# Contacts on LinkedIn: equity crowdfunding platforms' networks and creators' innovation performance

Received 14 March 2022
Revised 17 June 2022
7 October 2022
Accepted 29 November 2022

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## Abstract

**Purpose** – The purpose of this paper is to explore whether and how the innovation performance of start-ups and small and medium-sized enterprises (SMEs) that collect funds using equity crowdfunding (EC), i.e. creators (or proponents), and the EC performance are influenced by the social media networks (SMNs) in which EC platforms' managers and firms exchange their ideas with investors and customers.

**Design/methodology/approach** – The empirical analysis is conducted on a sample composed by all the creators that collected funds in EC platforms over the three-year period 2018–2020. For each creator, the innovation performance is computed as the percentage of sales from new or significantly improved product and services compared to total sales of firm. For each campaign, the EC performance is considered as the ratio between the total amount of funding raised at the end of the campaign and the target capital for the campaign. To investigate EC platform social media activity, LinkedIn profiles of EC platforms managers are analyzed using the social network analysis (SNA) methodology, which permits to observe the quantity and the quality of managers' interactions with other users. A regression analysis is thus performed to observe the relationship between managers' LinkedIn activities, EC performance and creators' innovation performance.

**Findings** – Data reveal that EC platforms managers display different activities in networking, with some individuals more active than others and more oriented to interact with business profiles rather than personal ones. The variables related to managers' LinkedIn activities are shown to impact both on the EC performance and on the ability of creators to innovate, suggesting the existence of a link between creators, EC platforms and the activity of the subject who manages it.

**Originality/value** – The present study is the first to examine the link between the ability of creators to innovate and SMNs, focusing on the social links of platforms managers and considering the LinkedIn social media; moreover, the analysis is conducted analyzing the quality of the interactions in addition to their number. The study is original also in that rather than focusing on specific EC platforms it considers all those purposefully authorized by the Italian financial market supervisory authority over a three-year time span. From a managerial point of view, the observation of the relevance of social networks by personnel with specific professional skills reveals it can be a successful driver for operators in the sector, not only to safeguard their reputation, but to stimulate the processes of co-creation of value that is essential in the crowdfunding market.

**Keywords** Equity crowdfunding, Innovation performance, Social media networks, Innovation management, Knowledge sharing

**Paper type** Research paper

The authors would like to thank Dario Sgrulletti for his precious support in collecting social network data.

European Journal of Innovation Management
Vol. 27 No. 7, 2024
pp. 2351-2372

1460-1060
DOI 10.1108/EJIM-03-2022-0125

## 1. Introduction

Albert Einstein's quote "the one who follows the crowd will usually get no further than the crowd" is one of the numerous aphorisms about the importance of not following other people. Relying on the opposite view, crowdfunding has developed as a new mean of funding, where success depends on the crowd behavior, that is, a large group of individuals use small amounts of money to finance entrepreneurial ventures, through online platforms that act as intermediaries (Mollick, 2014; Ahlers *et al.*, 2015; Bruton *et al.*, 2015; Cholakova and Clarysse, 2015).

The vast majority of the studies in the crowdfunding literature focus on the determinants of the campaigns' success. A first group of studies focuses on founders' characteristics, such as social capital, intellectual background, profile and gender (Duan *et al.*, 2020; Piva and Rossi-Lamastra, 2018; Skirnevskiy *et al.*, 2017). In this stream of research, creators' network becomes crucial (Vrontis *et al.*, 2021; Troise *et al.*, 2020b; Belleflamme *et al.*, 2018; Mollick, 2014) since previous studies revealed that the network size and strength – as proxied, for instance, by the number of retweets on Twitter (Battisti *et al.*, 2022), or the number of friends on Facebook (Mollick, 2014) - positively affect the campaign success. Other researchers investigated the influence played by campaign-specific characteristics (Wald *et al.*, 2019; Lukkarinen *et al.*, 2016; Vulkan *et al.*, 2016), and/or company-related features (Di Pietro *et al.*, 2018; Angerer *et al.*, 2017; Hornuf *et al.*, 2018). Only recently, another actor has been shown to be essential for the crowdfunding process and the campaign success, that is, the crowdfunding platform. The role of the crowdfunding platform tends to be generally overshadowed (Cosma *et al.*, 2022) and studies focused on a restricted number of variables as the due diligence process (Cumming and Zhang, 2017), the platform's number of social links (Vrontis *et al.*, 2021), the number and type of post-campaign services (Rossi and Vismara, 2018) and the adoption of different campaign mechanisms (Hornuf and Schwienbacher, 2018).

The popularity of crowdfunding as a new method to finance projects has increased to the point that in 2020, 4.41 billion US dollars was generated only through the market segment of equity crowdfunding (EC) globally (Cambridge Judge Business School, 2021). Crowdfunding seems to have enormous potential, and this is also attributable to the stimulus it produces in innovation and open innovation processes that allow small and medium-sized enterprises (SMEs) and start-ups to reduce information asymmetries and exploit the market of potential funders (Giudici and Rossi-Lamastra, 2018). The purpose of this study is to gain a better understanding of the influence of LinkedIn networks of EC platforms' managers on EC and innovation performance. In fact, while the creators' network has been explored in the crowdfunding literature, as well as, to a lower extent, the role played by the crowdfunding platform, surprisingly, to the best of the authors' knowledge, the social connections of the EC platform manager have never been investigated, neither with respect to the influence on the EC performance nor the companies' innovation performance. This study intends to fill this gap focusing on the usage of the professional social network LinkedIn by EC platforms managers. Combining hand-collected data about EC platforms managers processed through social network analysis (SNA), with companies' metrics, we observe that EC platform managers' higher number of connections and a stronger intensity are positively related to the collected funding and to the innovation process of innovation creation by start-ups and SMEs. The results of this research provide supporting evidence of the existence of a link between the activity on LinkedIn of EC platforms managers and the EC and innovation performance of start-ups and SMEs.

These findings are relevant for the literature for multiple reasons. Firstly, we contribute to literature on crowdfunding, that is in its infancy and still fragmented (Drover *et al.*, 2017; Short *et al.*, 2017; Wald *et al.*, 2019; Mochkabadi and Volkmann, 2020; Troise *et al.*, 2020a), focusing not only on the campaign success but also on the innovation process. Secondly, we advance the knowledge on the influence of social connections in reducing information

asymmetries in alternative financing systems. Finally, we focus on a unique database that merges multi-platforms data about EC campaigns to relational data about EC platform managers, leveraging for the first time in the EC research the professional social network LinkedIn.

The remainder of the paper is as follows. The section "Theoretical Background and Hypotheses" provides the review of the literature in order to synthetize knowledge about the relationships among EC, social networks, success and innovation, and identify gaps to derive two coherent hypotheses. In the sections "Data" and "Research Methodologies", we describe the database and elaborate on the social network and regression analyses that we used for the empirical analysis. The sections, "Results" and "Discussion" present the empirical results as well as their discussion, including a summary of the limitations and suggestions for further developments of the research.

