Analysis of Variable Calculation on Start-up Assessment: Case Study PT XYZ

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Abstract
Economic growth in Indonesia is increasing rapidly. In Indonesia, the growth of start-ups is increasing along with the continued development of the digital industry. The emergence of start-ups in Indonesia began in 2010 which was pioneered by the presence of start-ups Tokopedia and Blanja.com. PT. XYZ as a state-owned enterprise supports the development of start-ups by providing digital creative facilities, funding, and expanding market access, specifically to accelerate their industrial growth. The amount of funding that PT XYZ will provide to start-ups also varies according to the startup development stage and the company value (valuation) of the startup. The valuation calculation that is currently being carried out by PT. XYZ is by using the First Chicago method as the calculation method. However, in its application, there are still several calculation components that have not been standardized. The absence of standards for some of the components of this calculation can affect the size of the calculated startup valuation figures. This will have an indirect impact on start-ups, investors and stakeholders. Therefore, this study aims to analyze the standard setting on the three components of valuation calculations or business appraisals at start-ups carried out by PT. XYZ and to establish improvement evaluation standards for determining the three components of calculations in the first Chicago method. In this study, the results of the startup assessment are the dependent variable while the annual average growth rate, stock value size and discount rate are the independent variables. The sample population used in this study were start-ups who became alumni of PT. XYZ. The analytical method used is using linear regression.

***Keywords*:** *Start-ups, Valuation, First Chicago Method, Linear Regression.*

Abstrak
Pertumbuhan ekonomi di Indonesia meningkat pesat. Di Indonesia, pertumbuhan startup semakin meningkat seiring dengan terus berkembangnya industri digital. Kemunculan

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startup di Indonesia dimulai pada tahun 2010 yang dipelopori oleh hadirnya startup Tokopedia dan Blanja.com. PT. XYZ sebagai badan usaha milik negara mendukung pengembangan startup dengan menyediakan fasilitas kreatif digital, pendanaan, dan memperluas akses pasar, khususnya untuk mempercepat pertumbuhan industrinya. Besaran pendanaan yang akan diberikan PT XYZ kepada startup juga berbeda-beda sesuai dengan tahap pengembangan startup dan nilai perusahaan (valuasi) dari startup tersebut. Perhitungan penilaian yang saat ini sedang dilakukan oleh PT. XYZ adalah dengan menggunakan metode First Chicago sebagai metode perhitungannya. Namun dalam penerapannya masih terdapat beberapa komponen perhitungan yang belum terstandarisasi. Belum adanya standar pada beberapa komponen perhitungan ini dapat mempengaruhi besar kecilnya angka valuasi startup yang dihitung. Hal ini akan berdampak tidak langsung pada startup, investor, dan pemangku kepentingan. Oleh karena itu, penelitian ini bertujuan untuk menganalisis penetapan standar pada ketiga komponen perhitungan penilaian atau penilaian bisnis pada startup yang dilakukan oleh PT. XYZ dan menetapkan standar evaluasi perbaikan untuk menentukan ketiga komponen perhitungan pada metode chicago pertama. Dalam penelitian ini, hasil penilaian startup merupakan variabel dependen sedangkan tingkat pertumbuhan rata-rata tahunan, ukuran nilai saham dan tingkat diskonto merupakan variabel independen. Populasi sampel yang digunakan dalam penelitian ini adalah startup yang menjadi alumni PT. XYZ. Metode analisis yang digunakan adalah menggunakan regresi linier.

Kata Kunci: *Startup, Valuasi, First Chicago Method, Regresi Linier*.

1. Introduction

Currently, digital transformation has targeted all areas of life, especially in the economic field. This can be seen by the growing use of technology in business activities, especially to improve their performance efficiency. The use of technology in business activities is known as the digital economy. The digital economy refers to things that show future economic growth and development which are marked by the increasingly rapid development of internet-based business or transactions as a medium of communication (Sayekti, 2018). One proof of the growing development of the digital economy is the increasing number of start-ups. Start-up is defined as an industry that has just been established and is engaged in information technology and business developed via the internet (Apriyanthi et al., 2022). The start-up phenomenon has emerged many years ago with developments initially in areas such as Silicon Valley and New York City (Aleisa et al., 2013).

