



Startup Evaluation Methods

BY

Athanasios Davalas¹, Yannis Charalabidis²

¹Phd Candidate at the Department of Information and Communication Systems Engineering, University of the Aegean

²Professor at the Department of Information and Communication Systems Engineering, University of the Aegean

University of Aegean

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Abstract

Venture capitalists, investors, seed-fund managers, and founders of startup companies in different sectors face the challenge of valuation which is currently based on estimations and assumptions. As the companies start growing and generating new revenue streams new valuation methods need to be built.

This paper reports the results of our research on the application of existing valuation methods to evaluating startup businesses, emphasizing those associated with risk measurement and contract negotiations.

Out of this survey work, we seek to identify the dependency of the valuation method results to the stage of the startup and its revenue forecasts, its growth and viability scorecard, the financial and market risks as well as the knowledge that the investors have about the market domain.

On the assumption that the complexity of a startup valuation is high due to limited information available regarding their business model, their intellectual property, or under- (or over-) estimated figures regarding sales and costs, our objective is to present the key valuation methods for startups, the most important investment criteria used by venture capital investors, and any special criteria and valuation methods depending on the domain.

Our approach to this research was to define the common stages of startups and then compare them to the practices and techniques applied by three main valuation methods.

The assessment of these methods based on the aforementioned research questions is the main contribution of this paper, and the conclusions section concludes it with future research work in this direction.

Keywords: startup evaluation, startup performance, startup validation, and selection; analysis of collective decision-making, investment decision

1. INTRODUCTION

Most businesses are established to serve specific market niches identified. There exist a need to review various startup evaluation methods including venture capital, first Chicago, Berkus method, scorecard pre-money valuation, risk factor summation, traction, cost-to-duplicate, and discounted cash flow method. Although some methods are classified as evaluation methods for startups, they fail to fit into the category because they occur some months after the business is ongoing. For instance, the liquidation value method is considered a startup evaluation method. However, the method

is useful when the company wants to go out of business. Nonetheless, the paper will review the method and compare it to the other startup valuation methods of valuation for a better understanding of the valuation process.

Valuing startups in different sectors is a challenging task. Standard valuation methods that emphasize purely financial figures (e.g. cash flow, growth rates) typically fail. Features such as intellectual property and immaterial rights and the value they will bring to any future investment need to be measured too. Undoubtedly, researchers are striving to understand how venture capital investors (VCIs) evaluate startups per sector.



The focus of our research is on the hypothesis that VCI need the right method to evaluate a startup company as best as possible measuring all the risks a priori and before entering into contract negotiations. The valuation method should provide to the VCI a deep picture of the company's state. This is strongly associated with features such as contact details of customers, IPR rights, financial health, and more (Lauriala, 2004). Furthermore, startups have different life cycles, each domain sector has its constraints, and valuation needs to change as the startup grows (Damodaran, 2009).

The main research objective of this paper is to walk through the different valuation methods used by VCIs. We assume that the complexity of a startup's valuation is high due to limited information available regarding their business model, IPR information, or detailed figures with sales and costs (Damodaran, 2009). We emphasize identifying the various stages of startups and the investment criteria considered by the VCIs at each stage. Hence, the purpose of this paper is to identify:

1. The key valuation methods for startups
2. The most important investment criteria used by venture capital investors for startups
3. Any special criteria and valuation methods depending on the domain.

In the next section, we present the common stages of startups. Then we elaborate on three main valuation methods (Berkus, Scorecard, Risk factor summation) and summarize the main features of some additional quantitative methods. The assessment of these methods based on specific criteria is the main contribution of this paper, and the conclusions section concludes it with future research work in this direction.

1.2 Four Common Stages of Startups

Every business across the world has its beginning. Businesses go through various phases before they eventually become fully running enterprises. The four main stages of startups include,

2.1 Phase 1: Seed and Development

This is the initial stage in setting up a business and the beginning of a business lifecycle to a startup that exists officially. In most cases, individuals have an idea at this stage and are ready to convert it to business. They need to ensure that they have assessed the viability of the startup.

