# Towards financing the entrepreneurial SMEs: Exploring the innovation drivers of successful crowdfunding via a Multi-Layer Decision Making Approach

## Abstract

***Purpose.*** In this research extracting the innovation drivers of successful crowdfunding from the literature review, screening them for the entrepreneurial SMEs, analysing the cause and effect relationship amongst them and presenting a basic causal conceptual model and eventually determining the importance/weight of each relevant driver were the primary purposes of this research. As a result, the authors have also designed a score function to measure the future innovative crowdfunding score for SMEs.

***Design.*** A multi-layer multi-criteria decision-making (MCDM) approach has been designed and employed to achieve research objectives. After extracting the initial list of drivers, Fuzzy Delphi was applied to screen the relevant innovation drivers of successful crowdfunding for entrepreneurial SMEs. Decision-making trial and evaluation laboratory (DEMATEL) was used to analyse the cause and effect relationship amongst the drivers and illustrate a basic conceptual model. Analytical network process (ANP) and Stepwise Weight Assessment Ratio Analysis (SWARA) were applied to determine the importance of the drivers and by aggregating them to measure the innovative crowdfunding score.

***Findings.*** Initially, 28 innovation drivers of successful crowdfunding were extracted from the literature. Then by employing the first-round Delphi fuzzy method amongst 15 international entrepreneurs in SMEs, the relevant drivers, including eleven items, were screened and selected. Then By Implementing the DEMATEL method, the relationship amongst these screened drivers was identified, and seven drivers were determined as causes and the rest as effects. Subsequently, a conceptual model based on the causal analysis of the drivers from the DEMATEL method was designed. Eventually, by aggregating the weight of drivers emanated from SWARA, DEMATEL, and DANP, the score function for measuring the situation of an SME was designed.

***Practical Implications.*** According to the crowdfunding scores in this research from entrepreneurs of SMEs, influential factors in developing countries were recognised as two times more prominent in developing countries. This might be rooted in the circumstances of developing countries where many startups and SMEs are emerging in vast areas and different fields due to investment in innovation management. In these countries, the authorities and officials support these companies to empower their capabilities and innovative ideas to (i) deal with the severe competitive market and (ii) benefit from them as potential economic engines. Therefore, crowdfunding platforms and public initiatives can be considered one of the most effective government supports, which may involve financial risks.

***Originality***. To the best knowledge of the authors, investigating the innovation drivers of successful crowdfunding via quantitative analysis by multi-layer decision-making approaches has not been considered previously. Moreover, the authors have designed a crowdfunding score function to determine the situation of an entrepreneurial SME in this area. A combination of different MCDM methods, including Fuzzy Delphi, SWARA, DEMATEL, ANP, and DANP, to investigate the innovation drivers of successful crowdfunding in SMEs has not been considered previously.

**Keywords.** Crowdfunding; SMEs; emerging economy, multi-layer decision-making approach

**Introduction**

There has been a large consensus among scholars and practitioners that entrepreneurship provides employment, enhances innovation, and contributes to socio-economic development (Baumol and Strom, 2007; Braunerhjelm et al., 2010; Shan et al., 2018; Rezaei et al., 2020). However, entrepreneurial ventures and small- and medium-sized enterprises (SMEs) have been found to face deficiencies in the market that not only limit their potential contribution but also their survival in the market (Estrin et al., 2018; Anwar et al., 2020; Block et al., 2021). For instance, one of the significant challenges of entrepreneurial SMEs is the lack of access to the sources of external finance such as equity capital or bank loans in their early stages of activities (e.g., Cassar, 2004, Cosh et al., 2009). This may be due to the disparity between the demand for financing and financial suppliers (Eldridge, Nisar, and Torchia, 2021). In such circumstances, entrepreneurs strive to undertake innovative approaches to fulfil their financial needs (Stefani et al., 2019) rather than relying on specialised investors only. In recent years, SME founders have sought financing from the "crowd" by getting them involved in their business, venturing either as a funder or an active consumer (Belleflamme et al., 2014). As such, crowdfunding has become a joint entrepreneurial innovation against traditional financing (Bruton et al., 2015; Block et al., 2018).

Crowdfunding has been highly promoted since the recent technological development and transformation of business models, which facilitated the circulation of information and access to the finance pool beyond national boundaries (Harrison, 2013; Belleflamme, Lambert, and Schwienbacher, 2014). Crowdfunding can be undertaken in different forms, such as donation, rewards, debt, or equity models (Meyskens and Bird, 2015), and complemented crowdfunding platforms (e.g., Kickstarter) that assist in developing novel financing initiatives. Although the emergence of such platforms facilitates access to the source of crowdfunding for SMEs, however, they have increasingly intensified the level of competition among fund seekers. Therefore, entrepreneurs need to consider and develop a wide range of capabilities to become successful in their pitch for crowdfunding their ventures. Such drivers include various aspects such as creating an innovative partnership, having previous experience in innovation management, or making creative interactions with backers (Martínez-Cháfer et al., 2021).

In this vein, literature has explored crowdfunding from different perspectives. For instance, focusing on financial dimensions, a body of research has tried to explore the extent to which crowdfunding addressed the shortcomings of traditional financing (e.g., Cichy and Gradoń, 2016). Similarly, Belleflamme et al. (2014) highlight the financing struggles for business venturing and propose crowdfunding as a proper investment tool. Also, extant research argues the role of innovation management, technology, and the digital economy in emerging crowdfunding (e.g., Steigenberger, 2017; Niemand et al., 2018; Shahab et al., 2019). Furthermore, there has been an ongoing endeavour to investigate other dimensions of crowdfunding, such as its relationship with social capital, innovation management drivers (e.g., Agrawal, Catalini and Goldfarb, 2015; Onjewu et al., 2022; Vismara, 2016), the life cycle of start-ups (e.g., Hornuf and Schmitt, 2016; Paschen, 2017) and even crowdfunding as a tool for value-creation (e.g., Ahlers et al., 2015; Baumgardner et al., 2017).

However, although the interest in crowdfunding research has increased in recent years (Belleflamme, Lambert, and Schwienbacher, 2014), prior studies are still fragmented and scant (Mochkabadi and Volkmann, 2020; Troise et al., 2020; Troise et al., 2021). For example, there is a gap in the entrepreneurial finance literature to systematically explore and evaluate how entrepreneurs leverage innovation drivers to secure successful crowdfunding for their business venturing. Hence, this research is set to disentangle the success factors of innovation management in crowdfunding by entrepreneurial SMEs. Indeed, we sought three distinct research questions: $Q_1$. What are the innovation drivers of successful crowdfunding for the entrepreneurial SMEs? $Q_2$. What are the causal and effectual relationship (interrelationship) among identified drivers? And, $Q_3$. What are importance/weight of each driver?

To address these research questions, we have employed a multi-layer multi-criteria decision-making (MCDM) approach. In this regard, an initial list of drivers is extracted from the crowdfunding literature, which is later filtered to the most relevant innovation drivers of successful crowdfunding for entrepreneurial SMEs via the Fuzzy Delphi method (Q1). Then, we apply a decision-making trial and evaluation laboratory (DEMATEL) to investigate the causal and effectual relationship between the drivers and illustrate a basic conceptual model (Q2). Eventually, a combination of the analytical network process (ANP) as well as the stepwise weight assessment ratio analysis (SWARA) is employed to identify the importance of the drivers (Q3). Therefore, the findings of this paper contribute to crowdfunding research by identifying twenty-eight success drivers, of which fifteen factors are innovation-driven. This has further led to the identification of a construct that highlights how these drivers interact with each other to boost the success rate of the crowdfunding of SMEs. Finally, the weight of drivers emanated from SWARA, DEMATEL, and DANP analyses led to the identification of a score function for measuring the drivers, which provides insight for practitioners (entrepreneurs) by highlighting that they need to prioritise and focus on the crowdfunding drivers that have higher importance.

In the remainder, we will synthesise the extant research and explore the most important internal factors of innovation management towards crowdfunding by SMEs. This is followed by the methodology section highlighting the hybrid decision-making-mathematical modelling research design and rigour. After presenting the research findings, we discuss the contributions by detailing the theoretical and practical implications. The last section concludes the paper, addresses the research's limitations, and proposes potential areas for further studies.

**Literature review**
The term "crowdfunding" has existed since the early $21^{st}$ century when new platforms were used to generate and raise funds in financial markets (Dushnitsky, Fitza, 2018). According to the view (Dushnitsky and Zunino, 2018; Fleming and Sorenson, 2016), "crowdfunding" is the method of financing a project or investment by collecting small sums of money from a large number of people through the Internet. This innovative approach has been created more to help high-risk and traditional investments that do not comply with new financial mechanisms and, in a way, has had a significant impact on attracting funding and the success of these

investments, incredibly entrepreneurial and creative investments (Jafari-Sadeghi, 2022; Martínez-Cháfer *et al.,* 2021). In this regard, researchers believe that innovation management, technological advances, and new financing methods are changing how capital is raised (Molik, 2014; Sukumar et al., 2020; Visma, 2016). Crowdfunding covers many areas (Lukkarinen *et al.,* 2016). According to (Massolution, 2015), Crowdfunding has two main streams, including financial and non-financial, and these two models also breakdown into five categories of collective investment, including (i) donation-based, (ii) reward-based, (iii) lending-based, (iv) royalty-based, and (v) equity-based crowdfunding (Giudici, and Rossi-Lamastra, 2018; Straaten and Bieman, 2021).

