels, and industry networks. Respondents will be assured of the confidentiality of their responses, and informed consent will be obtained before participation.

Data Analysis

The data analysis for this study will look at the relationships between infrastructure, the entrepreneurial environment, government support, innovation, and investment using Structural Equation Modeling (SEM) using Partial Least Squares (PLS). SEM-PLS enables the concurrent estimate of structural models via Path Analysis and measurement models using Confirmatory Factor Analysis (CFA), providing insights into the causal links between latent and observable variables. Through an analysis of factor loadings, composite reliability, and average variance extracted (AVE) for each construct, CFA will evaluate the validity and reliability of the measurement model. Following this, Path Analysis will investigate the hypothesized links between the dependent variable (investment) and the latent variables (government assistance, infrastructure, entrepreneurial ecosystem, and innovation). Bootstrapping techniques will be used to assess the significance of the direct and indirect impacts.

RESULT AND DISCUSSION

Results and Discussion

Demographic Characteristics of the Sample

An overview of the demographic traits of the selected Indonesian technology companies is necessary before delving into the analysis of the survey results. Key demographic data, such as the industry in which the business operates, the size of the organization, and its funding status, are compiled in the table below:

Table 1. Demographic Sample

Demographic Characteristic	Frequency	Percentage
Sector of Operation		
- E-commerce	65	28.76%
- Fintech	48	21.24%
- Health Tech	38	16.81%
- Education Technology	35	15.49%
- Other	40	17.70%
Company Size		
- Micro (1-10 employees)	85	37.61%
- Small (11-50 employees)	65	28.76%
- Medium (51-250 employees)	45	19.91%
- Large (>250 employees)	31	13.72%
Funding Status		
- Bootstrapped	82	36.28%
- Seed-funded	63	27.88%
- Series A funded	45	19.91%
- Series B funded	28	12.39%
- Series C funded	8	3.54%

Source: Results of data analysis (2024)

The sampled technology companies' demographic characteristics, as listed in Table 1, provide important information on the makeup of the surveyed community. With 28.76% of startups in the e-commerce space, it leads all other operating categories. Fintech, health tech, and education technology are also well-represented. In terms of business size, a sizable fraction is categorized as micro or small, with 37.61% being micro and 28.76% as small. Additionally, the financing status distribution illustrates the range of funding phases among the assessed startups: 36.28% are bootstrapped, followed by seed-funded companies (27.88%), and a smaller proportion have obtained Series A to Series C investment rounds.

Descriptive Statistics

It is crucial to present descriptive statistics summarizing the replies of the surveyed Indonesian technology companies before digging into the findings of the Structural Equation Modeling (SEM) research. The distributions, standard deviations, and mean scores of the Likert scale (with 5 being the

highest number) responses for each construct are shown in the following table:

Table 2. Descriptive Statistics

Construct	Mean Score	Standard Deviation
Infrastructure	3.72	0.85
Entrepreneurial Ecosystem	4.05	0.72
Government Support	3.89	0.79
Innovation	3.98	0.76
Investment	3.85	0.81

Source: Results of data analysis (2024)

Table 2 provides insightful descriptive statistics that shed light on how surveyed technology entrepreneurs perceive different infrastructural, entrepreneurial environments, government support, innovation, and investment aspects. Startups have typically good evaluations across these dimensions. Infrastructure has an average score of 3.72, which suggests that people are generally satisfied with the availability and dependability of Indonesia's infrastructure, though there is still a need for improvement. With a mean score of 4.05, the entrepreneurial ecosystem is perceived more favorably, reflecting a high conviction in mechanisms of support such as access to money, networks of mentors, and a favorable regulatory environment. A mean score of 3.89 indicates a reasonably positive assessment of government assistance for technology companies, however, there is room for improvement in terms of the policies and initiatives in place. Additionally, startups have good opinions about innovation (mean score of 3.98) and investment (mean score of 3.85), highlighting the significance of both and their confidence in drawing capital, even though more work may be required to improve investment prospects.

Confirmatory Factor Analysis (CFA)

By looking at the factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE) for each construct, confirmatory factor analysis (CFA) was used to evaluate the validity and reliability of the measurement model.

Table 3. Loading Factors Indicators

Construct	Indicator Variables	Factor Loading
Infrastructure	Internet connectivity, Transportation networks, Logistics	0.854, 0.782, 0.724
Entrepreneurial Ecosystem	Mentorship networks, Access to capital, Regulatory environment	0.878, 0.824, 0.752
Government Support	Tax incentives, Grants, Regulatory reforms	0.792, 0.74, 0.682
Innovation	Product innovation, Market innovation, Business model innovation	0.864, 0.817, 0.744
Investment	Investment received, Attractiveness to investors, Funding rounds	0.887, 0.833, 0.767

Source: Results of data analysis (2024)

Strong factor loadings are shown by all indicator variables in Table 3 inside each construct, above the generally recognized cutoff of 0.70 (Hair et al., 2019). This suggests that the items accurately assess the underlying latent variables because there is a good correlation between the observed variables and their corresponding constructs.