2.2 Phase 2: Early Stage

After testing and canvassing the business idea thoroughly, individuals are convinced that the business is ready to go. This is the right time to launch the startup officially, although it is the riskiest phase in the whole lifecycle of a business. According to Picken (2017), mistakes that are made during this phase tend to have a significant impact on the business over the years, and this explains why most startups fail.

2.3 Phase 3: Growth and Establishment

When the business gets to this stage, it ought to be making a steady income and bringing onboard new customers regularly. Cash flow should begin to improve as recurring revenues help

cover expenses, helping the business to see the improvements in profits gradually.¹ The challenge with this stage is that the business might be overwhelmed in managing the increasing revenue levels, dealing with competition, and growing customers.

2.4 Phase 4: Expansion

The business is performing well at this stage and has established itself in the local market. Here the business owners might be contemplating expanding the business to other locations or going global to tap more customers and profits. It can also offer other types of services to continue attracting new customers.

3.0 Startup valuation methods

3.1 Berkus Method

The Berkus Method is primarily applied for the valuation of startups with small revenue. The method was developed by David Berkus considering that a startup will reach a maximum 2.5 million euros market value. Especially for startups that are in early development stages, the method can measure their chances to exit the Death Valley and proceed to the next growth stages (Parviainen, 2017). The method emphasizes assigning a value or a specific financial valuation to each main element of all risks faced by startups. The entrepreneurs are credited with the basic value for coming up with the idea and the method ensures that the entrepreneurs are also assigned a value to decide whether the startup should be funded.

The table below (Table 1) elaborates the qualitative and quantitative factors which are considered by the Berkus method (Alford, 2017). The approach relies mainly on five elements including its sound idea.

Table 1: Berkus Method Factors

Value driver	Add to Pre-money value
Sound idea	0-500K euros
Prototype	0-500K euros
Management performs well	0-500K euros
Relationships that lower risks towards market and competition	0-500K euros
Product Rollout and Sales	0-500K euros

For a startup to be considered for investment, it needs to be having the best idea, which is assigned the basic value. The second aspect under consideration is the prototype, which helps reduce the technology risk. A startup is evaluated by being developed as a prototype to take into account various risks they might face over time. A startup that is likely to face multiple risks should not be considered for investment as it likely to fail. The third aspect is the quality management team, which is meant to help the venture reduce execution risk. A startup has to be considered based on whether it can attract individuals with the right skills to help in operations. The

*Corresponding Author: Athanasios Davalas



fourth aspect is the strategic relationships where the startup is expected to focus on reducing market risk. Startups are evaluated based on working with other entities to help them succeed in the long run. A startup that can permeate the market through strategic partnerships can be termed as the best investment. The last factor under consideration is the product rollout or sales, which strive to help the startups reduce production risk. The best startups will have the capacity to take part in the production process and boost sales.

Hence, the Berkus method ensures that one can assign value to each element with \$500K being the highest value, and it also allows for the pre-money valuation of up to \$2.5M. The method also sets the hurdle at \$20M as it needs to be achieved in the fifth year (Richards, 2019). A startup will only be considered if it can increase value ten times over its life. In summary, the Berkus method is a simple model and more useful to value seed or early-growth companies.

3.2 Scorecard Pre-Money Valuation Method

The scorecard pre-money valuation method was developed by Bill Payne and focuses on pre-revenue startups before they are assigned financial resources. A business will be assigned financial resources in a situation that a mathematical model considers viable after several calculation steps.

The first step in the process involves finding the average value of the industry to be utilized in pre-money valuation (Kowlessar et al., 2016). The industry averages are derived from surveying various organizations in the same industry. Once the industrial averages have been determined, the startup would then have to focus on the individually weighted averages. There are various factors considered in this situation such as the size of the opportunity which needs to be between 0-25%, technology (0-15%), strengths tied to the management teams (0-30%), the level of competition in the environment (0-10%), and need for additional investment (0-5%).