## 2. Theoretical background and hypotheses development

### *2.1 Equity crowdfunding and SMN: between news dissemination and social interactions*

Based on four different motivations, as achievement, monetary need, prosociality and relationship building, crowdfunding project creators should be distinguished social entrepreneurs, fund seekers, indie producers and daring dreamers (Ryu and Kim, 2018). When it comes to EC, creators, often start-ups or innovative SMEs, are certainly fund seekers, expressing a monetary need at a stage of their existence in which they would not be financed through traditional channels. EC represents an alternative system in the financing of start-ups and SMEs, as these two types of companies have historically limited funds and limited access to traditional finance (Troise *et al.*, 2020a; Schwienbacher, 2019; Ahlers *et al.*, 2015; Belleflamme *et al.*, 2014; Bradford, 2012).

Several studies focus on the determinants of the success of crowdfunding projects and campaigns (Kim and Viswanathan, 2019; Kuppuswamy and Bayus, 2018; Ciuchta *et al.*, 2016; Agrawal *et al.*, 2014; Mollick, 2014; Burtch *et al.*, 2013), and many are those who take specifically EC into consideration (Battisti *et al.*, 2022; Vrontis *et al.*, 2021; Block *et al.*, 2018a; Angerer *et al.*, 2017; Nitani and Riding, 2017; Giga, 2017; Vismara, 2016; Li *et al.*, 2016; Ahlers *et al.*, 2015; Kshetri, 2015; Belleflamme *et al.*, 2014).

In the EC literature, studies can be organized across different streams of research.

A first stream in the literature observes the role played by the dissemination of information for the success of EC crowdfunding projects and campaigns (Geiger and Moore, 2022; Battisti *et al.*, 2022; Troise *et al.*, 2020b; Belleflamme *et al.*, 2018; Block *et al.*, 2018a; Giga, 2017; Angerer *et al.*, 2017; Nitani and Riding, 2017; Li *et al.*, 2016; Ahlers *et al.*, 2015). Information on project quality and progress in the crowdfunding platform is a determinant of success (Agrawal *et al.*, 2014). Examining different EC campaigns, Ahlers *et al.* (2015) find that providing detailed information about risks strongly impacts project success. In contrast to this finding, Vismara (2016) shows that disclosing information about planned exit strategies has no significant effect. Similarly, Nitani and Riding (2017) underline that risk warnings are not significant for the success of campaigns. Comparing the human capital signals with business information on the campaign performance in the US context, Giga (2017) finds that the human capital signals are more relevant than the business news in driving success. In a Chinese EC context, by analyzing 49 successful EC campaigns, Li *et al.* (2016) empirically observe the importance of project updates and information about lead investors as success drivers of campaigns. Similarly, examining the content of updates posted by 71 German EC ventures, Block *et al.* (2018a) support the positive effect of updates on campaign success. Applying a mixed methods approach based on a qualitative coding system to categorize the content of updates and regression analysis, the authors find that updates containing information about new funding sources, business development processes

and marketing initiatives influence funding success, while those informing investors about the team and product development have no significant effect. By conducting some interviews with German start-ups and platforms, Angerer *et al.* (2017) confirm the relevance of an active communication strategy as drivers for campaign success. In the Italian context, it has been observed that tweets about EC tend to converge on the topics of sustainability, innovation and start-ups, demonstrating a positive impact on the success of the deals (Battisti *et al.*, 2022). Geiger and Moore (2022) test a model that connects campaign characteristics to fundraising outcomes, suggesting that the amount of text, videos and positive tone of campaigns have a positive association with the number of backers that contribute to the campaigns. Number of backers, in turn, showed a positive association with funding amount and funding success.

While these studies observe the role played by information on the EC success, another stream of research investigates the role of networks through which information is disseminated, in determining crowdfunding success. The role played by creators' networks is examined especially by research on lending and reward-based crowdfunding (Agrawal *et al.*, 2014; Lin and Viswanathan, 2016; Colombo *et al.*, 2014; Burtch *et al.*, 2014; Zheng *et al.*, 2014). Differently, the studies that focus on EC take into consideration also the platforms or investors' networks (Battisti *et al.*, 2022; Cosma *et al.*, 2022; Vrontis *et al.*, 2021; Troise *et al.*, 2020b; Chu *et al.*, 2019; Tomboc, 2013). Studies on success of crowdfunding acknowledge the importance of creators' social capital (Adler and Kwon, 2002; Coleman, 1988), namely of the social relations which creators have within (Colombo *et al.*, 2014) and outside the crowdfunding platforms (Mollick, 2014). In recent time, social capital can also refer to the number of social network contacts: specifically, research identifies as a key driver of crowdfunding success the high number of social network relations (Nitani and Riding, 2017; Vismara, 2016). Exploring the rationales for a "lemons problem" in EC, Tomboc (2013) claims that friendship networks act as signal quality to potential investors, effectively reducing information asymmetries. Conducting a cross-platform analysis of four European EC platforms, Nitani and Riding (2017) confirm the relevance of an extensive social network on the campaign success. Cosma *et al.* (2022) analyze a sample of 233 projects, either funded or not funded, launched by 10 Italian EC platforms. The authors find that the variety of partners in a platform's network influence the probability of campaign success and the amount of capital raised. Using a multiple case study approach on a sample of 22 energy co-operatives, Dilger *et al.* (2017) observe that EC campaigns success is related to the strength of network ties that allows to acquire more potential members. In a Finnish-based study of 60 campaigns listed on Invesdor, Lukkarinen *et al.* (2016) observe that crowd-investors seem to base investment decisions on easily observable features like the previous funding amount collected from entrepreneurs' private networks and social media networks (SMNs). Considering 271 UK EC ventures, Vismara (2016) underlines that ventures with a more extensive social network have a higher probability of funding success. Troise *et al.* (2020b) explore how social capital in the multidimensional perspective influences EC performance, considering both the number of investors engaged and the funds collected. Their findings highlight that social network ties have a positive effect on EC performance, while social interactions have a positive impact on funding collected. Battisti *et al.* (2022) examine the role of hubs – intended as central users responsible of the construction of social relation of creators–in the Twitter network. The authors find that in the case of tweets concerning EC, crowdfunding platforms are central to the network, even more than traditional and specialized media. In other terms, the EC platforms are responsible of the social relations construction mechanism of creators in EC campaigns. Vrontis *et al.* (2021) explore the linkages among knowledge sharing, social capital and intellectual capital, and as they impact on the success rate of EC campaigns in the Italian market. They highlight that the success rate of EC campaigns is positively

related to intellectual capital and significantly and positively related to the number of connections the EC platforms have.

Overall, previous studies underline the role of both information and networks in crowdfunding campaigns, relying on data collected from very popular social network sites such as Twitter – which is mainly based on information sharing – or Facebook – that focuses on groups and relationships. Among the different social network sites that represent communication tools, the LinkedIn platform, launched in 2003, is gaining relevance since it represents the leading professional social network sites with over 774 million users from more than 200 countries (LinkedIn, 2021, retrieved from https://about.linkedin.com/it-it?lr=1). This social network allows its users, that are mainly professional, to communicate with other professionals, creating business relationships and thus making it an important tool to seek information and opportunities and to attract investors. In the literature, few studies have questioned whether the LinkedIn network is relevant for business success. While it is intuitive that the social network of a founder's affects fund raising in start-ups and SMEs, the relationship between social connections of the managers of the EC platforms, as can be revealed by LinkedIn, and EC performance has never been studied. Banerji and Reimer (2019) investigated the relationship between the financial success of start-up companies and LinkedIn profiles of the founders revealing that the founders' average number of followers is a predictor of the amount of funds raised by companies. In the last decades, the importance of social network in the entrepreneurial process has been widely demonstrated (e.g. see Cooper and Bruno, 1977), also relying on the theoretical assumption that better connected entrepreneurs have access to more valuable resources that enhance their probability of success (Dubini and Aldrich, 1991).