Success in crowdfunding requires a thorough and accurate knowledge of projects' innovative and effective drivers. The drivers are the factors that force entrepreneurs to choose crowdfunding as a source of funding and lead them to this approach (Mensah et al., 2021; Sadeghi et al., 2019; Straaten and Bieman, 2021). Drivers are also potential determinants of the success of investment campaigns that cover different areas related to project features (Di Pietro, 2021). Some scholars also extracted and presented the factors of equity crowdfunding that impact and match entrepreneurs and investors (Giudici et al., 2020). Researchers have recently addressed the factors and drivers for crowdfunding to succeed in projects. When investing in crowdfunding projects, investors face difficulties choosing the right one as this decision impacts the benefits and losses in the future (Vrontis et al., 2020). It is essential to be careful regarding the criteria that show the value of the project and its specificity. It has been illustrated that the main drivers of success are divided into six main categories, including (i) campaign features, (ii) networks, (iii) comprehensibility, (iv) innovation and quality signals, (v) company ratings, and (vi) risk. These six categories are divided into several smaller sub-categories, then finally, 24 drivers of success are extracted from the theory of collective financing (Hervás-Oliver et al., 2021).

In the ***campaign characteristics*** group, campaign duration stimuli, funding target, investment, provision of financials, number of early backers, capital raised, and number of investors are identified. In the ***networks group***, social media networks and private networks are proposed (Battisti et al., 2021). The ***comprehensibility group*** encompasses stimuli understandability, information of risk, and environmental commitments. Drivers, including updated stimuli, spelling mistakes, and videos, are classified in the ***innovation and quality signals***(Giudici and Rossi-Lamastra, 2018). The company rating category considers team, market, concept, scalability, terms, and stage ratings (Chan et al., 2019). Eventually, in the ***risk group***, the risk stimuli associated with the projects, risks of the project initiator, risks of the intermediary, etc., are included (Troise and Tani, 2021). Alongside the factors mentioned above, ***independent variables,*** including community description, community orientation, communication frequency, and structural rewards features, and control variables, including project goal, campaign duration, and staff selection, are defined and used (Venslaviene *et al.,* 2021). Images that show the concept of campaign elements and continuous and frequent communication with investors are critical drivers of success for SMEs entrepreneurs (Giudici, and Rossi-Lamastra, 2018; Lelo de Larrea *et al.,* 2019).

The success of crowdfunding campaigns depends on the experience of the SME members. In addition, the geographical location variable indicates that the success of collective investment in projects located in a geographical area is more significant than in projects outside that area (Borrero-Domínguez *et al.,* 2020). Fundraising is on the rise as one of the most fundamental and outstanding ways to outsource work to individuals who are available online. One of the critical factors in these campaigns' success is to show others credibility. The index of trust in crowdfunding (i.e., reconstruction, transparency, and experience) and the level of monetary compensation can predict the success or failure of such campaigns. Combining money with transparency and integrating money with experience is the best way to show sufficient credit and ultimately achieve success in crowdfunding campaigns (Xu *et al.,* 2021). Drivers such as campaign features, networks, and the ability to understand the concept and proposals of the company are discussed in online equity campaigns (Troise and Tani, 2021). The campaign has four main features: funding target, minimum investment, campaign duration, and fundings (Lukkarinen *et al.,* 2016). Networks in two categories of early funding from private and social media networks can be the factors of campaign success (Battisti et al., 2021).

The investment decision criteria traditionally used by venture capitals (VCs) or trading angels are not crucial for success in equity crowdfunding (Di Pietro et al., 2021; Battisti et al., 2021; Troise et al., 2022). Instead, success depends on the characteristics of the crowdfunding campaigns and the use of pre-selected private and public networks (Lukkarinen *et al.,* 2016). Entrepreneurs' experience in crowdfunding equity has also influenced other successful drivers, including *raising money, obtaining feedback, publicity, forming relationships/ broadening network, funding speed, lack of funding alternatives, and the maximum level of autonomy*. Obtaining feedback and lack of funding are influenced by the previous experience of entrepreneurs (Straaten and Bieman, 2021). Crowdfunding improves access to finance and is also rare and local. The existence of regulations related to crowdfunding as a driver has a positive relationship with the total per capita collective capital. The strong culture of e-services and innovation management are determinants for the different types of emerging crowdfunding (Kukk and Laidroo, 2020; Troise and Tani, 2021).

Accordingly, e-service, innovation management, and platforms are valuable tools in determining the influential factors in SMEs using crowdfunding. The number of awards, promoter experience, topic updates from promoters to sponsors, and various issues between promoters and sponsors covers various areas related to project features examining these factors (Chan et al., 209; Troise and Tani, 2021). Factors related to signalling theories such as participation, previous experience, and interaction with sponsors have a positive and direct relationship with the achievement ratio. At the same time, the number of rewards has no significant effect. The partnership program is very effective in increasing achievement. In this regard, developing a portfolio of partners and designing innovative mechanisms that increase the relationship between project promoters and partners can be very effective. (Martínez-Cháfer *et al.,* 2021). Examining operating systems and using cryptocurrency analysis of variance success in some reward-based and donation-based models is effective in raising crowdfunding to achieve successful drivers. Here, the average interest rate in a project is used as a dependent variable in the analysis of lending platforms. Expected effects such as "project

category, location, year, and size for each platform" are examined, and finally, different results are extracted.

The innovative factors related to success on one platform are not replicated on other platforms (Dushnitsky and Fitza, 2018). Funded methods can be used to succeed in raising crowdfunding. Raised amount (in the target percentage), Number of investors, and Speed of investment (number of days needed to complete financing) are used. Scholars demonstrated that between 2015 and 2018, the innovative factors that had the most impact on the campaign's success were project innovation and quality, information disclosure, and early investments (Correia et al., 2019). Crowdfunding of projects has changed the way innovation and management are performed. In this way, crowdfunding uses "crowd" as a lever to create a model of outsourcing in developed countries, using their power to raise capital. Previous participants influence the behaviour of potential supporters in the crowdfunding of innovation management, and a herding behaviour is created. Thus, essential mechanisms are information asymmetry, word of mouth effect, network effect, logical behaviour (Giones, 2017; Tian et al., 2021), and narratives and narrator experience in explaining crowdfunding (Cappa et al., 2021). Table 1 summarises research in this area to summarise drivers affecting crowdfunding success.

**Insert Table 1**

**Methodology**

Considering the research objectives discussed in the introduction section, (1) extract the most relevant crowdfunding drivers from an innovation management perspective, (2) investigate the causal relationship amongst the most important drivers and their cause and effect relationships, (3) and evaluate the importance of each crowdfunding driver amongst SMEs entrepreneurs, a multi-layer hybrid decision-making based framework has been utilised. In this regard, and to achieve the objectives above, different decision-making tools, including Fuzzy Delphi, Decision making trial and evaluation laboratory (DEMATEL), the Stepwise Weight Assessment Ratio Analysis (SWARA), and the analytical network process (ANP), have been employed. Figure 1 illustrates the research framework that this article follows.

**Insert Figure 1**

**Phase 1. Initialisation.** The initial list of crowdfunding drivers is extracted from the literature review at this stage. Based on the literature review employed in this article and after searching relevant keywords (e.g., crowdfunding drivers, crowdfunding success, crowdfunding equity, crowdfunding factors, crowdfunding enablers, etc.) in popular databases (e.g., Google Scholar, ScienceDirect, ProQuest, Web of Science, Scopus, etc.), during 2000 to 2021, 28 initial drivers of crowdfunding were extracted and listed (Table 3). Alongside selecting the most relevant crowdfunding drivers from SMEs entrepreneurs' point of view by considering innovation management, experts were selected from three different countries, including UK and Italy as developed economies and Iran as an emerging economy, to make the results more comparable for prominent benchmarking. According to the access to the SMEs entrepreneurs from these three countries and also having in mind other experts' qualifications such as (1) being familiar with crowdfunding drivers and innovation

management, (2) having at least three years experience in SMEs, (3) having at least bachelor in any field of science and business, etc. the following experts were selected and participated in this research (judgemental sampling approach) (Yadav et al., 2019). The expert profile is illustrated in Table 2.

**Insert Table 2**

**Insert Table 3**

**Phase 2. Selection.** After identifying the initial list of the crowdfunding drivers from the literature review (28) and accessing 15 experts in this field from SMEs entrepreneurs', a Fuzzy Delphi questionnaire was designed and completed by the experts in two rounds. In this questionnaire (A), each expert shared their opinion regarding the importance of crowdfunding drivers for SMEs from the innovation management perspective by linguistic terms and then transferred to triangular fuzzy numbers (TFN) according to the following transformation rules in Table 4. This stage took nearly two weeks, and before sending the questionnaire, a group briefing session (30 minutes) was set via MSTEAMS with each panel in each country to describe the research and how to complete the questionnaire. This research compared two developed countries with one emerging economy as benchmarking. This would provide some insights for any emerging economy to (i) set their policies regarding crowdfunding according to the successful experiences of the developed countries, (ii) how to increase the general public motivation and engagement in crowdfunding activities, and (iii) how to become familiar with crowdfunding for sustainability ventures and, (iv) extract guidelines and rewards to increase the engagement of the SMEs entrepreneurs for emerging economies to participate in crowdfunding activities from the experience of developed countries.