In Indonesia, start-up growth is currently increasing along with the development of the digital industry. The emergence of start-ups in Indonesia began in 2010 which was first pioneered by Tokopedia and Blanja.com. Along with the easier access to the internet in

Indonesia, in 2015 start-ups in Indonesia were growing and the Ministry of Communication and Information recorded that at that time there were at least 62 successful start-ups (Kristomuljono, 2022). Seeing this potential, the Ministry of Communication and Informatics (Kominfo) in collaboration with KIBAR launched a program namely the 1000 Start-up Digital National Movement to support the growth of start-ups in Indonesia (Viska, 2016). Until now, Indonesia has been ranked sixth highest with a total of 2,428 start-ups (Startup Ranking Countries, 2022). Start-ups are able to contribute 12% of the Gross Domestic Product (GDP) with a total absorption of 13 million workers based on the projections of the Creative Economy Agency (Bekraf) (BPS, 2018).

PT. XYZ supports the development of start-ups by providing digital creative facilities, funding, and expanding market access, especially to accelerate the growth of their industry. PT. XYZ's Grow program provides funding to start-ups both in the incubation and acceleration stages. The amount of funding that PT XYZ will provide varies according to the stage of development and the company value (valuation) of the start-up.

Valuation is a method used to determine company value which will then be used to determine investment value (Apriyanthi et al., 2022). Valuation is important to do because in fact every major resource allocation decision made by the company is decided on the basis of calculating the transfer value (Luehrman, 1997). At start-up, valuation functions as a process of measuring the value of a start-up idea or measuring the value of the start-up as a whole. The selection of this valuation calculation method is very important for start-ups to pay attention to because it can determine the value of their company. Often, investors decide to invest in start-ups, especially when they are still in the early stages, because they are able to see the value of the entire potential of the company (Saifi, 2020). Proper valuation can benefit start-ups in the long run and also allow investors to trust the company. Valuation according to research conducted by especial in 2021, this valuation also provides several benefits such as assisting in the decision-making process, knowing the actual market position, and can make start-ups popular among investors.

Start-ups that have successfully gone through several rounds of funding will attract the attention of investors (Goldberg, 2019). Start-ups that eventually make it through several rounds of funding may reflect that the company's development is getting better.

PT. XYZ is a government-owned subsidiary that supports the development of start-ups by providing digital creative facilities, funding, and expanding market access, specifically to accelerate the growth of their industry. The PT XYZ program provides funding for both companies that are in the incubation and acceleration stages. The amount of funding that will be provided by PT XYZ is in accordance with the stage of development and company value (valuation). The valuation calculations currently being carried out by PT. XYZ are using the First Chicago method. This method is a special approach used by venture capital or investors for companies in the early stages. In its calculations, the First Chicago method combines elements of analysis methods that have a market and fundamental orientation and is used for valuing companies whose growth is dynamic. However, in its application, there are still several calculation components that have not been standardized. The absence of standards for some of

the components of this calculation can affect the size of the calculated start-up valuation figures. This can have an impact on start-ups, investors and other stakeholders. The size of the valuation number of a start-up can affect the amount of further funding that the start-up will receive. If the calculated valuation is too small, it can result in the funding that start-ups receive is small, and vice versa.

Therefore, a study regarding standard setting in valuation calculations, especially start-up valuations. The results of this study are expected to provide a standard calculation standard in business valuation which can be a definite reference for investors in investing or providing funding for start-ups.

1.1 Start-ups

Start-up refers to a company that is in the first stage of operations. Start-up is a new business that appears to try to disrupt the market (Mitchell, 2020). According to Blank, 2013; Mollick, 2014; Osman et al, 2010 in (Bianco et al., 2022), Start-ups are companies that are in the early stages of development and are entering the market with a potentially scalable business model and have been studied extensively in the literature both from a financial and management perspective. Generally, start-ups are founded by one or several entrepreneurs who want to develop their ideas, namely in the form of products or services that are believed to have a lot of enthusiasts. Start-up can also be interpreted as an organization formed to find a repeatable and measurable business model where the business model can explain how the company will be able to create, generate, and capture value (Blank & Dorf, 2020). Start-ups are closely related to technology or the digital industry. Apriyanthi et al., (2022) define start-up as an industry that has just been established and is engaged in the field of technology and information businesses developed via the internet.

