

## STUDY ON THE ELIGIBILITY OF VENTURE CAPITAL FUNDS IN THE UNITED STATES MARKET

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**Abstract.** Experience shows that 9 out of 10 start-ups and SMEs do not survive in the market and fail at an early stage. This study aims to fill a gap on how start-ups and SMEs are affected by venture capital fund investments, i.e., identifying the criteria for selecting a potentially best VCF, ensuring the success of the investment and reducing possible bankruptcy risk. The object is VCFs in the United States. The data was used from a publicly available statistical database Crunchbase. Using the complex proportional assessment method CORPAS for evaluating and ranking VCF criteria and the cluster analysis – for identifying similarities between VCFs and dividing VCF into clusters, the investigation determines the crucial criteria. The most important are: Years in business of VCF; The number of employees working for VCF; The fund's marketing strategy. The study results can help further to develop an evaluation system of VCF eligibility criteria.

**Keywords:** venture capital funds, eligibility criteria, multi-criteria decision methods, COPRAS, cluster analysis, bankruptcy risk mitigation.

**JEL Classification:** G23, G24, C38.

### Introduction

In a rapidly changing and evolving economy, start-ups and small and medium-sized enterprises (SMEs) face many challenges. One of them is initial funding for companies' development. In many cases, these businesses do not have access to the capital market, participate in an initial public offering (IPO) or borrow money from banks. Hence, they look for different sources to finance their ideas, products, or services. Such funding sources are usually hazardous, dangerous, or overly ambitious. According to the research organization Startup Genome (2019) report, 9 out of 10 start-ups and small businesses fail to survive in the market and go out of business, encouraging start-ups and SMEs to look for solutions that reduce the risk of failure and promote growth.

Over the last fifty years, new financial alternatives have emerged to provide start-up finance or stimulate business expansion. Today, they can find investors willing to invest in an unnamed company, use crowdfunding platforms, and attract business angels or VCF.

Start-ups and SMEs are constantly faced with the decision-making challenge of carefully selecting the right investors in the business process, as this is one of the decisions that contribute to the company's financial performance. This study aims to fill a gap in the scientific literature on how start-ups and SMEs are affected by venture capital funds (VCF) investments. This paper focuses on VCFs as an investment alternative for SMEs and start-ups and their selection criteria in the United States (US) market. The VCF invests in start-ups and emerging companies that are not necessarily profitable but have a strong potential for growth due to the nature of their business. VCFs are pioneering capital that can stimulate corporate innovation and economic progress in global industrial development. Since the first venture capital firm was founded in the US in the 1950s, it has played an important role in social and economic development (Del Bosco et al., 2019).

*The research problem* is how start-ups and SMEs can select the most appropriate VCF based on publicly available statistical data to ensure the success of these investments and reduce the potential risk of bankruptcy. *The study focuses* on the selection criteria for VCF.

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*The study aims* to identify the most appropriate criteria for selecting a potential VCF investment. *Objectives of the study* are:

1. Validate the start-ups' and SMEs' importance to the economy and financing needs.
2. Identify the selection criteria for VCFs based on academic literature analysis.
3. Develop a methodology for the VCFs selection.
4. Empirically assess the selection criteria for VCFs to enable start-ups and SMEs to make a reasonable VCF selection decision.

*The research methods include* analysis and systematization of scientific literature to highlight the importance of start-ups and SMEs for the economy and their need for investment funds and highlight the selection of VCFs by start-ups and SMEs from a theoretical perspective. Preparation, selection, normalization, and comparison of sets of alternatives and criteria based on statistical data. The data were analysed using the complex proportional assessment method (COPRAS) for evaluating and ranking VCF criteria to determine which VCF would be the most suitable choice. The data was clustered to investigate similarities of the VCF in terms of the clustering attributes using the Euclidean method. All the obtained results were analysed and summarized in the conclusions.

