

Article

Assessment of Successful Drivers of Crowdfunding Projects Based on Visual Analogue Scale Matrix for Criteria Weighting Method

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Abstract: When investing in crowdfunding projects, every investor has some difficulties in selecting the right one. The most important issue is choosing criteria that show the value of the specific project. The aim of this study was to determine which of the criteria are the most important for investors when selecting various crowdfunding projects to fund. A visual analogue scale matrix for criteria weighting (VASMA weighting) methodology was used to determine the main criteria that affect investors' decisions to invest. The VASMA methodology can capture both objective and subjective parts of criteria weighting. In addition, the risk factor was considered a success driver of crowdfunding projects. The main findings reveal that the criteria of the three risk groups have the highest weights of the VASMA weighting methodology. In this research, only investor preferences were chosen and analyzed for successful crowdfunding project investment. The VASMA weighting methodology's criteria ranking might help investors select the most exciting crowdfunding project to fund.

Keywords: crowdfunding; crowdfunding campaign; criteria weighting; VASMA weighting; funding; success drivers; risk



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1. Introduction

The global financial crisis in 2008 led to a significant push for the crowdfunding industry because it caused a fall in trust in the financial system, especially in the banking sector. Since then, crowdfunding has proliferated all over the world. Crowdfunding, being a significant part of fintech, is an emerging alternative form of financing that connects those who can invest money directly with those who need financing for a specific project [1–5]. It is an Internet-enabled way for businesses or other organizations to raise money through either donations or investments from multiple individuals [6–8]. The basic principle of crowdfunding is therefore to pool money from a group of individuals instead of professional parties [9,10]. Agrawal et al. [11] and Mollick [12] provide a different view, defining crowdfunding in an entrepreneurial context as “the efforts by entrepreneurial individuals and groups to fund their ventures by drawing on comparatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries”. Definitions of crowdfunding may vary, but they often include the following key components: (i) raising funds in small amounts, (ii) a many-to-many platform and (iii) use of digital technology [13]. Crowdfunding is an umbrella term that covers several different forms [7,14–19]. Donation-based crowdfunding is used to collect charitable funding in support of causes and projects. In rewards-based crowdfunding, funders receive non-monetary rewards in exchange for their contribution. On the contrary, debt-based crowdfunding offers a credit contract, while equity-based crowdfunding offers an equity stake in the target company.

Crowdfunding has the potential to transform retail financial services by using technology. As connectivity increases through mobile phones and other devices, the legal and regulatory framework and constantly changing economic conditions allow new and innovative firms to compete with market players [20,21]. However, it is still unclear if crowdfunding offers a more efficient mechanism to deliver local entrepreneurs' capital. Policies and strategic recommendations for governments should help support crowdfunding ecosystems by addressing the economic, social, technological and cultural challenges.

When investing in crowdfunding projects, every investor has some difficulties in selecting the right one. The most critical issue is choosing criteria that show the value of a specific project. Since there is not one specific criteria set that can help investors, the aim of this study was to determine which of the criteria are the most important for investors when choosing various crowdfunding projects to invest in. With the intention to achieve this aim, a visual analogue scale matrix for criteria weighting (VASMA weighting) methodology was utilized. This methodology helps to determine the main criteria that affect investor funding decisions. The VASMA methodology can capture both objective and subjective parts of criteria weighting. The objective part of the VASMA methodology is defined by entropy weights, while the subjective part is the weighted aggregated sum product assessment by single-valued neutrosophic sets (WASPAS-SVNS).

The VASMA weighting methodology's criteria ranking might help investors select the most exciting crowdfunding project to fund. In addition, the risk factor was considered a success driver of crowdfunding projects. To the best of our knowledge, there is no such research that adds risk as one of the factors affecting investors' decisions to fund specific crowdfunding projects. Finally, only investor preferences for successful crowdfunding project investment were chosen and analyzed in this research.

The article is organized as follows: First, we start with a literature review of financing crowdfunding projects and success drivers. The applied methodology is then described. Finally, results, discussion, limitations and conclusions are given.

2. Literature Review

2.1. Financing Crowdfunding Projects

Crowdfunding ecosystems can be complex, and each model is different. The central point of every crowdfunding ecosystem is a platform that is a technologically supported solution used to match demand with supply. The demand side consists of people and different entities looking for funds. Depending on the specific model, they can be beneficiaries, borrowers or issuers. The supply side consists of donors, backers, lenders and investors [13]. An ecosystem of crowdfunding consists of three main groups: the platform, project owners who look for funds and backers or investors who invest.

Crowdfunding has become a novel and popular financing channel worldwide [22]. The first studies that focused on equity crowdfunding platforms discussed this new financing form's general functioning and compared the decision-making process of equity crowdfunding with traditional venture capital funding [23–25]. However, most platforms' success rate of crowdfunding campaigns is still less than 50% [19,26]. Therefore, project supporters should attract more visitors and understand their funding intention, which is vital in increasing crowdfunding as an alternative instrument of financing [2]. Knowledge of the factors contributing to crowdfunding success is required to better understand crowdfunding dynamics and improve campaign success rates [27]. With the increasing number of crowdfunded projects, it is essential to understand what drives people to either create or fund these projects [28]. Using social capital theory [29–31], signal theory [32,33], the herding effect [34] and local bias [35], factors that affect the success of crowdfunding campaigns were found.

