How Do Start-up Characteristics and Innovation Practices Influence Share Value? An Empirical Examination

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Abstract

Start-up ecosystems, with their inherent dynamism and potential for innovation, have grown significantly in recent years. However, understanding the factors that influence their share value remains an intricate task. This research aims to elucidate the direct and indirect impacts of start-up attributes - assets, capital, and employees - and their innovative practices on the share value of these burgeoning enterprises. Using regression analysis on data collected from start-ups operating between 2019 and 2022, this study uncovers several critical insights. The assets, capital, and number of employees were found to have a significant influence on the level of innovation within the start-up. Yet, surprisingly, these factors, along with innovation itself, did not exert a direct influence on the start-up shares. However, an indirect effect was noticed, with assets and capital influencing shares when mediated by innovation. No such indirect effect was discerned with the number of employees. This study enriches the existing literature by providing a nuanced perspective on the interconnectedness of start-up characteristics, innovation, and share value. Moreover, it presents vital insights to investors and start-up decision-makers by underscoring the essential role of innovation in enhancing share value. For future research, exploration of other potential mediators and examination of these relationships across diverse start-up contexts is recommended to develop a more comprehensive understanding.

INTRODUCTION

The establishment of start-up corporations across various industrial sectors has transformed economic systems in numerous regions (Eka, 2016; Kondova & Simonella, 2019; Suwarni et al., 2020). A business can gain momentum by fostering a nurturing environment that allows it to compete effectively with other companies (Cantele & Cassia, 2020). The swift progression of technology motivates everyone to recognize opportunities and incorporate innovation when establishing a business, bringing about changes across multiple business sectors (Fahlevi & Alharbi, 2021). Every developed innovation has the potential to enhance human resources, economic systems, and expertise within a specific field (Acosta-Prado, 2020; Arts et al., 2011; Meiryani et al., 2022). Investors play a pivotal role in the business development process, particularly in terms of augmenting the capital of a start-up

company (Cupák et al., 2022; Morabito & Shelley, 2018). A newly-formed start-up must present its intended innovation, providing a clear vision and purpose for its establishment. This clarity can persuade potential investors to contribute to the company's capital (Cheng et al., 2021; Katadata, 2017). However, the value of the company that a start-up holds can be unstable, and often tends to decrease (Chakraborty, 2010; Davis & Marquis, 2021; Fahlevi, 2019). This volatility can profoundly impact the productivity of the company's human resources.
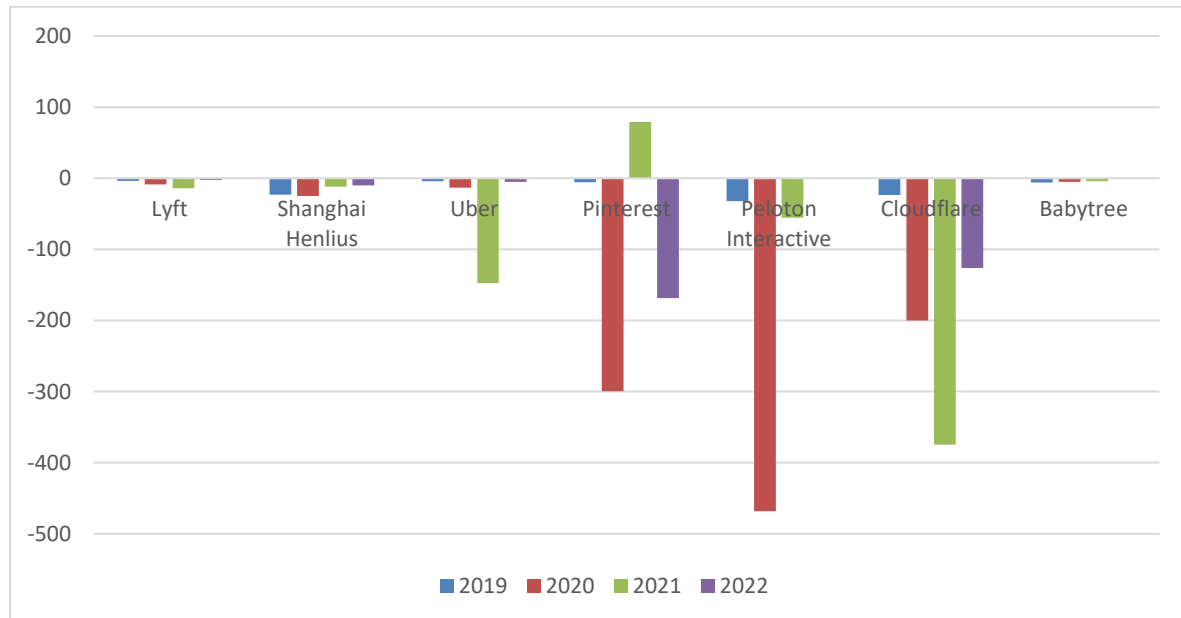