These arguments lead us to formulate the Hypothesis 1.

*H1*. The higher is the number of ties of EC platforms managers and their social activity, the more positive is the EC performance.

### *2.2 Equity crowdfunding and innovation management*

The creators who use EC not only find an alternative source of financing to traditional channels, but benefit from the knowledge, skills, networks and relations of investors and platforms (Troise and Tani, 2021; Troise *et al.*, 2020b) for the development of their business (Battisti *et al.*, 2022; Miglietta *et al.*, 2019), supporting their innovation process (Le Pendeven, 2016). Campaigns' performance and success are the main variables investigated in the crowdfunding literature; anyway, other nonfinancial motivations besides raising money are crucial. As suggested by Stanko and Henard (2017), successful campaigns struggle with the production advancement and subsequent innovation is critical for the development of crowdfunding campaigns.

Innovation and open innovation are thus essential phenomena in the crowdfunding context that recently attracted researchers' attention (Troise *et al.*, 2020a; Banerji and Reimer, 2019; Giudici and Rossi-Lamastra, 2018). Giudici and Rossi-Lamastra (2018) discuss the linkages among EC, social capital and open innovation. Analyzing three interesting cases of SMEs from the Crowdcube platform, the authors find how these SMEs leveraged their social relations with extant customers and innovative users to raise equity capital. According to Chu *et al.* (2019), social network and knowledge sharing on platform stakeholders or on online forum improve the quality of the projects: networking positively impacts on innovation performance of involved SMEs or start-ups and on open innovation performance. Wu *et al.* (2021) focus on crowdfunding innovation performance investigating technology-oriented projects on three major Chinese crowdfunding platforms. Their findings show that crowdfunding interaction breadth and depth both partially mediate the relationship between technological boundary-spanning search and innovation performance. The authors also

demonstrate that knowledge sharing moderates the path from technological boundary-spanning search to crowdfunding interaction depth and the path from crowdfunding interaction depth to crowdfunding innovation performance.

Relying on previous studies that suggest the importance of networks in EC campaigns and the importance of a nonfinancial variable as innovation performance, our study aims to test whether it exists a link between these two variables. Exploiting relational data from the LinkedIn SMN, we aim to observe if the network of EC platform managers is related to the creators' innovation performance, thus formulating Hypothesis 2 as follows:

*H2.* The SMN of EC platforms managers influences the innovation performance of creators.

## 3. Data

This study focuses on start-ups and SMEs that collect funds using EC, i.e. creators, in the Italian market, during the period 2018–2021. Following previous studies (Cosma *et al.*, 2022; Vrontis *et al.*, 2021; Block *et al.*, 2018b; Hornuf *et al.*, 2018), we hand-collected data on all EC campaigns launched by creators in Italy between January 2018 and December 2021, constantly monitoring information published on all Italian platforms' websites. The choice of this time horizon is due to a regulatory reason: Italy is the first country in Europe to adopt an *ad hoc* regulation about EC through the Italian financial market regulator (Commissione Nazionale per le Società e per la Borsa – Consob – that is the Italian Securities and Exchange Commission) on 17th January 2018 [1].

We find 726 creators that use EC in Italy over the period analyzed. Out of these, 57 are start-ups or SMEs whose campaigns are still ongoing, 130 are start-ups or SMEs whose campaigns were not funded and 539 start-ups or SMEs whose campaigns are successfully closed. Balance sheets' data are downloaded from the AIDA *(Analisi Informatizzata delle Aziende Italiane)* database. Out of the 539 funded campaigns, 144 creators are newly formed start-ups whose balance sheet data are not available, thus our final sample consists of 395 observations. The 395 campaigns are launched from 24 EC platforms.

Figure 1 shows their distribution in the years of analysis.

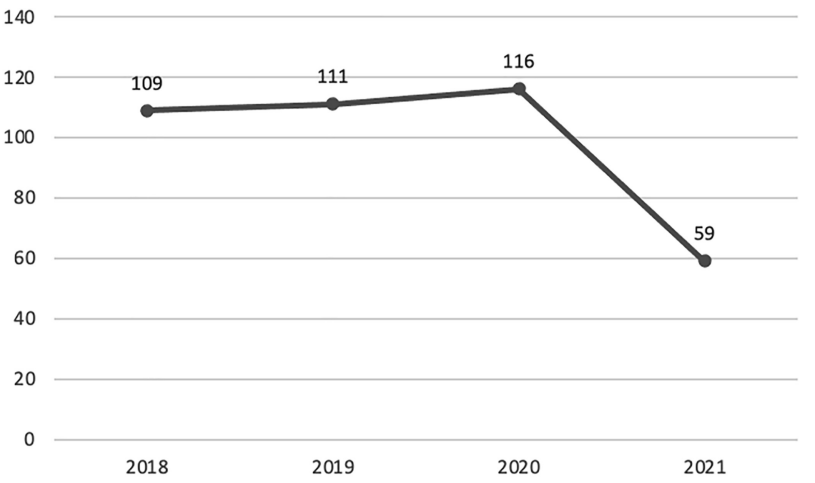



**Figure 1.**
Time distribution of creators over the period 2018–2021

The decreasing number of campaigns for 2021 is explained by the fact that most of them had been recently launched and therefore are still ongoing.

Data reveal that most of the campaigns launched by the creators were overfunded: in fact, in 376 cases, EC funding exceeded the target capital while in the remaining 19 cases the funding in CE equaled the target capital. Collecting data about creators' incentives, we observed that 177 creators offered a gift to encourage investors to subscribe equity capital, while in the remaining cases this does not happen (Figure 2).

The second unit of data is the EC platform managers' LinkedIn profile. LinkedIn profiles are publicly accessible and display information about users' followers and interaction that, in turn, can be used to infer their network size, through more objective data than self-reported network ones (Banerji and Reimer, 2019). We thus detected the name of the 24 CEOs or board members that manage the EC platforms, we systematically recorded their LinkedIn profiles collecting public relational data, and then we analyzed their activity in terms of interactions with other actors in their network.

## 4. Research methodology

### *4.1 Social network analysis (SNA)*

In order to investigate the influence of the LinkedIn SMN on creators' innovation performance we processed relational data through SNA (Mitchell, 1969; Wasserman and Faust, 1994). Our attention focuses on each individual network that originates from any EC platform manager's profile on the LinkedIn platform through his/her social media activities. EC manager's activity is related to other actors through likes, posts to comments, share of post created by other profiles.

Each EC platform manager and the people or the business profiles with which he/she interacts on the LinkedIn platform are treated as the basic unit of the SNA, the nodes (or the vertices). Any activity detected between the EC platform manager and other profiles on LinkedIn represents an edge within the network; overall, 22 centralized graphs have been constructed and analyzed.