However, there is little knowledge of how crowdfunding targets are assessed. Moreover, research on campaign success drivers and investors' investment criteria in equity crowdfunding is scarce. To the best of our knowledge, only a few researchers have covered this field. Agrawal et al. [11] and Kuppuswamy and Bayus [36] studied revenue

sharing data from the Netherlands-based platform. Ahlers et al. [32] investigated the Australian equity crowdfunding platform to evaluate the impact of selected start-up features on campaign success. Cholakova and Clarysse [37] researched the motivations that control individuals' decisions to invest in equity crowdfunding. Moreover, the role of early investors in crowdfunding campaigns was considered by Kim and Viswanathan [18]. Bernstein et al. [38] led an experiment on the significance of the accessibility of different information types to accredited early-stage investors.

Lukkarinen et al. [19] addressed the limited research explaining variation in equity crowdfunding campaign success. They built on research from the two forms of funding closest to equity crowdfunding in the funding life cycle. They combined both business angels and venture capitalists with non-equity-based crowdfunding. Since they all reflect growing companies' funding needs, angel investing, venture capital and equity crowdfunding are often evaluated together and compared to each other [39–41]. Lukkarinen et al. [19] hypothesized that traditional investment criteria used by venture capital and angel investors might be seen to predict the success of equity crowdfunding campaigns. In addition to this, they chose different campaign and company characteristics to predict crowdfunding campaign success. Finally, Salomon [25] discussed the crowdfunding financing form's general functioning and compared the decision-making process of equity crowdfunding with traditional venture capital funding.

Similarly to the mentioned literature, this research combined traditional funding, venture capital and business angels with crowdfunding theory criteria. Additionally, reward-based crowdfunding is a form of pre-selling [32] and hence can be comparable to e-commerce transactions, such as the buying process on marketplaces. This similarity lets us apply theoretical perceptions of risk from the body of e-commerce literature. As a result, the risk criteria group is included in this research.

2.2. Success Drivers for Crowdfunding Campaigns

In order to determine possible success drivers for equity crowdfunding campaigns, success drivers were identified in different forms of crowdfunding, venture capital and business angel theory and e-commerce literature. According to the existing literature on the success drivers of crowdfunding campaigns, they can be split into four main groups: campaign characteristics, networks, understandability and quality signals [19,42]. Various authors in the literature describe campaign characteristics. They distinguish several success drivers from campaign characteristics that might influence the investors' decisions to invest in specific crowdfunding projects. Thus, campaign characteristics include campaign duration [12,19,36,43–47], funding target [12,19,32,36,42,44–49] and minimum investment [3,19,32,36,44]. Further, provision of financials [12,19,32,42], number of early backers [19,30,36,42,44,45], capital raised [19,30,36,44,45,47] and number of investors [19,36,42,44] can be considered campaign characteristics as well. In total, we were able to find seven success drivers that are related to crowd-funding campaign characteristics. Another group of success drivers are networks, including social media networks and private networks [12,19,30,32,42,45,46]. The third group from crowdfunding theory is understandability, which consists of understandability, information about risk and environment commitments [19,32,45,48]. The fourth success driver group is quality signals, including updates, spelling mistakes and video of the campaign [12,42,45–47]. To sum up, we found 15 success drivers from crowdfunding theory.

Furthermore, venture capital and business angel investment criteria differ from one investor to another, but there are numerous mutual patterns for both groups [50,51]. Generally, investment criteria related to the team are considered as the most important for venture capitalists and business angels [19,42,45,47,50,52–54]. To be more precise, the entrepreneur's characteristics and experience are critical factors [55]. In addition to this, criterion groups such as product (concept) [19,42,50–55] and financial potential are also considered very important for venture capitalists and business angels. Further, scalability, terms and stage might be considered success criteria for investment [19,51–54]. Venture

capital and business angel investors select company ratings as success criteria for their investments. To summarize, we were able to find six success drivers from venture capital and business angel theory.

Finally, the criterion group of risks was added as a decisive factor for investors. We found no studies reporting that risk affects the decision to invest, but it appears crucially vital for crowdfunding campaigns due to the level of uncertainty. Considering the literature of e-commerce and crowdfunding comparison, we added three groups of risk: risk associated with the project, risk associated with the project initiator and risk associated with the intermediary. The risk associated with the project includes product risk, social risk, psychological risk and post-funding risk [2,56–58]. Furthermore, the risk associated with the project initiator includes owner risk, time risk and delivery risk [2,59,60]. To conclude, the risk associated with intermediary covers intermediary risk, financial risk and performance risk [2,5,60–66]. We found three risk groups that might be considered as success drivers for investors. The whole list of 24 success drivers found in the literature is given in Table 1.

Table 1. Success drivers for crowdfunding projects found in literature.

