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The Effect of Management Control System and Financial Leverage on Start-up Performance: Business Financial Literacy as Moderation

Henny Yunita Sihite[1], Nurna Aziza[2]
[1]Universitas Bengkulu, Bengkulu, Indonesia, sihitehenni49@gmail.com
[2]Universitas Bengkulu, Bengkulu, Indonesia, nurna_aziza@unib.ac.id

[*]Corresponding Author: sihitehenni49@gmail.com[1]

Abstract: This study aims to examine the effect of management control systems and financial leverage on the performance of start-ups fostered by the Bengkulu University Technology Business Incubator (IBT). The sample in this study consists of 37 start-ups engaged in various business sectors, including agriculture, food and beverages, technology, and handicrafts. This study also analyzes the role of business financial literacy as a moderating variable that is expected to strengthen or weaken the effect of management control systems and financial leverage on start-up performance. Data analysis was conducted in two stages. The first stage used multiple linear regression to test the direct effect between the independent variables on start-up performance. The second stage uses Moderated Regression Analysis (MRA) to test the interaction effect between independent variables and moderating variables on performance. The regression model was analyzed using SPSS version 26 software, with classical assumption testing including normality, multicollinearity, and heteroscedasticity tests to ensure model validity. The results showed that management control system and financial leverage have a positive and significant effect on start-up performance. In addition, business financial literacy proved to have a significant moderating role, with a tendency to weaken the relationship between management control system and performance, and strengthen the relationship between financial literacy and performance.

Keywords: Business Financial Literacy, Financial Leverage, Management Control Systems, Start-up Performance.

INTRODUCTION

Start-ups are innovation and technology-based start-ups that aim to provide solutions to unmet market needs (Aras, 2021). In Indonesia, the development of start-ups contributes significantly to national economic growth, especially in terms of job creation, increased competitiveness, and digital transformation (Priantinah et al., 2024). Based on the Global Start-up Ecosystem Index 2022, Indonesia is ranked 38th in the world, indicating an increasingly conducive business climate for start-up growth (David et al., 2020). Locally, the

Bengkulu University Technology Business Incubator (IBT UNIB) plays an active role in fostering technology and agribusiness-based entrepreneurs through training, mentoring, and facilitating market access (Novanda, 2022). However, many fostered start-ups still face challenges in maintaining and improving their business performance, especially in the early stages of development. The main problems often encountered include weak financial management and the lack of a comprehensive management control system (Roberto Grana-Alvarez ˜ a, 2024) In addition, limited internal funds make many start-ups rely on debt-based financing.

Business financial literacy is believed to play an important role in moderating the relationship between management control systems and financial leverage on business performance. Previous research by Afsar Basha & Bennasr, (2023 and Gomez-Conde et al.,(2023) shows that managerial preference and information availability affect the capital structure decision. This is in line with Pecking Order Theory which explains that companies tend to choose internal funding first, then debt, and finally equity (Hastutik et al., 2023).

Research that specifically examines the effect of the management control system and financial leverage on start-up performance with financial literacy as a moderating variable in the context of UNIB IBT-assisted start-ups is still very limited. Therefore, this research was conducted to fill this gap and contribute both theoretically and practically. The findings of this study are expected to be implemented directly by start-up business actors in building an adaptive control system, appropriate financing strategies, and increasing financial literacy capacity in supporting sustainable business continuity and growth.

METHODS

This study uses a quantitative approach with the aim of analyzing the effect of management control systems and financial leverage on start-up performance, as well as the role of business financial literacy as a moderating variable. The object of research is start-ups fostered by the Bengkulu University Technology Business Incubator (IBT).

The number of samples in this study were 37 start-ups who were active participants in the UNIB IBT incubation program in 2024. The sampling technique used is a saturated sample, because the population is relatively small and all business units can be reached by researchers. By involving the entire population as a sample, this research is expected to describe the real conditions of the fostered start-ups as a whole. However, the limited number of samples makes the generalization of research results only applicable to similar contexts, especially start-ups that are in the incubation phase in universities or regional incubators.

Data was collected through distributing questionnaires to start-up founders or managers. The questionnaire instrument was developed based on indicators adapted from relevant previous research, and measured using a five-point Likert scale. Prior to use, the questionnaire was tested for validity and reliability. The validity test was conducted through item-total correlation analysis, and all items were declared valid because the correlation value was > 0.334. Meanwhile, the reliability test showed that all variables had a Cronbach's Alpha value above 0.70, so the instrument was declared reliable.