Analysing profile information and the linkages between EC platforms managers and other users permits to map their interests and network of contacts; processing relational data among these main actors and the other users permits to obtain information about the number

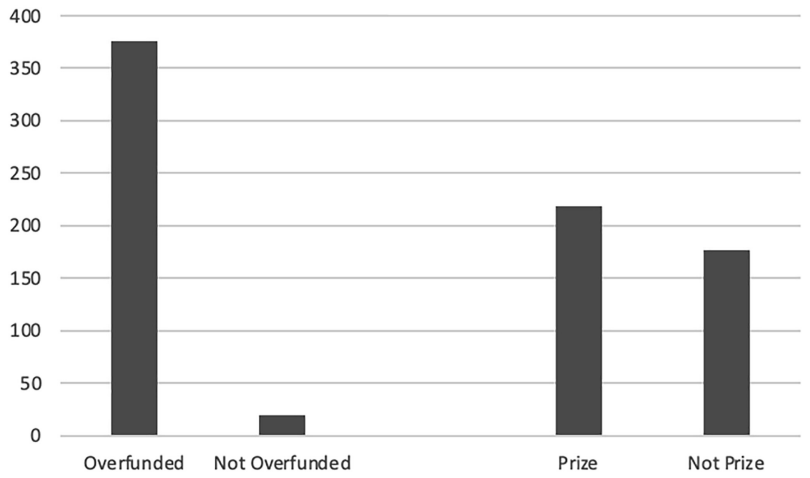



**Figure 2.**
Features of the EC campaigns with respect to creators' ability to collect more resources than target capital and use of incentives

of people or companies with which they interact, but also the intensity of these interactions. In fact, while edges within the network highlight people or businesses that belong to the EC manager platform network, the average weighted degree reveals how many times the interactions occur. This last metric thus provides insights about the type of the relationships of the EC platform manager, clarifying whether they are episodic or recurring within the network. In fact, EC platform manager can be linked to their social community creating a large network with weak connections, or a smaller network with strong interactions. Figure 3 displays graphs related to LinkedIn EC platforms managers' profiles with different features.

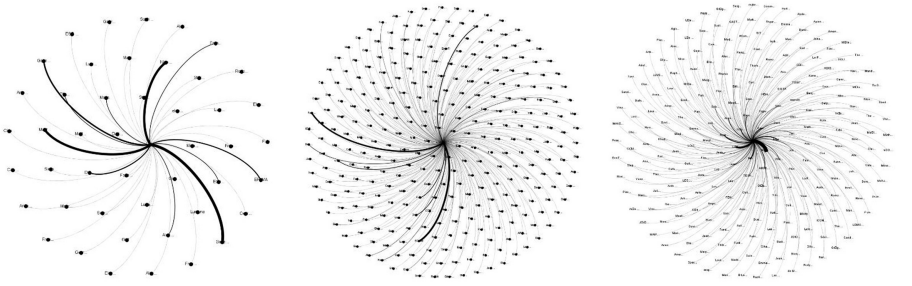
*4.2 Econometric model*

Two different linear regression models are conducted to verify our research hypotheses.

The first linear regression model (Eq. (1)) is developed in order to test the relationship between EC performance, some variables related to social relevance of EC platforms managers (Troise and Tani, 2021; Troise *et al.*, 2020b; Colombo *et al.*, 2014) and several control variables.

$$\text{Fund\_Coll}(\%)_{i,t} = a_0 + a_1\text{LinkedIn\_Follower}_{i,t} + a_2\text{LinkedIn\_Activities}_{i,t} + a_3\text{TC}_{i,t} + a_4\text{Board}_{i,t} + a_5\text{Employees}_{i,t} + a_6\text{Plat\_Size}_{i,t} + a_7\text{Years}_{i,t} + \epsilon_{i,t} \quad (1)$$

where subscripts $i$ and $t$ denote the cross-section and time dimensions, respectively. $\text{Fund\_Coll}(\%)_{i,t}$ is the dependent variable in the model and represents the total amount of funding raised at the end of the campaign divided by the target capital for the campaign $i$ at the time $t$. Following Troise *et al.* (2020b), instead of using the dummy variable that indicate campaigns' success or failure, we choose the percentage of funding amount collected, because this measure "is a fine-tuned measure of campaign success that indicates how much capital has been raised (when ≥1) or how close the pitch was to reaching the target" (Vismara, 2016). This variable is able to capture both the overfunding rate–when the campaign exceeds the funding target–and the failure rate, if the campaign did not reach the funding target. In the model, the explanatory variables, related to the social relevance of EC platforms managers are $\text{LinkedIn\_Follower}_{i,t}$ and $\text{LinkedIn\_Activities}_{i,t}$. $\text{LinkedIn\_Follower}_{i,t}$ is the number of LinkedIn followers of EC platforms managers, while $\text{LinkedIn\_Activities}_{i,t}$ is the number of activities on LinkedIn by each managers, represented by the sum of the numbers relative to posts creation, share, reactions, or comments. Relying on prior studies on EC performance (Troise and Tani, 2021; Troise *et al.*, 2020b; Block *et al.*, 2018a; Hornuf and Schwienbacher, 2018;



**(a)** **(b)** **(c)**

**Figure 3.**
Examples of EC platforms' managers social connections on LinkedIn

**Note(s):** Graph (a) is characterized by a low number of edges and a low AWD, graph (b) has a high number of edges and a high AWD, and graph (c) has a high number of edges and a low AWD

Vismara, 2016), we included five control variables. $TC_{i,t}$ is the target capital used to measure the project size, $Board_{i,t}$ represent the board size of EC platforms, $Employees_{i,t}$ is the number of creators' workers at the time of the launch of EC campaign, $Plat\_Size_{i,t}$ is a dummy variables that represents the size of the platform that assumes value 1 if the platform launched at least 35 campaigns – estimated as the mean of the all launched campaigns – 0 if not; $Years_{i,t}$ represents the platform's age. The definitions and constructions of the variables are summarized in Table 1.

The second linear regression model is built to investigate the relationships between innovation performance of creators and variables related to the relevance of social network interactions and connections (Battisti *et al.*, 2022; Troise *et al.*, 2020b; Chu *et al.*, 2019; Giudici and Rossi-Lamastra, 2018), variables on EC platforms and campaigns (Cosma *et al.*, 2022; Skirnevskiy *et al.*, 2017; Vismara, 2016; Colombo *et al.*, 2014; Ahlers *et al.*, 2015), and several control variables.

$$\begin{aligned} Inn\_Perf_{i,t} = {} & a_0 + a_1 PoSN\_Rate_{i,t} + a_2 SUX\_Rate_{i,t} + a_3 Edges_{i,t} + a_4 AWD_{i,t} \\ & + a_5 \Delta\_EBITBA_{i,t} + a_6 \Delta\_TA_{i,t} + a_7 \Delta\_ROE_{i,t} + a_8 Employees_{i,t} + a_9 RC_{i,t} \\ & + a_{10} EQ\_RT_{i,t} + a_{11} PRZ_{i,t} + a_{12} Overfunded_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where subscripts $i$ and $t$ denote the cross-section and time dimensions, respectively. $Inn\_Perf_{i,t}$ is the dependent variable in the model and represents the innovation performance of creator $i$ at the time $t$. Relying on previous studies on innovation management that calculate the innovation performance by using the percentage of sales from new or significantly improved products and services compared to total sales of the firm (Papa *et al.*, 2018; Scuotto *et al.*, 2017; Chen *et al.*, 2016; Brunswicker and Vanhaverbeke, 2015; Laursen and Salter, 2006), we estimate the innovation performance of creators as the variation of sales pre and post the launched EC campaign. PoSN_Rate is the rate of presence of platform board's components on social network and SUX_Rate is the success rate of EC campaigns. Relying on data extracted