	Success Driver Category	Success Driver	Description	Author
Crowdfunding theory	Campaign Characteristics	Campaign duration	Duration of the project campaign	[12,19,36,43–47]
		Funding target	Minimum sum needed to launch the project	[12,19,32,36,42,44–49]
		Min. investment	Minimum amount to invest in order to participate in project campaign	[3,19,32,36,44]
		Provision of financials	Financial forecasts/projections, early financial statements	[19,42]
		Number of early backers	Number of investors who invest before the campaign is launched	[19,30,36,42,44,45]
		Capital raised	Total capital raised for one project	[19,30,36,44,45,47]
		Number of investors	Actual number of investors investing in the same project	[19,36,42,44]
	Networks	Social media networks	The followers' social network of the project owner	[12,19,30,32,42,45,46]
		Private networks	Family and friends who support the project	
	Understandability	Understandability	Business-to-business (B2B) or business-to-customer (B2C) orientation	[19,32,45]
		Information about risk	Whether the crowdfunding campaign gives information about the risk	
		Environment commitments	Whether the crowdfunding campaign is committed to the environment	
	Quality signals	Updates	How often updates are sent to stakeholders	[12,42,45–47]
		Spelling mistakes	Presence of any spelling errors in the campaign text	
		Video	A descriptive video about the campaign/product	

Table 1. Cont.

Success Driver Category	Success Driver	Description	Author
Venture Capital and Business Angels	Team rating	Industry expertise	[19,42,45,47,50–55]
		Educational background	
		Experience	
		Balance between team members' skill sets	
		Perceived motivation, drive, passion, commitment and honesty	
	Market rating	Attainable market that determines the company's growth potential	[19,43,45,50–55]
	Concept rating	How well the product fits the target market	[19,42,50–55]
		Relevance of the end customer's problem	
		How well the company addresses the problem compared to other alternatives	
		Value of the solution to the customer	
	Scalability rating	Ease of scaling up the solution to the entire target market.	[19,51–54]
	Terms rating	Valuation Whether the targeted funding amount is sufficient to lift the company to the next level	[19,51–54]
Extra	Stage rating	Progress of the company on its development path	[19,51–54]
		Remaining gap to the target state	
		Status of the product	
		Status of market validation	
		Existence of paying customers	
	Risks associated with the project	Product risk/funding object risk	[2,56–58]
		Social risk	
		Psychological risk	
		Post-funding risk/repayment risk	
	Risks associated with the project initiator	Project initiator risk/owner risk/seller risk	[2,59,60]
		Time risk/convenience risk	
		Delivery risk	
	Risks associated with the intermediary	Intermediary risk/privacy risk	[2,5,60–66]
		Financial risk	
		Performance risk/operating risk	

3. Methodology and Data

3.1. VASMA Weighting Methodology

Visual analogue scale matrix for criteria weighting (VASMA weighting) is a survey-based criteria-weighting technique. It is a combination of WASPAS-SVNS weights and information entropy weights. WASPAS-SVNS determines the subjective weights, while information entropy determines objective weights. Zavadskas et al. [67] introduced weighted aggregated sum product assessment (WASPAS) and later extended it by single-valued neutrosophic sets (WASPAS-SVNS). WASPAS and its alterations are extensively used for numerous multi-criteria decision-making tasks [68–71]. Information entropy is also widely discussed by Friesner et al. [72]. VASMA weighting is constructed to decrease the uncertainties found in survey-based criteria evaluation. The complete VASMA weighting methodology is described in Figure 1.