## 1. The Role of Start-ups and SMEs in the Economy and the Need for Investment

Around the world, start-ups and small and medium-sized enterprises (SMEs) play an essential role in the economy at the national level in every country, creating jobs, adding value, and contributing to innovation. SMEs are critical to environmental sustainability and more inclusive growth, but their contribution to the economy varies considerably across countries and sectors. Researchers agree that start-ups, especially in their early stages in the US market, positively impact economic growth and employment rates (Audretsch, 2002; Decker et al., 2014; Sedláček & Sterk, 2017; Zhao & Ziedonis, 2020). According to the Organisation for Economic Co-operation and Development (OECD), in 2017, start-ups and SMEs were one of the primary forms of entrepreneurship, accounting for 99% of all businesses. They can be a significant source of employment, accounting for around 70% of jobs and making a substantial contribution to value creation with an average of 50–60% of value-added (OECD, 2017). SMEs account for up to 45% of total employment and 33% of GDP in emerging economies. Considering the contribution of informal businesses, SMEs contribute to more than half of employment and GDP in most countries, irrespective of income level (International Finance Corporation [IFC], 2010). In addition, SME development can contribute to economic diversification and resilience, which is relevant for rich countries vulnerable to commodity price fluctuations.

Business development is the ideas, initiatives, and activities that help improve a business and includes

increasing revenues, growing business, increasing profitability through strategic partnerships and strategic business decisions. It is essential to understand what factors influence profitable business growth. Roomi (2020) analysed and identified four key areas that significantly affect small business development: business structure and management, external factors, behavioural and interpersonal characteristics, and business location.

Access to strategic resources is crucial for the competitiveness of start-ups and SMEs. Many such companies face various supply and demand barriers, skills shortages, poor management practices, and a lack of knowledge or resources to train staff. All of these constrain the productivity and innovation of SMEs. Due to the riskiness of their business, sources of finance such as banks are in many cases inaccessible to this type of enterprise due to strict requirements for start-ups or SMEs such as pledging of assets, submission of business financial statements, and owner's financial details, etc. They often look for different sources to finance their ideas, products, or services. Over the last fifty years, new financial alternatives have emerged to obtain seed funding or promote the development of a company to gain a foothold on the capital market and participate in Initial Public Offerings (IPOs). Today, start-ups and SMEs can find investors willing to invest in an unknown company, use crowdfunding platforms, and attract business angels or VCFs. The article focuses on VCFs that contribute to the companies' development through their investments and give companies a chance to grow. Companies' main benefits from VCFs are usually capital to start or grow their business. Still, they promote the company's well-being and provide relevant experience, valuable information, resources, or technical assistance to make the business successful.

Kato (2021) analyses the impact of venture capital financing on SME growth in the emerging economy and states that venture capital financing has a positive effect on the growth of venture capital-backed firms, including sales growth and job creation, in terms of return on investment and development. Besides, the services provided by VCFs, such as operational, financial, marketing, and others, have a significant impact on the growth of venture capital-backed companies. Brettel et al. (2013) and Kumar and Peter (2020), in their studies, agree that the VCF investment is a partnership with an entrepreneur in which the investor can add value to the company through his knowledge, experience, and contacts. According to Pocket (2015), a good venture capitalist is a thoughtful, experienced ally who sits alongside the entrepreneur as a partner and mentor, knowing full well that their destinies are intertwined. In many cases, scientists or researchers are employed by VCFs to stimulate innovation and productivity that have technological expertise, experience in business promotion and growth, extensive experience in the industry. Therefore, companies are looking for the most reliable investor to help fill the gaps in the knowledge of start-ups and SMEs.

Companies' main benefit from VCFs is usually capital to start or grow their business. However, VCFs also promote the company's well-being and provide relevant experience, valuable information, resources, or technical assistance to make the business successful. Also, the investment expertise of VC institutions, adequately matched to the specific growth of the companies, facilitates, and accelerates the IPO process. Thus, the degree of match between the two is significantly positively correlated with a company's IPO. Based on the assumption of low company growth, venture capital has a significant impact on a company's listing. As the company's growth increases, the influence of venture capital on the listing of the company gradually decreases. Venture capital institutions with overseas experience are more likely to promote IPOs of invested multinationals (Wu & Wang, 2021).

