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Empowering Startup Company: Entrepreneurial Capacity as a Key Factor

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ABSTRACT

Objectives*: The startup sector continues to evolve amidst rising competition. Entrepreneurial leadership and artificial intelligence (AI) literacy are recognized as key enablers for sustaining and enhancing competitiveness. This study aims to explore how these two elements, both individually and in combination, influence the competitiveness of startup firms, with entrepreneurial capacity considered as a potential mediating factor.*
Methodology*: The study employed a structural equation modeling approach using Partial Least Squares (PLS-SEM), drawing data from employees of digital startups based in West Java. Reliability and validity of the measurement model were confirmed through comprehensive statistical testing. The analysis assessed both direct and indirect relationships among variables.*
Result : *The findings demonstrate that AI literacy exerts a strong and statistically significant positive influence on entrepreneurial capacity, as well as directly on startup competitiveness. Entrepreneurial leadership also shows a meaningful positive contribution to both entrepreneurial capacity and startup competitiveness. Furthermore, entrepreneurial capacity itself plays a crucial role in strengthening a startup's market position and adaptability. The analysis confirms that entrepreneurial capacity serves as a significant mediating variable in the relationship between both AI literacy and entrepreneurial leadership with startup competitiveness. The overall model exhibits a high level of explanatory power, suggesting that the proposed variables collectively account for the vast majority of variance in startup competitiveness.*
Conclusion*: The results underscore the importance of fostering AI literacy and entrepreneurial leadership within startup environments, as their impact on competitiveness is not only direct but also reinforced through enhanced entrepreneurial capacity. These findings provide practical guidance for startup leaders seeking to develop strategic capabilities and sustain growth in increasingly dynamic and tech-driven markets.*

Keywords*: Artificial Intelligence Literacy; Entrepreneurial Capacity; Entrepreunerial Leadership; Startup Competitiveness; Startup Company.*

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INTRODUCTION

The technological advancement surrounding the Fourth Industrial Revolution has dramatically changed the commerce landscape. Innovations in technologies, especially in areas of Artificial Intelligence, create both opportunities and challenges for startups to seek enhanced competitive advantage.(Steyn, 2020) By their nature, innovative and technology-driven entities, it is important for startups to understand the potential of AI and include it in their strategic business frameworks.(Davalas et al., 2022) In this context, AI literacy, which involves understanding, using, and deploying AI technologies, has been one of the critical factors determining the success of a startup.(Lee et al., 2024).

At the global level, adoption of artificial intelligence is increasingly on the rise, especially in high-tech industries, finance, healthcare, and education. Many advanced economies, such as the United States and China, have incorporated AI literacy into their education systems to prepare workers for the digital era.(Karina et al., 2021) In addition, AI has been used to enhance the efficiency of operations in business, as witnessed in business process automation and big data analytics.(Tidd & Bessant, 2018) Moreover, not just technological knowledge contributes to a start up's success; rather a startup's progress also roots from innovative entrepreneurial governance. Entrepreneurial governance refers to strategic visionary leadership, calculated risk, effective resource management and gaining of competitive advantage by the organization. (Weber et al., 2022).Entrepreneurial –minded leaders are mostly more alert towards the events occurring in business environment than their non entrepreneurial counterparts and hence engage themselves into more proactive approach in sniffing new opportunities (Vargas, 2015).

The second critical factor is entrepreneurial capacity—it gives a startup the ability to manage innovation, business networks, and the value created with their offered products or services. It is startups that entrepreneurial capacity could be developed of AI literacy and visionary leadership support.(Towers et al., 2020) The way to develop entrepreneurial capacity involves providing support from strong ecosystems globally, including access to funding, mentorship, and training. (Díaz-Casero et al., 2012)

Competition among the new companies is increasing continuously because of the availability of disruptive technologies such as blockchain and artificial intelligence. Companies that can capitalize on these technologies will possibly win the race in the global market. Tech startups are leading to continuous innovation and facilitating ecosystem (Arenal et al., 2020). The landscape of entrepreneurial leadership is changing dramatically in Indonesia, especially among technology-based startups. Owners of Gojek, Tokopedia, and Ruangguru have demonstrated what a strong entrepreneurial vision can achieve in leading organizations to better heights.(Wardana et al., 2023) Initiatives meant to improve entrepreneurial capacity in Indonesia are being supported by the government through various programs such as the National Movement for 1000 Digital Startups. While there are many success stories, most Indonesian startups still face challenges related to technological innovation, access to funding, and global business networks. West Java, particularly Bandung, has emerged as a dynamic innovation and startup ecosystem hub in Indonesia. The West Java Provincial Government (Pemda Jabar) has supported programs like the Digital Village Program to facilitate collaborations between regional government agencies and more than 30 startups to enhance life qualities in rural areas by way of ICTs(Steyn, 2020). In all, West Java rose to become the region where the most number of Indonesia's startups are rooted since 56 of this year's 396 Startups hailed from there. That represents a growth in the ecosystem of startups in West Java, with huge

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potential.(Pinski et al., 2024). However, alongside this expansion, Indonesia's startup ecosystem has faced considerable headwinds. In the third quarter of 2024, equity funding deals dropped to their lowest level in six years, with only 20 transactions recorded. This sharp decline in investment has forced many startups to implement cost-cutting measures, including workforce reductions and, in some cases, shutting down operations. Other challenges include limited access to capital, talent shortages, infrastructure gaps, and complex regulatory environments that hinder scalability.(Kompas.id)