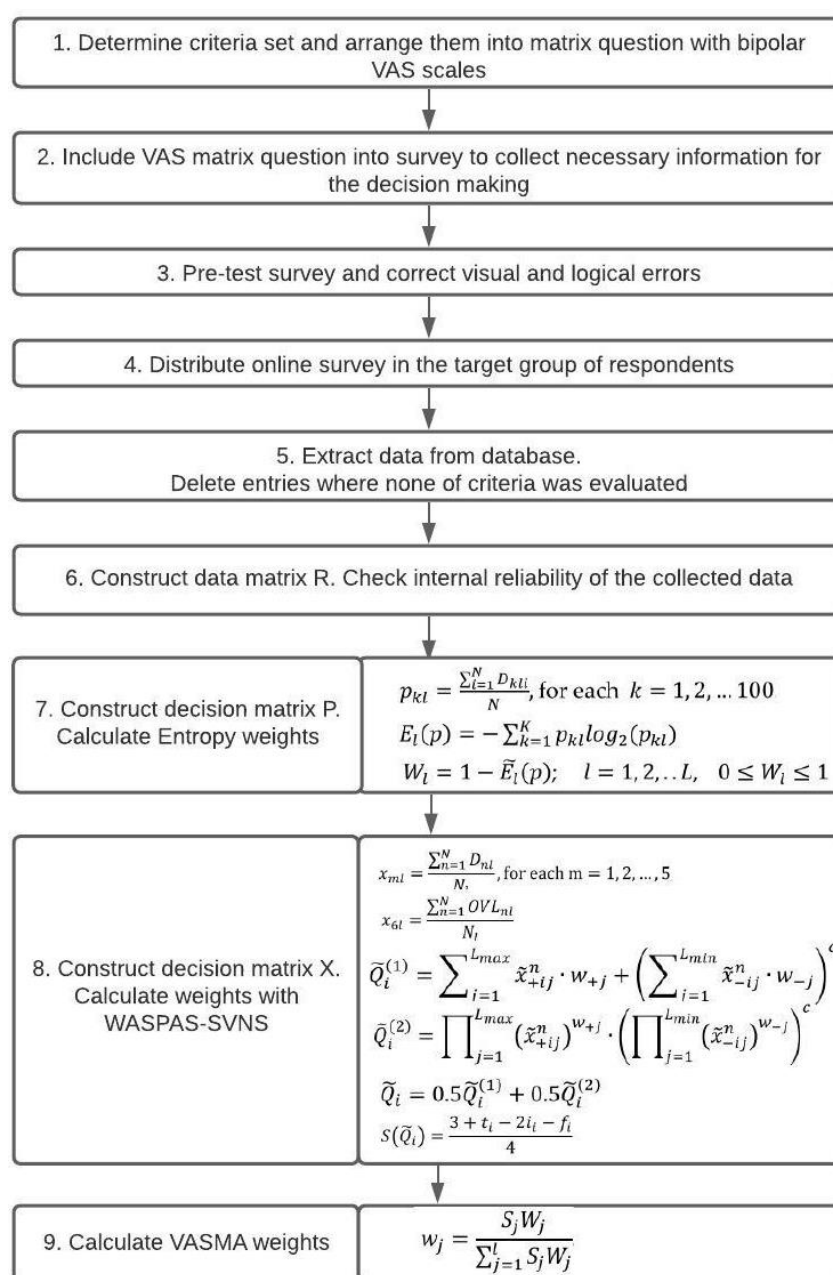


Figure 1. VASMA weighting methodology, source: adapted from (Lescauskiene et al., 2020).

Following the methodology procedure from Figure 1, the selected criteria were prepared in a question matrix and included in the online survey for the target group respondents. Later, responses were taken out from the survey database and entered in the data matrix R that consists of the number of criteria and number of respondents. All the evaluations were converted from visual analogue scales (VASs) to integer numbers. The initial value at the negative extreme, “absolutely unimportant”, was determined as 1, and the other value at the positive extreme, “extremely important” was determined as 100. All other values were calculated as the distance between these two values. If any respondent did not move the indicator from the default middle position of VASs, it was presumed that the opinion was not expressed on the specific criterion, so the value was equal to 0.

Moreover, if a respondent marked the extremes “absolutely unimportant” or “extremely important” in all their answers when evaluating criteria, then it was considered that this respondent did not seriously consider the evaluating topic, and the results were marked as outliers. Consequently, a simple data clearing procedure was performed by deleting entries where the respondent did not evaluate the criteria or else evaluated all the criteria by extremes. The matrix R with all the data was later customized to build other two different matrixes P and X . Decision matrix P was used to calculate the objective entropy weights, while the decision matrix X was used to calculate subjective WASPAS-SVNS weights. Both matrices P and X and the procedure of how to apply them in VASMA weighting consist of several mathematical steps that are explained in depth by Lescauskiene et al. [73] and were not used in this study due to being outside the scope of this research.

Finally, when information entropy weights and WASPAS-SVNS weights were calculated, it was possible to calculate the final VASMA weights. VASMA weights w_j were designed as the combination of the entropy weights W_j and the WASPAS-SVNS weights S_j .

3.2. Survey Based Data Collection and Matrix Questions

Usually, it is impossible or very expensive to have face-to-face interviews with respondents, so online surveys are frequently used [74]. If experts have to give ratings concerning different aspects of a single variable, all items of the survey should be intentionally presented on the same page. This means of presenting multiple related items is called a semantic differential [73]. Semantic differentials are normally stated as matrix questions, where preferences are presented on the matrix side, and the response scale is presented on the top of it. In addition, matrix questions can increase the accuracy of the direct weighting techniques, as participant responses are significantly improved with comparative decisions rather than absolute ones [75,76].

Matrix questions were evaluated using the chosen measurement scale. Likert-type scales were predominantly used in the online surveys as they are very easy and understandable [73,77]. However, intervals between Likert-type values cannot be assumed to be equal, and the biases brought by the ordinal data points might have opposing effects on the calculations of the statistical measures like correlation, mean, covariance and reliability coefficients [78]. To mitigate such issues from Likert-type scales, continuous scales, also known as visual analogue scales (VASs), were used. The VAS is characteristically presented as a horizontal line, fixed with two verbal descriptors at the extremes. The VAS uses a line range to measure underlying behaviors and to obtain data measurements, and this approach is able to present weighting results without the constraints raised by the limited number of response categories [79,80]. Moreover, VASs are suitable for mathematical and statistical algorithms because of interval-level measures [81]. A set of VASs combined in a single question is called the VAS matrix.

3.3. Data

The initial data were collected from Kickstarter, one of the largest crowdfunding platforms in the world. Ten successfully funded technological campaigns were analyzed, and all possible data were collected from them. It was only possible to obtain information

stemming from crowdfunding theory that is considered related to success drivers for investment. Later, an expert was asked to read the story of every campaign and evaluate all criteria groups that were found from the theory of venture capitalists and business angels. The expert evaluated all criteria of team, market, concept, scalability, terms and stage groups in a range from 1 to 5, where 5 was the best. Finally, another expert read every campaign story again and evaluated from the risk perspective, again from 1 to 5, where 5 is the highest risk. This was carried out in order to operationalize all criteria groups.