| Variable | Symbol | Definition |
|---|---|---|
| *Dependent Variable* | | |
| Funding Collected (%) | *Fund_Coll* | The ratio between the total amount of funding raised at the end of the campaign and the target capital for the campaign $i$ at the time $t$ |
| *Explanatory Variables* | | |
| Number of LinkedIn followers (count) | *Linkedin_Follower* | The number of LinkedIn followers of EC platforms' managers |
| Number of LinkedIn activities (count) | *Linkedin_Activities* | The number of activities made on LinkedIn by EC platforms' managers, represented by post creation, share, reaction, or comment |
| *Control Variables* | | |
| Target Capital (Euros) | *TC* | Campaign target amount to be raised |
| Number of board member (count) | *Board* | It is the number of the EC platform's board members at the time of the launch of the EC campaign |
| Number of Employees (count) | *Employees* | It is the number of creators' workers at the time of the launch of the EC campaign |
| Platform Size | *Plat_Size* | It is a dummy variable which assumes value 1 if the project is in a large platform (≥35 campaigns population); 0 otherwise |
| Platform's age (count) | *Years* | Number of years in which the company has been active since its establishment |

**Table 1.** Description of variables of Model 1

from the LinkedIn platform, Edges is the number of people or companies with which the EC's manager interact, and AWD is the average weighted degree. Δ_EBITBA, Δ_TA and Δ_ROE are respectively the variation of EBITDA, total asset and return on equity (ROE) values between the year of the launch of EC campaign ($t$) and the year following the launch of EC campaign ($t$+1). Employees are the number of creators' workers at the time of the launch of EC campaign and RC is the registered capital of the creator. EQ_RT is the equity retention ratio, and PRZ is a dummy variable that assumes value 1 if the campaign offers a gift to encourage investors to subscribe equity capital, 0 if not; Overfunded is a dummy variable that assumes value 1 if the campaign raised more than the target capital, 0 otherwise.

The variables are grouped in three different clusters; their definitions and construction is synthetized in Table 2.

| Variable | Symbol | Definition |
|---|---|---|
| *Dependent Variable* | | |
| Creators' Innovation Performance (percent) | *Inn_Perf* | The variation of sales pre and post the EC campaign launched to fund a new or significantly improved products and services, compared to total sales of the firm |
| *Panel A – EC platforms and networks features* | | |
| Rate of Presence on Social Network (percent) | *PoSN_Rate* | The ratio between the number of EC platform board's members with a profile on LinkedIn and the total number of board's members |
| Success rate of the campaigns (percent) | *Sux_Rate* | The ratio between the number of EC campaigns that have been closed with success and the total number of EC campaigns launched by the platform |
| Number of edges (count) | *Edges* | The number of people or companies (nodes) with which EC's managers interact |
| Average Weighted Degree (count) | *AWD* | It is computed weighting the average number of connections in the network for the number of links for each node |
| *Panel B–Creators' features* | | |
| Variation of EBITDA (Euros) | *Δ_EBITDA* | It is the variation of the Earnings Before Interest Taxes Depreciation and Amortization values between the year of the launch of the EC campaign ($t$) and the year following the launch of EC campaign ($t$+1) |
| Variation of TA (Euros) | *Δ_TA* | It is the variation of the values of Total Assets between the year of the launch of EC campaign ($t$) and the year following the launch of EC campaign ($t$+1) |
| Variation of ROE (Euros) | *Δ_ROE* | It is the variation of the Return On Equity value between the year of the launch of EC campaign ($t$) and the year following the launch of EC campaign ($t$+1) |
| Number of Employees (count) | *Employees* | It is the number of creators' workers at the time of the launch of the EC campaign |
| Registered Capital (Euros) | *RC* | It is the registered capital of creator |
| *Panel C–Campaigns' features* | | |
| Equity Retention (percent) | *EQ_RT* | It is the ratio between the issuer company's equity before the campaign is launched to the maximum equity it would have had if the campaign was finalized |
| Prize presence for subscription (binary) | *PRZ* | It is a dummy variable which assumes value 1 if the campaign offers some kind of gift to investors who subscribe equity capital, 0 otherwise |
| Overfunded campaign (binary) | *Overfunded* | It is a dummy variable which assumes value 1 if the campaign raises more funds than the target capital. 0 otherwise |

**Table 2.**
Description of variables of Model 2

The first group of variables refers to the characteristic of the EC platform that is likely to influence the innovation performance of the creators. PoSN_Rate represents the number of EC platform board's members with a profile on LinkedIn in relation to the total number of EC platform board's components. SUX_Rate is the ratio between the number of EC campaigns that have been closed with success and the total number of EC campaigns launched by the platform. Edges and AWD are social network variables. Edges reveals the dimension of EC board members' network, while AWD weighs the number of connections for the actual number of links for each node. It is useful to understand the strength of the interactions since it considers that the EC platform board's members can interact with the same person more than once.

The second group of variables relates to the creators' features. Δ_EBITBA, Δ_TA, Δ_ROE, Employees and RC are control variables that should impact on innovation performance of creators.

The third group comprises variables related to a campaign's features. This group includes the equity retention ratio, calculated as the ratio of the issuing company's equity before the campaign was launched to the maximum equity it would have had when the campaign was finalized, and two dummy variables that capture the possibility that the campaign offers some kind of gift to encourage investors to subscribe equity capital and the case in which the campaign is overfunded.

## 5. Results

### *5.1 EC performance and EC platforms networks (Model 1)*

Panel A of Table 3 presents the descriptive statistics for the variables of Model 1.

On average, the percentage of the collected funding is equal to 2.81, with a standard deviation of 3.03. With respect to the variables related to the social relevance of EC platforms' managers, the average number of the LinkedIn managers' followers is equal to 7,899.23, with

| Variable | Obs | Mean | Median | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|---|
| *Panel A–Model 1* | | | | | | |
| *Fund_Coll* | 395 | 2.81 | 2.03 | 3.03 | 0.15 | 37.40 |
| *LinkedIn Follower* | 395 | 7899.23 | 8,771 | 3313.67 | 187 | 29,971 |
| *LinkedIn Activities* | 395 | 475.06 | 609 | 272.67 | 45 | 998 |
| *TC* | 395 | 201909.10 | 100,000 | 354299.02 | 1,300 | 3,600,000 |
| *Board* | 395 | 3.89 | 3.00 | 1.09 | 1.00 | 8.00 |
| *Employees* | 395 | 7.11 | 2.00 | 40.72 | 0 | 567 |
| *Plat_Size* | 395 | 0.87 | 1.00 | 0.34 | 0 | 1.00 |
| *Years* | 395 | 6.34 | 7.00 | 1.14 | 2.00 | 8.00 |
| *Panel B–Model 2* | | | | | | |
| *Inn_Perf* | 395 | 28.67 | 7.22 | 190.64 | −894.58 | 901.20 |
| *PoSN_Rate* | 395 | 0.57 | 0.29 | 0.31 | 0.29 | 1.00 |
| *Sux_Rate* | 395 | 0.75 | 0.76 | 0.10 | 0.31 | 1.00 |
| *Edges* | 395 | 164.55 | 183 | 119.23 | 28 | 490 |
| *AWD* | 395 | 4.62 | 4.30 | 1.16 | 2.92 | 8.39 |
| *Density* | 395 | 0.02 | 0.01 | 0.02 | 0 | 0.07 |
| *Delta_EBITDA* | 395 | −13.23 | 9.86 | 705.24 | −13647.66 | 685.21 |
| *Delta_TA* | 395 | 558.18 | 219.29 | 1165.08 | −3689.13 | 10,286.64 |
| *Delta_ROE* | 395 | 9.80 | 4.62 | 46.53 | −183.82 | 149.75 |
| *Employees* | 395 | 7.11 | 2.00 | 40.72 | 0 | 567 |
| *RC* | 395 | 174.74 | 16.07 | 791.42 | 0 | 8791.52 |
| *EQ_RT* | 395 | 0.83 | 0.76 | 2.05 | −1.84 | 36.52 |
| *PRZ* | 395 | 0.45 | 0 | 0.50 | 0 | 1.00 |
| *Overfunded* | 395 | 0.95 | 1.00 | 0.21 | 0 | 1.00 |