1.2 Valuation

Valuation is a method used to determine the value of an investment compared to the value offered on the market (Apriyanthi et al., 2022). According to Palepu et al., (2020), valuation is the process of changing projections on estimates of company value. Valuation can also be defined as an investor's perception of a company that is closely related to stock prices. If the stock price of a company is high, it will make the company's valuation also high (Utami & Agamaya, 2018). Start-up valuations are used to determine the price that must be paid by an investor when they want to buy a startup (Poland, 2014). Apart from that, valuation can also be used to determine the percentage of an investor's share ownership in a start-up, which must be agreed before the investor gives his money. In making valuation calculations, investors have certain indicators that are used, one of which is by analyzing financial reports against financial ratios. The valuation calculation for start-ups is different from conventional company valuation calculations because start-ups have a high level of uncertainty. This difference in valuation calculations is due to the fact that most of the financial statements owned by start-ups still show a significant increase in cash flow and are in a loss phase, whereas conventional companies are in a profit earning phase and stable cash flow (Mazaka, 2022).

The First Chicago method is a method that can be used to calculate start-up valuations. This method was popularized to the public in 1970 by the equity group of First Chicago

National Bank (Catty, 2008). This method is a special approach used by venture capital or investors for companies in the early stages. The first Chicago method is a variant of the standard capitalization method that is applied to value entities in certain situations (Catty, 2008). This can happen because the entity is still in the early stages of development or turn-around and the valuation calculation is still based on their business plans and financial projections. According to (Puca, 2020) the first Chicago method estimates the company's post-money value using a scenario-based approach that looks at the company's performance and its targets for three scenarios, namely:

a. Success/Best: In the success/best scenario, the company is able to achieve outstanding business performance within or above management's financial projections.
b. Survival/Base: In this scenario, the company is judged to underperform in the success scenario due to delays in product approval or business pivots, which results in higher expenses or longer time to market.
c. Failure/Worst: In the failure/worst scenario, the company performs a poor survival scenario and sees business continuation or decline resulting in capital loss or business failure.

The calculations are done using the first Chicago technique, which determines a percentage that represents the likelihood of each scenario happening (Nasser, 2016). If the DCF method is not possible, the internal rate of return formula or multiples thereof are used. The First Chicago technique is used to value companies whose growth is dynamic and incorporates aspects of analysis methods with a market and fundamental emphasis. The First Chicago Method (FCM) can also be defined as an evolution of the Venture Capital Method (VCM), but there are differences, namely the use of a lower discount rate and the terminal value which is replaced with the net present value of the investment which is calculated as the average start-up value in different scenarios (Majercakova & Mittelman, 2018).

The first Chicago technique is said to have an advantage over the venture capital calculation method in that it takes into account additional scenarios, allowing for a more cautious and realistic assessment and allowing for the identification of some of the unique hazards connected to start-ups. The first Chicago method, however, has limits because it does not account for prospective changes in the circumstances and is best suited mainly for start-ups that are already making money, according to Demyanova (2018) in (Montani et al., 2020).

2. Method

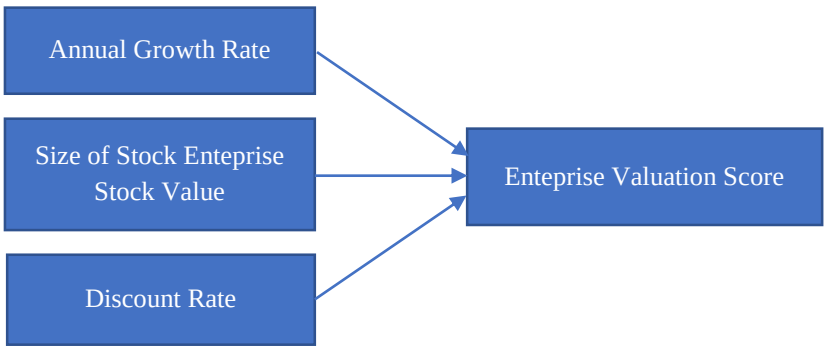

Figure 1. Research Model

This research was conducted using a qualitative analysis of the literature study approach and quantitative analysis with multiple linear regression. The start-up data used in this study are as many as 40 active start-ups from PT XYZ alumni. In this study, the quantitative analysis model used refers to Novita's research, (2020). The dependent variable in this study is the startup valuation value registered at PT. XYZ as a valuation calculation with the independent variables being the Compound Annual Growth Rate (AGR), EV/Revenue, and Discount Rate.