**Insert Table 4**

Then, the aggregated fuzzy value for each crowdfunding driver is measured via the following formula. Where $\widetilde{D_j^k} = (a_j^k, m_j^k, b_j^k)$ is the fuzzy importance of the $j^{th}$ crowdfunding driver ($j = \{1,2,...,n\}$) from the $k^{th}$ expert opinion ($k = \{1,2,...,L\}$) and $\widehat{AFV_j}$ is the aggregated fuzzy value of the $j^{th}$ driver.

$$\widehat{AFV_J} = (a_j, m_j, b_j) = (\min D_j^k, \prod_{k=1}^{L} D_j^k, \max D_j^k) \tag{1}$$

After, the defuzzied value of each driver is measured via the following equation (Amoozad Mahdiraji *et al.*, 2020).

$$DF_j = a_j + \frac{(b_j - a_j) + (m_j - a_j)}{3} \qquad \forall\, j \in n \tag{2}$$

In case the difference of the defuzzied values for each crowdfunding driver in two rounds of Fuzzy Delphi is less than the threshold value (0.2), and also the $DF_j$ for the driver is above the threshold value (0.7), that driver is selected; otherwise, deleted from the initial list.

Accordingly, if the average score of a driver in two rounds of FD is less than 0.2 (20%) (Hashemi et al., 2021), then that driver has met the first condition. Furthermore, the drivers that passed the first condition, those with an average defuzzified score equal to or above 0.7 (70%) (Mahdiraji et al., 2022), are selected for further investigation. This approach was repeated until all innovation-based crowdfunding drivers were selected or deleted from the initial list. As a result, 11 drivers were selected as relevant from SMEs entrepreneurs' perspectives.

**Phase 3. Analysis.** A hybrid multi-criteria decision-making (MCDM) approach consisting of DEMATEL, ANP, and SWARA has been examined to understand the relationship amongst the selected drivers and measure their importance. The first method was applied to identify the cause and effect relationship amongst the drivers, and the last two were employed to measure the importance of each selected indicator. DEMATEL, ANP, and SWARA have been introduced in the following three subsections.

**Phase 3.1. DEMATEL.** To implement DEMATEL, a questionnaire (B), including a square matrix, was sent for the experts to determine the direct relationship among the selected drivers. This stage took nearly four weeks, and before sending the questionnaire, a group briefing session (75 minutes) was set via MSTEAMS with each panel in each country to describe the research and how to complete the questionnaire. In this research, a seven-scale Likert questionnaire has been used to gather experts' opinions regarding the impact of drivers on each other, including *strongly ineffective, ineffective, nearly ineffective, neither effective nor ineffective, nearly effective, effective, and strongly effective*. These linguistic values were then transferred to numerical values as 1, 2, 3, 5, 7, 8, 9, relatively (Jafari-Sadeghi *et al.,* 2022). Then the average value from the expert's opinion was measured via a simple arithmetic mean. The result is a square matrix known as Z, including the direct initial relationship amongst the drivers. The Z matrix elements present the impact of the driver on row (i) over the driver on column (j), known as $z_{ij}$. Subsequently, the normalised direct-relation matrix (N) and the total relation matrix (TRM or T) are resulted from implementing equations (3) to (5).

$$s = Min\left\{\frac{1}{max_{1\leq i\leq n}\sum_j^n Z_{ij}}, \frac{1}{max_{1\leq j\leq n}\sum_i^n Z_{ij}}\right\} \qquad ; \quad \forall_{ij} = 1,2,\dots,n \qquad (3)$$

$$N = s \times Z_{ij} \qquad (4)$$

$$T = N + N^2 + N^2 + \cdots = \sum_{i=1}^{\infty} N^i = N \times (I - N)^{-1} \qquad (5)$$

Note that $t_{ij}$ is the element of the total relationship matrix. In the next step, the direct and indirect effects of each driver $(R_i)$ and $(D_j)$ has been measured relatively (Equations 6 and 7). Next, the net effect $(E_j)$ and the overall prominence $(P_j)$ of each driver is measured via the following equations (Equations 8 and 9) (Hashemi *et al.,* 2021).

$$R_i = \sum_{j=1}^n t_{ij} \qquad (6)$$

$$D_j = \sum_{i=1}^n t_{ij} \qquad (7)$$

$$P_j = \{R_i + D_j | i = j\} \qquad (8)$$

$$E_j = \{R_i - D_j | i = j\} \qquad (9)$$

Ej's positive and negative values relatively illustrate the cause and effect drivers. Besides, the higher values of $P_j$ present, the more critical the considered driver. According to the net effect ($E_j$) and the overall prominence ($P_j$) the network relationship diagram (NRD) is designable. The causes are above the x-array, and for TRM values above the threshold value (the arithmetic mean of elements of TRM), the arrow from cause to effect is drawn (Hajiagha *et al.*, 2021).

**Phase 3.2. DANP.** This approach combines DEMATEL and ANP, where the TRM matrix is used as the supermatrix and input of the ANP method. The following steps are employed in this method (Jafari-Sadeghi *et al.*, 2022).

(1) Normalised $C^H$ matrix is measured by dividing every row in $G_{ij}$ by the sum of the row ($S_i$) where $G_{ij}$ shows the DEMATEL total relationship matrix.

$$C^H = \begin{bmatrix} G_{11} & ... & G_{1m} \\ G_{i1} & ... & G_{1m} \\ G_{m1} & ... & G_{mm} \end{bmatrix} \begin{matrix} S_1 \\ S_i \\ S_m \end{matrix} \tag{10}$$

Where $S_i = \sum_{j=m}^{1} G_{ij}$

(2) The $C^H$ is transposed as equation 11 where $F^m$ denotes the transposed normalised matrix.

$$F^m = (C^H)' = \begin{bmatrix} H_{11} & ... & H_{1m} \\ H_{i1} & ... & H_{1m} \\ H_{m1} & ... & H_{mm} \end{bmatrix} \tag{11}$$

(3) The weighted supermatrix ($W^{limit}$) is measured by limiting the supermatrix as follows.

$$W^{limit} = \lim_{k \to \infty} (C^{H'})^k \tag{12}$$

**Phase 3.3. SWARA.** This method is a simple weighting approach usually used in voting conditions; however, in this research, the authors have benefited from SWARA to check the results of DANP and provide a more robust weight for each driver. In this approach, the drivers are sorted according to the results of fuzzy Delphi. Then, the setpoint of each driver, known as $S_j$ is measured as follows. Note that, $P_j$ illustrates the mean point of each criterion based on the Fuzzy Delphi results (Mahdiraji *et al.*, 2021).

$$S_j = \begin{cases} P_j, & j = 1 \\ |P_j - P_{j-1}|, & j > 1 \end{cases} \tag{13}$$

After, the primary coefficient $K_j$ results as follows.

$$K_j = \begin{cases} 1, & j = 1 \\ S_j + 1, & j > 1 \end{cases} \tag{14}$$

Then, measure the initial weight known as $Q_j$ as follows.

$$Q_j = \begin{cases} 1, & j = 1 \\ \dfrac{Q_{j-1}}{K_j}, & j > 1 \end{cases} \tag{15}$$

Afterwards, calculate the normalised weights as follows.

$$W_j = \frac{Q_j}{\sum_{j=1}^{n} Q_j} \tag{16}$$

After obtaining the weights of each driver via ANP, SWARA, and DEMATEL, the authors aggregated the weights. They extracted the final importance coefficient for each driver by calculating the average weights resulting from all three methods. In case $W_j$ determines the coefficient of each crowdfunding driver, $S_j$ presents the score of each company or organisation regarding that driver on a scale of 0-100. The crowdfunding score function (CSF) is measured as follows.

$$CSF = \sum_{j=1}^{n} W_j \times S_j \tag{17}$$

**Results**

After extracting 28 initial crowdfunding drivers from the literature review and using a questionnaire (A) amongst 15 SMEs entrepreneurs mentioned in Table 2, the expert's opinion was gathered, and the Fuzzy Delphi method (Eq. 1 and 2) was implemented in two rounds. The results are presented in Table 5. The underlined and bold values of the last column distinguish the common drivers and are selected by the experts from the innovation management perspective for further investigation.

**Insert Table 5**

For further illustration and to provide more value, the process of Fuzzy Delphi was also considered for each panel and each country separately to check the differences. Table 6 presents the selected crowdfunding drivers from different experts' opinions by considering innovation management in three cases.

**Insert Table 6**

By selecting 11 crowdfunding drivers from the initial list by the experts and implementing the Fuzzy Delphi method, the DEMATEL approach has been implemented. In this regard, experts have dispersed and completed the relevant questionnaire (B), and the average value for the Z matrix was measured and presented as follows.

**Insert Table 7**

Then by applying Eqs. 3 to 5, the total relationship matrix emanates as follows. Note that the threshold value for this matrix was measured (arithmetic mean of the elements) and resulted in 0.298. Thus, all values equal to or above the threshold are underlined and bolded to illustrate the important cause and effect relationships. These values will be the source of designing the NRD in the following sections.