**Table 3.**
Descriptive statistics of Model 1 and Model 2

a maximum value of 29,971, while the mean number of managers' activities on LinkedIn is 475.06, with a minimum and a maximum value of 45 and 998, respectively. The campaigns have a target capital equal, on average, to 201,909.10, with a standard deviation of 354,299.02. The average number of EC platforms' managers and of creators' employees are respectively equal to 3.89 and 7.11, while the variable Platform size has a mean value of 0.87, with a standard deviation of 0.34. On average, the EC platform have been active for 6.34 years, with a minimum value of two years and a maximum value of 8 years.

The Pearson's correlation matrix of all variables inserted in Model 1 is showed in Table 4.

In all cases, the Pearson's correlation coefficients are lower than 70% and the funding collected is highly, positively and significantly correlated with the explanatory variables of Model 1 (0.5840 for LinkedIn Followers, and 0.5393 for LinkedIn Activities). The target capital is negatively correlated with the percentage of funding collected (−0.5853), while the correlation between the variable of funding collected and the variables Plat_Size and Years is strong, positive and statistically significant (0.6134 and 0.6493, respectively).

Table 5 displays the results of the multiple linear regression analysis described in Equation (1).

**Table 4.**
Pearson's correlation matrix of Model 1 variables

| | Fund_Coll | LinkedIn follower | Linkedin activities | TC | Board | Employees | Plat_Size | Years |
|---|---|---|---|---|---|---|---|---|
| Fund_Coll | 1 | | | | | | | |
| LinkedIn Follower | 0.5840 | 1 | | | | | | |
| LinkedIn Activities | 0.5393 | 0.1990 | 1 | | | | | |
| TC | −0.5853 | −0.0983 | −0.1673 | 1 | | | | |
| Board | −0.0610 | −0.0682 | 0.0859 | 0.0047 | 1 | | | |
| Employees | −0.0389 | −0.0305 | 0.0689 | 0.0349 | −0.0916 | 1 | | |
| Plat_Size | 0.6134 | 0.0529 | −0.0178 | 0.0354 | 0.0160 | −0.089 | 1 | |
| Years | 0.6493 | 0.0828 | −0.0674 | 0.0233 | 0.0926 | 0.0520 | 0.6155 | 1 |

**Table 5.**
Results of the multiple regression analysis – Model 1

| | Coefficient | Std Error | *t*_stat | *p*-value |
|---|---|---|---|---|
| Intercept | 2.164881668 | 1.084212407 | 1.996732056 | 0.00005** |
| *Explanatory Variables* | | | | |
| LinkedIn Follower | 8.70189E−05 | 4.62733E−05 | 2.88054252 | 0.00004*** |
| LinkedIn Activities | 0.00115963 | 0.000570285 | 2.033420452 | 0.04484** |
| *Control Variables* | | | | |
| TC | −7.44185E−07 | 4.29156E−07 | −1.734067876 | 0.08802* |
| Board | −0.180738066 | 0.137917838 | −1.310476361 | 0.73451 |
| Employees | −0.004747596 | 0.003730981 | −1.272479217 | 0.41032 |
| Plat_Size | 2.166376549 | 0.564684709 | 3.836435653 | <0.0001**** |
| Years | 0.517675381 | 0.168670822 | 3.069146007 | 0.00052**** |
| *R-squared* | 0.595238912 | | | |
| *Adj. R-squared* | 0.563404859 | | | |
| *p-value (F)* | 2.78182E−28 | | | |
| *Test Breusch-Pagan* | LM = 1.6683 | | | 0.19648 |
| *Test Hausman* | H = 43.4897 | | | 7.1705 |

**Note(s):** The table represents the results of the multiple regression analysis that considers as dependent variable the innovation performance of Italian creators; The symbols *. **, ***, and **** represent significance levels of 10, 5, 1, and 0.01% respectively

Applying the variance inflation factor (VIF) before proceeding with the regression analysis, we excluded the possible multicollinearity among explanatory variables. We then performed the regression adopting the ordinary least squares (OLS) model robust standard errors clustered at the firm level. Indeed, the Breusch–Pagan test and the Hausman test are applied in order to respectively demonstrate the preferability of this model compared to the random effects panel model and to certify the preferability of the random effects panel model compared to the fixed effects panel model. The tests values confirm the goodness of the model adopted. The significance of the all variables simultaneously is attested by the *p*-values (F), while the adequacy of the number of explanatory variables in the model is demonstrated by a high *R*-squared value (0.5952) and its small difference with the adjusted *R*-squared (0.5634). The funding collected has a positive e significant relation with both the variables on the relevance of EC platforms' managers on LinkedIn – LinkedIn Followers and LinkedIn Activities –, albeit with different confidence levels (99 and 95%, respectively). Findings reveal that the number of followers of the EC platforms' managers and their social activities, represented by post creation, comments, reactions and shares, increase the success of campaign in term of funding raised at the end of the campaign, thus confirming our first research hypothesis. With respect to control variables, we find that funding collected has a negative and statistically significant relationship with the target capital, with significance level of 90%, while the relationship with the size of the platform and the year of activity is positive and highly significant, both with 99.99% of confidence level.

*5.2 Innovation performance and EC platforms networks (Model 2)*

Descriptive statistics for the variables considered in Model 2 are presented in Table 3 – Panel B.

The average value of the Innovation Performance variable is equal to 28.67 with a standard deviation of 190.64, a minimum value of −894.58 and a maximum value of 901.20. On average the board members' presence on social network rate and the success rate of EC campaigns are equal to 0.57 and 0.75%, respectively, with a standard deviation of 0.31 and 0.10, respectively. With respect to the variables from the SNA, the average number of Edges is equal to 164.55, with a standard deviation of 119.23, a minimum value of 28, and a maximum of 490, while AWD is, on average, equal to 4.62 with a maximum value of 8.39. The mean value of the EBITDA variation is negative and equal to −13.23, with a standard deviation of 705.24, while the average variation of total asset and ROE value is positive (558.18 and 9.80%), with standard deviations of 1165.08 and 46.53, respectively. The number of employees of the creators is on average 7.11, with a standard deviation of 40.72, a minimum number of workers equals to 0 and a maximum of 567. The registered capital has an average value equal to 174.74 euros, with 0 as minimum value and 8,791.52 euros as maximum. The mean value of the board size of the issuing company is 2.47; some boards are composed of a single member, and some are composed of up to of seven members. The mean of the equity retention is equal to 0.83 ranging between −1.84 and 36.52. The average number of EC campaigns that offered a reward in order to stimulate the initial subscription is 0.45%, while the variable "Overfunded" has a mean value of 0.95.