## 2. Venture Capital Funds and their Selection Criteria

Venture capital is defined as a subset of private equity investments for the start-up, early development, or expansion of a business EUROSTAT (2016). These investments are usually described as very high risk and high return opportunities. They are investments designed for medium to long-term returns. At the outset of an investment, venture capital firms invest in a portfolio of companies, knowing that some will succeed, some will fail, and most will perform moderately or below the average. According to Organisation for Economic Co-operation and Development (2014) data, on average, 65% of venture capital portfolio generates a return of 3.8%, and 4% of a portfolio generates over 60%. It is also worth noting that VCFs invests mainly in companies in markets characterized by the rapid development of new technologies. A study to determine the impact of venture capital on innovation in China Yi et al. (2021) found that the incentive effect is more pronounced when the VC institutions have more industry experience, a higher shareholding ratio, and are syndicated. Further this research also shows that VCs mainly foster open innovation through three mechanisms: increasing cash pools, improving absorptive capacity, and strengthening managerial incentives and that the impact of VCs on open innovation varies considerably across regions, industries, and property rights.

Although there is not much academic literature on the topic, researchers Block et al. (2019); Lai (2006) have almost anonymous agreement on the main factors that founders should consider when choosing a VCF. One of these is *industry and product fit*. VCFs with significant investment in the industry and those who have previously worked with companies similar to the founder in terms of revenue growth, consumer base, and product suitability are more likely to succeed. Another is the *appropriateness of the investment stage*, as many VCFs specialize in different investment stages corresponding to the company's growth stages. Choosing a VCF that

invests in the appropriate phase of the company, start-up, or SME founders increases their chances of selecting the right investor. *Compatibility* is also an essential factor that goes hand in hand with VCFs. It helps to maintain a better relationship with the investor, which contributes to the continued success of SMEs and start-ups. The *reputation* of the VCF is the following one, which helps to understand better whether the fund is a good investor, and *Location* – both investors and funds often choose this criterion for simple reasons of ease of cooperation

Kim et al. (2021), in their work on VC fund selection criteria, identified three key elements: the *reputation of the VC fund*, the founder-investor *relationship*, and the *value-added* to the firm. A significant component of selecting a VCF is the investment portfolio, which is attributed to the fund's reputation. The authors also identified founder-investor relations as one of the most critical elements. However, the study shows that the years of the venture capital life and the assets under management are not relevant. Finally, in terms of value-added services of venture capital, this is not important for the start-ups in this study. Also, they found that VC advisory as a service and monitoring is a burden for start-ups.

## 3. Justification of the Research Methods

When companies choose a VCF as an investor, there are many questions about selecting the right investor who will help them raise capital, refine their strategy or IPO, and meet their expectations. Objective and subjective reasons often influence decisions, which multi-criteria decision-making techniques can best address.

Multi-criteria decision methods include methods for classifying and grouping alternatives and procedures for selecting choices when it is difficult to determine which set of given criteria will propose the best option. The most common methods mentioned in the literature are AHP, TOPSIS, MOORA, ELECTRE, COPRAS, etc.

Zavadskas and Kaklauskas (1996) introduced the Complex Proportionality Assessment Approach or COPRAS (COMplex PROportional ASsessment) in 1996. The COPRAS method uses a stepwise ranking and an evaluation of alternative procedures according to the degree of significance and utility. The following *advantages* of using the COPRAS method are highlighted (Podvezko, 2011; Podvezko & Podvezko, 2014):

- The main *advantage* of the COPRAS method over other multi-criteria decision methods is the ability to determine the degree of utility. By comparing alternatives, it can show which one is better or worse.
- This method allows the calculation of both qualitative and quantitative criteria.
- The COPRAS method can calculate both maximizing and minimizing criteria.
- Compared to other methods such as TOPSIS or AHP, far fewer calculations are involved, making this method easy to use.

There are also *disadvantages*:

- The results may be sensitive to slight variations in the data, and the degrees awarded may differ from those obtained using other methods.
- In cases of data variation, COPRAS may be less stable than SAW or TOPSIS methods.