**Insert Table 8**

Equations 6 to 9 were employed in the next step to extract and separate the causes from the effects and determine each crowdfunding driver's prominence by considering innovation management. Table 9 presents the results. Note that the negative values of $E_j$ denote the effects, and the positive values (bold and underlined) demonstrate the causes. Furthermore, the last column presents the normalised weights of each crowdfunding driver according to $P_j$ values; thus, $W_D(j) = P_j \Big/ \sum P_j$.

**Insert Table 9**

On the basis of the NRD rules mentioned in the methodology section, the causal diagram demonstrating the relationship amongst the crowdfunding drivers by focusing on innovation management has been presented in Figure 2.

**Insert Figure  2**

According to the above findings, the initial list of crowdfunding drivers from the literature review (28 drivers) has been identified; then, by implementing Fuzzy Delphi, the selected drivers from SMEs entrepreneurs were selected. After implementing the DEMATEL method, the causes, effects, and the conceptual model illustrating the relationship amongst the crowdfunding drivers have resulted by considering innovation management. In the last stage of this research, the findings of employing the DANP and SWARA methods have been shared. As mentioned in the methodology section, these approaches are appropriate for weighing drivers. To increase the robustness of the results, the authors have aggregated the weights resulting from DEMATEL, ANP, and SWARA. Implementing the DANP method (equations 10 to 12) on the TRM matrix and the SWARA method (equations 13 to 16) on Fuzzy Delphi results has measured the importance of each crowdfunding driver in Table 10.

**Insert Table 10**

The aggregated column presents the average weights from three other methods of each driver by simple arithmetic mean. These values are inserted as $W_j$ in the score function (equation 17). The following radar chart is remarkable for visualizing the weights' distinctions from different methods.

**Insert Figure 3**

**Implications**

**Theoretical Implications**

Crowdfunding is crucial for many small and medium-sized enterprises to develop products and improve their competitive advantages. Due to the scarcity of resources, these financial supports should be planned and investigated to prevent undesired consequences such as debt and early-stage bankruptcy for these SMEs instead of ambiguous achievements (Shkiotov, 2022). To this aim, many influential factors must be considered, and their effects can be monitored on SMEs' successful funding. According to the results, "risk associated with

project initiator" ($D_7$) is essential due to the need for the project owner to be trustworthy, and as shown in Table 6, both developed and developing countries have addressed it (Gierczak *et al.,* 2014; Venslaviene *et al.,* 2021). The second factor, called "raising money" ($D_3$), was common in all three countries and was also mentioned in the joint study of Straaten and Bieman (2021). Three innovation-based factors include "Innovative Partnership" ($D_1$) (Courteny *et al.,* 2017); "Experience in innovation management and crowdfunding" ($D_2$) (Buttice *et al.,* 2017; Straaten and Bieman, 2021), and "Forming innovative relationships and broadening network" ($D_4$) (Gerber *et al.,* 2012; Ahsan and Musteen, 2021) were ranked third. After the financial factor, the importance of human characteristics toward innovation was highlighted, which relies on the moral aspect of factors.

According to these days' concern for sustainable development, developed and developing countries try to prevent environmental damage and the long-lasting effects of climate change. In this research, it was emphasised on "Environment commitments via innovation management" ($D_{10}$), which requires them to observe the related rules and considerations (Venslaviene *et al.,* 2021). According to Triple Bottom Line (TBL), by focusing on People, Planet, and Profit (3Ps) (Khan et al., 2021), it is required that all crowdfunding activists consider all three pillars of sustainability in their policy making. Bento et al., 2019, emphasised that sustainability indicators should be considered and balanced during crowdfunding commitments (Bento et al., 2019). Environmental commitments should be considered in different aspects of crowdfunding, money-gathering ways, innovation management, and SME's business operation fields. The results indicated that the sustainability orientation of entrepreneurs to obtain financial resources through crowdfunding is adequate, and the sustainability orientation of an investment increases the ability to attract capital for that project (Calic and Masakowski, 2016; Petruzzelli *et al.,* 2019). The "trustable platforms" act as trusted third parties. The "Risk associated with the intermediary" ($D_8$) was directly related to "trust" that can lead to the crowdfunding process to success or failure in developing countries (Amuna, 2019; World Bank, 2013; Lukkarinen *et al.,* 2016; Venslaviene *et al.,* 2021). Similarly, Bento et al. 2019 also presented the idea of crowdfunding for sustainability ventures to manage the relevant risks and support the environmental aspects (Bento et al., 2019). Innovative funding alternatives ($D_5$) are of particular importance for obtaining foreign capital due to reducing the financial gap in the early stages. Developed European countries such as the UK, Germany, Spain, etc., believe that by creating more innovation alternatives, entrepreneurs will be able to network and build investor confidence and, finally, access to several financing alternatives (Hermer *et al.,* 2011; Pierrakis and Collins, 2012; Martínez-Cháfer *et al.,* 2021;). This factor has also been observed in Straaten and Bieman's (2021) results.

In general, "higher" Human capital for innovation management ($D_{11}$) was related to various aspects of entrepreneurial and investment success. The characteristics of human capital and their role as an entrepreneurial team or project promoters in the United States, the United Kingdom and Australia have been examined. In these developing countries, the human capital role in innovation management was a multifaceted concept that was broadly related to the capabilities and skills of individuals (Ahlers *et al.,* 2015; Barbi and Mattioli, 2019). Furthermore, in this regard, Stapylton-Smith 2015, in his book/theory, focused on

crowdfunding for social entrepreneurship. He revealed that reward-based crowdfunding provides prominent fundamentals for social entrepreneurs to absorb funding by advertising and signaling their commitment to social or environmental issues (Stapylton-Smith, 2015). Borrero-Domínguez et al. (2020) also pointed out the importance of this issue in their study. "The risk associated with the project" ($D_6$) was illustrated as another compelling factor in the crowdfunding process due to its monetary nature and the type of projects or industries that react variously to environmental events (Rossi, 2014). This factor was important from the point of view of experts in both developing and developed countries. The team rating ($D_8$) factor, like human capital, is a concept that encompasses the personality traits of individuals and can be examined in several ways; features such as industry expertise, educational background, experience, team balance, set of member skills, motivation, passion, commitment, and honesty (Block. et al., 2018; Lukkarinen et al., 2016; Venslaviene et al., 2021).

## Practical Implications

Regarding the crowdfunding scores assigned by experts from developed and developing countries, different factors affected different SMEs. In this study, the influential factors in developing countries were recognised two times more than in developing countries. This gap may be caused by the circumstances of developing countries where many startups and SMEs are emerging in vast areas and different fields due to investment in innovation management (Jamil et al., 2016). In these countries, the authorities and officials support these companies to empower their capabilities and innovative ideas to (i) deal with the severe competitive market and (ii) benefit from them as potential economic engines. Therefore, crowdfunding platforms and public initiatives can be considered one of the most effective government supports, which may involve financial risks (Kantis et al., 2020). The impact of crowdfunding on innovation management goes beyond the goals of the campaign or call. From a broader perspective, it has pushed the boundaries of innovation in newly established and emerging projects. Large numbers of participants, from idea providers to users, customers, investors, and even brand or campaign sponsors, create unwanted effects on market structure and, willingly or unwillingly, create new challenges and opportunities for innovation management (Le Pendeven, and Schwienbacher, 2021).

Furthermore, today, with platforms' evolution and relationship with innovation management or creative entrepreneurs, the acceptance and use of different crowdfunding models have changed. Hence, in some cases, it has been seen that two or several platforms have been employed simultaneously, and the association of these platforms has arisen from the relationship between innovation management and crowdfunding (Giones, 2017; Tian et al., 2021). In this regard, emerging economies and developing countries should redesign their regulatory structure and processes as an intermediary role to highlight and affect the crowdfunding procedures. To some extent, and according to the findings of this research, "cultural factors" are negatively impacting "trusted third parties" drivers. This indicates that policymakers should invest in and increase the general public's knowledge regarding the role of innovation drivers in successful crowdfunding.

**Conclusions and Future recommendations**

Extracting the crowdfunding drivers via innovation management perspective from the literature review, screening them for the entrepreneurial SMEs, analysing the cause and effect relationship amongst them and eventually determining the importance/weight of each relevant crowdfunding driver were the main research objectives of this article. Alongside this, the score function for determining the score of crowdfunding for each entrepreneurial SME was recommended in this article for further use in the future. Entrepreneurial SMEs can benefit from the results of this research to (i) focus on relevant drivers, (ii) understand the cause-effect relationship between the drivers, and (ii) have real anticipation of their possible score in crowdfunding in the future. To this aim, a combination of MCDM methods was employed in this article. Scholars have applied (i) Fuzzy Delphi for screening the relevant crowdfunding drivers for entrepreneurial SMEs from an innovation management perspective, (ii) the DEMATEL method to analyse the causal relationship amongst the drivers, (iii) ANP and SWARA to measure the importance of the selected drivers.