Table 6 shows the Pearson's correlation matrix of all variables–dependent and independent ones. The Pearson's correlation coefficients are lower than 65% for all the variables included in the model. A first finding from this analysis regards the correlation between the innovation performance and the board's members presence on LinkedIn that is high, positive and statistically significant (0.5543). In addition, the innovation performance is strongly and positively correlated with all variables calculated through the SNA (0.6021 for Edges and 0.5205 for AWD), with all control variables related to the economic and financial

**Table 6.**
Pearson's correlation matrix of Model 2 variables

| | Inn_Perf | PoSN_Rate | Sux_Rate | Edges | AWD | Δ_EBITDA | Δ_TA | Δ_ROE | Employees | RC | EQ_RT | PRZ | Overfunded |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inn_Perf | 1 | | | | | | | | | | | | |
| PoSN_Rate | 0.5543* | 1 | | | | | | | | | | | |
| Sux_Rate | 0.1398 | 0.5201* | 1 | | | | | | | | | | |
| Edges | 0.6021* | 0.6374 | 0.2223 | 1 | | | | | | | | | |
| AWD | 0.5205* | 0.5512 | 0.0013 | 0.5025 | 1 | | | | | | | | |
| Δ_EBITDA | 0.5111* | 0.4510 | 0.4888 | 0.6400* | 0.0397 | 1 | | | | | | | |
| Δ_TA | 0.5633* | −0.1039 | 0.5001 | −0.3249 | 0.0812 | 0.3597 | 1 | | | | | | |
| Δ_ROE | 0.6209* | 0.6316* | 0.6700 | 0.5811* | 0.6427* | 0.5529 | 0.3288 | 1 | | | | | |
| Employees | 0.0812 | −0.0212 | −0.3201 | −0.0033 | 0.3321 | −0.2306 | 0.4400 | 0.0976 | 1 | | | | |
| RC | 0.0304 | −0.0033 | −0.0046 | 0.0256 | 0.0216 | 0.0031 | 0.0002 | 0.0221 | −0.0299 | 1 | | | |
| EQ_RT | 0.0231 | 0.0711 | 0.0733 | −0.0147 | 0.0023 | 0.4904 | 0.0011 | 0.4310 | −0.1660 | 0.2021 | 1 | | |
| PRZ | −0.0117 | −0.0472 | 0.6212 | 0.0034 | −0.3527 | −0.0120 | −0.3611 | −0.1284 | 0.0668 | 0.1314 | 0.0587 | 1 | |
| Overfunded | 0.6346* | 0.5431* | 0.4719 | 0.1499 | 0.5431* | 0.0885 | 0.4617 | 0.0180 | 0.0079 | 0.4515 | 0.1679 | −0.00310 | 1 |

**Note(s):** The table represents Pearson's correlation matrix of Model 1 variables; The symbol * represent significance levels of the value

condition of the creators (specifically, with Δ_EBITBA is equal to 0.5111, with Δ_TA is equal to 0.5633 and with Δ_ROE is equal to 0.6209) and also with the overfunded variable (0.6346).

The PoSN_rate variable is positive and statistically significantly correlated with the success rate of the EC campaign (0.5201), with the Δ_ROE (0.6316) and with the overfunded variable (0.5431). The coefficient related to Edges is strongly and positively correlated with the variations of EBITDA and ROE value (respectively, 0.6400 and 0.5811). Finally, AWD has a positive and statistically significant correlation with the Δ_ROE value and the overfunded variable.

Results of the multiple linear regression analysis from Equation (2) are displayed in Table 7. As for Model 1, we used the VIF to exclude the multicollinearity between the explanatory variables before the regression analysis, while we applied the Breusch–Pagan test and the Hausman test in order to exclude homoskedasticity and endogeneity of the model variables. The Hausman test fails to reject the null hypothesis that parameters of exogenous and endogenous models are statistically the same ($p = 7.344$). Consequently, the test shows that endogeneity is not a problem. The analysis reveals a high *R*-squared value (0.6831) and a small difference with the adjusted *R*-squared (0.6530), demonstrating an adequate number of explanatory variables considered. Moreover, the *p*-values (F) attest the significance of the model as a whole (i.e. all variables simultaneously).

Starting from the features of the EC platforms and their network (Table 7 – Panel A), we find a positive e significative relationship between creators' innovation performance and the presence of EC platforms' board members on LinkedIn, the Edges and AWD variables, albeit with different levels of significance (with a confidence level of 99 and 90%, respectively).

| | Coefficient | Std Error | *t*_stat | *p*-value |
|---|---|---|---|---|
| Intercept | 3.997883915 | 0.532004052 | 2.61082254 | 0.00001*** |
| *Panel A – EC Platforms' and network features* | | | | |
| PoSN_Rate | 0.910304513 | 0.848915813 | 1.96953451 | 0.00005** |
| Sux_Rate | 0.134014713 | 1.219118989 | 0.11917492 | 0.90321 |
| Edges | 0.64296918 | 0.021926989 | 2.72986145 | 0.00004*** |
| AWD | 0.914270755 | 0.120421487 | 1.66785147 | 0.08918* |
| *Panel B–Creators' features* | | | | |
| Δ_EBITDA | 0.579026783 | 0.279066798 | 2.07486805 | 0.04393** |
| Δ_TA | 0.050025581 | 0.017931239 | 2.78985639 | 0.00051*** |
| Δ_ROE | 0.559181479 | 0.031064481 | 18.0006705 | <0.0001**** |
| Employees | 0.001958607 | 0.002053137 | 0.95395841 | 0.71992 |
| RC | 7.42667E−06 | 0.000134954 | 0.05292666 | 0.40954 |
| *Panel C–Campaigns' features* | | | | |
| EQ_RT | 0.047052509 | 0.096101848 | 0.48961087 | 0.62515 |
| PRZ | −0.158722832 | 0.261498756 | −0.6069736 | 0.54483 |
| Overfunded | 0.795248152 | 0.520621007 | 1.6546276 | 0.08925* |
| *R-squared* | 0.683138912 | | | |
| *Adj. R-squared* | 0.653048588 | | | |
| *p-value (F)* | 1.61823E−31 | | | |
| *Test Breusch-Pagan* | LM = 1.6973 | | | 0.7321 |
| *Test Hausman* | H = 42.851 | | | 7.34456 |

**Note(s):** The table represents the results of the multiple regression analysis that considers as dependent variable the innovation performance of Italian creators; The symbols *. **, ***, and **** represent significance levels of 10, 5, 1, and 0.01% respectively

**Table 7.** Results of the multiple regression analysis – Model 2

With respect to the variables on creators' economic and financial conditions (Table 7 – Panel B), we find that Δ_EBITBA, Δ_TA and Δ_ROE are positive and statistically significant related with the innovation performance, with the significance level of 95, 99 and 99.99%, respectively.

Regarding the characteristics of the EC campaign, the results present a positive and statistically significant impact of the variable overfunded on the innovation performance of the creators with a confidence level of 90%, while EQ_RT and PRZ are never statistically significant (Table 7 – Panel C).