The study develops a set of alternatives to achieve the objective. Vector A of rational alternatives constructed using the formula:

$$A = (A_1, A_2, A_3, A_4, A_5, A_6, \dots, A_{12}), \quad (1)$$

where  $A_1, A_2, \dots, A_n$  – alternatives.

A vector X of indicators constructed against which the alternatives are evaluated using the formula:

$$X = (X_1, X_2, X_3, X_4, X_5, X_6, X_7), \quad (2)$$

where  $X_1, X_2, \dots, X_n$  – criteria.

Given the alternatives and criteria, a decision matrix is constructed. It consisted of the quantitative estimates of the  $i$ -th alternative, according to the  $j$ -th indicator:

$$X_{[m \times n]} = \begin{pmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{pmatrix}, \quad (3)$$

where  $X_{[m \times n]}$  – a decision matrix consisting of  $i$  alternatives and  $j$  criteria quantifications;  $n$  – number of performance indicators;  $m$  – number of alternatives.

According to the given criteria, the cross-proportionality assessment method, or CORPAS, is used to determine which VCF is the best one to choose as an investor. The COPRAS method consists of 7 steps. The first step is already mentioned above. The remaining six steps are discussed below, during which a decision matrix is developed. Based on Organ and Yalçın (2016), the following sequence of methods is used:

*Step 1: Normalization of the decision-making matrix.*

A normalization procedure transforms the results of the alternatives under consideration into comparable dimensionless values. The following formula is used to normalize the matrix:

$$\hat{x}_{ij} = x_{ij} / \sum_{i=1}^m x_{ij}, \quad (4)$$

where  $x_{ij}$  – the performance of alternative  $i$  with respect to criterion  $j$ ;  $\hat{x}_{ij}$  – its normalised value;  $m$  – number of alternatives.

*Step 2: Determination of the weighted normalized decision matrix.* Once the normalized decision-making matrix has been established, the next step is to determine the weighted normalised decision-making matrix using the following formula:

$$\tilde{x}_{ij} = \hat{x}_{ij} \cdot w_j, \quad (5)$$

where  $\hat{x}_{ij}$  – normalized value;  $w_j$  – weight.

*Step 3: Calculation of the maximising and minimising index for each alternative.* The maximising (3) and minimising (4) indices are calculated in a weighted normalised decision matrix. The following formulas are used:

$$s_{+i} = \sum_{j=1}^n \tilde{x}_{+ij}; \quad (6)$$

$$s_{-i} = \sum_{j=1}^n \tilde{x}_{-ij}, \quad (7)$$

where  $s_{+i}$  – the sum of the maximising indicators;  $s_{-i}$  – the sum of the minimising indicators.

*Step 4: Determining the relative weight of each alternative.*

$$Q_i = s_{+i} + \frac{S - \min \cdot \sum_{i=1}^m S - i}{S_{-i} \cdot \sum_{i=1}^m \frac{S - \min}{s_{-i}}}, \quad (8)$$

where  $Q_i$  – the relative importance of the alternatives;  $S - \min = \min S - i$ .

*Step 5: Calculate each alternative's performance index ( $U_i$ ) value.* The best option is the one with 100%. We use the formula:

$$U_i = \frac{Q_i}{Q_{\max}} \cdot 100\%, \quad (9)$$

where  $Q_i$  – the relative importance of the alternatives;  $Q_{\max}$  – max value of all possible alternatives.

*Step 6: Ranking the alternatives.* The other options are ranked, also known as the Priority Ranking of Alternatives (PRA). The ranking of other options is done from the highest to the lowest. Thus, the alternative with the highest weight is ranked first and is the most preferred or highest weighted alternative.

$$A^* = \left\{ A_i \mid \max_i Q_i \right\}, \quad (10)$$

where  $A^*$  – order of alternatives.

In contrast to multi-criteria decision-making methods, which aim to find out which alternative is the best, cluster analysis is used to identify similarities between the objects under study. A “cluster” is a group of similar objects, a term first coined by R. Tryon in 1939 (Čekanavičius & Murauskas, 2008).