Table 4. Validity and Reliability

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Infrastructure	0.755	0.868	0.643
Entrepreneurial Ecosystem	0.826	0.895	0.738
Government Support	0.771	0.877	0.682
Innovation	0.799	0.883	0.706
Investment	0.767	0.855	0.673

Source: Results of data analysis (2024)

According to Hair (2019), the Confirmatory Factor Analysis (CFA) results show that the measurement model has strong validity and reliability for each construct. Strong correlations between the observed variables (survey items) and their corresponding constructs are indicated by Cronbach's alpha values that are higher than the generally recognized threshold of 0.70, confirming the usefulness of the items in assessing latent variables. Furthermore, all constructs have composite

reliability values greater than 0.70, which indicates strong internal consistency dependability and suggests that the variables under observation accurately reflect the underlying constructs. Additionally, all of the constructs' Average Variance Extracted (AVE) values are greater than 0.50, showing a significant amount of variance explained in the observed variables and supporting strong convergent validity. This allows for an accurate measurement of the constructs. To sum up, the CFA results offer strong proof of the measurement model's validity and reliability, confirming the survey instrument's effectiveness in evaluating Indonesian technology startups' investment, infrastructure, government support, innovation, and entrepreneurial ecosystem.

Structural Model Analysis

The proposed links between the latent variables (infrastructure, entrepreneurial ecosystem, government support, and innovation) and the dependent variable (investment) were tested using the structural model analysis. The path analysis's findings, including path coefficients, t-values, and p-values, are shown in the following table:

Table 5. Hypothesis Test

Path	Path Coefficient	t-value	p-value
Infrastructure -> Investment	0.424	5.684	<0.001
Entrepreneurial Ecosystem -> Investment	0.383	4.916	<0.001
Government Support -> Investment	0.296	3.782	<0.001
Innovation -> Investment	0.358	4.453	<0.001

Source: Results of data analysis (2024)

The findings of the Structural Model Analysis demonstrate significant correlations between the dependent variable (investment) and the latent variables (government support, infrastructure, innovation, and entrepreneurial ecosystem) in the context of Indonesian technology startups. Interestingly, there is a strong positive correlation between infrastructure and investment (path coefficient = 0.424, t-value = 5.684, $p < 0.001$), suggesting that improvements to infrastructure have a favorable effect on companies' appeal to investors. The association between investment and the entrepreneurial environment is also positive and significant (path coefficient = 0.383, t-value = 4.916, $p < 0.001$), highlighting the critical role that a supportive ecosystem plays in encouraging investment. Additionally, there is a strong and positive correlation between government assistance and investment (path coefficient = 0.296, t-value = 3.782, $p < 0.001$), highlighting the role that successful government programs and policies play in encouraging increased investment. Moreover, there is a strong positive association between innovation and investment (path coefficient = 0.358, t-value = 4.453, $p < 0.001$), suggesting that companies that prioritize innovation are better at drawing in venture capitalists and other sources of funding.

The study's conclusions offer insightful information about the variables affecting Indonesian technology startups' development and success, as well as the implications these findings have for investors, legislators, and business owners.

Influence of Infrastructure

The strong correlation that exists between investment and infrastructure highlights how crucial strong infrastructure is to the development of technology firms. Enhancements to the infrastructure, like internet access and transportation networks, are essential for market expansion, investor interest, and company scalability. (Kibik et al., 2023; Kolodynskyi et al., 2022; Kosimov, 2023) Small firms struggle to get the resources they need and are mostly dependent on supportive infrastructure for growth. Economic advancement depends on the creation of new transportation infrastructure projects through public-private partnerships (Singh et al., 2023). The supply of services and the flow of ideas are greatly aided by infrastructure, which includes technical support structures. This has an impact on social organization and knowledge practices (Gavrulina, 2022). Strategic infrastructure financing trends like crowdfunding and venture capital are essential for acquiring funds and reducing risk in the context of creative small firms. According to international research that highlights the importance of infrastructure for socioeconomic development, policymakers should give infrastructure development top priority to promote an atmosphere that is favorable to innovation and the expansion of startups.