Considering the methods used in this research, scholars can consider the future recommendations in this article for further investigations in the area of crowdfunding drivers. First, all MCDM methods employed in this article benefited from crisp numbers and values under certain conditions. While in today's turbulence environment, using uncertainty approaches, including fuzzy, interval, grey, hesitant fuzzy, intuitionistic fuzzy, Pythagorean fuzzy, Fermatean Fuzzy, etc., seems essential for further investigation. These uncertainty approaches use more complicated values to insert and employ the experts' intuition and experience in the analysis. Furthermore, the relationship amongst the crowdfunding drivers was studied via the DEMATEL method in this research; however, interpretive-structural modelling (ISM), Fuzzy Cognitive map modelling (FCM), etc. approaches are also applicable to investigate and benchmark the results. Although the indicators in this manuscript were qualitative (subjective) and access to numerical data was not possible, in the future, while these limitations are solved and accurate data are accessible, a statistical analysis such as Structural Equational Modelling (SEM) and other multi variates statistical analysis are applicable. As in this manuscript, the ANP approach was applied to evaluate indicators' importance; other different weighing methods could have also been studied (e.g., Best-Worst Method (BWM), Simultaneously Evaluating of Criteria and Alternatives (SECA), etc.) to compare the results and check the robustness of the suggested score function.

From the data gathering perspective, three panels of experts from three different countries participated in this study. Countries with different economic levels should also be investigated to generalize the results. These experts and their members were selected based on their qualifications and also accessibility, and eagerness to participate in this research. This is a limitation of this research as other professionals from other countries and regions could have also been capable of participating in this research through enough time and budget. Thus, we recommend other scholars increase the number and the diversity of the participants for more generalisable results. To strengthen the initial list of crowdfunding drivers, instead of using the literature review methodology in the first stage, other data gathering approaches and methods, including interviews with experts, action research, grounded theory, or thematic analysis, are also recommendable in the future for other

scholars. As this research tried to evolve and employ a novel, uncertain MCDM model in the crowdfunding era, the main focus was on the methodology rather than the extracted factors. Hence, other scholars can focus on the first part of this research and try to identify, explore and extract specific crowdfunding factors instead of using the available literature. Besides, according to the scope of this research and the level of analysis, the results of this research are based on entrepreneurial SMEs; hence, the fundamental factor of innovation resulting in successful crowdfunding might differ for large-scale organisations. As a result, it is recommendable to investigate the same research questions and extract the critical innovation drivers leading to successful crowdfunding in large-scale organisations.

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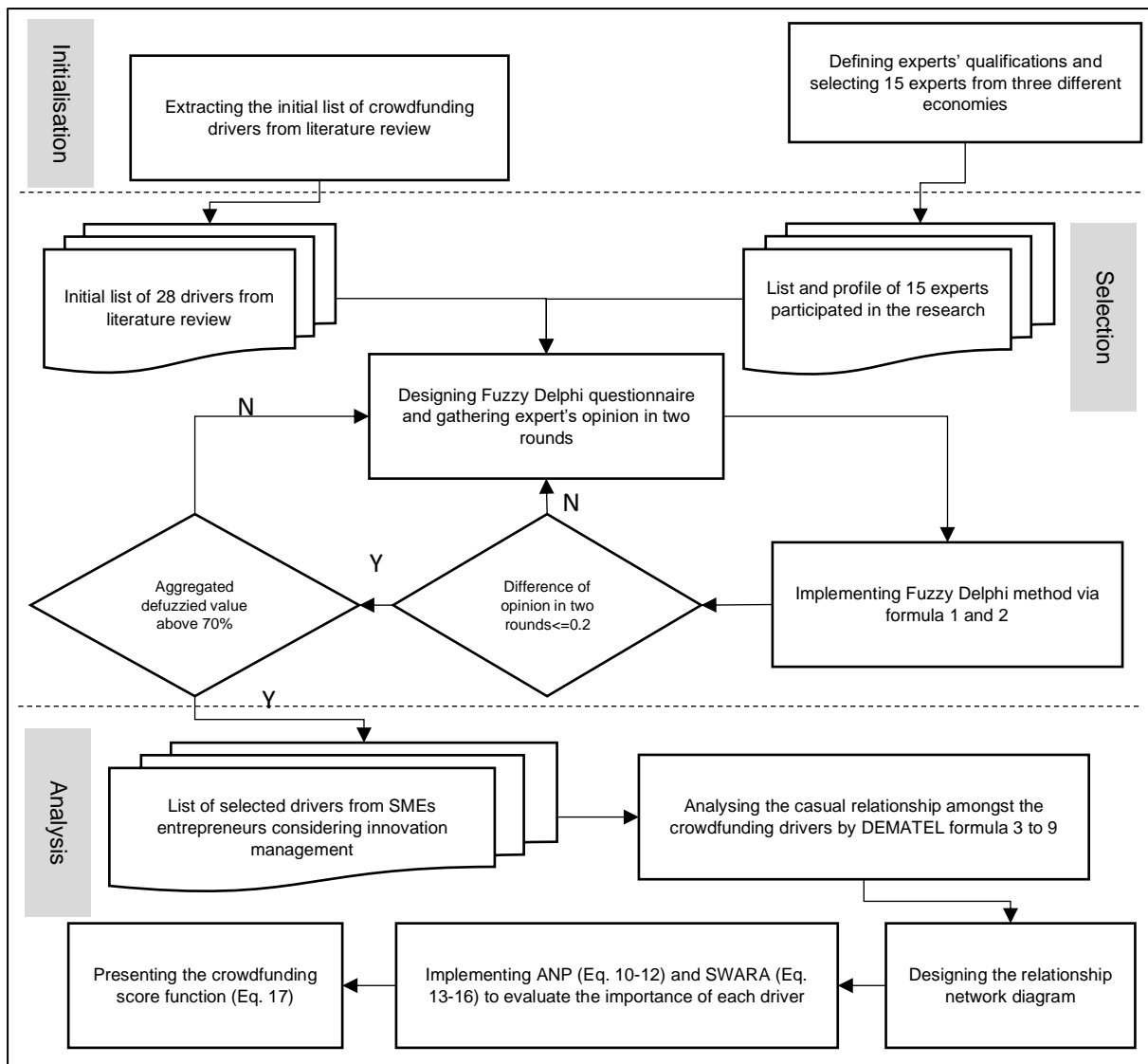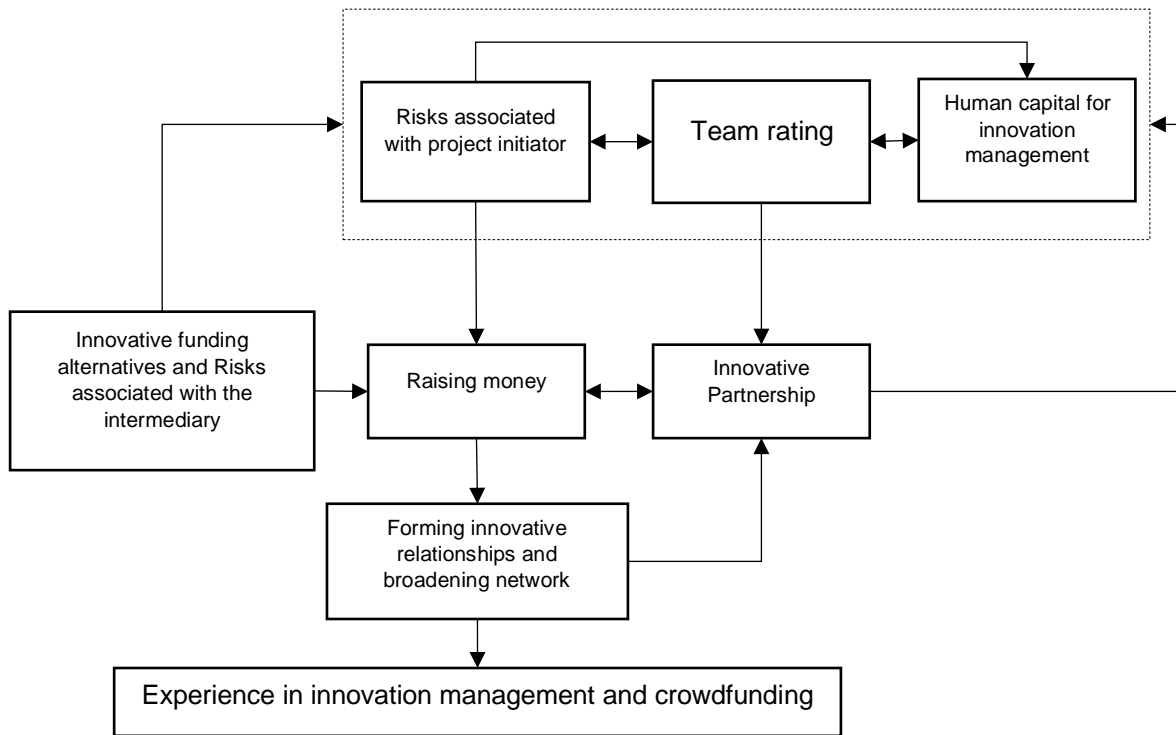**Figure 1.** Research framework/steps