Cluster analysis methods are generally divided into hierarchical and non-hierarchical methods (see Figure 1). Hierarchical methods show and describe the

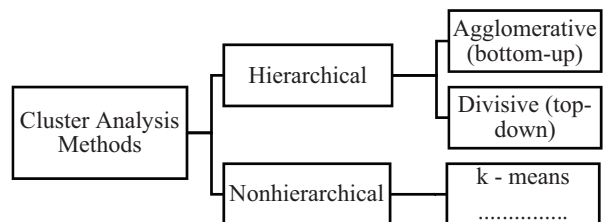


Figure 1. Main Classes of Cluster Analysis Methods (source: Čekanavičius & Murauskas, 2008)

interdependence structure of clusters. The flowchart of this process is represented by a graph called a dendrogram.

Non-hierarchical methods are usually used when the number of clusters to be analysed is known or chosen in advance. The main *disadvantage* of these methods is the unequal and different influence of the attributes measured or, in other words, the different results obtained by the different methods.

In this study, Hierarchical methods are chosen over Non-hierarchical to determine similarities of the clusters compared with one another and possibly build a larger cluster group rather than non-overlapping groups with no hierarchical relationships between themselves.

Five main steps usually are used to identify similarities and cluster research alternatives (Čekanavičius & Murauskas, 2008):

1. The objects selected to be clustered.
2. The objects are clustered by their attributes.
3. The similarity of objects measured.

4. To answer the problematic questions, the Ward method is adopted, together with one of the metric measures of distance, the Euclidean square of the distance. The formulas used to calculate them are:

$$d(U, V) = \frac{\bar{U} - \bar{V}^2}{\left(\frac{1}{U_n} + \frac{1}{V_n}\right)}; \quad (11)$$

$$x - y^2 = \sum_{i=1}^m (x_i - y_i)^2, \quad (12)$$

where  $d(U, V)$  – the distance between two clusters;  $X$  and  $Y$  are non-negative numerical functions of two objects.

5. Group objects into clusters.
6. Conclude the results.

#### 4. Analysis of Venture Capital Funds' Choice

One of the objectives of this study is to rank the alternatives and their data according to a set of criteria designed to test which VCF would be the most suitable candidate to invest in a start-up or SME using the COPRAS method. The study evaluates 12 alternatives and 7 criteria. The data is used from a publicly available statistical database Crunchbase (2021).

The alternatives are randomly selected from the available database lists choosing only US venture capital firms. The aim of such random choice is to analyse their data without any bias. The selected VCFs are Foundation Capital, QED Investors, SB Opportunity Fund, Newark Venture Partners, Next Wave Impact, Founders First Capital Partners, Norwest Venture Partners, Techstars, SixThirty, Columbia Capital, Oak HC/FT and Kapor Capital.

The set of criteria consists of the following measurements: total funds raised, fund value, the total number of investments made, the total number of successful exits, number of employees at the venture capital firm, global web traffic rating and year of founding. Such criteria are selected to emphasize companies' success in business, experience in the field, compare the internal infrastructure and popularity among other competitors, that are considered the key fields while making a choice.

Based on Crunchbase data for 2021 (see Table 1), a decision matrix is constructed from the abovementioned alternatives and criteria using formula (3). All weights for the criteria were chosen equal to 0.143 without wishing to single out anyone among others.

In addition, the decision matrix is normalized using formula (4). The relative weight of each alternative is calculated using the formula (5). Moreover, the maximising and minimising indexes are calculated for each alternative using formulas (6) and (7). As maximising indexes,

Table 1. Decision Matrix (source: compiled by the authors based on statistical data (Crunchbase, 2021))