Data were analyzed using multiple linear regression and Moderated Regression Analysis (MRA). Multiple linear regression was used to examine the direct effect of management control system and financial leverage on start-up performance. Furthermore, MRA was conducted to determine whether business financial literacy moderates the relationship between the two independent variables and start-up performance. The regression model was processed using SPSS version 26, and was preceded by classical assumption testing which includes normality test, multicollinearity test, and heteroscedasticity test.

The moderation analysis model is structured in two stages. The first model tests the direct effect:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Description:
Y = Start-up performance
X1 = Regression coefficient of Management Control System
X2 = Regression coefficient of financial leverage
ε = Error term

The second model tests the moderation effect by including interaction variables between each independent variable and moderation variables:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 (Z \times X_1) + \beta_4 (Z \times X_2) + \varepsilon$$

Description:
Y = Start-up Performance
X1 = Management Control System
X2 = Financial Leverage
Z = Business Financial Literacy (as moderator)
Z×X1 = Interaction between Business Financial Literacy and SPM
Z×X2 = Interaction between Business Financial Literacy and Financial Leverage
ε = Error term

This model is used to see whether business financial literacy strengthens or weakens the influence of management control systems and financial leverage on start-up performance.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistical tests are used to describe the characteristics of the data obtained from respondents, such as frequency distribution, mean, and standard deviation of each research variable. This analysis provides an overview of the data collected, such as the average respondent's answer to the questionnaire for each variable studied. This information is important to understand the initial pattern of the data before entering the inferential analysis stage.

Table 1. Descriptive Statistics Test Results

	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Management Control System	37	30,00	72,00	53,2703	9,92933
Financial Leverage	37	18,00	36,00	25,7838	5,20222
Business Financial Literacy	37	17,00	39,00	27,2432	5,69798
Start-up Performance	37	16,00	38,00	27,0270	6,04835
Valid N (listwise)	37				

The results show that the management control system and business financial literacy are in the high category, while financial leverage is moderate. Start-up performance also falls into the high category, suggesting that incubated businesses show stable achievements in efficiency, growth, and sustainability.

Validity Test

The validity test is carried out to determine the extent to which the instrument used is able to measure the intended construct precisely. The technique used is item-total correlation, namely by correlating the score of each item with the total score of the variable concerned. An item is declared valid if the correlation coefficient value (r-count) is greater than the r-table, which is 0,334.

Table 2. Validity Test Results

Variable	Indicator	r-Count	r-Table	Description
Management Control System	MCS1	0,815	0,334	Valid
	MCS2	0,500	0,334	Valid
	MCS3	0,590	0,334	Valid
	MCS4	0,766	0,334	Valid
	MCS5	0,529	0,334	Valid
	MCS6	0,680	0,334	Valid
	MCS7	0,437	0,334	Valid
	MCS8	0,402	0,334	Valid
	MCS9	0,555	0,334	Valid
	MCS10	0,689	0,334	Valid
	MCS11	0,692	0,334	Valid
	MCS12	0,413	0,334	Valid
	MCS13	0,663	0,334	Valid
	MCS14	0,715	0,334	Valid
	MCS15	0,585	0,334	Valid
	MCS16	0,431	0,334	Valid
Financial Leverage	FL1	0,650	0,334	Valid
	FL2	0,434	0,334	Valid
	FL3	0,711	0,334	Valid
	FL4	0,638	0,334	Valid
	FL5	0,601	0,334	Valid
	FL6	0,539	0,334	Valid
	FL7	0,766	0,334	Valid
	FL8	0,735	0,334	Valid
Business Financial Literacy	BFL1	0,665	0,334	Valid
	BFL2	0,750	0,334	Valid
	BFL3	0,645	0,334	Valid
	BFL4	0,612	0,334	Valid
	BFL5	0,786	0,334	Valid
	BFL6	0,696	0,334	Valid
	BFL7	0,682	0,334	Valid
	BFL8	0,741	0,334	Valid
Performance *Start-up*	KS1	0,686	0,334	Valid
	KS2	0,612	0,334	Valid
	KS3	0,604	0,334	Valid
	KS4	0,739	0,334	Valid
	KS5	0,703	0,334	Valid
	KS6	0,744	0,334	Valid

	KS7	0,698	0,334	Valid
	KS8	0,645	0,334	Valid

All questionnaire items used to collect data have been considered valid as a whole, according to the table showing the results of the validity test that has been carried out, because the value of r count > r table.