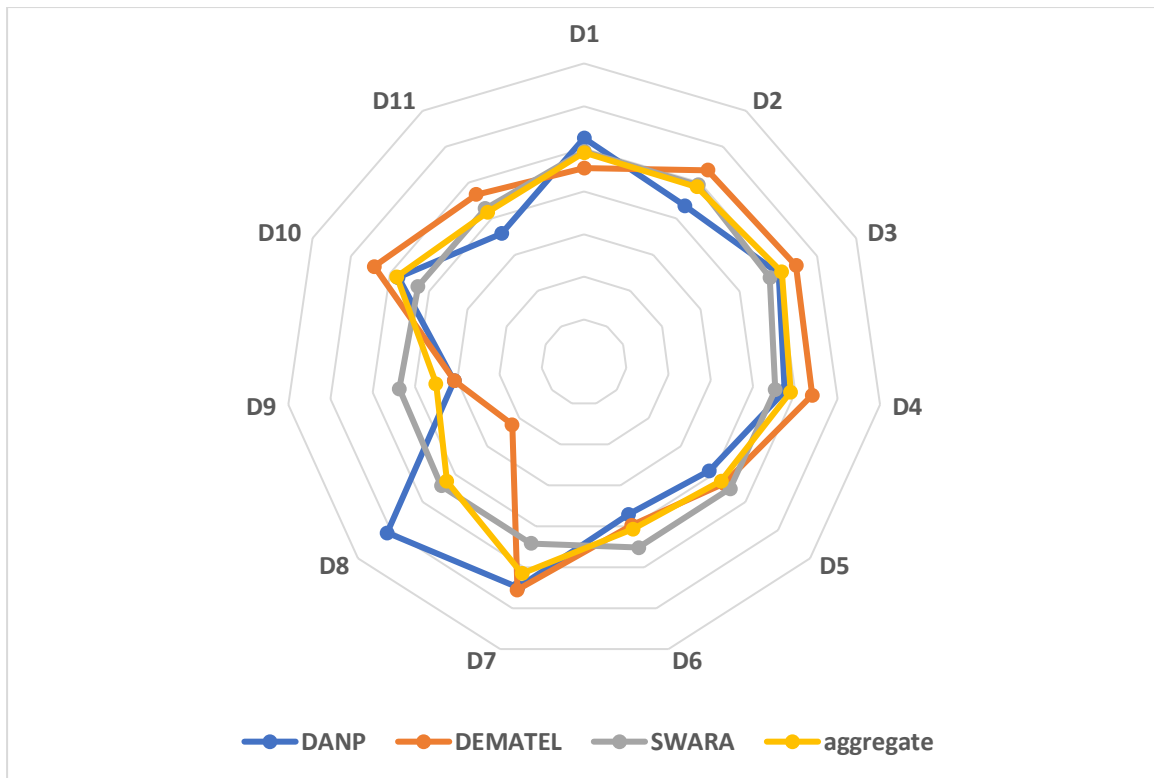**Figure 2.** The conceptual model resulted from a network relationship diagram

**Figure 3.** Weights of Crowdfunding Drivers/ comparison of methods

**Table 1.** the summary of studies and their drivers in the literature review

| Author(s) | research Purpose(s) | Method/Approach | Successful drivers of crowdfunding |
|---|---|---|---|
| Martínez-Cháfer, et al., 2021 | Identify critical determinants in the various stages of crowdfunding projects | determinants of successful crowdfunding initiatives using a sample of 5,251 projects | • Innovative Partnership<br>• having previous experience in innovation management<br>• Creative interaction with backers |
| van Straaten and den Bieman, 2021 | Identify the stimuli that influence the previous experiences of entrepreneurs in crowdfunding projects. | abductive reasoning; reasoning logic combining deductive and inductive elements<br><br>(mixture of theory derived from the literature and theory that emerged from the process of data collection, analysis, and interpretation) | • Raising money<br>• Obtaining feedback<br>• Publicity<br>• Forming innovative relationships/broadening network<br>• Funding speed<br>• funding innovative alternatives<br>• The maximum level of autonomy toward innovation |
| Dushnitsky and Fitza, 2018 | Achieve what drivers can be generalised across multiple operating systems in crowdfunding. | Variance decomposition | • Donation<br>• Rewarding innovation<br>• Lending |
| Lukkarinen, et al., 2016 | Achieving success factors in raising equity crowdfunding increases the number of investors. | Multiple linear regression | • Early funding collected from private networks<br>• Social media networks<br>• Size of the minimum allowed investment in innovation management<br>• Funding target<br>• Campaign duration<br>• The provision of financial information in the pitch<br>• B2C orientation of the company's offering |
| de Larrea et al., 2019 | Achieving the success factors of crowdfunding in a campaign with a specific theme | Use a web crawler to analyse and retrieve Kickstarter projects | • Innovative reward-based crowdfunding |
| Kukk and Laidroo, 2021 | Determining the institutional drivers that affect the volume of crowdfunding | analysis of crowdfunding data for 160 countries across the world during 2015–2016- | • Innovative crowdfunding-specific regulations |
| Venslaviene *et al.*, 2021 | Determine which criteria are essential for investors when choosing different crowdfunding projects for financing. | Use of Visual Analogue Scale Matrix for Criteria Weighting Method | • Risks associated with a project<br>• Risks associated with project initiator<br>• Risks associated with intermediary<br>• Market rating<br>• Innovation Concept rating<br>• Team rating<br>• Funding target<br>• Grammar mistakes<br>• Innovation Updates<br>• Campaign duration<br>• Minimum investment<br>• Campaign video<br>• Social media and private networks<br>• Environment commitments toward innovation |
| Correia *et al.*, 2019 | Achieving the drivers of fundraising success in equity crowdfunding | use Funded as a measure of success- use a logistic regression To analyse the static drivers of fundraising success | • The quality of the project, signalled by equity retention and the presence of a prominent investor<br>• The innovation and information disclosure |

| Author(s) | research Purpose(s) | Method/Approach | Successful drivers of crowdfunding |
|---|---|---|---|
| | | | • Early investments in innovation management |
| Borrero-Domínguez, et al., 2020 | Investigating the factors affecting the success of crowdfunding | using the ordinary least squares regression, the negative binomial, the logit, and the Cox proportional hazard models | • Experience of the project members<br>• Geographic location<br>• Human capital for innovation management<br>• Gender |
| Xu et al., 2021 | Achieving success factors in a crowdfunding campaign according to the relationship between indicators | Using the methods of Structural Equation Modelling and fuzzy set Qualitative Comparative Analysis | • Ability to signal credibility towards the potential workers innovation (gamification-based, transparency, and experience) |

**Table 2.** Experts profile participated in this research

| Expert code | Country | Experience | Age | Gender | Education | Area[*] |
|:-----------:|:-------:|:----------:|:---:|:------:|:---------:|:-------:|
| E01 |  | 29 | 55 | M | BSc | I |
| E02 |  | 5 | 34 | M | MBA | I |
| E03 | Iran | 3 | 25 | M | BSc | I |
| E04 |  | 15 | 39 | F | BSc | I |
| E05 |  | 15 | 41 | M | PhD | A |
| E06 |  | 10 | 44 | F | PhD | A |
| E07 |  | 25 | 54 | M | BSc | I |
| E08 | Italy | 12 | 36 | F | MBA | I |
| E09 |  | 23 | 55 | F | MBA | I |
| E10 |  | 19 | 48 | M | BSc | I |
| E11 |  | 13 | 34 | M | PhD | A |
| E12 |  | 5 | 33 | F | MBA | I |
| E13 | UK | 4 | 32 | M | BSc | I |
| E14 |  | 3 | 28 | M | BSc | I |
| E15 |  | 11 | 36 | F | MBA | I |

I (Industry); A (Academia)