Based on the following research model, this study composes the hypothesis as follows:
H1: The Effect of Annual Growth Rate on Enterprise Valuation.
H2: The Effect of Stock Size on Enterprise Valuation.
H3: The Effect of Discount Rate on Enterprise Valuation

3. Result and Discussion

3.1 Identification of Existing Conditions

Identification in the early stages was carried out by observing the valuation used by PT XYZ. The observation results show that the determination of the CAGR and EV/Revenue numbers that have been used so far refers to the industry and product category of each start-up based on general references to companies that have globally similar businesses and industries. Meanwhile, the determination of the discount rate is based on several assumptions originating from internal factors and external factors which will then be set forth in quantitative figures using data collected from related start-ups.

3.2 Evaluation of Standard Variable Component in Valuation Calculations

3.2.1. Annual Growth Rate (AGR)

Improvement evaluation design for determining the AGR number is made using the original CAGR formula. AGR is calculated by the final value, initial value, and the combined number of years calculated. The first improvement of AGR using the final value or t-1 Valuation value (previous year of valuation) with the Intake Valuation (valuation value when the start-up joins the program at PT X.YZ). The following is the formulation of the first AGR improvement made as follows:

$$\text{AGR 1} = \left[\left(\frac{\text{Valuation t-1}}{\text{Intake Valuation}}\right)^{\frac{1}{n}} - 1\right] \times 100\% \quad (1)$$

However, in reality, there are several start-ups that have different values between the percentage of PT.XYZ's assessment and the Funding they get so that the value of the second AGR improvement uses the investment value t-1 (Indigo Telkom's investment value in the previous year) with the Funding value when start-ups join the program in Indigo Telkom as in formula below:

$$\text{AGR 2} = \left[\left(\frac{\text{Valuation t-1}}{\text{Funding}}\right)^{\frac{1}{n}} - 1\right] \times 100\% \quad (2)$$

3.2.2. Size of Stock Enterprise Value (EV/Revenue)

The standard share size value carried out by PT. XYZ is obtained through general reference searches based on similar businesses and industries globally. However, this is deemed less relevant due to several factors, such as:

a. Reference searches are still carried out in general and there is no one definite reference.
b. EV/Revenue based on general references cannot describe the size of the share value used to compare the value of the business with its overall income.

Therefore, the evaluation of standard EV/Revenue improvements uses two designs. The design evaluation for this improvement was carried out by considering the limited access to startup financial data owned by PT. XYZ. The first improvement evaluation design is based on an article written by Aswath Damodaran in January 2022 with the title Revenue Multiple by Sector, and for the second improvement evaluation design that is still using the same article but taking into account their financial performance. The following Table 1 and 2 are EV/Revenue data based on industry sectors industry and product category as well as financial performance factor.

Table 1. Aswath Damodaran EV/Revenue Multiple by Sector (Size of Stock 1)

Industry	Product Category	Size of Stock Value
Agriculture	IoT	13,80
	Fintech	1,26
Education	Application	3,70
	Market Place	2,27
	VR/AR	2,77
Enterprise	Application	3,38
	Big Data/AI	2,65
	IoT	4,30
	SAAS	5,50
Environment & Sustainability	Application	3,63
	IoT	10,38
Farming	IoT	1,26
Government & Public Service	Application	2,70
	SAAS	5,50
IT Security	Application	2,44
Legal & Partnership	SAAS	6,60
Lifestyle	Big Data/AI	9,10
	Market Place	2,50
	SAAS	1,48
Logistic	Application	1,30
Media	Market Place	2,40
MSME	Fintech	4,50
	Market Place	2,50
	SAAS	5,50
Smart City	SAAS	5,50

Table 2. EV/Revenue Based On Financial Performance Factor (Size of Stock 2)

Financial Performance Factors	-	-		
Revenue increase in the last year	Decrease< 50%	Decrease > 50%	Increase <50%	Increase >50%
Pitching activity to Investors in the last 1 year	Only 1x	None at all	There is 2-5 times	There is more 5 times
The last Funding Stage of Startup	Seeds	Pre-Seeds	Series A	Series B
Recurring Revenue Business Model	No, but active users are increasing	No, and there is a decrease in active users	Yes, partially	Yes, thoroughly

3.2.3. Discount Rate

The discount rate improvement in business assessment was made using two improvement evaluation frameworks, namely the first based on alumni clusters using the BCG Matrix and the second based on their funding stages. The determination of the percentage range of the discount rate given refers to Plummer's research (1987) entitled QED Report on Venture Capital Financial Analysis in Pettersen & Nylen's (2017) research, which is 40% to 75%.

In the second improvement, the grouping of discount rates is in accordance with Plummer's research in 1987, then divided according to start-up funding stages with slight adjustments to start-up funding stages at PT. XYZ as follows.