Reliability Test Results

Reliability test aims to measure the internal consistency of the instrument, namely the extent to which the instrument produces consistent data when used to measure the same construct under different conditions. The test is carried out using the Cronbach alpha coefficient, where an instrument is declared reliable if it has an alpha value greater than 0.70.

Table 3. Reliability Test Results

Variable	Cronbach Alpha Value	Limit Value	Description
Management Control System (X1)	0,880	0,70	Reliable
Financial Leverage (X2)	0,782	0,70	Reliable
Start-up Performance (Y)	0,828	0,70	Reliable
Business Financial Literacy (Z)	0,849	0,70	Reliable

From the test results produced, it is known that all constructs in this study have a Cronbach's Alpha value> 0.70. Therefore, it can be concluded that all constructs are reliable.

Classical Assumption Test

The classical assumption test is carried out as a prerequisite to ensure that the regression model used in the study fulfills the basic assumptions of linear regression, so that the model is suitable for statistical use.

Normality Test Results

Table 4. Shapiro-wilk Normality Test Results

	Statistic	df	Sig.	Statistic	Df	Sig.
Unstandardized Residual	0,099	37	0,200	0,982	37	0,805

In this study, the normality test was carried out using the Kolmogorov-Smirnov test. It is said to be normal if the sig level value. > 0,05. The test results above show that the significance value of 0.200 is greater than 0.05, which means that the data is normally distributed and suitable for analysis.

Multicollinearity Test Results

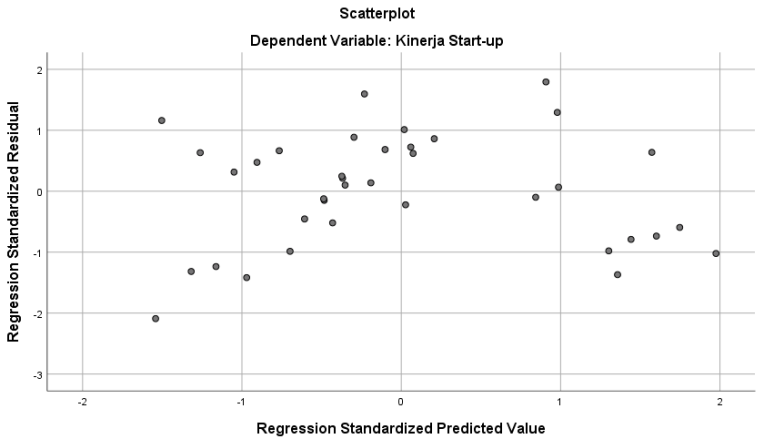
Table 5. Multicollinearity Test Results

Variable	*Tolerance*	*VIF*
Management Control System	0,293	3,411
Financial Leverage	0,396	2,524
Business Financial Literacy	0,411	2,433
X1_Z	0,347	2,884

X2_Z	0,341	2,929

Based on the multicollinearity test results, the tolerance value of all variables is > 0.01 and the VIF value is < 10, thus these results state that the data does not have multicollinearity symptoms**.**

Heteroscedasticity Test Results



Based on the scatterplot graph on the side, it shows that the points spread randomly and do not focus on one place. These results prove that there are no symptoms of heteroscedasticity.

Hypothesis Test

Table 6. Hypothesis Test Results

	Model 1			Model 2		
Variable	**Coefficient**	**t**	**Sig**	**Coefficien**	**t**	**Sig**
Constant	1,457	0,390	0,699	14,611	3,947	0,000
Management Control System	0,269	2,598	0,014	0,175	2,377	0,024
Financial Leverage	0,435	2,197	0,035	-0,913	-13,326	0,000
Business Financial Literacy				0,469	3,331	0,002
Interaction X1*Z				-0,008	-2,946	0,006
Interaction X2*Z				0,035	23,241	0,000
R Square	0,588			0,983		
Adjusted R Square	0,564			0,980		
F	24,291		0,000	356,702		0,000
Sig			0,000			0,000

The first model is used to examine the direct effect of management control system and financial leverage on start-up performance. The analysis results show that the management control system shows a positive and significant influence on the effectiveness of start-up performance. Financial leverage also shows a positive and significant influence on the effectiveness of start-up performance. The R Square value of 0.588 indicates that these two variables are able to explain 58.8% of the variation in start-up performance, while the rest is explained by other variables outside the model.