**Table 3.** The final 28 extracted factors and related studies

| Successful drivers of crowdfunding | Description | References (sample) |
|---|---|---|
| Innovative Partnership | Get support from potential investors such as supporting organisations | Martínez-Cháfer, *et al.,* 2021; Courtney *et al.,* 2017 |
| Experience in innovation management and crowdfunding | Existence of other projects on the platform and their analysis | Martínez-Cháfer, et al., 2021; Borrero-Domínguez, *et al.,* 2020; Dwarakanath *et al.,* 2016; Thuan *et al.,* 2016; Wolf *et al.,* 2020<br>Arora *et al.,* 2016; Laursen and Salter, 2014; Petruzzelli *et al.,* 2019; Shane, 2003 |
| Innovative Interaction with partners and stakeholders | Interact with the audience, actively communicate with potential supporters | Martínez-Cháfer, et al., 2021; Löher, 2016; Vismara, 2016; Wang *et al.,* 2018; Plummer *et al.,* 2016 |
| Raising money | It acts as a driver for entrepreneurs to leverage crowdfunding | van Straaten and den Bieman, 2021; Belleflamme *et al.,* 2013; Gerber *et al.,* 2012 |
| Obtaining feedback | Framework for choosing the right crowdfunding type for each stage in start-up life cycle + benefits of crowdfunding related to the crowdfunding type by questionnaire and discussion | van Straaten and den Bieman, 2021; Belleflamme *et al.,* 2013, 2014; Brown *et al.,* 2015; Di Pietro *et al.,* 2018; Gerber *et al.,* 2012; Lambert and Schweinbacher, 2010; Liu *et al.,* 2016; Macht and Weatherston, 2014; Martin, 2012; Schwienbacher, 2018; Schwienbacher and Larralde, 2010; Surowiecki, 2005; Wald *et al.,* 2019 |
| Publicity | Advertising for the general public | van Straaten and den Bieman, 2021; Venslaviene *et al.,* 2021<br>Lukkarinen, et al. 2016; Belleflamme *et al.,* 2013, 2014; Brown *et al.,* 2015; Burtch *et al.,* 2013; Di Pietro *et al.,* 2018; Gerber *et al.,* 2012; Lambert and Schweinbacher, 2010; Macht and Weatherston, 2014; Martin, 2012 Miglo, 2016; Mollick and Kuppuswamy, 2014; Wald *et al.,* 2019 |
| Forming innovative relationships/broadening network | The direct connection to the funders through an innovative and long-term interaction that extends | van Straaten and den Bieman , 2021; Gerber *et al.,* 2012; Lukkarinen, *et al.,* 2016 |
| Funding speed | The response time and agility in the funding process | van Straaten and den Bieman 2021; Brown *et al.,* 2015; Moritz and Block, 2016; Schwienbacher and Larralde, 2010 |
| Innovative funding alternatives | Other possible and innovative opportunities for funding | van Straaten and den Bieman 2021; Brown *et al.,* 2015; Hemer *et al.,* 2011; Pierrakis and Collins, 2012 |
| The maximum level of autonomy toward innovation | The highest level of independent decision-making power in crowdfunding | van Straaten and den Bieman, 2021; Ahlers *et al.,* 2015; Belleflamme *et al.,* 2014; Brown *et al.,* 2015; Macht and Weatherston, 2014; Vismara, 2018 |
| Donation | Duration of the project campaign | Dushnitsky and Fitza, 2018; Belleflamme *et al.,* 2014; Lukkarinen *et al.,* 2016; Mollick, 2014; Parhankangas *et al.,* 2019; Kallio *et al.,* 2014; Kuppuswamy *et al.,* 2015; Agrawal *et al.,* 2013; Belleflmme *et al.,* 2014; Cholakova and clarysse, 2015; Molik, 2014; Puro and Techy,2011; Rossi, 2014; Freedman and Nutting, 2015; Kshetri,2015; Dushnitsky *et al.,* 2016; Meer, 2014 |
| Rewarding innovation | The rewarding policies and guidelines to engage in crowdfunding by innovation management | Mollick, 2014; Dushnitsky and Fitza, 2018; de Larrea *et al.,* 2019; Belleflamme *et al.,* 2014; Lukkarinen *et al.,* 2016; Parhankangas *et al.,* 2019; Guo *et al.,* 2017; Cholakova and Clarysse, 2015; Vismara, 2016; Kuppuswamy and Bayus, 2014; Colombo *et al.,* 2015; Gierczak *et al.,* 2014; Bento *et al.,* 2019; Ferreira and Pereira, 2018; Frydrych *et al.,* 2014; Cumming *et al.,* |

| Successful drivers of crowdfunding | Description | References (sample) |
|---|---|---|
| | | 2017; Kshetri, 2015, 2018; Freedman and Nutting, 2015; Gamble *et al.,* 2017; Simons *et al.,* 2017; Kunz *et al.,* 2016 |
| Lending | alternative funding channels to that represented by credit intermediaries | Moss *et al.,* 2015; Allison *et al.,* 2015; onnelly *et al.,* 2010; Gafni *et al.,* 2019; Dushnitsky and Fitza, 2018; Belleflamme *et al.,* 2014; Lukkarinen *et al.,* 2016; Mollick, 2014; Parhankangas *et al.,* 2019; Zhang and Liu, 2012; Rau,2018; Belleflamme *et al.,* 2014; Lukkarinen *et al.,* 2016; Mollick, 2014 |
| Early and innovative funding opportunities | Minimum amount to invest in participating in project campaign via innovative approaches | van Straaten and den Bieman, 2021; Venslaviene*et al.,* 2021; Lukkarinen, et al., 2016; Colombo *et al.,* 2015; Correia *et al.,* 2019 |
| Funding target | The minimum sum needed to launch the pro | Venslaviene *et al.,* 2021; Belleflamme *et al.,* 2014 Richardson, 2014; Lukkarinen, et al., 2016; Cumming *et al.,* 2015 |
| Crowdfunding-specific regulations toward innovation | The regulations and restrictions relevant to crowdfunding toward innovation management | Venslaviene *et al.,* 2021 |
| Risks associated with a project | Product risk/funding object risk, Social risk, Psychological risk, Post-funding risk/repayment risk | Venslaviene *et al.,* 2021; Gierczak *et al.,* 2014; Cunningham *et al.,* 2005; Zhang *et al.,* 2018 |
| Risks associated with project initiator | Project initiator risk/owner risk/seller risk, Time risk/convenience risk, Delivery risk | Venslaviene *et al.,* 2021; Gierczak *et al.,* 2014; Bente *et al.,* 2012; Verhagen *et al.,* 2006 |
| Risks associated with the intermediary | Intermediary risk/privacy risk, Financial risk, Performance risk/operating risk | Venslaviene *et al.,* 2021; Gierczak *et al.,* 2014; Wati *et al.,* 2018; Verhagen *et al.,* 2006; Oxera, 2015 |
| Market rating | Attainable market that determines the company's growth potential | Venslaviene *et al.,* 2021; Correia *et al.,* 2019; Burtch *et al.,* 2013; Drabløs *et al.,* 2015; Frydrych *et al.,* 2014; Streletzki and Schulte., 2013 |
| Concept rating | How well the product fits the target market, the relevance of the end customer's problem, how well the company addresses the problem compared to other alternatives, and the value of the solution to the customer | Venslaviene *et al.,* 2021; Lukkarinen *et al.,* 2016; Block *et al.,* 2018; Streletzki *et al.,* 2013; Lukkarinen *et al.,* 2016 |
| Team rating | Industry expertise, Educational background, Experience, Balance between team members' skill sets, Perceived motivation, drive, passion, commitment, and honesty | Venslaviene *et al.,* 2021; Lukkarinen *et al.,* 2016 |
| Innovation management and updates | How often updates regarding innovation are sent to stakeholders | Venslaviene *et al.,* 2021 |
| Campaign duration | Duration of the project campaign | Venslaviene *et al.,* 2021; Cumming *et al.,* 2015; Molik, 2014; Harkonen, 2014; Zheng *et al.,* 2014; Butticè *et al.,* 2017; Calic and Mosakowski, 2016; Colombo *et al.,* 2015; Mitra and Gilbert, 2014; Lukkarinen *et al.,* 2016; Kuppuswamy *et al.,* 2013; Burtch *et al.,* 2013; Frydrych *et al.,* 2014; Correia *et al.,* 2019; Signori and Vismara, 2018 |

| Successful drivers of crowdfunding | Description | References (sample) |
|---|---|---|
| Environment commitments via innovation management | Whether the crowdfunding campaign is committed to the environment by implementing innovation management | Venslaviene *et al.,* 2021 |
| geographic location | The location of the SME | Borrero-Domínguez, et al., 2020; Agrawal *et al.,* 2015 Stroube, 2017; Lin and Viswanathan, 2015; Mollick, 2014; Guenther *et al.,* 2017 |
| human capital for innovation management | the economic value of a worker's experience and skills in the SME | Josefy *et al.,* 2017; Borrero-Domínguez, *et al.,* 2020; Ahlers *et al.,* 2015; Barbi and Mattioli, 2019; Courtney *et al.,* 2017; Yao and Zhang, 2014; Beckman *et al.,* 2007; Burton *et al.,* 2002; Gompers *et al.,* 2008; Hsu, 2007; Kaplan and Strömberg, 2004; Piva and Rossi-Lamastra ,2018; Gompers *et al.,* 2008; Ahlers *et al.,* 2015 |
| Ability to signal credibility towards the potential workers innovation | The power to send signals to credit intermediaries for funding opportunities from potential workers | Xu et al., 2021 |

**Table 4.** Linguistic terms and TFNs for Fuzzy Delphi (Amoozad Mahdiraji *et al.,* 2020)

| Linguistic Term | Triangular Fuzzy Numbers (a,m,b) | | |
|---|---|---|---|
| | a | M | B |
| very important | 0.9 | 1 | 1 |
| Important | 0.7 | 0.9 | 0.9 |
| nearly important | 0.5 | 0.7 | 0.7 |
| Moderate | 0.3 | 0.5 | 0.5 |
| nearly unimportant | 0.1 | 0.3 | 0.3 |
| Unimportant | 0 | 0.1 | 0.1 |
| extremely unimportant | 0 | 0 | 0 |