Figure 1. Start-up Company Shares

Figure 1 displays the Price Earnings Ratio (PER) of the start-up company. According to Figure 1, most companies' shares are undervalued, indicated by their negative PER ratio. This presents an enticing opportunity for investors to purchase these shares before the market rectifies their value (Vo, 2016).

Despite the increasing importance of start-ups and their innovations in today's economy, there is a significant gap in understanding the interplay between a start-up's assets, capital, employees, innovation, and their combined impact on the company's shares (Anisa, 2013; Halawa & Br.Purba, 2020; Kuniawati & Asyik, 2017; Suwarni et al., 2020). Moreover, current literature provides divergent views on the influence of these factors, and there is a dearth of comprehensive studies examining these effects simultaneously. Thus, the present study seeks to fill this gap by examining how assets, capital, employees, and innovation directly and indirectly impact the share value of start-up companies.

The aim of this study is threefold. Firstly, we intend to investigate the direct impact of assets, capital, and the number of employees on a start-up's innovation. Secondly, we strive to determine the direct effect of these factors and innovation on the company's shares. Finally, we aim to explore the indirect effect of assets, capital, and the number of employees on shares through the mediation of innovation. Through these objectives, we hope to provide a comprehensive understanding of how various factors can influence the shares of start-up companies.

The structure of the paper is as follows. Section one provides a detailed introduction and background to the study, outlining the research gap and the study's aims. The second section elucidates the research methodology adopted, including details on the data collection and analysis techniques. Section third presents the findings of the study in a comprehensive manner. Finally, the paper concludes with a discussion on the implications of the findings, the limitations of the study, and suggestions for future research. This paper strives to contribute valuable insights to both the academic literature and practical knowledge in the field of finance and start-up management.

METHOD

This research employed a quantitative approach, characterized by numeric data and statistical analysis (Lind et al., 2018; Sekaran & Bougie, 2016). The study population comprised 49 start-up companies listed on Investing.com. Sample selection was based on purposive sampling techniques, whereby samples were chosen by meeting specific criteria. The criteria included (Saunders et al., 2009): 1) start-up companies with accessible data on Investing.com, 2) start-ups that had an Initial Public Offering (IPO) between 2019 and 2022, and 3) companies possessing complete data relevant to the research variable. Based on these criteria, seven companies were ultimately included in the final sample. The operational variables of the study are defined in the following Table 1.

Table 1. Operational Variables

Variable	Formula
Asset	Liability + Equity
Capital	Asset - Liability
Employees	Total Employees
Innovation	R&D expense
Share	$PER = \dfrac{stock\ price}{EPS}$

Data testing was performed using EViews software, version 12, employing several testing methods (Fahlevi, 2019; Juhandi et al., 2022). Three tests were employed for model selection (Lind et al., 2018): The Chow test, which chooses between a common effect model and a fixed effect; the Hausman test, choosing between a fixed effect and a random effect model; and the Lagrange multiplier test, used to select between common and random effects. Panel data analysis was conducted via the common effect and fixed-effect models. The common effect model combined all-time series and cross-section data, employing the Ordinary Least Squares (OLS) approach for estimating its parameters. The fixed-effect model accounted for potential omitted variables that may result in changes in intercept time series or cross-section changes.