The current literature reveals inconsistencies in the perception of AI literacy, entrepreneurial leadership, entrepreneurial capacity, and startup competitiveness. While some studies have posited that AI literacy enhances operational efficiency and innovation in startups, it also enables them to derive more value from data to drive their decision-making (Davenport & Ronanki, 2018). Nevertheless, some other studies found that AI literacy is not always positively impactful if the infrastructural and resource support to implement it is not adequate. Most startups face failures in integration of AI technology because of their financial constraints and unavailability of skilled labor (Bessen, 2019). Entrepreneurial leadership has been recognized as the driving force toward innovation and adaptability of startups to changed market circumstances (Bagheri & Harrison, 2020). The leadership approach in question is frequently linked to a propensity for risk-taking and the formulation of strategic visions. Nevertheless, alternative research indicates that entrepreneurial leadership may yield negative outcomes when it excessively prioritizes unmeasured risks, resulting in hasty decision-making (Pukkinen et al., 2024). Numerous studies suggest that the capacity for entrepreneurship, encompassing the capability to identify opportunities and formulate strategies, significantly boosts the competitive edge of startups (Tidd & Bessant, 2018). Other researches suggest that the entrepreneurial capacity is not a guarantee of competitiveness, specifically if it is not backed by adequate financial support or market access (Zhang et al., 2021). Some studies have combined AI literacy with entrepreneurial leadership and entrepreneurial capacity. In those studies it was found that interdependently related variables, Startups with high levels of AI literacy and with entrepreneurial leaders, have higher levels of innovation and competitiveness ((Chen & Zhang, 2023). Contrasting this, other studies argue that these factors do not always complement each other. For example, high AI literacy may become useless when the organizational leadership lacks a clearly defined entrepreneurial strategy (Hindle, 2007). The observed inconsistencies may emerge from several factors, including geographical context, the scale of business operations, or methodological approaches employed in research. The main purpose of this research is to investigate the relationship between AI literacy, entrepreneurial leadership, and entrepreneurial capacity in the context of startup competitiveness(Krivorotov et al., 2020). More precisely, it tries to analyze how these elements—on their own and in different combinations—impact innovation, adaptability, and market performance within startups operating in highly dynamic and competitive environments. The study pulls together perspectives from technology, entrepreneurship, and leadership in a holistic view of how startups can harness these interdependent factors to drive success (Jiang et al., 2022). This kind of overarching framework is quite rare in existing literature, which tends to look at these variables in isolation. While much of the research has focused on developed economies, this study brings forth the special challenges and opportunities that exist for startups in emerging markets, with a focus on Indonesia. It brings new insights into how startups in such contexts may bridge gaps in technology adoption and build leadership capabilities.(Weber et al., 2022) . The research explores the interrelationship between AI literacy, entrepreneurial leadership, and entrepreneurial capacity in a manner that brings out how their interaction fosters

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competitiveness (Purnama, Eka, 2023). What makes this research an important and new contribution to the field of entrepreneurship and technology management is that it identifies certain gaps in the literature but, at the same time, raises difficult interrelations among critical variables.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Artificial Intelligence Literacy

Artificial Intelligence Literacy is the knowledge, skills, and competencies needed for effective interaction with AI technologies. That is, understanding the basic concepts of AI, using AI tools, and applying AI methods in practical settings.(Putri Supriadi et al., 2022) But AI literacy is not possible without being informed about what AI is, how it works, and its impact on society, business, and individual decision-making.(George et al., 2023)

AI literacy refers to the ability to successfully use AI-based tools and platforms for a variety of purposes, such as data analysis, automation, predictive modeling, and decision-making. This skill is applied when using AI technologies in normal business operations—for example, through the implementation of chatbots, data analytics tools, or customized marketing solutions. This includes understanding issues such as algorithmic bias, privacy concerns, job displacement due to automation, and the role of artificial intelligence in decision-making systems.(Asio, 2024)

Entrepreneurial Leadership

Entrepreneurial Leadership is a style of leadership that combines the visionary, strategic thinking, and innovativeness embodied in entrepreneurship with the skills needed to lead teams, make effective decisions, and drive business success (Chen & Zhang, 2023). It is characterized by a focus on value creation, taking calculated risks, and being able to embrace opportunities and challenges in a fast-evolving business environment. Entrepreneurial leadership is driven not only by business growth but also by the desire to motivate and lead teams toward continuous innovation in a dynamic marketplace.(Locke & Robert Baum, 2014)

Entrepreneurial leaders are important in the development of innovation in organizations. Their ability to think out of the box and institute game-changing innovation ensures that their businesses can grow, adapt, and remain competitive in light of market turbulence (Bagheri & Krauss, 2013). Entrepreneurial leadership is essentially long-term value creation. Entrepreneurial leaders do not focus on short-term gains, rather they build a sustainable business that would face no problem in dealing with the challenges of the future (Kim et al., 2018).

Entrepreneurial Capacity

A strong entrepreneurial capability increases the competitive advantage of an organization because it can innovate faster, adapt quicker to changes in the marketplace, and find new ways to create value for its customers. This, in turn, creates differentiation in the marketplace and sustains success over time (Satyanarayana et al., 2021).