VCF (i) / Evaluation Criteria (j)	Number of Funds	Total Fund Value (M \$)	Investments	Exits	Employees	Global Traffic Rank	Foundation Year
Weight	0.143	0.143	0.143	0.143	0.143	0.143	0.143
Foundation Capital	10	3,400,0	634	152	24	1,013,233	1995
QED Investors	5	1,400,0	204	30	20	1,651,006	2007
SB Opportunity Fund	1	100,0	48	0	19	3,131,134	2020
Newark Venture Partners	2	45,0	121	9	13	4,363,365	2015
Next Wave Impact	1	1,0	21	2	3	3,756,672	2015
Founders First Capital Partners	1	109,0	2	0	3	2,963,131	2015
Norwest Venture Partners	12	9,600,0	784	169	68	1,233,171	1961
Techstars	1	108,0	3339	329	319	203,130	2006
SixThirty	4	2,0	144	12	10	4,632,230	2013
Columbia Capital	1	500,0	188	54	23	1,856,565	1989
Oak HC/FT	3	1,900,0	105	11	24	1,688,150	2014
Kapor Capital	1	125,0	235	46	12	2,091,410	1999

the following were chosen because of their “more is better” importance for the client: number of funds raised, the fund’s value, the total number of investments made, the total number of successful sales (Exits), number of employees in the VCF. The minimising values are the global web traffic ranking, because the lower the ranking, the closer to first place, and the year of incorporation, which is seen as meaning that the older the firm, the more experience it is likely to have, so the earlier the year, the better.

Furthermore, each alternative’s relative weight significance ( $Q_i$ ) was determined using formula (8). The performance index or utility index ( $U_i$ ) for each alternative is picked using the formula (9). The final step (see Table 2) was to rank the alternatives from highest to lowest using the formula (10).

Table 2. Ranking of Alternatives (source: authors’ calculations and rankings based on statistical data (Crunchbase, 2021))

VCFs	Rank
Techstars	1
Norwest Venture Partners	2
Foundation Capital	3
QED Investors	4
Oak HC/FT	5
Columbia Capital	6
Kapor Capital	7
SixThirty	8
Newark Venture Partners	9
SB Opportunity Fund	10
Founders First Capital Partners	11
Next Wave Impact	12

The COPRAS evaluation of all available alternatives showed that alternative X8, represented by the VCF Techstars, is the best performing alternative. In contrast, alternative X5, represented by Next Wave Impact, is the worst-performing alternative. One can assume that the best firm is not necessarily the one with the highest total funds raised (see Table 1), which indicates the extent to which the VCF itself has attracted other investors to meet its objectives. The highest total amount of funding raised across all available VC funds, or the fund’s value, is not the main criterion for choosing the best investor. According to the calculations, the incorporation date is also not a key criterion in investor choice. It is not necessarily the case that an older company will have more experience or be better than a newly created company. The study shows that it is best to choose a company with a medium-long track record, such as Techstars, established in 2006 (see Table 1).

In contrast to the above-analysed criteria, the total number of investments that shows whether a company’s activity will impact its success was an important criterion influencing the choice. An additional criterion influencing the choice was the total number of successful divestments, which is the point at which a VC fund decides to

divest its stake in a particular company to make a profit. Therefore, we can argue that the more times a VCF has invested in other companies and the more successful divestments it has made, the more experience it has and the better it is at selecting an investor. Another criterion that is considered an influencing factor in a VCF choice is the number of employees in the venture capital firm. We can therefore assume that a company with a more developed infrastructure with a sufficiently high number of employees is worth choosing. The last criterion examined, which is also worth noting, is the ranking of global web traffic. This criterion helps determine the popularity of a VCF’s website concerning other websites located worldwide. The global web traffic ranking is only one of many marketing indicators that indicate a company’s superiority over others. The lower ranking it is, the closer it’s to the first place. Therefore, a VCF having a lower ranking will be more easily and frequently visible to potential clients. That may result in receiving more offers to partner and thus, gain more experience in its direct work. Therefore, one can assume that choosing a VCF with a better-developed marketing strategy is worth picking.

## 5. Identification of Similarities between Venture Capital Funds

Funding is a two-way decision, where the start-up or SME chooses the VCF, and the VCF determines the business. When we looked at the alternatives in the previous chapter, we realised that we wanted to select the best option, but what alternative did we like decided not to invest in you during the negotiations? Therefore, when choosing an investor, it is helpful to have choices. One of these is to identify the similarities between VCFs to understand what they have in common and why we can consider other similar alternatives when choosing, and what to look for in them? Cluster analysis is used to address these and similar questions.