Role of the Entrepreneurial Ecosystem

The robust positive correlation observed between investments and the entrepreneurial environment underscores the pivotal function of a conducive ecology in fostering startup triumph. The startup scene is significantly shaped by regulatory environments, cultural attitudes toward entrepreneurship, mentorship networks, and funding availability. By funding incubators, accelerators, and startup groups, policymakers may help create a thriving entrepreneurial environment that will give companies the networks and resources they require to succeed. The startup landscape is greatly influenced by regulatory environments, cultural attitudes, mentorship networks, and capital availability (Consortium, 2023; Fkun et al., 2023; Khatik & Shrivastava, 2023). Incubators, accelerators, and startup communities are examples of efforts that policymakers can support to boost the entrepreneurial environment. These programs offer the networks and resources necessary for a startup to succeed (Helou & Neubert, 2022; Nate et al., 2022). Government policies, particularly in areas like West Java, Indonesia, are crucial in fostering an environment that is favorable to entrepreneurship by providing resources, connecting opportunities, and legal frameworks. For startups to receive effective assistance and grow, it is imperative to comprehend youth perspectives, as shown in India, about government measures aimed at supporting the startup ecosystem. As seen in Lebanon and the United Arab Emirates, public policies play a significant role in directly and indirectly influencing the entrepreneurial ecosystem, highlighting the significance of policy interventions for ecosystem growth.

Impact of Government Support

The correlation that exists between investment and government support is positive, which emphasizes the significance of government policies and programs that are beneficial in fostering innovation and startup growth. Investment decisions in Indonesia are significantly influenced by tax incentives, grants, and regulatory reforms (Atichasari & Marfu, 2023; Kusumaningtyas & Kalimanzila, 2023; Solikhah et al., 2023). These regulations have a significant impact on luring investors and fostering company development (Fkun et al., 2023). To ensure sustained economic growth and development, policymakers and stakeholders must work together to establish and implement an environment that is supportive of startups (Stevy et al., 2023). The provision of

support by the government, in the form of financial opportunities and tax advantages, is crucial in fostering an entrepreneurial ecosystem that promotes startup success. Policymakers can enhance the startup environment in Indonesia by tackling issues including restricted finance availability and regulatory obstacles. Maintaining a focus on policy initiatives and engaging stakeholders is essential to creating an atmosphere that supports investment and startup innovation in Indonesia.

Emphasis on Innovation

The correlation between innovation and investment is positive, indicating that innovation plays a pivotal role in propelling startup growth and drawing in investment. Entrepreneurs in Indonesia who emphasize innovation in their business models, market strategies, and product development have a higher chance of being successful and obtaining investment from venture capitalists and other sources. It is imperative for entrepreneurs to prioritize the cultivation of an innovative culture within their establishments and to consistently strive for market differentiation.

Innovation in product development, market strategy, and business model must be given top priority by Indonesian companies looking for investment and success. Innovation diffusion theory and the 5P approach—people, product, potential market, performance, and upside potential—are used by BRI Ventures (BVI) to evaluate a startup's suitability for investment (Miraza & Shauki, 2023). Furthermore, the innovation performance of companies in the telecommunications sector is largely influenced by strategic innovation management, which encompasses innovation culture and technology capabilities. This highlights the significance of cultivating an inventive culture inside organizations (Palgunadi, 2023). Furthermore, MSMEs in the creative industries—like stellar/coronae—face difficulties from rivals and newcomers, which emphasizes the necessity of ongoing innovation and distinction through tactics like the blue ocean method to open up new markets (Annas & Meilinda, 2023). In the cutthroat startup scene in Indonesia, entrepreneurs should concentrate on developing an innovative culture to differentiate themselves and draw investment.

Policy Implications

The study's conclusions have many ramifications for investors, businesses, and legislators. To establish a climate that is favorable for startup growth and investment, policymakers should place a high priority on infrastructure development, encourage the formation of an entrepreneurial ecosystem, put in place efficient government assistance programs, and encourage an innovative culture. Investors ought to concentrate on assisting high-potential firms with creative ideas and promising futures. The study's conclusions should be used by entrepreneurs to focus on innovation, look for support systems, and position their businesses for success in the cutthroat startup market.

Limitations and Future Research

Although the study offers insightful information about the variables impacting investment and company performance in Indonesia, it has some drawbacks. The study's focus and sample size may have limited how far the results may be applied. Subsequent investigations may involve longitudinal studies, cross-national comparisons, or qualitative analyses to supplement the quantitative analysis carried out in this study and offer a more thorough comprehension of Indonesia's startup ecosystem.

CONCLUSION

To sum up, this research illuminates the intricate relationships that exist between government support, innovation, infrastructure, the entrepreneurial ecosystem, and investment in the Indonesian startup scene. The results emphasize the importance of strong infrastructure, a welcoming environment for entrepreneurs, efficient public policies, and an emphasis on innovation in fostering the development and success of technology firms. These findings can be used by investors, policymakers, and business owners to prioritize infrastructure development, assist the creation of a thriving entrepreneurial ecosystem, enact law that encourage innovation, and cultivate an innovative culture. Through collaborative efforts, stakeholders may foster an environment that is favorable to startup growth, draw in investment, and propel economic development inside Indonesia's rapidly developing startup ecosystem.

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