The second model adds business financial literacy variables and two moderating interactions, namely the interaction between the management control system and business financial literacy and between financial leverage and business financial literacy. The analysis

shows that business financial literacy has a significant effect on start-up performance. The interaction between management control system and business financial literacy shows a coefficient of -0.008 (sig. 0.006), signifying a negative but significant moderating effect. Meanwhile, the interaction between financial leverage and business financial literacy shows a huge positive coefficient of 0.035 (sig. 0.000), which means that business financial literacy significantly strengthens the effect of leverage on internal control effectiveness. The R Square value increases dramatically to 0.983, which means that the second model is able to explain 98.3% of the variation in start-up performance. This indicates that the addition of business financial literacy variables and their interactions substantially improve the predictive ability of the model. Thus, business financial literacy is proven to act as a significant moderator variable in the relationship between management control system and financial leverage on start-up performance.

The Effect of Management Control System on the Performance of Incubated Start-ups

Based on the results of the data analysis obtained, the management control system is proven to have a positive influence on the performance of start-ups that are undergoing the incubation process. The implementation of an effective internal control system can support start-ups in managing resources efficiently, improving supervision of financial aspects, and ensuring the achievement of growth targets during the incubation period. Good cash flow management ensures sufficient funds are available to support operations, while financial planning serves to prepare financial projections and make strategic decisions. Evaluation of funding sources is also important to ensure optimal use of funds, while the application of cost accounting helps in controlling costs and setting competitive selling prices. Managing these aspects thoroughly can support business growth and minimize financial risks during the incubation period. Research results from Sinarasri et al. (2023) also support this, showing that a good financial control system can improve the efficiency and effectiveness of start-up operations in Indonesia.

In addition to financial aspects, non-financial aspects also contribute to improving start-up performance. Strategic planning is an important element because it determines the direction, goals, and long-term priorities that support consistent and measurable decision-making. Start-ups that have good strategic planning tend to be more adaptive to changes in the business environment. On the other hand, the development of new products or projects shows the company's innovative capacity in responding to market needs. Continuous innovation allows companies to maintain competitiveness and create added value that is relevant to consumers. Forecasting and sales targets also play a role in operational efficiency. Companies that are able to accurately project market demand can optimally manage production and distribution and measure performance achievements more clearly. In addition, the customer relationship management system works to build customer loyalty through a data-driven approach and continuous interaction. A well-managed relationship leads to increased customer satisfaction and can organically expand the marketing network. Therefore, non-financial aspects are important components that complement each other in creating sustainable start-up performance. A non-financial management control system enables more informed and measured decision-making in responding to market dynamics and business opportunities. In line with the Pecking Order approach, the use of managerial information in strategic planning and innovation development shows the start-up's efforts to minimize dependence on external funds by strengthening its internal capacity and resources as expressed by Gomez-Conde et al.,(2023).

The results of this study are also in line with research from Roberto Grana-Alvarez (2024) which confirms that an integrated management control system between financial and non-financial aspects can improve business performance through better risk management and

more optimal resource allocation. Thus, the implementation of a comprehensive and integrated management control system is essential to improve operational efficiency, reduce risk, and support the sustainability of start-up growth in the future. So the result of this study is H1 accepted, namely the management control system has a positive effect on start-up performance.

The effect of financial leverage on the performance of incubated start-ups

The results of this study indicate that financial leverage has a positive influence on the performance of start-ups that are in the incubation period. Financial leverage itself describes the level of debt use by start-ups as a source of funding in carrying out their business activities. The higher the ratio of debt to assets owned, the greater the portion of funds derived from debt. In the early stages of development, start-ups generally have limited internal capital so that funding through debt becomes the main choice to support business activities and accelerate business growth. By using debt, start-ups can obtain additional funds without having to reduce the founder's share ownership. This is important considering that start-ups need quick and substantial funding to fulfill operational needs and product development during the incubation period.