Entrepreneurial capacity is a composite construct, enabling individuals and organizations to identify, capitalize on, and sustain entrepreneurial opportunities (Goh et al., 2022). It is not merely the ability to innovate and take risk; it combines leadership, resourcefulness, and adaptability to survive in dynamic business environments (Karina et al., 2021). Strong entrepreneurial capacity would then enable an entrepreneur to build a venture

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that could withstand challenges in the market, scale up, and stay competitive to play a major role in the growth of an economy, helping to give rise to new industries (Zaech & Baldegger, 2017).

Startup Competitiveness

Startup competitiveness refers to the ability of a new enterprise to outperform its peers in the market by creating value, adapting to dynamic circumstances, and achieving sustainable growth (Eisenmann, 2020). Competitive startups not only have strong products or services, but they are also strong in their strategic approach and execution, market positioning, and ability to adapt repeatedly in a rapidly changing business environment (Chen & Zhang, 2023). Innovation is at the core of startup competitiveness. This may create a differentiation that drives customer preference and sets the startup as a leader in its niche. This helps the startup stand out in a crowded market. An unque brand identity, distinct value proposition, and comprehensive understanding of the target client are fundamental for achieving a competitive advantage.(Lee et al., 2024).

Research Hypothesis and Framework

The influence of AI literacy toward Entrepreneurial Capacity

AI literacy can be explained as a set of knowledge, skills and understanding needed to utilize AI tools competently and with due accountability (Towers et al., 2020). Since AI is installed in diverse work as well as social activities, its effects on the constructs such as the entrepreneurial capacity which articulates the creative and innovative potential of an individual or group of individuals or an organization to set up, nurture and sustain, strategies has attracted interest in both the researcher and the practitioner over time (Oloruntosin Tolulope Joel & Vincent Ugochukwu Oguanobi, 2024).

AI literacy is an important one as it improves the entrepreneurial capacity substantially. The entrepreneurs who are keen on learning and adopting AI technologies will have a better capacity to explore new ventures, invent and be relevant in the changing AI economy (Ersarı & Naktiyok, 2022).

H_1 : AI Literacy has a significant influence on Entrepreunerial Capacity.

The influence of Entrepreneurial Leadership towards Entrepreneurial Capacity

Entrepreneurial leadership is revolve a person's ability to create and acquire opportunities and also rally people towards those opportunities (Megawaty et al., 2022). Its impact on the entrepreneurial capacity is, however, very overwhelming since it specifically enables the knowledge, attitude, and preparedness of the business to seek and use potential opportunities. There are numerous ways in which entrepreneurial leadership helps in formation of a more optimal entrepreneurial capacity. For example, "this approach assists organizations in mobilizing resources and competencies to foster innovation (an enhancement of the repertoire of capabilities) by advocating an innovative culture, risks being taken to empower teams, and strategic resource management practices"(Pinski et al., 2024) In this regard, such organizations will be better placed to navigate the challenges of uncertainty and take advantage of the growth and development opportunities that come on their way. (Alzaghal et al., 2024)

H_2 : Entrepreneurial Leadership has a significant influence on Entrepreneurial Capacity

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The influence of AI Literacy toward Startup Competitiveness

AI Literacy involves a person's appreciation, interaction, and application of various knowledge related to the technologies, structured development and technologies (Tóth-Pajor et al., 2023). In the perspective of emerging businesses, the understanding of AI is becoming increasingly relevant because it affects competition through its contribution to inventions, improvement of processes and structural reorganizations. Startups are based on innovations and AI to great entrepreneurs and the teams with means able to spot the opportunities where AI can be useful(Weber et al., 2022). For instance, a health tech startup with a fluent AI team could be able to create machine learning powered devices that diagnose patients which gives the company an edge in providing advanced innovations such as the automation of serving customers using chatbots, eliminating repetitive tasks, intelligent process automation, and using AI insights to influence marketing strategies (Hindle, 2007). Those Startups that implement AI into their businesses the right way tend to grow faster and invest more towards their growth, which puts them in a more favorable position.

H_3 : AI Literacy has a significant influence on Startup Competitiveness.

The influence of Entrepreneurial Leadership toward Startup Competitiveness

Leadership in this style focuses on vision, innovation and a risk appearance of identifying / capturing opportunities in the current dynamic markets. The product experimentation and risk taking spirit by entrepreneurial leaders in this arena (Ng et al., 2024). Entrepreneurs are most likely also to have network and collaborational characteristics. They are good at finding strategic partnerships or mentors that provide startups with additional resources, markets and skills (Davalas et al., 2022). At the start-up stage, resource constraints are usual. They are masters at working with the resources they have and finding a way to employ alternative solutions in order to serve their interests. This is how some of the most successful entrepreneurial leaders work to learn and ask for customer needs. Startups can have an edge by addressing the needs of their customers through listening to feedback and improving products or services in real time (Neumann et al., 2024).

H_4 *:* Entrepreneurial Leadership has a significant influence on Startup Competitiveness.