The panel data regression analysis aimed to predict changes in dependent variables described by

two or more independent variables (Nayak & Singh, 2021). The formulation of panel data regression analysis in this study is as follows:

$$Y = \alpha + \beta 1 X1 + \beta 2 X2 + \beta 3 X3 + \beta 4 Z + e$$

Information:

Y	= Share
α	= Constant
$\beta 1, \beta 2, \beta 3, \beta 4$	= Coefficients
X1	= Asset
X2	= Capital
X3	= Employees
Z	= Innovation

A classic assumption test was conducted if a common effect or fixed effect model was chosen, including multicollinearity and heteroscedastic tests. If the model chosen was a random effect, this test was deemed unnecessary. The t-test was performed to ascertain the influence between independent and dependent variables, and the coefficient of determination was used to measure the size of this influence. The Sobel Test was utilized to assess the indirect influence of an independent variable on a dependent variable through a mediating variable. Manual calculation was required for this test as EViews does not directly support mediated variables. The Sobel Test formula is as follows:

$$t\ value = \frac{ab}{\sqrt{(b^2 SEa^2) + (a^2 SEb^2)}}$$

Information:

a   = The path of the independent variable to the mediated variable

b   = The path of the mediated variable to the dependent variable

SE = Standard error

If the calculated t value is larger than the tabulated t value, the study hypothesis is accepted. Conversely, the hypothesis is rejected if the calculated t value is less than the tabulated value.

RESULTS AND DISCUSSION

In the study sample, the lowest asset value of Rp 3,323,893,364,000 was held by Babytree in 2022, while the highest asset value of Rp 581,924,069,400,000 was held by Uber in 2021. The average total assets across the research sample amounted to Rp 103,098,660,591,550. Babytree had the least capital in 2022, with Rp 2,986,790,372,400, while Uber had the most in 2021, totaling Rp 230,359,326,900,000. The average capital across the research sample was Rp 41,348,590,603,971. In terms of workforce size, Babytree employed the fewest individuals in 2022, with a count of 431 employees, whereas Uber had the largest workforce in 2022, employing 32,800 individuals. The average number of employees across all companies in the sample was 6,358.

In terms of R&D expenditure, Babytree had the lowest expense in 2021 at Rp 93,544,978,400,

while Uber had the highest in 2019, reaching Rp 72,579,171,600,000. The average R&D expenditure for the entire sample was Rp 11,513,406,197,929. The lowest share value, as measured by the PER ratio, was held by Peloton Interactive in 2020 at -468.272, and the highest by Pinterest in 2021 at 79.022. The average PER ratio across the entire company sample was -70.081.

The research utilized two distinct regression models. The first model examined the effects of asset variables (X1), capital (X2), and employees (X3) on innovation (Z). The second model assessed the impacts of assets (X1), capital (X2), employees (X3), and innovation (Z) on shares (Y). These regression models were separated to prevent erroneous test results, as EViews cannot directly test such research models. To discern the effect of assets (X1), capital (X2), and employees (X3) on shares (Y) through innovation (Z), the Sobel formula was used for calculation (see Table 2).

Table 2. Coefficients

Test/Regression	Model	Coefficient/Probability	Hypothesis
Chow Test	Regression 1	0.0000	
Hausman Test	Regression 1	0.0008	
Coefficients	C (Reg. 1)	20789152	
	Assets (Reg. 1)	-0.412396	
	Capital (Reg. 1)	0.399901	
	Employees (Reg. 1)	2.627.599	
Chow Test	Regression 2	0.2253	
Lagrange Multiplier Test	Regression 2	0.9870	
Coefficients	C (Reg. 2)	-6.551.768	
	Assets (Reg. 2)	176.212	
	Capital (Reg. 2)	-342.239	
	Employees (Reg. 2)	-0.018441	
	Innovation (Reg. 2)	629.935	
Hypothesis Test (Reg.1)	Assets	0.0000	Accepted
	Capital	0.0001	Accepted
	Employees	0.0011	Accepted
Hypothesis Test (Reg.2)	Assets	0.2544	Rejected
	Capital	0.1277	Rejected
	Employees	0.3564	Rejected
	Innovation	0.0910	
Sobel Test Results	Assets	3.778	
	Capital	3.547	
	Employees	0.038	

The model selection was performed using the Chow test to choose between fixed effect and common effect models. Given that the resulting probability value was 0.000, which is less than 0.05, the fixed effect model was selected. The Hausman test, utilized to decide between a fixed effect or random effect model, yielded a probability value of 0.0008, again less than 0.05, resulting in the selection of the fixed effect model. Consequently, the chosen model for this first regression is a fixed effect. The formulated regression equation.