In addition, start-ups tend to opt for short-term debt due to its flexibility and relatively quick payback process. Short-term debt also usually has lower interest costs compared to long-term debt, making it more suitable for temporary funding needs during the incubation period. Proper and planned use of leverage can help start-ups improve capital utilization efficiency and business productivity, which in turn contributes to improved overall performance. However, it is important for start-ups to manage debt well so that financial risks such as difficulties in debt repayment can be minimized. Inappropriate leverage management can lead to liquidity problems and hinder business development.

This supports the assumption in the pecking order theory which states that start-ups tend to choose debt as the main source of funding in the early stages of development. This is because debt is considered a strategic choice and is more in line with operational needs and product development during the incubation period. However, this finding also emphasizes the importance of managing leverage appropriately so that financial risks, such as difficulty in repaying debt, can be minimized. Thus, the positive effect of financial leverage on start-up performance obtained from this study suggests that applying the pecking order principle in managing funding during incubation is a relevant and effective strategy. However, the success of the strategy is highly dependent on the start-ups' ability to manage financial risks properly.

Previous research that supports these findings, among others, conducted by Zhang & Nik Azman, (2023) shows that financial leverage can increase firm value and start-up financial performance with proper management. Research from Priyanka dan Narwal (2023) found that strategic use of debt can accelerate start-up growth and improve operational efficiency during incubation. Meanwhile, Afsar Basha dan Bennasr (2023) confirmed that effective leverage management contributes to increasing the success of start-ups in facing financial challenges and strengthening their competitive position. So the result of this study is H2 accepted, namely financial leverage has a positive effect on start-up performance.

Business Financial Literacy as moderation in the relationship of the management control system on start-up performance.

The results of this study show that business financial literacy significantly moderates the relationship between the management control system and start-up performance. Interestingly, the direction of the moderation effect is negative and statistically significant, which implies that a higher level of financial literacy among start-up founders weakens the direct influence of management control systems on performance. This finding is unexpected and presents a

noteworthy novelty, considering that prior literature generally suggests that financial literacy strengthens the implementation and outcomes of managerial practices.

This phenomenon can be interpreted as a potential substitution effect between financial literacy and formal management control systems. Start-up founders who possess high financial literacy are generally more competent in understanding financial implications, managing risks, and making autonomous strategic decisions. As such, they may no longer rely heavily on formalized control mechanisms provided by the incubator or internal systems. Instead, these entrepreneurs tend to develop informal or adaptive internal controls that are more responsive to their dynamic business environment, making formal control structures appear rigid or less relevant. Consequently, the presence of strong financial literacy may diminish the marginal benefit derived from structured management controls, leading to a negative moderating relationship.

From the perspective of Pecking Order Theory, start-ups with financially literate founders are more likely to utilize internal resources efficiently, minimize external financing needs, and optimize cost structures without having to depend on strict managerial oversight. Financial literacy enables better capital structure decisions, more efficient budget allocations, and improved financial forecasting, all of which support strategic agility and reduce the necessity of formal procedures. In incubator environments, this condition is even more pronounced, as entrepreneurs may already benefit from mentorship and knowledge sharing, further reducing their reliance on codified control frameworks. These start-ups may consider formal systems to be redundant or burdensome, especially when they have the capacity to evaluate and respond to financial challenges independently.

The negative moderating effect found in this study is supported by empirical evidence from Roberto Grana-Alvarez (2024), who found that financial literacy may reduce the dependence on formal internal control systems by increasing the entrepreneur's ability to make effective decisions independently. Entrepreneurs with strong financial capability are more likely to emphasize intuition, market responsiveness, and flexible decision-making, rather than procedural supervision. Similarly, Zhang, Wang, dan Chen (2021) observed that financial literacy enhances the ability to innovate and manage business risks, but in some cases, may decrease the adoption or reliance on formal control systems, especially among high-capability founders.

Overall, these findings indicate that business financial literacy, while beneficial to performance on its own, may change the functional role of management control systems within start-ups. Rather than acting as complementary elements, financial literacy and MCS may serve overlapping roles in certain contexts, particularly in highly agile or resource-constrained environments like start-up incubators. This reinforces the idea that the effectiveness of control systems is contingent on the internal capabilities of the business, and that one-size-fits-all approaches to management control may not be appropriate for all early-stage ventures.