With the purpose of setting the right criteria from the whole group, correlations between all variables were analyzed. Pairwise correlations between each of the independent variables and the dependent variable were also assessed. We took the number of investors and the amount raised as dependent variables since campaign success is measured with these two variables [19]. As independent variables, we took all the success drivers mentioned in traditional funding, venture capital, and business angel and crowdfunding theory and e-commerce theory.

Moreover, logarithmic transformations were conducted for the following variables: the number of investors, amount raised, funding target, minimum investment and campaign duration. This was performed due to relative changes being more relevant than absolute changes in these cases. Such transformations diminish the variables' skewness. Variables with the highest pairwise correlations were used later to choose the final criteria list for investing in crowdfunding projects. The final criteria list of the 14 most important success drivers was used in the survey of the target group of respondents. The final criteria list is given in Table 2.

Table 2. Adjusted final success drivers list.

	Success Driver Category	Success Driver
Crowdfunding theory	Campaign Characteristics	Campaign duration
		Funding target
		Min. investment
	Networks	Social media and private networks
	Understandability	Environment commitments
Venture Capital and Business Angels	Company ratings	Updates
		Spelling mistakes
		Video
Extra	Risk	Team rating
		Market rating
		Concept rating
		Risks associated with project
		Risks associated with project initiator
		Risks associated with intermediary

4. Crowdfunding Project Criteria Evaluation Based on VASMA Weighting Methodology

Crowdfunding has become a novel and popular financing channel worldwide. An increasing number of crowdfunding projects have attracted various investors' interest. However, it is very hard for investors to choose successful crowdfunding projects to invest in. Thus, there should be specific criteria to evaluate specific crowdfunding projects. The best method of determining this is to ask the investors what criteria are important to them when investing. Therefore, an online survey of seven questions was created for the target group of respondents. The VAS matrix was positioned as the fourth question, where respondents were asked to indicate how important the analyzed criteria are for choosing a crowdfunding project to invest in. Fourteen criteria adapted from our analysis were presented in the VAS matrix.

Overall, 64 individuals completed the online survey. However, one response was excluded from further analysis as answers were marked at the extremes of each VAS matrix question. This means that the respondent did not seriously consider the topic. Therefore, the final number of respondents was 63. The demographic profile of respondents is given in Table 3, and their crowdfunding knowledge is shown in Table 4.

Table 3. Demographic profile of survey respondents.

Variable	Category	%
Gender	Male	76%
	Female	22%
Age	<24	14%
	25–30	22%
	31–35	22%
	36–40	25%
	41–50	14%
	>51	2%
Education	Secondary	5%
	Professional	10%
	Bachelor	40%
	Masters	38%
	Doctor	8%
	Other	0%

Table 4. Target respondents' knowledge of the crowdfunding.

Variable	Response	
Do you know what crowdfunding (CF) is?	Yes	100%
	No	0%
Have you ever invested in CF projects?	Yes	89%
	No	11%
Have you ever used CF platforms?	Yes	83%
	No	17%

The respondent demographic profile (Table 3) shows that crowdfunding project investors are mainly males (76%) aged from 25 to 40 years. Moreover, they are highly educated as they usually have bachelor's or master's degrees. Looking into the knowledge of investors about crowdfunding, it can be seen from Table 4 that all respondents know about crowdfunding. Additionally, 89% of respondents tried at least once to invest in crowdfunding projects, and 83% of individuals had used crowdfunding platforms.

4.1. Data Extraction

Collected data from the VAS matrix were automatically transformed to the data matrix R , where columns represent the set of criteria, and rows denote the ID of the respondent (Table 5). Values with $r_{nl} = 0$ were considered as cases with non-response values.

Table 5. Criteria evaluation converted from VAS matrix to the data matrix R.

ID	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
1	16	74	64	78	27	39	42	81	87	93	79	64	39	22
2	17	84	69	64	36	70	77	82	90	91	91	88	68	75
3	11	68	14	97	55	100	76	22	68	42	66	79	61	33
4	68	70	57	32	13	43	29	24	96	97	91	78	82	12
5	56	26	20	59	22	63	83	36	100	100	100	100	100	56
...
58	19	72	83	82	15	70	86	66	89	80	95	96	72	86
59	96	93	8	7	62	84	4	8	84	80	89	99	99	95
60	92	45	63	60	29	39	73	8	77	100	67	99	99	98
61	76	38	21	27	36	20	81	16	63	37	44	100	74	38
62	72	53	40	52	97	59	81	45	68	72	90	92	55	74
63	64	80	64	16	31	65	82	32	86	87	90	92	90	92

Descriptive statistics of the data from the VAS matrix were found using one of statistical software packages and are presented in Table 6. As can be seen, all the criteria were evaluated by all of the 63 respondents analyzed in this research.

Table 6. Descriptive statistics of selected criteria from a survey.