Innovation = 20,789,152 - 0.412396 * Assets + 0.399901 * Capital + 2627.599 * Employees + e

Leads to several interpretations, a constant of 20,789,152 implies that if the variables of assets, capital, and employees are zero, the innovation cost would be Rp 20,789,152; a coefficient of -0.412396 suggests that a unit increase in assets, while capital and employees remain constant, would decrease the cost of innovation by 0.412396; a coefficient of 0.399901 signifies that a unit increase in capital, with assets and employees constant, would increase the cost of innovation by 0.399901; and a coefficient of 2627.599 denotes that a unit increase in employees, with assets and capital constant, would increase the cost of innovation by 2627599. In terms of classical assumptions, the test results showed correlation values between independent variables exceeding 0.8, indicating correlations among these variables. Moreover, all independent variables yielded a probability value greater than 0.05, suggesting that the data in this study is free from heteroscedasticity.

For the second regression, the initial step was model selection using the Chow test. The result showed a probability value of 0.2253, which is greater than 0.05, leading to the selection of a common effect model. A Lagrange multiplier was then used to decide between common effects or random effects. The resulting probability value was 0.9870, greater than 0.05, solidifying the choice of a common effect model. Therefore, in this second regression, the selected model was a common effect. The following regression equation was derived:

Shares = -65.51768 + 1.76212 * Assets - 3.42239 * Capital - 0.018441 * Employees + 6.29935 * Innovation + e

Interpretations from this regression equation include: a constant of -65.51768, which indicates that if all variables (assets, capital, employees, and innovation) are zero, the company's share value would be -65.517.68. The coefficient of 1.76212 suggests that an increase by one unit in the asset variable, while capital, employees, and innovation remain constant, would result in an increase in the share value by 1.76212. The coefficient of -3.42239 implies that a unit increase in the capital variable, while the assets, employees, and innovation variables remain constant, would cause a decrease in the share value by 3.42239. Lastly, the coefficient of -0.018441 denotes that an increase by one unit in the employee variable, while the asset, capital, and innovation variables remain constant, would lead to a decline in share value by 0.018441.

With respect to the classical assumptions, the test results indicated that the correlation value between the independent variables was above 0.8, signifying a correlation among these variables.

Furthermore, all independent variables showed a probability value greater than 0.05, suggesting that the data in this study is free from heteroscedasticity.

The findings from testing both regression models are as follows: H1, H2, and H3 showed that assets, capital, and employees respectively influence innovation in start-ups, with probability values less than 0.05. H4, H5, and H6 showed that assets, capital, and employees respectively do not influence the start-up company's share value, with probability values greater than 0.05. H7 also showed that innovation does not affect the start-up company's shares, with a probability value greater than 0.05.

Lastly, hypothesis testing involving mediation variables was performed using the Sobel test formula. The calculations led to the following advanced findings: H8 and H9 showed that assets and capital respectively influence the share value through the innovation variable, given that the calculated t-values were greater than the table t-value. However, H10 demonstrated that employees do not influence share value through the innovation variable, as the calculated t-value was less than the table t-value.

DISCUSSION

Effect of Assets on Corporate Innovation

The statistical test results demonstrated a probability value of 0.0000, which is less than 0.05. Therefore, the conclusion was drawn that assets have a significant influence on start-up innovation, thus supporting the study's hypothesis. However, this variable's negative coefficient indicates a reverse effect, implying that as a company's total assets increase, expenditure on innovation decreases. This might occur if the company redirects its assets towards interests other than innovation.