In conclusion, the hypothesis (H3) that proposed a positive moderating effect of business financial literacy on the relationship between management control systems and start-up performance must be rejected. Instead, financial literacy significantly moderates this relationship in a negative direction, implying that while financial literacy improves performance independently, it also diminishes the extent to which management control systems contribute to that performance. This provides an important insight for incubator institutions and early-stage investors: enhancing financial capacity among entrepreneurs should be balanced with adaptive and non-redundant control frameworks to maintain strategic alignment and operational effectiveness.

Business Financial Literacy as moderation in the relationship of financial leverage on start-up performance

The results of hypothesis testing in this study indicate that business financial literacy significantly moderates the relationship between financial leverage and start-up performance. Statistically, this moderation is significant and shows a positive relationship direction, which means that increasing the level of financial literacy can strengthen the effect of leverage on start-up performance. In other words, start-ups that have a good understanding of finance can manage funding structures more strategically and effectively so as to improve overall business performance. Financial literacy gives business managers the ability to understand the financial consequences of various funding sources, such as debt and equity. According to Pecking Order Theory, businesses tend to prioritize internal sources of funds followed by debt, and finally equity, according to their respective cost and risk levels. With good financial literacy, managers can understand and apply this principle more precisely, so that funding decisions become more targeted and efficient. In addition, financial literacy also helps in controlling financial risks and reducing information asymmetry.

Research by Afsar Basha dan Bennasr (2023) supports these findings, showing that financial literacy is significantly related to leverage decisions on start-up performance. Business owners with a high level of financial literacy are able to manage the risks and consequences of using debt more effectively, which has a positive impact on business performance. Similarly, research by Christanty et al. (2023) found that financial literacy strengthens the relationship between financial decision making and start-up performance, because it helps business actors in utilizing funding sources optimally and as needed. Based on the results of data analysis from this study, it can be concluded that business financial literacy has a significant influence on the performance of start-ups undergoing the incubation process. . Financial literacy acts as a moderating variable that strengthens the effect of leverage on performance, so that start-ups that understand financial aspects well are able to manage financial resources optimally and improve business performance sustainably. The results of this study indicate that H4 is accepted, because business financial literacy acts as a moderator in the relationship between financial leverage and start-up performance with a positive effect, which means that business financial literacy strengthens the relationship.

CONCLUSION

This study highlights the complex interplay between management control systems, financial leverage, and business financial literacy in shaping the performance of incubated start-ups. The results reveal that while structured internal control mechanisms and prudent use of debt independently support business growth, their effectiveness is conditioned by the level of financial literacy possessed by start-up founders. Financial literacy emerges as a contextual factor that enhances decision-making quality and alters how other management tools function in practice.

Theoretically, these findings enrich the literature on entrepreneurial finance by underscoring financial literacy not merely as a complementary skill, but as a moderating variable that can either amplify or substitute formal mechanisms depending on the strategic context. This provides a more nuanced understanding of how start-ups navigate financial and operational challenges during the early stages of development.

From a practical perspective, the study offers several implications. Start-up founders should be equipped not only with technical business knowledge but also with tailored financial literacy competencies—especially in debt management, financial planning, and performance monitoring. Business incubators are therefore encouraged to embed structured financial literacy training programs as part of their core incubation curriculum. These programs should be designed to strengthen the ability of entrepreneurs to interpret financial information, evaluate funding options, and make informed strategic choices.

In addition, incubator managers should consider adopting adaptive management control systems that align with the financial literacy levels of their tenants. For financially literate entrepreneurs, control systems may need to emphasize strategic flexibility and decentralized decision-making, while still maintaining accountability frameworks. Conversely, for entrepreneurs with limited financial knowledge, tighter controls and more formalized planning tools may be more effective in guiding performance.

Although the current study provides valuable insights, it is constrained by its limited sample size and focus on start-ups incubated within a single institution. Future research should explore cross-regional comparisons involving diverse incubation models to capture broader patterns and context-specific dynamics. Such efforts would strengthen the generalizability of findings and support the formulation of evidence-based policies tailored to the evolving needs of the start-up ecosystem.

In summary, improving start-up performance requires more than financial resources or internal controls; it demands the strategic integration of financial capabilities, control practices, and founder competencies. Stakeholders including policymakers, incubators, and ecosystem developers should collaborate to build capacity in these areas and ensure the long-term sustainability of start-ups in a competitive economic environment.

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