The Influence of Entrepreneurial Capacity towards Startup Competitiveness

Today, the highly dynamic and competitive business climate gives rise to many startups that should act as incubators and drivers of innovation, as well as being contributors to economic development. But even their success and survival is largely predicated on their capacity to keep that competitive advantage. Determinant of startup competitiveness with the concept of Entrepreneurial Capacity; defined as the degree in which an entrepreneur or organization can scan and exploit opportunities effectiveness (Manajemen & Ekonomi, 2011). The entrepreneurship is the very root of startup competitiveness as it promotes qualities like novelty, flexibility and optimal strategic resource management (Davalas et al., 2022). Startups, that devote resources to developing their entrepreneurial capacity, are ultimately more capable of challenges and taking advantage of opportunities in a competitive market to achieve long term success (Chauhan, n.d.). The entrepreneurial capacity of Global Entrepreneurship remains a key focus for start-up founders and investors/ policymakers as entrepreneurship is seen as driving the global economic growth.

H_5 *:* Entrepreunerial Capacity has a significant influence on Startup competitiveness.

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The Influence of AI literacy and start up competitiveness through entrepreneurial capacity.

In other words, AI literacy is a critical enabler for startups to outcompete. Startups have the capability for more efficient innovation by embedding know-how on how best to blend AI in with their processes and thereby augment operations and on-market demand.(Mishra et al., 2022)

Entrepreneurial capacity mediates this effect. And it covers talents, tools, and ways of thinking that will impact the identification of opportunities, how business solutions are developed and lastly the design of strategies. Entrepreneurs with good AI literacy are well positioned to deploy their entrepreneurial capacity. They can employ AI to observe market trends, automate chores and personalize customer interactions, that are all points which matter when it comes to the competition (Weber et al., 2022).

H_6 : AI Literacy is significantly related to the Startup Competitiveness through Entrepreneurial Capacity

The Influence of Entrepreneurial Leadership and start up competitiveness through entrepreneurial capacity.

The connection between Entrepreneurial Leadership and startup competitiveness through entrepreneurial capacity illustrates how effective leadership cultivates entrepreneurial skills that directly impact a startup's competitive edge (Oloruntosin Tolulope Joel & Vincent Ugochukwu Oguanobi, 2024). Entrepreneurial leadership is characterized by the ability to inspire teams, take calculated risks, and craft innovative visions that improve a startup's capacity to recognize and seize new opportunities (Davenport & Ronanki, 2018). Entrepreneurial capacity serves as a bridge linking entrepreneurial leadership to startup competitiveness. This capacity includes elements such as innovation, proactivity, adaptability to market shifts, and efficient resource management. Entrepreneurial leaders strengthen these attributes by empowering their teams, formulating strategic plans, and securing necessary resources (Jagdale, 2024) .

In the end, a startup's competitiveness is determined by its ability to adapt, stand out from rivals, and swiftly respond to market needs. With a robust entrepreneurial capacity, startups can create distinctive products or services that offer a notable competitive advantage.

H_7 : Entrepreneurial Leadership has a significant influence on Startup Competitiveness through Entrepreneurial Capacity.

It outlines key studies and their findings on the relationships between AI Literacy**,** Entrepreneurial Leadership**,** Entrepreneurial Capacity**,** and Startup Competitiveness**:**

Author(s)	Focus	Key Variables	Key Findings
Towers et al. (2020)	AI literacy and entrepreneurial capacity	AI Literacy → Entrepreneurial Capacity	AI literacy builds entrepreneurial capacity by enhancing innovation and strategic thinking.
Zhang et al. (2021)	Limitations of entrepreneurial capacity	Entrepreneurial Capacity → Startup Competitiveness	Capacity alone isn't enough without market and financial access.

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Weber et al. (2022)	AI usage in startups	AI Literacy → Startup Competitiveness	AI allows startups to improve innovation and automation for better competitiveness.
Ersarı & Naktiyok (2022)	Entrepreneurial mindset and AI	AI Literacy → Entrepreneurial Capacity	Entrepreneurs with AI knowledge are more capable in identifying opportunities and remaining competitive.
Megawaty et al. (2022)	Leadership impact on SME performance	Entrepreneurial Leadership → Entrepreneurial Capacity	Leadership enhances entrepreneurial preparedness and opportunity utilization.
Davalas et al. (2022)	Startup innovation and leadership	Entrepreneurial Leadership → Startup Competitiveness	Leadership drives strategic partnerships and adaptive innovation.
Mishra et al. (2022)	AI and capacity in startups	AI Literacy → Entrepreneurial Capacity → Startup Competitiveness	AI enhances competitiveness when mediated by entrepreneurial capability.
Alzaghal et al. (2024)	Digital literacy and sustainable competitive advantage	Entrepreneurial Leadership → Entrepreneurial Capacity	Leadership supports strategic resource management and innovation culture.
Neumann et al. (2024)	Startup responsiveness	Entrepreneurial Leadership → Startup Competitiveness	Leaders translate feedback into real-time product improvements.
Jagdale (2024)	Entrepreneurial leadership in innovation	Leadership → Entrepreneurial Capacity → Startup Competitiveness	Leadership fosters capacity which drives competitive advantages.