For example, under the pre-money valuation method, a company with a lower bound of €2,482,222 and a higher bound of €2,882,222 will have an average pre-money valuation of €2,682,221.

A startup that meets the established criteria under the individually weighted averages can be considered for investment. A startup that does not meet the established criteria would further be considered using the percentage weights, which are used for comparison. The maximum percentage weights are assigned and compared to the comparison percentages for the specific business sector. The final step in the method involves multiplying the sum of factors by the industry averages.

In summary, this approach is based on the understanding that a cash cow with a high EBITDA cannot be evaluated quickly. However, the method is considered complicated as most seed investors are not able to understand the mathematical calculations.

3.3 Risk Factor Summation Method

Startups can also be evaluated using the risk factor summation method. The approach is based on the understanding that the

startups are likely to face various risks, and the operational environment has to be considered. The negative risk will mean a negative score to the company's value. A risk close to zero will contribute a positive score to the company's value. Therefore, it is another pre-money valuation method that is useful for startups in the early stages.

The risks are typified into 12 classes (e.g. management, growth stage, technology, competition, etc) and they are classified based on a set of four multiples (-1, 0, +1, +2). Each risk is associated with a 250K euros value, so a negative risk will contribute a -250K euros value, or in the best-case scenario, it will contribute a +500K euros value (Parvianen, 2017). The base value which is determined at the projection stage and adjusted based on the 12 risk classes helps additionally to articulate the risk profile of the startup. A startup with a higher risk will tend to be abandoned, while those with lower risks will be considered for investment.

The method is made up of concise and articulate steps geared toward helping evaluate startups to decide on whether to invest in the startup in comparison to other startups. The first step in the method involves conducting an average valuation of the startup based on similar companies to establish a benchmark. The comparison has to be conducted using companies in the same environment as they are faced with similar risks. Gathering the right data is critical to the evaluation process. The second process involved in evaluation is the comparison of risk factors, with each being assigned a risk profile, which ranges from "very high" to "very low." The valuation of a company can be improved by identifying the risks to reduce them and guarantee overall success. The method can be used with other valuation methods to guarantee the success of various startups.

In summary, this method has the advantage of being simple focusing on the most important items that bring value to a company. However, if the risk scoring won't work well and the strengths or weaknesses of the startup are not reflected on it, the comparison to competitors for any significant differences won't work very well.

3.3 Venture Capital Method

The approach from Venture Capital Method (Figure 4) calculates the post-money valuation of the startups, 3-7 years after the initial investment (Payne, 2007). First, earnings are estimated for the number of years that the venture capital investors are planning to exit. Secondly, the value at the time of exit is calculated by multiplying the earnings (by the time of exit) by price to earnings ratio. Thirdly, the equity value is calculated taking into account the return or the discount rate. The discount rate is higher for startups whereas the Return required varies in each stage of Venture capital and they are decreasing as the startups move further in the lifecycle: Start-up (50-70%), First stage (40-60%), Second stage (35-50%) and IPO stage (25-35%).

$$\text{Equity Value today} = \frac{\text{Equity value at the end of forecast period}}{(1 + \text{Target rate of return} \vee \text{discount rate})^n}$$

Finally, the post-money valuation considers the pre-money valuation from the previous step plus any new venture capital ingested.

$$\text{Proportion of equity new capital provider} = \frac{\text{New capital provided}}{\text{post money valuation}}$$

For example, a startup with a pre-money valuation of €2,975,087 and an annual discount rate of 60% will require an initial investment of €2,000,000 and will record an EBIT of €1,335,098 in the third year.

Also, if the startup expects an internal rate of return to be 30%, then the estimated revenue of the company after 7 years would be €6 million. The exit value of the company would be 24.6 million while the post-money valuation would be €3.9 million and pre-money valuation €3.2 million with an investor's share of 17.9%.

3.4 Discounted Cash Flow (DCF) Method

The discounted cash flow method seeks to estimate the worth of an asset at the current time using projected cashflows. It helps an investor analyze how much they would earn if they were to invest in another project with similar risks. Once the current value has been determined, an investor can use the method to determine the amount of investment required at the current time to offer the desired returns in the future.