## 6. Discussion and conclusions

In the crowdfunding environment, creators possess private information and for funders is difficult to assign a value to the project of the campaign, thus the reduction of information asymmetries between the investor and the investee during the evaluation of the proposal became crucial in affecting the campaign success. Networks are widely recognized as a way to facilitate the information flow (Troise *et al.*, 2020a; Troise and Tani, 2021). Previous studies highlight that one of the determinants of the campaign's success is represented by creators' network (Ryu and Kim, 2018), and moving the focus from creators' network to platforms' ones, other studies underlined that the platform's partner networks (Giudici *et al.*, 2013; Mollick, 2014; Colombo *et al.*, 2014; Lukkarinen *et al.*, 2016; Nitani and Riding, 2017; Troise *et al.*, 2020b; Vrontis *et al.*, 2021; Cosma *et al.*, 2022), or the number of connections and the presence of EC platforms on social media as Facebook and Twitter (Mollick, 2014; Nitani and Riding, 2017; Vrontis *et al.*, 2021), tend to attract more investors, positively influencing the success of the launched campaigns. The results of this research help to gain a better understanding of the influence of LinkedIn networks of EC platforms' managers on EC and innovation performance. While previous studies empirically reveal the importance of creators' social networks and platforms for the success of the campaigns, no studies investigate whether platforms managers' social networks impact on crowdfunding and companies' performances. This study contributes to the theory on EC observing, through a unique database, that EC platforms managers' social network contributes to the success of the crowdfunding campaigns. We detected and measured EC platforms managers' activity with other actors on the LinkedIn social network site, observing that managers tend to create social links with different features. In fact, EC platforms managers differ in the number of actors they interact with on LinkedIn, with some managers having only less than 30 interactions with other people or companies on the social media, and other managers having more than 400. In addition, some managers have persistent relationships with the same actors on the social network, while other have weaker connections.

Our results show that, besides the size of the platform and its age, also the social connections of its manager are important determinants of creators' ability to collect funds, thus contributing to the theory on the determinants of EC success. Findings from this study support the hypothesis that a higher number of ties of EC platforms managers and their social activity are positively related to the EC performance.

At the same time, the literature shows that platforms permit companies to interact online with investors, receive advice, feedbacks and suggestions, improving their products and services, also in term of innovation (Bogers *et al.*, 2017). The EC model specifically targets start-ups and SMEs for which generating and exploiting innovation is a fundamental source of competitive advantage (Schwienbacher, 2019; Hervé and Schwienbacher, 2019), moreover, EC investors obtain equity shares, thus becoming owners of the firms and directly benefiting from the potential creation of value in the long run. Accordingly, investors might be interested not only in financially supporting SMEs and startups during the campaigns but also in what happens to these firms once the campaigns end (Troise and Tani, 2021; Colombo

*et al.*, 2014). Previous literature shows that creators' social links and the size of their network influence companies' innovation performance (Chu *et al.*, 2019; Giudici and Rossi-Lamastra, 2018). Anyway, studies on the link between the social network of EC platforms managers and companies' innovation performance were missing. Our study fills this gap showing that the most innovative creators of products or services are those whose platforms are more active on social networks both in terms of managers who have a LinkedIn profile and size and number of connections of their networks. Results show a positive effect of the EC platforms managers' number and intensity of interactions with other actors on LinkedIn on the variation of sales pre and post the EC campaign compared to the total sales of the firm. A high rate of platforms managers with a social network and active profile stimulates the innovative production of start-ups and SMEs that use EC. The analysis reveals that besides companies' profitability and financial condition, creators' innovation is affected by the strength of the interactions of platforms managers on LinkedIn, i.e. platforms managers social connections improve the quality of the projects likely fostering the activation of the innovation and open innovation processes. Thus, findings from this study support the hypothesis that the SMN of EC platforms managers influences the innovation performance of creators.

According to the best of our knowledge, when taking into account the proponents' point of view, previous literature only considered the relationship between creators' network and innovation performance (Chu *et al.*, 2019; Giudici and Rossi-Lamastra, 2018), or between the network and the success of the campaign in term of the amount of capital raised at the end of the campaign (Troise *et al.*, 2020a; Cosma *et al.*, 2022). We therefore contribute to the literature on EC revealing that among the determinants of creators' innovation performance, the network of the manager of the EC platform deserves attention, representing a crucial party in affecting the relationship between investor and investee. We also suggest that different features of the social network affect the degree of innovation of the funded companies. Overall, the results of this research provide supporting evidence EC platforms managers activity on LinkedIn is related to both EC and innovation performance of start-ups and SMEs.

From the theoretical perspective, this study also enriches the existing literature in alternative financing, showing that social networks in general, and LinkedIn in particular, represents a mean to reduce information asymmetries between the investor and the investee. In fact, EC involves exchanges of financial resources among strangers which can be perceived dangerous by prospective users (Cowden and Young, 2020), we show that EC platforms managers connections likely represent a way to reduce investors' uncertainty perception, increasing the probability of success and of higher innovation performance of companies who engage in the EC activity.

In terms of practical implications, our study focuses on how the EC platforms, through the pages of their managers, promote campaigns that offer an additional virtual space for bilateral comparison between creator-investor. The social page of the EC platform manager is an online place where contacts are activated, allowing investors to give suggestions to creators about the improvement of the quality of their products or services. Thus, from a managerial point of view, the positive relationship between the presence of EC platforms managers on social networks and the proponents' innovation performance suggests that social pages of the EC platforms managers might offer a further opportunity for proponents to receive feedback from investors, stimulating innovation processes and increasing capital raising, with indirect and relevant impact on the campaigns' success. By constructing a social profile and by using and monitoring content and post publication, EC platforms could affect investment decisions, thus supporting the success of creators' projects. For this reason, we believe our research has also important business implications.

Finally, this study reveals to start-ups and SMEs' that besides their own interactions with investors through their own social pages, also the interaction of the EC platforms managers fosters the success of the campaigns and of the innovation of their products and services.

This implication provides insights for proponent companies in that they can raise the efficiency of their crowdfunding campaigns selecting the EC platforms whose managers have intense social connections.

### *6.1 Limitations and further developments*

Since previous studies have underlined that the national institutional environment affects crowdfunding activity, our sample considers a homogeneous legal and regulatory framework, focusing only on Italian EC campaigns. Further developments of this research can expand the dataset, including different countries, to observe whether and how the legal and regulatory environment interacts with EC platform managers' social network in affecting companies' innovation performance. In this paper, we focused on the interactions of the EC platforms managers on LinkedIn, measuring their social connections and the strength of those connections. Anyway, we did not take into account how the actors within EC platforms mangers networks interact among them. This information would allow to measure the density of the network, beyond the size and the strength of connections, and to understand how different actors in a graph tend to cluster together, influencing innovation performance. In addition, it would be interesting to explore how the types of interactions, whether they are institutional, professional, unformal, or mixed, impact on the crowdfunding ecosystem. Finally, a further study can explore whether the process of content creation on social network sites as LinkedIn, quantified through textual analysis to extract sentiment, tone and temporal focus of attention of the posts, represents a further variable that impacts on the EC activity.

## Note

1. Specifically, the regulation of EC in Italy is developed through five Consob Regulations: Consob Regulation n. 18592 of 26/06/2013 updated with the changes made by resolution no. 21259 of February 6th, 2020, Consob Regulation n. 19520 of 24/02/2016, Consob Regulation n. 20204 of 29/11/2017, Consob Regulation n. 20264 of 17/01/2018, and, finally, Consob Regulation n. 21110 of 10/10/2019, which modified the first regulation.

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