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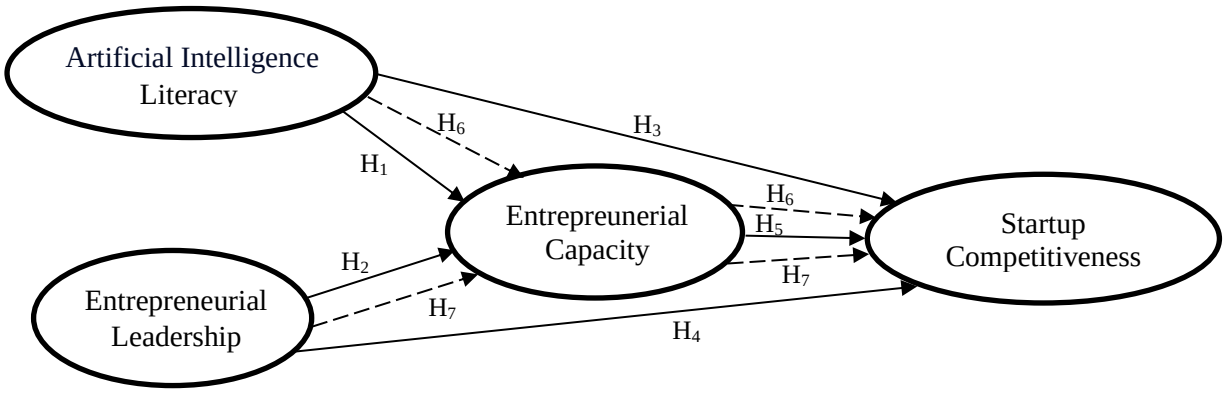

Figure 1 Research Framework

METHOD

This study adopts a quantitative approach using survey methods. A questionnaire was developed to explore how independent variables affect dependent variables within the context of startup companies, focusing on factors like artificial intelligence literacy, entrepreneurial leadership, entrepreneurial capacity, and startup competitiveness. The study's participants include employees from 20 startup companies in West Java, with each company contributing 10 to 15 employees, leading to a total of 250 participants selected through Purposive Sampling (criteria-based sampling) and Accidental Sampling (Manajemen & Ekonomi, 2011). The criteria for inclusion in this study are employees who have been working for at least one year, active, and have used Artificial Intelligence programs at least twice. Data will be collected through a questionnaire featuring statements that assess the study variables, based on validated indicators from previous research. The gathered data will be analyzed using the Partial Least Squares (PLS) method, which is a statistical technique suitable for testing models with numerous variables and small to medium sample sizes (Le Trinh, 2019). The researcher will ensure that the questionnaire is completed by respondents who meet the specified criteria. Participants will be informed about the research objectives prior to data collection, and their confidentiality will be maintained. Only aggregate data will be collected, and participation will be voluntary.