We chose the hierarchical analysis methods to determine the hierarchy between clusters. The merging method is the method that transforms smaller clusters into larger ones by merging them. In the course of the work, 12 US VCFs were selected: 1. “Foundation Capital”; 2. “QED Investors”; 3. “SB Opportunity Fund”; 4. “Newark Venture Partners”; 5. “Next Wave Impact”; 6. “Founders First Capital Partners”; 7. “Norwest Venture Partners”; 8. “Techstars”; 9. “SixThirty”; 10. “Columbia Capital”; 11. “Oak HC/FT”; 12. “Kapor Capital”. This numbering also corresponds to the number of clusters.

Funds are clustered according to the following attributes: total funds raised, fund value, the total number of investments made, total number of successful company sales, number of employees in the venture capital firm, global web traffic ranking, and year founded.

The Ward method is used in combination with one of the distance metrics of cluster analysis to measure the similarity of objects, the Euclidean distance squared (see formulae (11) and (12)). Using SPSS, the objects

Table 3. Clustering flowchart (source: authors' calculations using SPSS software, based on Crunchbase (2021) data)

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	3	6	14153005203.0	0	0	5
2	4	9	51221699593.0	0	0	6
3	10	12	149110287852.5	0	0	7
4	2	11	274800131336.0	0	0	7
5	3	5	617572499436.3	1	0	6
6	3	4	2389164823055.4	5	2	10
7	2	10	4270736221166.4	4	3	8
8	2	8	6976826160186.0	7	0	9
9	1	2	12777470539970.1	0	8	10
10	1	3	31710668162916.0	9	6	11
11	1	7	105774291930625.8	10	0	0

are divided into clusters. We obtained results based on Ward's and Euclidean distance squared methods (see Table 3). The data in the table show, we can see that 11 steps have been carried out, as indicated by the "Stage" column (12 VCFs – 11 steps). In the "Clusters combined" columns, we can see which clusters have been combined in the corresponding step. The column "Coefficients" shows the distance between combined clusters. One should stress that the smaller the distance between the values, the more correlated. The table "Stage at which a cluster first appears" below shows the stages at which clusters are first merged with other clusters and will be merged in the next step "Next step" and shows 0, which means no clusters merged in that step.

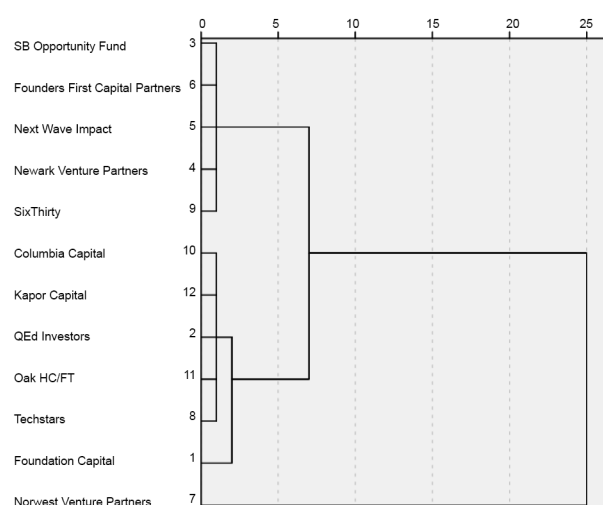


Figure 2. SPSS results using hierarchical methods – Dendrogram (source: authors' calculations using SPSS software, based on Crunchbase (2021) data)

Thus, Table 3 shows that the analysis carried out in the first stage, on similar VCFs divided into clusters 3 and 6, with a distance of 14153005203.0. One can further see that clusters 3 and 6 have not been merged with any other clusters before, and only in step 5, cluster 3 merge with cluster 4. Similarly, in steps 2, 3 and 4, clusters 4 and 9, 10 and 12, 2 and 11 are merged with a distance of 51221699593.0, 149110287852.5, 274800131336.0, respectively.