For example, for an entity with an EBIT of €1,355,098, forecasted long-term growth of 0.8%, industry beta of 1.38, market risk premium of 5.50%, and a weighted average cost of capital of 9.24% will have a value of €7,115,354 in three years.

The disadvantage of the DCF method is that it assumes that investors would have all the knowledge about the cash flows, access to details of the company's growth rates, revenues, or operating margins (Damodaran, 2009).

3.5 Cost-To-Duplicate Method

The approach aims to estimate the cost of starting the same startup business from scratch (Startup Know, 2019). Hence, it seeks to calculate the advantages of the startup subject to its current value. If the cost of starting the same startup business is low then its value is also low. If the cost and complexity of duplicating its assets are high then its value is also high. Nevertheless, the method has various shortcomings, including the lack of focus on the future potential related to its intangible assets, and the market size.

3.6 First Chicago Method

The First Chicago Method is considered an improved version of the DCF method. The method helps analysts to walk through three scenarios: Success, Survival, and Failure. In the Success scenario, the investors will be willing to consider the startup as it will offer the expected returns in the long run. The Survival scenario means less growth whereas the Failure scenario indicates losses (Startup Know, 2019).

4.0 Assessment of the Startup Valuation Methods

4.1 POCD Framework

Understanding the creation of entrepreneurial ventures involves the use of a fundamental framework known as the POCD framework. The main key areas to consider while evaluating a startup venture are the People, the Opportunity, the External Context, and Deals. The degree of integration of these four main elements is known as fit. The success of entrepreneurial ventures is measured by the ability of the people, the opportunity, the deal, and the context that influences the venture over time and the relationship among them. The POCD framework provides a balanced emphasis on anticipating how ventures evolve and how the managers can change the outcomes (Sahlman, Nanda & White 2018)

For instance, the People, who are the individuals who have a significant impact on the venture such as the founders, employees, advisors, investors, lawyers, suppliers, and at times customers are evaluated to check the level of their experience, skills, and attitudes about the nature of the opportunity, the context and the deals in place. Therefore, this framework supports the teams with directly relevant track records pursuing attractive opportunities. Successful ventures have great teams that can create and capture clients' value.

The opportunity is the intended service or product that the venture anticipates earning more than the cost of production. The venture must create a unique product or service with a sustainable cost advantage to create and capture value. Therefore, the venture must consider how the opportunity relates to the people involved, the context, and the deals in place while setting its objectives, and set barriers for competition. Entrepreneurial ventures scan the business environment for opportunities in which the consumers might be willing, over time, to pay more than the costs and the investments required. Also, the nature of the opportunity concerning the potential customers' value proposition, the supplier power, and the threats of the new entry should be evaluated appropriately.

However, the ventures must exist in a context. This is the representation of the factors that influence the outcome of the opportunity but are generally outside direct control by the management. To be considered fit, the context should be relevant to the venture and relate to the other key elements of the venture. Therefore, the entrepreneurial team must be aware of the context and how it relates to their proposal and consider the fact that the context will inevitably change over time. Lastly, the management should consider ways in which it can affect the context positively.

The deals which refer to the contractual relationships between the venture and the resource providers must be evaluated. The allocation of risks and funds in a venture is affected by the deals. The deals in a venture should make sense to fit with the people involved, the opportunity, and the context. Due to the risky nature of ventures, most entrepreneurs aim to maximize their shares at the end of the company's existence. Venture valuation bases on the investor's hard-earned experience that a

few ventures come close to meeting their expectations. Therefore, to manage the risk/reward in a venture, the management should change the distribution, increase the likelihood and the outcomes of success, and decrease the likelihood and implications of the problems.

In summary, evaluation of startup ventures includes; analysis of people involved, nature of opportunities and characteristics, factors involved in the context, and how management may respond to changes and deals that have been set in the business and procedures put in place to handle risks that may arise.