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RESULTS AND DISCUSSION

Results

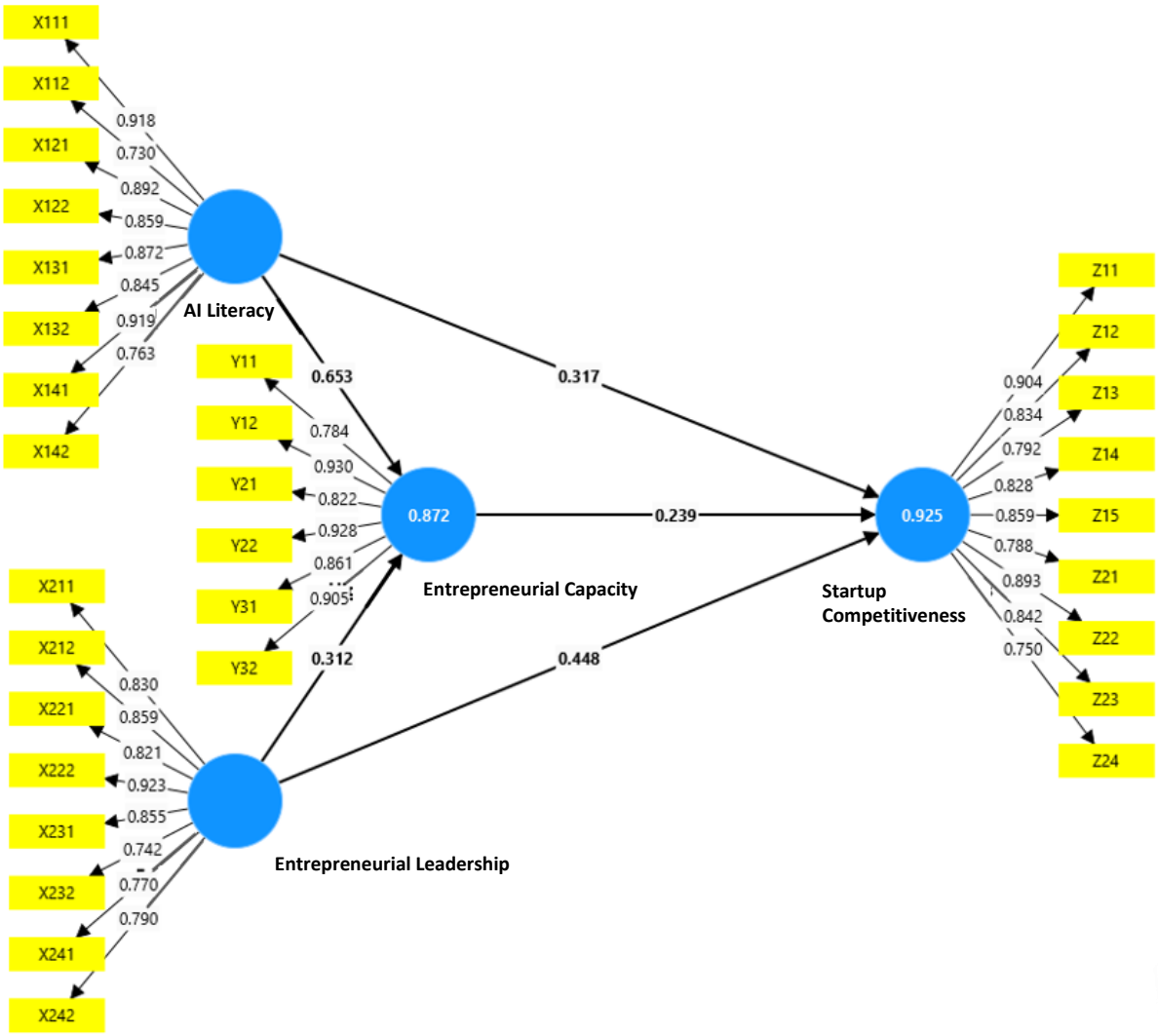

Figure 2 Final PLS Model

Evaluation Model Measurement (Outer Model)

This model specifies how each indication relates to its latent variable; alternatively, the outer model can indicate the relationship between the latent variable and its indicators. External models were tested using Confirmatory Factor Analysis (CFA). Because the loading factor values are more than 0.7, all of the questionnaire's questions are considered valid, according to the evaluation results in Table 1. Furthermore, all items are regarded as dependable since the Average Variance Extracted (AVE) values are greater than 0.5, the Composite Reliability (CR) is greater than 0.7, and the Cronbach Alpha (CA) is greater than 0.7. In discriminant validity, the correlation values between indicators and their respective constructs should be higher than the correlation values with other constructs. In terms of cross-loading discriminant validity, all indicators have stronger correlations with relevant constructs than with other constructs, implying that the study model has good discriminant validity.

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Table 1 Evaluation Results of the Outer Measurement Model

Variable	Indicator Code	*Outer Loading Value*	AVE	CR	CA	Information
Artificial Intelligence Literacy	X111	0.918	**0.726**	**0.955**	**0.945**	Valid and Reliable
	X112	0.730				Valid and Reliable
	X121	0.892				Valid and Reliable
	X122	0.859				Valid and Reliable
	X131	0.872				Valid and Reliable
	X132	0.845				Valid and Reliable
	X141	0.919				Valid and Reliable
	X142	0.763				Valid and Reliable
Entrepreunerial Leadership	X211	0.830	**0.681**	**0.945**	**0.932**	Valid and Reliable
	X212	0.859				Valid and Reliable
	X221	0.821				Valid and Reliable
	X222	0.923				Valid and Reliable
	X231	0.855				Valid and Reliable
	X232	0.742				Valid and Reliable
	X241	0.770				Valid and Reliable
	X242	0.790				Valid and Reliable
Entrepreneurial Capacity	Y11	0.784	**0.763**	**0.951**	**0.937**	Valid and Reliable
	Y12	0.930				Valid and Reliable
	Y21	0.822				Valid and Reliable
	Y22	0.928				Valid and Reliable
	Y31	0.861				Valid and Reliable
	Y32	0.905				Valid and Reliable
Startup Competitiveness	Z11	0.904	**0.694**	**0.953**	**0.944**	Valid and Reliable
	Z12	0.834				Valid and Reliable
	Z13	0.792				Valid and Reliable
	Z14	0.828				Valid and Reliable
	Z15	0.859				Valid and Reliable
	Z21	0.788				Valid and Reliable
	Z22	0.893				Valid and Reliable
	Z23	0.842				Valid and Reliable
	Z24	0.750				Valid and Reliable

Structural Model Evaluation (Inner Model)

R Square Test

This model specifies the relationship between the latent variables, also known as the inner relationship. This is a type and magnitude test that measures the influence of an independent variable on a dependent variable. The test is divided into two stages: the R Square Coefficient (R^2) test, which evaluates how much variance an independent variable explains in a dependent variable, and a hypothetical test, which tests the research model's premise.

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Determination Coefficient Test / R Square (R^2)

The determination coefficients are used to assess the model's internal validity. The value of the determination coefficient ranges from 0 to 1. The determination factor (R^2) value is close to one. The R^2 score indicates how well the independent variable proposed in the equation may explain the dependent variable.(Díaz-Casero et al., 2012), categorizes the criteria for restricting R^2 values as strong, moderate, or weak.

Table 2 R Square Results

Variable	R-square	Adjusted R-Square
Startup Competitiveness	0.925	0.924
Entrepreneurial Capacity	0.872	0.871

This table indicates that 92.4% (High) of the Startup Competitiveness variables can be impacted by Artificial Intelligence Literacy, Entrepreneurial Leadership, and Entrepreunerial Capacity, whereas 7.6% is influenced by variables outside of the study. Furthermore, the R-square Adjusted Entrepreneurial Capacity is 0.871 (High), indicating that 87.1% of the Entrepreneurial Capacity factors can be influenced by the Artificial Intelligence Literacy and Entrepreneurial Leadership variables, while the remaining 12.9% is affected by other variables.

F Square

F-square analysis is used to identify the strong effect size of the influence of independent factors on dependent variables and the mediated variable on bound variables, with criterion of > 0.35 stated strong, 0.35 s.d > 0.15 stated moderate, and 0.15 s.d > 0.02 stated weak.