Further, the same results are reflected in the dendrogram (see Figure 2). One can see that the selected VCFs are divided into smaller clusters where two main groups are formed: clusters 3, 6, 5, 4, 9 and clusters 10, 12, 2, 11, 8. Clusters 1 and 7 remain outside the smaller clusters, but we can observe that clusters 10 to 8, together with 1, form one larger cluster. Likewise, combined with 3–9 would form another even larger cluster. They are somewhat similar in terms of the value of their funds, which exceeds USD 1 billion, and the total number of investments made, which exceeds 100 units.

The clusters that do not form clusters are 1 and 7, represented by Foundation Capital and Norwest Venture Partners. They had the furthest distance from each other of 105774291930625.8. They differ from the other VCFs in the number of VCFs accumulated, which exceeds ten units. Unlike the additional funds in the clusters with an average of around two pooled funds. Another striking criterion why these two funds are not included in the clusters is the significant difference in the foundation year below 2000, i.e., they were founded in the 20th century. In contrast, funds established in the early 21st century were also placed in clusters according to the foundation year.

No other striking similarities could be extracted from the data, suggesting that with these selected features, the approach is not the most appropriate one to categorise VC funds according to similarities when looking for alternative solutions to choose an investor.

## Conclusions

An analysis of the academic literature on the importance of start-ups and SMEs for the economy and their needs for investment shows that in general, start-ups and SMEs are a significant source of employment, accounting for around 70% of jobs and contributing significantly to value creation, on average accounting for between 50–60% of value-added. Access to strategic resources is crucial for the competitiveness of start-ups and SMEs. Many of them face various supply and demand barriers, skills shortages, poor management practices and a lack of knowledge or resources to train staff. All of this limits the productivity and innovation of SMEs, and it is essential to find the right financing to stimulate this. The study shows that the experience of VCFs, adequately aligned with the growth of companies, will facilitate, and accelerate the IPO process, which is vital for the development of the company and the entry into the market in the broader sense.

Although there is not much academic literature on the selection of VCFs, a review of other studies reveals the following criteria influencing the choice of venture capital: suitability of the industry and the product, suitability of the investment stage, compatibility or other relationship with the fund, the reputation of the VCFs themselves, location and, of course, the creation of added value.

The empirical evaluation of the criteria for VCFs, based on the results of the COPRAS calculations, suggests that it is crucial to consider the funds' lifespan when selecting a venture capital firm as an investor. The fund should not be too young or too long-established, as this may relate to the lack of experience of a young fund or the lack of interest in new technologies and the latest trends of an elder fund. Therefore, when choosing a fund, one should look for a fund that is on average up to 15 years old. For example, it should also be a fund with experience, such as Techstars, which has made a significant number of investments over its lifetime – over 3000 – and a considerable number of successful companies' sales, which should exceed at least 300.

Another important criterion when choosing a fund is the number of employees in it, which should not be very low, indicating an undeveloped company structure. The structure of the company or fund is an essential factor in enabling better decisions to be made and ensuring consistency. The structure is often the basis for implementing objectives and strategy. A fund with more employees can also impact SMEs and start-ups when invested in by companies with sufficient employees.

One of the most important results is the global web traffic ranking, which should be relatively low (or as close to first place as possible) when choosing a fund. Such a ranking shows that the fund has a well-developed marketing strategy and is visible to other clients and investors, allowing it to keep abreast of new technologies and build up the necessary expertise.

This research also has limitation and suggestions for future research based on the limitation. One of the objectives of the preparatory work for the study is to select and prepare a set of alternatives and criteria to determine the choice of VCFs. This work has encountered limitations in obtaining statistical data on VCFs. There are little data available in public databases. They are paid for, or the data are not sufficiently informative. They cannot be compared with different alternatives or be analysed adequately due to the lack of a sample and appropriate conclusions. Free statistics were available through Crunchbase, a publicly available statistical database for business information on private and public enterprises. However, when choosing an investor, the ratio between the time spent searching for publicly available free information on VCFs and the cost of paid database packages should be calculated to obtain partial or complete statistics on funds or other investment vehicles.

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