No	Criteria	Mean	Median	SD	Count
C1	Campaign duration	54.98	64	28.27	63
C2	Funding target	68.84	72	23.75	63
C3	Min. investment	53.79	62	27.89	63
C4	Social media and private networks	43.29	37	29.79	63
C5	Environment commitments	34.10	28	28.32	63
C6	Updates	55.92	63	29.06	63
C7	Grammar mistakes	67.81	76	28.18	63
C8	Campaign video	31.22	27	25.06	63
C9	Team rating	72.19	74	23.15	63
C10	Market rating	74.70	80	22.96	63
C11	Concept rating	76.30	80	23.32	63
C12	Risks associated with project	88.37	92	12.20	63
C13	Risks associated with project initiator	84.60	88	15.84	63
C14	Risks associated with intermediary	81.94	90	21.53	63

Although all the respondents evaluated all criteria, the reliability of the data was checked. Here, Cronbach's alpha was used to determine the internal reliability of the collected data. The total Cronbach's alpha reliability coefficient was 0.7571. This means that the total internal reliability of collected data is high. The general rule of thumb is that a Cronbach's alpha of 0.70 and above indicates reliable data.

4.2. Calculation of the Entropy, the WASPAS-SVNS and VASMA Weights

Entropy weights can cover the objective part of the VASMA weights methodology. Decision matrix P was constructed from data matrix R . In matrix P , columns represent sets of criteria and rows indicate the possible values of VASs. Values p_{kl} found in Table 7 show the proportion of responses k for analyzed criterion l ($0 \leq p_{kl} \leq 1$ and $\sum_{k=1}^{100} p_{kl} = 1$).

Table 7. Matrix P constructed from matrix R for entropy weighting.

k	$C1$	$C2$	$C3$	$C4$	$C5$	$C6$	$C7$	$C8$	$C9$	$C10$	$C11$	$C12$	$C13$	$C14$
1	0	0	0.016	0.048	0.079	0.063	0.016	0.079	0	0	0.016	0	0	0
2	0.016	0	0.016	0.016	0.016	0	0	0.016	0	0	0	0	0	0
3	0	0	0	0.032	0.048	0	0	0.063	0.016	0	0.016	0	0	0
4	0	0	0	0.016	0.016	0.016	0.032	0	0	0	0	0	0	0
5	0	0.016	0	0.016	0.048	0	0	0	0.016	0	0	0	0	0
...
96	0.016	0.032	0.032	0	0	0.016	0.032	0	0.048	0.032	0.016	0.048	0.032	0.048
97	0	0	0.016	0.016	0.016	0	0.016	0	0	0.016	0	0.048	0.111	0.032
98	0.016	0.063	0	0	0	0.016	0.079	0.016	0.048	0.063	0.032	0.079	0.048	0.127
99	0	0.016	0	0	0	0	0	0	0.016	0.016	0.032	0.032	0.063	0.032
100	0.032	0.032	0.016	0	0.016	0.063	0.048	0	0.079	0.095	0.111	0.175	0.095	0.127

The final measures of entropy weights and their ranks are shown in Table 8. The calculation of these weights was mentioned in Section 3.1.

Table 8. Entropy weights calculated from survey data for selected criteria.

Entropy Weights	$C1$	$C2$	$C3$	$C4$	$C5$	$C6$	$C7$	$C8$	$C9$	$C10$	$C11$	$C12$	$C13$	$C14$
$El(p)$	0.815	0.773	0.812	0.820	0.780	0.781	0.769	0.763	0.760	0.747	0.747	0.658	0.685	0.697
W_i	0.185	0.227	0.188	0.180	0.220	0.219	0.231	0.237	0.240	0.253	0.253	0.342	0.315	0.303
Rank	13	9	12	14	10	11	8	7	6	4	5	1	2	3

The WASPAS-SVNS weights method is a part of the multi-criteria decision-making task, which covers the subjective part of VASMA weights. Decision matrix X in Table 9 was also constructed from matrix R . In matrix X columns indicate variables $V1-V6$ and rows indicate analyzed choices. An explanation the matrix X construction and how variables $V1-V6$ were found is presented in Section 3.1.

Table 9. Matrix X constructed from matrix R for WASPAS-SVNS criteria weighting.

Variables	$C1$	$C2$	$C3$	$C4$	$C5$	$C6$	$C7$	$C8$	$C9$	$C10$	$C11$	$C12$	$C13$	$C14$
V1	0.032	0.032	0.063	0.190	0.270	0.095	0.063	0.254	0.032	0.032	0.048	0	0	0
V2	0.365	0.159	0.349	0.349	0.429	0.302	0.159	0.492	0.111	0.111	0.063	0.016	0.048	0.079
V3	0.286	0.397	0.302	0.254	0.206	0.317	0.206	0.175	0.365	0.238	0.254	0.095	0.190	0.222
V4	0.238	0.270	0.206	0.190	0.063	0.190	0.381	0.063	0.302	0.381	0.429	0.492	0.397	0.286
V5	0.079	0.143	0.079	0.016	0.032	0.095	0.190	0.016	0.190	0.238	0.206	0.397	0.365	0.413
V6	4.952	6.556	4.540	3.286	2.651	5.032	6.825	2.127	6.810	7.206	7.857	9.794	9.000	9.095

WASPAS-SVNS weights are designed as the score function for generalized criteria are presented in Table 10. The ranks for the weights are presented.

Table 10. WASPAS-SVNS weights calculated from survey data for selected criteria.