Table 3 F Square Results

Variable	Startup Competitiveness	Entrepreneurial Capacity
Entrepreneurial Leadership	0.606	0.207
Entrepreneurial Capacity	0.097	
Artificial Intelligence Literacy	0.192	0.908

Table 3 shows that data analysis of F^2 on exogenous or independent constructions has the highest value of 0.907 (Strong) of the Artificial Intelligence Literacy variable versus Entrepreneurial Capacity variable, and the maximum value of 0.207 (Moderate) versus the Startup Competitiveness of the Entrepreneurial Leadership variable.

Hypothesis Test

The inter-constructive hypothesis test is carried out using the bootstrap resampling method. The calculation of the hypothetical test using SmartPLS 4.1.0 can be seen from the Path Coefficient value, i.e. the t-statistical value of the relationship between the variables in the study. The decision-making method is:

- If *P-Values* > 0.05 or t counts < 1.96, then Ho is accepted and Ha is rejected.
- If *P-Values* < 0.05 or t counts > 1.96, then Ho is rejected and Ha is accepted.

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Table 4 Path Coefficient, t-Statistics, and P-Values

Path Coefficient	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Information
Direct Effect				
Artificial Intelligence Literacy -> Entrepreneurial Capacity	0.653	11.374	0.000	**Positive**
Entrepreneurial Leadership -> Entrepreunerial Capacity	0.312	5.329	0.000	**Positive**
Artificial Intelligence Literacy -> Startup Competitiveness	0.317	4.412	0.000	**Positive**
Entrepreneurial Leadership -> Startup Competitiveness	0.448	4.747	0.000	**Positive**
Entrepreneurial Capacity ->Startup Competitiveness	0.239	3.892	0.000	**Positive**

Table 5 Indirect Effect

Path Coefficient	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Information
Indirect Effect				
Artificial Intelligence Literacy -> Entrepreneurial Capacity -> Startup Competitiveness	0.156	3.432	0.001	**Positive**
Entrepreneurial Leadership -> Entrepreneurial Capacity -> Startup Competitiveness	0.074	3.672	0.000	**Positive**

Discussion

There is a significant influence of Artificial Intelligence Literacy on Entrepreneurial Capacity (H_1).

The path coefficient is **0.653**, with a **t-value of 11.374** and a **p-value of 0.000**. This means AI literacy has a **strong and statistically significant** positive influence on entrepreneurial capacity.

In practical terms, startups that improve their understanding and use of AI technologies are significantly better equipped to enhance innovation, problem-solving, and value creation abilities.Creating a culture that prioritizes AI is equally crucial. Startups need to cultivate an environment that encourages curiosity and experimentation with AI. Employees should feel

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empowered to investigate how AI can improve their roles, optimize processes, or create new opportunities for innovation (Hindle, 2007). This cultural transformation can lead to groundbreaking ideas and initiatives that establish the company as a leader in its field. Additionally, incorporating AI literacy into product development can enable startups to create offerings that are innovative, efficient, and highly relevant to their target markets. By integrating AI-driven features and solutions, companies can maintain competitiveness and effectively respond to emerging customer needs. Simultaneously, educating customers about AI and its advantages can strengthen relationships and build trust, highlighting the startup's progressive approach (Eisenmann, 2020).

There is a significant influence of Entrepreneurial Leadership on Entrepreneurial Capacity (H_2).

The coefficient is **0.312**, **t-value = 5.329**, **p-value = 0.000**. This indicates that entrepreneurial leadership has a **moderate but significant** impact on entrepreneurial capacity. Leaders who foster vision, risk-taking, and adaptability help their organizations build the internal capacity needed to succeed in competitive markets.

If research indicates that entrepreneurial leadership positively affects entrepreneurial capacity, startups should intentionally integrate this insight into their strategies. The foremost step is to foster entrepreneurial leadership within the organization (Purnama, Eka, 2023). This means identifying and developing individuals who possess essential traits like vision, adaptability, resilience, and the ability to inspire and motivate teams. Implementing leadership development programs tailored to entrepreneurial settings can enhance these qualities and prepare leaders to handle the challenges of a business landscape.

There is a significant influence of Artificial Intelligence Literacy on Startup Competitiveness (H_3)

The coefficient is **0.317**, **t-value = 4.412**, **p-value = 0.000**. AI literacy also has a **significant direct effect** on how competitive a startup is. When startups embed AI tools into operations—such as through automation, customer personalization, or data analytics—they gain an edge in the market.

Startups should evaluate the impact of their AI literacy initiatives on competitiveness. Monitoring key performance indicators, such as market share growth, customer retention rates, and operational efficiency, can help identify successes and areas needing improvement. By adjusting their strategies based on data-driven insights, startups can ensure that AI literacy becomes a fundamental driver of sustained competitiveness, allowing them to succeed in a fast-changing market environment.(Lee et al., 2024)

There is a significant influence of Entrepreneurial Leadership on Startup Competitiveness (H_4).

The coefficient is **0.448**, **t-value = 4.747**, **p-value = 0.000**. This shows that entrepreneurial leadership contributes nearly **45% improvement** in startup competitiveness. Visionary leaders can guide startups to seize opportunities, adjust to change, and maintain strategic focus.

