



Innovation, team creativity, and intellectual property in equity crowdfunding: a fuzzy and disaggregated approach

Carlotta Bottaro^a , Fabrizio Cesaroni^b, Mattia Fasano^b , Raffaele Staglianò^{b,*} 

^a Deloitte NextHub S.R.L.S.B, Forensic & Financial Crime, Via Umberto Giordano, 4, Bari, Italy

^b Department of Economics, Università degli Studi di Messina, Via dei Verdi, 75, 98122, Messina, Italy

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ABSTRACT

This study investigates how project radicalness, team creativity, and intellectual property influence the success of equity crowdfunding (ECF) campaigns. Using fuzzy-set Qualitative Comparative Analysis (fsQCA) on a sample of 42 campaigns from Italian ECF platforms, we explore the configurations of innovation-related dimensions that lead to successful fundraising outcomes. Our findings reveal that no single factor guarantees success. Rather, specific combinations of innovation dimensions are crucial. These results support a contingent perspective and offer practical insights for campaign designers and platform managers seeking to optimise innovation signalling in ECF.

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1. Introduction

Equity crowdfunding (ECF), a form of collective financing, has proven effective in addressing funding barriers that limit small firms and startups, particularly those with strong growth potential (e.g., Belleflamme et al., 2014; Eldridge et al., 2021; Valenza et al., 2023). Despite its growing relevance, limited research has examined how innovation-related factors affect the success of ECF campaigns. This study fills that gap by focusing on three key dimensions –project radicalness, team creativity, and intellectual property –that may influence campaign outcomes. These dimensions are central to how innovation creates competitive advantage for startups, yet highly innovative and creative projects tend to involve greater uncertainty and risk, which can discourage investors. Understanding how innovation characteristics affect campaign performance is, therefore, essential for entrepreneurs, investors, and policymakers interested in the development of alternative finance ecosystems. Specifically, we aim to answer the question: *How do configurations of innovation-related dimensions shape the success of ECF campaigns?*

Building on signalling theory (e.g., Ahlers et al., 2015; Vismara, 2016; Cumming et al., 2021), we explore how entrepreneurs can use innovation signals to reduce information asymmetries that affect their ability to attract equity investors through crowdfunding. Prior studies emphasize that, in the absence of traditional investor protections, credible signals are crucial for shaping investor

* Corresponding author.

E-mail addresses: cbottaro@deloitte.it (C. Bottaro), fabrizio.cesaroni@unime.it (F. Cesaroni), mattia.fasano@unime.it (M. Fasano), raffaele.stagliano@unime.it (R. Staglianò).

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perceptions and reducing uncertainty in investment decisions. In this context, ECF appears especially relevant for innovative projects (e.g., Ahlers et al., 2015; Hervé and Schwiendacher, 2018; Di Pietro et al., 2023), where technological and market uncertainty are often high. When investors lack the expertise to assess innovative projects, signals related to a firm's creativity, technological edge, and intellectual property can help reduce perceived risk and improve funding success.

By linking innovation dimensions to campaign performance, this paper offers insights into how ECF can foster radical and creative forms of entrepreneurship. In doing so, we expand the existing literature that primarily focuses on incremental innovation, thereby overlooking how radical innovation –projects that challenge industry conventions and produce significant market change –can be financed (Keupp and Gassmann, 2013; Chan and Parhankangas, 2017; Woschke et al., 2017; Mochkabadi et al., 2024).

To address our research question, we use fuzzy-set qualitative comparative analysis (fsQCA), a method well-suited for small and medium-sized samples (Ragin, 2008; Nikou et al., 2024). Based on 42 observations from surveys of Italian ECF promoters, the analysis identifies combinations of innovation-related characteristics that lead to successful or unsuccessful campaigns. Unlike previous research that isolates single factors, our study examines how these factors interact to form configurations associated with campaign success.

Radical innovation refers to efforts that disrupt existing norms and create major industrial or market changes (Garcia and Calantone, 2002). Prior studies have noted a persistent funding gap for radical innovation (Keupp and Gassmann, 2013; Chan and Parhankangas, 2017; Woschke et al., 2017; Le Pendeven and Schwiendacher, 2023). Highly creative individuals drive such innovation by pursuing original ideas that challenge conventional thinking (Hebda et al., 2012). However, these projects are highly uncertain, and their outcomes are difficult to predict (Keizer and Halman, 2007; O'Connor and Rice, 2013).

Creativity, in turn, pushes organizations to go beyond established approaches and explore new paths with transformative potential. It is vital for generating distinctive ideas and high-quality outcomes (Amabile, 1988) and has been examined through various perspectives (Amabile and Fisher, 2012; O'Connor and Rice, 2013). At the individual level, creativity enables problem-solving and innovation (Feist, 1998), but it flourishes most in collaborative and diverse environments that enhance firm performance (Paulus and Nijstad, 2003; Zhou and Shalley, 2003).

Intellectual property (IP), particularly patents and trademarks, can increase firm valuation and make ventures more attractive to investors by providing legal protection and signaling technological capability (Gredel et al., 2012; Hottenrott et al., 2016). Patents indicate technological know-how and safeguard innovations (Hsu and Fang, 2009; Hsu and Ziedonis, 2013). They also show a firm's capacity to communicate complex technical aspects to external stakeholders (Greenberg, 2013). Trademarks, on the other hand, reveal marketing progress and product maturity (Mendonça et al., 2004; Greenhalgh and Longland, 2005), as well as a firm's market positioning and future direction (Moritz et al., 2015). In service industries where patents are less relevant, trademarks often serve as the main form of IP protection (Jensen and Webster, 2011).