WASPAS-SVNS Weights	$C1$	$C2$	$C3$	$C4$	$C5$	$C6$	$C7$	$C8$	$C9$	$C10$	$C11$	$C12$	$C13$	$C14$
$S(Q_i)$	0.786	0.838	0.760	0.611	0.468	0.747	0.808	0.477	0.847	0.850	0.838	0.972	0.950	0.936
Rank	9	6	10	12	14	11	8	13	5	4	7	1	2	3

VASMA weights were calculated from Entropy and WASPAS-SVNS weights by multiplying each weight together and then dividing by multiplication sum. The full equation is shown in Section 2.2. The final VASMA weights and their ranks are given in Table 11.

Table 11. Final VASMA weights and ranks for selected criteria of crowdfunding projects.

No	Criteria	VASMA	Rank
C1	Campaign duration	0.0539	10
C2	Funding target	0.0705	7
C3	Min. investment	0.0529	11
C4	Social media and private networks	0.0408	13
C5	Environment commitments	0.0381	14
C6	Updates	0.0605	9
C7	Grammar mistakes	0.0690	8
C8	Campaign video	0.0418	12
C9	Team rating	0.0754	6
C10	Market rating	0.0798	4
C11	Concept rating	0.0785	5
C12	Risks associated with project	0.1231	1
C13	Risks associated with project initiator	0.1106	2
C14	Risks associated with intermediary	0.1052	3

From the table, it is possible to see that all types of risks (risks associated with project (C12), project initiator (C13) and intermediary (C14)) have the first three rankings and VASMA weights of 0.1231, 0.1106 and 0.1052 respectively. These top criteria are considered as the most important criteria for investors when they choose crowdfunding projects. Conversely, the least important criteria for investors are environment commitments (C5) with a VASMA weight of 0.0381, social media and private networks (C4) with a VASMA weight of 0.0408 and campaign video (C8) with a VASMA weight of 0.0418.

5. Results and Discussions

The visual analogue scale (VAS) matrix can be effectively used for the survey-based criteria weighting tasks, as ranking information and importance value can be collected from one single question. The VAS matrix question was used in an online survey to determine the main criteria that influence investors' decisions to invest. The results show that respondents evaluate and easily compare criteria when they see all of them in one question. The data for this research were taken mainly from online survey questions and from expert evaluation. The online survey was sent to the specific target group of crowdfunding project investors. In addition, expert evaluation was used before the survey in order to evaluate successful criteria for investing into crowdfunding projects. The results indicate that the most important criteria for investors are related to risk. All three criteria related to risk have the highest weights and ranks of all criteria. Since there is little research on whether risk criteria affect the decision to invest, we added these factors to this research as they appeared important especially for crowdfunding campaigns. The results from the VASMA weighting methodology supported our hypothesis about the importance of risk factor.

We were able to find risk factors in the literature when we compared crowdfunding projects with e-commerce. Risk and uncertainty regarding item quality are common factors for customers when making online purchases. Investors are similar, as they seek low-risk and profitable investments. To be more precise, risk associated with the project is considered as the most important of all criteria. Thus, funders consider crowdfunding projects as very important when searching for investment opportunities. This goes together with e-commerce literature [2,56–58]. Furthermore, we found that risk associated with the project initiator is the second most important criterion for investors when selecting crowdfunding projects to invest in. It is essential for investors that the project owner is trustworthy. This is similar to online shopping, as online shops must be reliable for their customers [2,59,60]. Finally, the risk associated with the intermediary was the third most important criterion found by VASMA weighting. It is crucial to have a properly working online platform that supports deals among fundraisers and funders. This aligns with e-commerce literature, according to which it is essential to have a secured transaction

system for buying various products [2,5,60–66]. To sum up, our research results show that there are three risk groups that can be considered as success drivers for investors. The successful criteria with highest VASMA methodology rankings might be very useful in practically selecting crowdfunding projects to invest in. Moreover, this methodology can be adapted from the crowdfunding platform or project owner perspective, where the same criteria, preferences of different importance, could be chosen. The results of this research also contribute to academic literature as to the best of our knowledge, there are few academic findings regarding crowdfunding projects' success drivers. The main strength of this research is its unique methodology for choosing success drivers for investment in crowdfunding projects.

We compared direct rating (DR) and VASMA weighting approaches to show how the data processing technique integrated into the VASMA weighting methodology affects both the accuracy and the variability of the criteria weights. Direct rating is undoubtedly one of the simplest and easiest criteria weighting methods. These rating weights are measured by assigning absolute values and taking the average of them. The criteria weights found with VASMA weighting and direct rating are compared in Figure 2.