Entrepreneurial leaders are crucial in determining the strategic direction of the startup. They play a key role in spotting growth opportunities, guiding product innovation, and establishing strong relationships with stakeholders. By utilizing their vision and adaptability, these leaders

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can help the startup stay agile and responsive to shifts in the competitive environment. Their capacity to foresee trends and create proactive strategies provides the company with a considerable advantage over its rivals.(Arenal et al., 2020)

There is a sifnificant influence of Entrepreneurial Capacity on Startup Competitiveness (H_5).
The coefficient is **0.239**, **t-value = 3.892**, **p-value = 0.000**. Entrepreneurial capacity itself has a **positive and statistically significant** impact. This suggests that when a startup is able to innovate, scale, and adapt effectively, it performs better in the market.

Entrepreneurial capacity is crucial for the success and competitiveness of startups. By promoting innovation, adaptability, and strategic risk-taking, it allows startups to seize opportunities, effectively meet market demands, and tackle challenges with resilience (George et al., 2023). Research consistently shows that startups with robust entrepreneurial capacity are more likely to experience sustainable growth, outperform their competitors, and gain a competitive advantage in ever-changing markets. The significant positive effect of entrepreneurial capacity on startup competitiveness highlights its role as a vital driver of business performance and long-term success.(Dvalidze & Markopoulos, 2020)

There is a significant influence of Artificial Intelligence Literacy on Startup Competitiveness through Entrepreneurial Capacity (H_6)
The **indirect effect coefficient is 0.156**, **t-value = 3.432**, **p-value = 0.001**. This means AI literacy not only influences competitiveness directly but also **indirectly enhances competitiveness** by improving entrepreneurial capacity. So, startups benefit more when AI tools are used alongside strong internal capabilities.

When combined with entrepreneurial capacity—the skill to recognize opportunities, mobilize resources, and take informed risks—AI literacy serves as a significant catalyst for competitiveness. Entrepreneurs who possess a robust understanding of AI can weave these technologies into their business strategies, allowing them to analyze market trends, anticipate consumer behavior, and optimize operations. This synergy not only boosts agility and responsiveness but also empowers startups to establish themselves as frontrunners in their industries.(Pukkinen et al., 2024)

There is a significant influence of Entrepreneurial Leadership on Startup Competitiveness through Entrepreneurial Capacity (H_7).
The **indirect effect coefficient is 0.074**, **t-value = 3.672**, **p-value = 0.000**. This finding shows that the **impact of entrepreneurial leadership is amplified when mediated by entrepreneurial capacity**. Leaders who inspire innovation and proactive behavior help build stronger internal structures that translate into greater competitiveness.

Entrepreneurial leadership significantly affects startup competitiveness, especially when it is expressed through entrepreneurial capacity. This type of leadership involves the ability to inspire innovation, motivate teams, and tackle challenges, while entrepreneurial capacity includes the skills and mindset necessary to seize opportunities, manage risks, and foster business growth (Karina et al., 2021). Together, these elements are crucial in determining a startup's effectiveness in competing within dynamic and competitive markets.

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CONCLUSION

This study provides clear evidence that both AI literacy and entrepreneurial leadership play a central role in shaping the success of startups. The statistical results show that:

AI literacy significantly boosts not only a startup's internal capability but also its market competitiveness. Entrepreneurial leadership enhances the startup's ability to adapt, lead innovation, and outperform competitors. Most importantly, entrepreneurial capacity serves as a crucial bridge, mediating and amplifying the positive effects of AI and leadership on competitiveness. The strength of the path coefficients, all with p-values below 0.05, confirms that these relationships are not due to chance. For example, a path coefficient of 0.653 means that for every 1-unit increase in AI literacy, entrepreneurial capacity increases by approximately 65.3%, assuming other variables are held constant. The consistently high t-values (all above 3.0) across all paths further validate the model's robustness.

Artificial Intelligence Literacy plays a vital role in enhancing both the operational and strategic dimensions of a Startup Company, ultimately boosting its overall capacity. The role of entrepreneurial leadership in integrating artificial intelligence literacy within the startup is essential. This leadership guides and supports the necessary digital transformation to maximize the benefits of artificial intelligence. By combining effective AI applications with strong entrepreneurial leadership, the competitiveness of the Startup Company is significantly enhanced. Both Artificial Intelligence Literacy and entrepreneurial leadership serve as crucial pillars that reinforce each other in strengthening Entrepreneurial Capacity. When AI literacy is leveraged to enhance efficiency, tailor learning experiences, foster innovation, and is driven by visionary entrepreneurial leadership, it leads to a notable increase in competitiveness. This collaboration empowers the Startup Company to thrive not just in the local market but also on a global scale, establishing it as a standout player in the startup ecosystem.

Example, Nodeflux (Bandung-based**)**, a startup specializing in computer vision and AI-based analytics. With strong AI literacy, the company has implemented advanced AI tools in smart city surveillance and traffic analytics. Their success illustrates how AI proficiency can directly improve market competitiveness by offering unique, high-value products, Warung Pintar (Jakarta-based but active in West Java) by applying entrepreneurial leadership, Warung Pintar turned traditional street kiosks into tech-empowered micro-retailers. The leadership team's strategic thinking and risk-taking behavior enabled fast scaling and successful investor relations, and **S**ociolla (Operational across Indonesia including West Java), has developed a robust entrepreneurial capacity by integrating digital marketing, supply chain innovation, and strategic partnerships with beauty brands. They've succeeded in leveraging local ecosystems to support expansion and tech adoption.

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