4.2 Evaluating Startup Businesses

About the POCD framework, we propose a set of assessment criteria for the startup valuation methods which were presented in the previous section. The assessment criteria refine the POCD framework with features related to the investment criteria of the investors. These are split into three categories: Personality and Experience of Founders; Product and Market Characters and Financial considerations which are connected to People, Opportunity, Context, and Deals attributes of the POCD framework. In other words, we are taking an investor's view who is seeking to assess the management knowledge of the market, risk management, and goal-achievement attitude at every stage of the startup before investing or continuing to invest. The assessment criteria are:

- Strength of the management team: Does it support risk management, i.e. does it help the investors to be aware of the risks and forecasts?

- The basic value of the startup (opportunity)
- Knowledge about the product/technology: does it take into account intangible assets including technology, patents, R&D prospects, and human capital?
- Competitive environment: does it consider any knowledge of the market sector and the capabilities of the company's competitors?
- Financial state: The balance sheets or other financial statements project the startup's profitability strength, its potential for future growth. The financial history of the company (e.g. earnings and market prices) provides an indicator of how well the company had done and most importantly its business cycle.
- Stage
- complexity

The comparison results are shown in the table below (Table 2). We observe that most of the methods are used in the pre-money valuation stage (phase 1 or 2). The scorecard pre-money valuation method and the risk factor summation method take into account both qualitative and quantitative measures to their approach; hence the probability of providing full analysis is higher than the other methods. The Scorecard pre-money valuation requires a deeper understanding of the associated mathematical model to consider accurately all the relevant risk factors. The quantitative methods (e.g. Venture capital, DCF, Cash-to-duplicate) have the advantage of being simple and fast on deriving estimation models.

Table 2: Title: Comparison Results

	People	Opportunity		Context	Deals		
Valuation method	Strength of the Management team	Basic value of the opportunity	Product/Technology	Competitive Environment	Financial state	Phase	Complexity
Berkus method	N/A	product risk	technology risk	market risk and competitive risk	Financial risk	1 or 2	Simple for low-revenue startups
Scorecard pre-money valuation	Teams' experience and completeness	target market size	Is Intellectual Property well-defined?	Barriers to entry	Key partners, other Angels, or VCs	1 or 2	Complex mathematical calculations
Risk factor summation	Management risk, Manufacturing risk	Stage of the business risk	Technology risk	Competition risk, Legislation/ political risk, International risk	Sales and marketing, Funding/ capital raising, Litigation risk	1 or 2	Simple
Venture capital	N/A	N/A	N/A	N/A	Expected Return on Investment (RoI)	2	Simple

Discounted cash flow (DCF)	N/A	N/A	N/A	N/A	DCF analysis to estimate future cash flows	3	Simple
Cash-to-duplicate	N/A	N/A	N/A	N/A	Cost of hard assets	4	Blur estimations
First Chicago method	N/A	N/A	N/A	Market risk	Financial forecasts – estimate the divestment price using multiples	4	Requires extensive analytical research

On the other hand, they don't consider other features such as the market size, the value of intangible assets, the personality of the management team, etc. Whereas, the First Chicago Method has the advantage of building concrete scenarios as an improved version of the DCF method and complex options of cash flows can be modeled. It has the disadvantage of calculating inaccurate risks if the scenarios are not properly modeled. The discount rate cannot be yet precisely determined.

4. Conclusion

In summation, the evaluation of startups is geared toward understanding whether a particular investment will generate returns. The discussed methods of startup valuation include the First Chicago method, the discounted cash flow method, the cost-to-duplicate method, the risk factor summation method, the scorecard valuation method, and the Berkus method. Each method is developed to help investors estimate future returns. The proposed set of assessment criteria and comparison matrix helps startup valuation analysts to select the right method depending on the stage of the startup, and analytics tools and knowledge. Research needs to continue in this direction by expanding the proposed framework with additional assessment criteria. Additionally, the framework needs to be evaluated with real-life case studies to different domains.

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