Table 3. Discount Rate Based on Funding Stages

Startup Funding Stages	**Discount Rate**
Pre – Seed	63-75%
Seed	51-62%
Series A	40-50%

3.3 Hypothesis Test Results

Table 4. Hypothesis Result

Scenario	***Variable***	***Hypothesis***		***Summary Model Result***
		T-Value	***Result***	
1	AGR 1	3.808	Accept H1	R^2= 0.574, simultaneously effected
	Size of Stock 2	-0.71	Reject H1	
	DR 1 (Based On BCG Matrix)	0.000	Accept H1	
2	AGR 1	4.216	Accept H1	R^2= 0.502, simultaneously effected
	Size of Stock 1	-0.811	Reject H1	
	DR 2 (Based On Funding Stages)	-3.120	Accept H1	
3	AGR 1	5.386	Accept H1	R^2= 0.667, simultaneously effected
	Size of Stock 2	-0.502	Reject H1	
	DR 1 (Based On BCG Matrix)	-4.491	Accept H1	

Scenario	***Variable***	***Hypothesis***		***Summary Model Result***
		T-Value	***Result***	
4	AGR 1	5.616	Accept H1	R^2= 0.628, simultaneously effected
	Size of Stock 2	-0.147	Reject H1	
	DR 2 (Based On Funding Stages)	-3.758	Accept H1	
5	AGR 2	4.103	Accept H1	R^2= 0.561, simultaneously effected
	Size of Stock 1	-0.643	Reject H1	
	DR 1 (Discount Rate Based On BCG Matrix)	-3.918	Accept H1	
6	AGR 2	4.472	Accept H1	R^2= 0.511, simultaneously effected
	Size of Stock 1	-0.955	Reject H1	
	DR 2 (Based On Funding Stages)	-2.957	Accept H1	
7	AGR 2	4.238	Accept H1	R^2= 0.593, simultaneously effected
	Size of Stock 2	-0.539	Reject H1	
	DR 1 (Based On BCG Matrix)	-4.247	Accept H1	
8	AGR 2	4.698	Accept H1	R^2= 0.544, simultaneously effected
	Size of Stock 2	0.887	Reject H1	
	DR 2 (Based On Funding Stages)	-3.127	Accept H1	

Based on the table, the results of the tests that have been carried out on the 8 scenarios, it is known that both the variables AGR 1 and 2 and Discount Rate 1 and 2 have a significantly positive effect on the resulting startup valuation figures while the EV/Revenue 1 variable shows that it has no significant effect on startup valuation figures. Meanwhile, the Discount Rate 2 variable has a significantly negative effect on startup valuation figures.

AGR is an indicator to measure the annual investment growth rate from time to time which is calculated by the compounding effect, where the higher the annual investment growth rate, the higher the start-up valuation value will be generated. It can be concluded that the more these start-up receive financing, the higher the value of the company.

This is in line with indicator 3, namely the discount rate, where this variable is an indicator of the risk of a cash flow, the greater the risk of cash flow, the smaller the value, the smaller the risk of cash flow, the higher the value of the company, if this start-up company has many investors, the risk cash flow can be further reduced.

Therefore, these two variables are highly correlated in determining the valuation value even though variable 2 has no significant effect based on the hypothesis test, but if you look at the magnitude of the R square value in the eight scenarios, it can be said that these three variables when used together will have a simultaneous effect. Mc Donald's research in 2016, he also stated that the discount rate is one of the main components that explains how significant an outcome changes if there is a delay factor. Meanwhile, Lee at al research in 2016 stated that the valuation on pharmaceutical is directly proportional to the income of licensees and the reduction rate and inversely proportional to market size and CAGR.

From the results of R- square, the best design that can be used as a guideline for calculations for PT XYZ is Scenario 3 with an R Square value of 66.7%. Scenario 3 uses AGR version 1, Size of Stock using the Damodaran Revenue Multiple by Sector reference and the discount rate based on the BCG Matrix.

4. Conclusion

This research was conducted to determine the standard for each calculation variable in business valuation at PTXYZ. The results of this test conclude that the variable AGR and the discount rate are very influential so that it is necessary to improve the method of calculating especially for these variables and PT. XYZ can use scenario 3 as a reference for the calculation method according to the results of R-Square.

However, this research is only focused on the standard variables that have been used at PT XYZ, but seeing the start-up conditions that are dynamic and will continue to bigger development in the future, it is necessary to add other indicator variables so that the valuation value will be absolute.

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