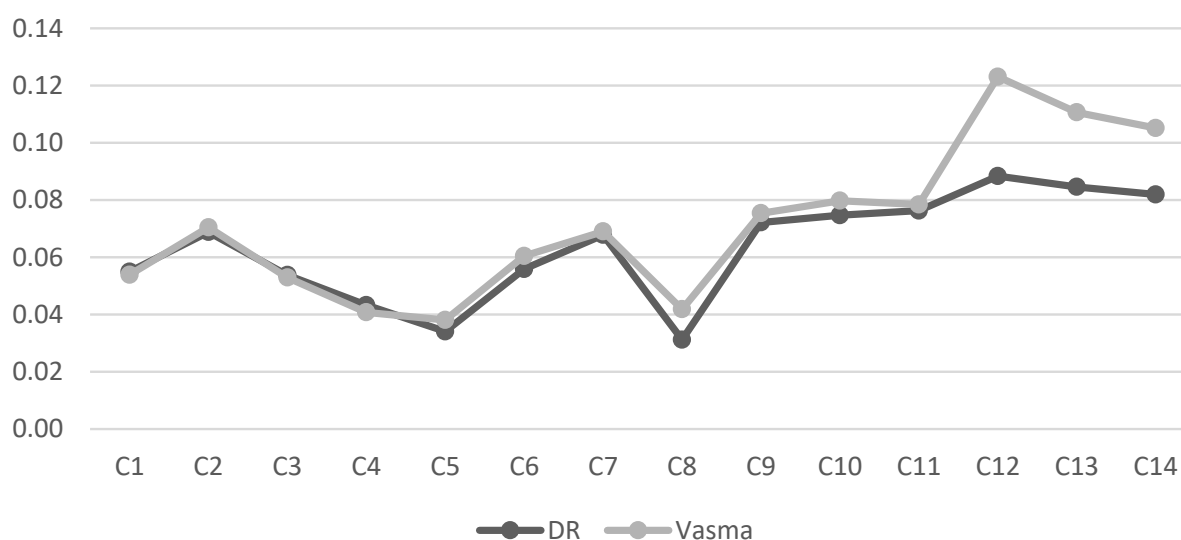


Figure 2. VASMA and direct rating weighting comparison.

Outcomes given in Figure 2 show that DR is usually linked with low variation of the criteria weights. Weights calculated by VASMA and by direct rating slightly vary for criteria C1–C11. The VASMA weighting methodology proves the positive effect for both equal weighting and high bias issues, which are enormous disadvantages of the DR technique [73].

This research could further contribute to better analysis of the platform economy in terms of digital data aggregation [82] and analysis and infrastructure in fintech operations. Additionally, it would be beneficial to elaborate on digital services facilitated by online labor platforms and public trust in digital platform operations [83]. To be more specific, it is important when discussing crowdfunding platforms to know how digital personal reputation and feedback systems facilitate interaction and trust between strangers [84]. Another important aspect is customer behavior regarding value co-creation in the online platform economy [85]. Generally, the research could be extended by discussing sustainable crowdfunding platform capitalism [86] and the commodification of digital labor in the gig economy [87].

6. Limitations

This research has some limitations. A crowdfunding project can be considered from project owner, investor and platform perspectives. In this research, only investor prefer-

ences were chosen and analyzed for successful crowdfunding project investment. In the future, it would be beneficial to also analyze project owners and crowdfunding platforms' preferences for successful projects. Another limitation is the number of respondents, which could be increased, and other target groups could even be chosen, as different respondents may choose different criteria. Finally, the chosen criteria groups could be altered due to different initial evaluation of experts.

7. Conclusions

Crowdfunding can change financial services due to the ease of obtaining funding via technology, legal and regulatory frameworks and the constantly changing economic conditions. It is a prospective opportunity to invest, but the success rate of crowdfunding campaigns on most platforms is still less than 50%. Project supporters should not only try to attract more visitors but also understand their funding intention, which is largely important in increasing the success of crowdfunding as an alternative instrument of financing. Moreover, investors usually have doubts about choosing the right crowdfunding projects. In order to better understand crowdfunding dynamics and improve campaign success rates, it is significant to know the success factors. Therefore, the most important issue is to choose the right criteria that show the value of the specific project.

To discover possible success drivers for crowdfunding campaigns, we searched for success drivers that were identified in different forms of crowdfunding, venture capital and business angel theory as well as e-commerce literature. According to the existing literature on the success drivers of crowdfunding campaigns, they can be split into four main groups: campaign characteristics, networks, understandability and quality signals. These four groups of success drivers were split into several smaller groups, and overall 15 success drivers were found from crowdfunding theory. Furthermore, investment criteria of venture capital and business angels differ from one investor to another, but there were numerous mutual patterns for both groups. To sum up, we were able to find six success drivers from venture capital and business angel theory. Finally, the criterion group of risks was added as a decisive factor for investors. We added three risk groups to possible success drivers for investors. The whole list of 24 success drivers was summarized in this research. The list of success drivers was shortened to 14 success drivers and applied in the survey.

In this research, the VASMA weighting methodology was used to determine the main criteria that affect investors' decisions to invest. The VASMA weighting methodology combines entropy weights and the WASPAS-SVNS multi-criteria decision-making method. The VASMA methodology can capture both objective and subjective parts of criteria weighting. The results showed that all three criteria related to risk play the most important role for investors when they choose to fund crowdfunding projects. These results were expected as they are in line with investment theory, where risk has a huge role in investment decisions. Conversely, the three least essential criteria for investors are environment commitments, social media and private networks and campaign video given in the description of the campaign. They obtained the lowest VASMA weights.

In the future, it would be interesting to apply this weighting methodology to other aspects of crowdfunding such as crowdfunding platforms or crowdfunding project owners and see whether these criteria remain of the same importance.

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