**Table 5.** Results of Fuzzy Delphi

| Row | Success drivers of crowdfunding | $AFV_j$ | | | $DF_j$ |
|---|---|---|---|---|---|
| 1 | Innovative Partnership | 0.5 | 0.828 | 1 | **0.7759** |
| 2 | Experience in innovation management and crowdfunding | 0.7 | 0.900 | 1 | **0.8667** |
| 3 | Innovative Interaction with partners and stakeholders | 0 | 0.356 | 1 | 0.4519 |
| 4 | Raising money | 0.7 | 0.900 | 1 | **0.8667** |
| 5 | Obtaining feedback | 0 | 0.247 | 0.5 | 0.2489 |
| 6 | Publicity | 0.1 | 0.472 | 0.7 | 0.4239 |
| 7 | Forming innovative relationships/broadening network | 0.7 | 0.900 | 0.9 | **0.8333** |
| 8 | Funding speed | 0.1 | 0.513 | 1 | 0.5377 |
| 9 | Innovative funding alternatives | 0.5 | 0.828 | 0.9 | **0.7426** |
| 10 | The maximum level of autonomy toward innovation | 0 | 0.000 | 0.9 | 0.3000 |
| 11 | Donation | 0 | 0.276 | 0.7 | 0.3253 |
| 12 | Rewarding innovation | 0 | 0.276 | 0.7 | 0.3253 |
| 13 | Lending | 0.1 | 0.513 | 0.9 | 0.5043 |
| 14 | Early and innovative funding opportunities | 0.1 | 0.574 | 1 | 0.5580 |
| 15 | Funding target | 0.3 | 0.626 | 0.7 | 0.5419 |
| 16 | Crowdfunding-specific regulations toward innovation | 0.3 | 0.680 | 0.9 | 0.6268 |
| 17 | Risks associated with a project | 0.5 | 0.828 | 1 | **0.7759** |
| 18 | Risks associated with project initiator | 0.5 | 0.761 | 0.9 | **0.7204** |
| 19 | Risks associated with the intermediary | 0.5 | 0.761 | 0.9 | **0.7204** |
| 20 | Market rating | 0 | 0.433 | 1 | 0.4776 |
| 21 | Concept rating | 0 | 0.208 | 0.9 | 0.3693 |
| 22 | Team rating | 0.5 | 0.761 | 1 | **0.7537** |
| 23 | Innovation management and updates | 0.1 | 0.528 | 0.7 | 0.4426 |
| 24 | Campaign duration | 0.1 | 0.574 | 0.9 | 0.5246 |
| 25 | Environment commitments via innovation management | 0.5 | 0.828 | 1 | **0.7759** |
| 26 | Geographic location | 0 | 0.000 | 0.9 | 0.3000 |
| 27 | Human capital for innovation management | 0.5 | 0.761 | 1 | **0.7537** |
| 28 | Ability to signal credibility towards the potential workers innovation | 0.3 | 0.626 | 0.7 | 0.5419 |

**Table 6.** Comparison of crowdfunding drivers in different circumstances

| Success drivers of crowdfunding | Iran | Italy | UK | Aggregated |
|---|:---:|:---:|:---:|:---:|
| Innovative Partnership | * | * | * | * |
| Experience in innovation management and crowdfunding | * | * | * | * |
| Innovative Interaction with partners and stakeholders | | * | | |
| Raising money | * | * | * | * |
| Obtaining feedback | | | | |
| Publicity | | | | |
| Forming innovative relationships/broadening network | * | * | * | * |
| Funding speed | * | | | |
| Innovative funding alternatives | * | | * | * |
| The maximum level of autonomy toward innovation | * | | | |
| Donation | | | | |
| Rewarding innovation | | | | |
| Lending | | * | | |
| Early and innovative funding opportunities | * | | | |
| Funding target | * | | | |
| Crowdfunding-specific regulations toward innovation | * | | | |
| Risks associated with a project | * | * | | * |
| Risks associated with project initiator | * | | | * |
| Risks associated with the intermediary | * | | | * |
| Market rating | * | | * | |
| Concept rating | * | | | |
| Team rating | * | | | * |
| Innovation management and updates | * | | | |
| Campaign duration | | * | * | |
| Environment commitments via innovation management | * | * | * | * |
| Geographic location | | | * | |
| Human capital for innovation management | * | * | * | * |
| Ability to signal credibility towards the potential workers innovation | * | | | |

**Table 7.** DEMATEL initial average matrix

| Z | $D_1$ | $D_2$ | $D_3$ | $D_4$ | $D_5$ | $D_6$ | $D_7$ | $D_8$ | $D_9$ | $D_{10}$ | $D_{11}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ | 0 | 3 | 2 | 2 | 5 | 1 | 7 | 7 | 1 | 3 | 3 |
| $D_2$ | 7 | 0 | 8 | 8 | 2 | 7 | 8 | 9 | 5 | 7 | 2 |
| $D_3$ | 8 | 7 | 0 | 9 | 3 | 2 | 9 | 9 | 2 | 7 | 1 |
| $D_4$ | 8 | 8 | 9 | 0 | 8 | 3 | 7 | 9 | 1 | 5 | 3 |
| $D_5$ | 3 | 1 | 7 | 5 | 0 | 8 | 3 | 7 | 7 | 3 | 3 |
| $D_6$ | 7 | 3 | 3 | 3 | 3 | 0 | 1 | 7 | 1 | 5 | 7 |
| $D_7$ | 8 | 2 | 3 | 8 | 7 | 3 | 0 | 8 | 3 | 8 | 5 |
| $D_8$ | 5 | 5 | 8 | 8 | 3 | 1 | 9 | 0 | 1 | 3 | 3 |
| $D_9$ | 8 | 7 | 9 | 3 | 7 | 7 | 8 | 5 | 0 | 7 | 5 |
| $D_{10}$ | 3 | 7 | 7 | 3 | 3 | 7 | 5 | 5 | 8 | 0 | 9 |
| $D_{11}$ | 5 | 8 | 3 | 3 | 3 | 8 | 5 | 5 | 8 | 9 | 0 |

**Table 8.** DEMATEL Total Relationship Matrix

| T | D$_1$ | D$_2$ | D$_3$ | D$_4$ | D$_5$ | D$_6$ | D$_7$ | D$_8$ | D$_9$ | D$_{10}$ | D$_{11}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D$_1$ | 0.147 | 0.159 | 0.169 | 0.164 | 0.175 | 0.120 | 0.245 | 0.261 | 0.103 | 0.175 | 0.139 |
| D$_2$ | **0.362** | 0.222 | **0.358** | **0.344** | 0.225 | 0.275 | **0.383** | **0.425** | 0.215 | **0.333** | 0.208 |
| D$_3$ | **0.349** | 0.292 | 0.236 | **0.338** | 0.222 | 0.196 | **0.373** | **0.400** | 0.166 | **0.310** | 0.178 |
| D$_4$ | **0.360** | **0.312** | **0.361** | 0.236 | 0.288 | 0.221 | **0.360** | **0.415** | 0.164 | 0.297 | 0.207 |
| D$_5$ | 0.247 | 0.185 | 0.285 | 0.245 | 0.148 | 0.247 | 0.250 | **0.323** | 0.205 | 0.224 | 0.177 |
| D$_6$ | 0.258 | 0.183 | 0.200 | 0.188 | 0.161 | 0.122 | 0.192 | 0.284 | 0.116 | 0.219 | 0.206 |
| D$_7$ | **0.332** | 0.221 | 0.264 | **0.307** | 0.262 | 0.207 | 0.240 | **0.369** | 0.179 | **0.310** | 0.223 |
| D$_8$ | 0.274 | 0.234 | 0.296 | 0.291 | 0.192 | 0.155 | **0.330** | 0.240 | 0.130 | 0.228 | 0.172 |
| D$_9$ | **0.382** | **0.318** | **0.377** | 0.289 | 0.291 | 0.292 | **0.389** | **0.388** | 0.165 | **0.345** | 0.253 |
| D$_{10}$ | 0.295 | **0.302** | **0.329** | 0.262 | 0.221 | 0.277 | **0.324** | **0.353** | 0.254 | 0.235 | 0.285 |
| D$_{11}$ | **0.314** | **0.309** | 0.278 | 0.256 | 0.219 | 0.287 | **0.319** | **0.348** | 0.252 | **0.343** | 0.173 |

**Table 9.** Results of DEMATEL over crowdfunding drivers considering innovation management

| Crowdfunding drivers | $E_j$ | $P_j$ | $W_D(j)$ |
|---|---|---|---|
| $D_1$ | -1.464 | 5.178 | 0.0910 |
| $D_2$ | **0.614** | 6.091 | 0.1070 |
| $D_3$ | -0.092 | 6.214 | 0.1092 |
| $D_4$ | **0.299** | 6.142 | 0.1079 |
| $D_5$ | **0.133** | 4.942 | 0.0868 |
| $D_6$ | -0.271 | 4.527 | 0.0795 |
| $D_7$ | -0.488 | 6.320 | 0.1110 |
| $D_8$ | **2.542** | 2.542 | 0.0447 |
| $D_9$ | **3.488** | 3.488 | 0.0613 |
| $D_{10}$ | **0.118** | 6.155 | 0.1081 |
| $D_{11}$ | **0.877** | 5.320 | 0.0935 |

**Table 10.** Importance of Crowdfunding Drivers via different methods

| Drivers | DANP | DEMATEL | SWARA | Aggregate |
|---|---|---|---|---|
| $D_1$ | 0.105 | 0.091 | 0.099 | 0.098 |
| $D_2$ | 0.087 | 0.107 | 0.099 | 0.098 |
| $D_3$ | 0.100 | 0.109 | 0.096 | 0.102 |
| $D_4$ | 0.095 | 0.108 | 0.090 | 0.098 |
| $D_5$ | 0.078 | 0.087 | 0.090 | 0.085 |
| $D_6$ | 0.074 | 0.080 | 0.090 | 0.081 |
| $D_7$ | 0.110 | 0.111 | 0.088 | 0.103 |
| $D_8$ | 0.122 | 0.045 | 0.088 | 0.085 |
| $D_9$ | 0.061 | 0.061 | 0.087 | 0.070 |
| $D_{10}$ | 0.096 | 0.108 | 0.086 | 0.096 |
| $D_{11}$ | 0.072 | 0.093 | 0.086 | 0.084 |