Effect of Capital on Innovation

The test results revealed a probability value of 0.0001, less than 0.05, leading to the acceptance of the second hypothesis. It was confirmed that capital has a significant effect on start-up innovation from 2019 to 2022. The positive coefficient indicates that higher company capital leads to increased innovation costs. The financial data supports this, showing that innovation costs rise in line with the decrease in owned capital.

Effect of Employees on Innovation

The third hypothesis test yielded a probability value of 0.0011, less than 0.05, concluding that employees significantly influence company innovation. The coefficient for this variable is positive, suggesting that the more employees a company has, the higher the innovation cost. This might be due to innovation being closely tied to human resources - more employees could result in more ideas for innovation, subsequently increasing the cost.

Effect of Assets on Shares

The statistical tests concluded that assets do not significantly affect start-up shares, with a probability value of 0.2544, greater than 0.05. Consequently, the fourth hypothesis was rejected. This finding is consistent with the Halawa and Purba study (2020), indicating no significant influence of total company assets on share value.

Effect of Capital on Shares

This study found that capital doesn't significantly affect shares, with a probability value of 0.1277, greater than 0.05. Therefore, the fifth hypothesis was rejected. According to the data, both companies with the largest and smallest capital have negative share values, indicating that capital level doesn't affect the share. This result aligns with Suwarni et al. (2020) research, which also showed no significant influence of company capital on shares.

Effect of Employees on Shares

The test demonstrated that the number of employees doesn't significantly influence the company's shares, with a probability value of 0.3564, greater than 0.05. The sixth hypothesis was thus rejected. This could be because share value tends to be influenced by financial factors, and the number of employees has little impact on share fluctuations.

Effect of Innovation on Shares

In the seventh hypothesis, the probability value of 0.0910, greater than 0.05, resulted in the rejection of the hypothesis, suggesting that innovation cost doesn't significantly affect the company's shares. This is consistent with the Kurniawati and Asyik (2017) study, showing that R&D costs don't significantly affect shares, as investors often view R&D as costly and potentially detrimental to company profit growth and dividend distribution.

Effect of Assets on Shares Through Innovation

The study found that total assets significantly influence the company's shares through the mediation of innovation, with a t-value of 3.778, greater than the t-table value of 2.069. Thus, if innovation mediates, total assets become influential, indirectly affecting the start-up's shares.

Effect of Capital on Shares Through Innovation

In the ninth hypothesis, the t-value of 3.547, greater than the t-table value of 2.069, led to the acceptance of the hypothesis. Therefore, it was concluded that the company's capital has an indirect effect on shares through innovation.

CONCLUSION

This study has provided several key findings. Firstly, assets, capital, and the number of employees were found to significantly influence innovation within start-ups, but they demonstrated an opposite effect on shares. Specifically, assets were found to inversely affect innovation costs, suggesting that companies may prioritize other interests as their total assets increase. Capital, on the other hand, displayed a positive correlation with innovation costs, indicating that higher company capital leads to increased expenditures on innovation. Lastly, the more employees a company has, the higher the innovation cost, potentially due to the increase in ideas generated for innovation.

Moreover, neither assets, capital, nor the number of employees had a significant direct impact on start-up shares. This indicates that these variables might not be the primary determinants of share value, which tends to be influenced more by financial factors. Furthermore, the cost of innovation did not significantly affect shares either, possibly due to the perception of investors regarding high R&D costs as a potential drawback. However, when innovation was considered as a mediator, both assets and capital were found to indirectly influence start-up shares, implying the potential significance of innovation in affecting share value. As with all studies, this research has limitations. The primary limitation lies in the focus on start-ups during the period 2019-2022, which might limit the generalizability of the results. Additionally, the study only looked at the effects of assets, capital, employees, and innovation on shares, neglecting other potential influencing factors like management, market trends, or governmental policies.

For future research, it would be beneficial to extend the research timeline to understand the impact of these variables over a longer period. Additionally, it would be interesting to examine these effects in different industry sectors, as start-ups in various industries might have differing dynamics. Lastly, future research could explore other potential influencing factors on shares to provide a more comprehensive understanding of share value determinants. Such research will not only enrich the academic literature but also offer practical implications for start-up management and investors, enabling them to make more informed decisions.

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