By exploring these innovation dimensions, our study shows that ECF success depends not only on a firm's creative or innovative capacity but also on how potential investors perceive the transformative and practical value of the proposed innovation.

The remainder of this paper is structured as follows: Section 2 describes the research design, Section 3 presents results, Section 4 offers additional analyses, and Section 5 concludes.

2. Data and methods

This study uses the fsQCA methodology articulated by Ragin (2008) and Nikou et al. (2024) for empirical analysis. FsQCA is particularly suited for this study because it allows for causal complexity, in which multiple paths can lead to the same outcome of interest, and conditions may operate both as necessary and sufficient factors.

Data for this study were collected via online questionnaires administered between October 2023 and January 2024 to proponents who launched ECF campaigns on Italian platforms, yielding a final convenience sample of 42 observations, for a response rate of 10.4 %. While this may appear limited compared to conventional statistical approaches, it is well within the scope of fsQCA applications and aligns with other management studies (e.g., Oliveira et al., 2019). FsQCA was initially developed as a set-theoretic method for smaller samples, designed to identify causal configurations rather than estimate average effects (Ragin, 2008; Nikou et al., 2024). In addition, the relatively short time frame is particularly relevant because it reduces the likelihood that external events of a different nature could impact campaign success at other times. More generally, this window captures important post-pandemic dynamics.

We considered ECF campaigns launched on MamaCrowd, CrowdfundMe, BacktoWork24, WeAreStarting, and 200Crowd, some of the most active platforms in the Italian market for the number of launched campaigns (Politecnico di Milano, 2024). To obtain a substantial degree of heterogeneity in the data, we selected campaigns from nine different sectors: eCommerce & Wholesale; Food, Beverages & Agribusiness; HealthCare & LifeScience; Technology, Products & Manufacturing; Cleantech, Social Enterprises & Green Ventures; Online Services & Sharing Economy; Leisure, Travel & Sport; IT, Software Solutions & Telco; Fintech & Alternative Finance. Moreover, as detailed in Section 4, we performed a series of robustness and sensitivity checks to confirm the stability of our findings despite the limited sample size.

The questionnaire was designed to capture key study variables, with scales adapted for ECF and previously validated to ensure reliability. The degree of radicalness of innovation was measured using a 6-item scale by Dominguez-Escrign et al. (2019), which showed a high Cronbach's α of 0.93. Team creativity was assessed through an 8-item scale by Rego et al. (2007) and Barczak et al. (2010), showing a Cronbach's α of 0.85. Participants were also asked whether they had filed any patents or trademarks before starting the ECF campaign.

The literature emphasizes the need for clear outcomes, causal conditions, and calibration definitions, as explained in the next section. In this study, the outcome is defined as the success of a fundraising campaign, measured by the ratio of funds raised to the

target amount. This ratio is a proxy for the campaign's success rate (e.g., De Crescenzo et al., 2020). To identify the factors that may influence the outcomes of ECF campaigns, this study identified four antecedent conditions, detailed in Table 1, along with their coding methods.

3. Results

Calibration is a fundamental step in fsQCA, and it is necessary to convert the raw data into fuzzy values that accurately represent the various degrees of membership in the set. This study employs the direct calibration method (Ragin, 2008), which involves scaling the data on a continuum from 0.0 (indicating complete non-set membership) to 1.0 (indicating complete set membership). A critical aspect of this calibration is identifying a cross-over point set at 0.5, which marks the 50 % membership level. Specifically, the breakpoints were set as follows: full membership (quartile 3), crossover point (median), and full non-membership (quartile 1). However, as noted by Crilly et al. (2012), the fsQCA 3.0 software drops values of 0.5, which are then replaced by 0.49 to avoid ambiguity at the midpoint. Table 2 outlines these calibration thresholds, providing a clear framework for converting standard data into a fuzzy set. These calibrated data are then analyzed to understand causal relationships and contributions of the various conditions to the outcome.

Following the calibration procedure, the necessary conditions are prerequisites whose presence or absence is essential for achieving a specific outcome. A condition is necessary if its consistency is above 0.9 (Schneider and Wagemann, 2012). Table 3 reveals that two conditions exceed the consistency threshold of 0.9 – *Rad* (consistency = 0.96) and *Creat* (consistency = 0.91). Therefore, *Rad* and *Creat* are essential to ensure the campaign's success. In practical terms, nearly all successful campaigns exhibit high project radicalness and creative input from the founding team. This finding reinforces prior work suggesting that investors in equity crowdfunding are particularly responsive to signals of transformative potential (Ahlers et al., 2015; Di Pietro et al., 2023).

The variable *Rad* is highly correlated with the outcome, suggesting that its absence significantly reduces the probability of success. Similarly, *Creat* also shows a strong association with successful outcomes.

The next stage of the analysis involves identifying all possible configurations of conditions and assessing the extent to which each configuration aligns with the observed outcome. For this analysis, the adopted consistency cut-off for campaign success is 0.8. According to empirical literature, the consistency cut-off should be higher than 0.75. In addition, the frequency threshold was set to 1. The fsQCA produces three distinct solutions: parsimonious, complex, and intermediate. Each solution represents a different balance between generalizations based on empirical data and theoretical specificity. This study prefers the parsimonious solution over the other two for analyses with large samples, typically 10–50 observations. The parsimonious solution identifies the minimal set of disjunctive combinations of sufficient conditions, highlighting the core conditions central to the explanation of the outcome. Consistency is analogous to goodness-of-fit in quantitative methodology (Woodside, 2013).

Table 4 summarizes the results of the fsQCA, highlighting the configurations that emerged as pathways to successful ECF campaigns. Such configurations represent combinations of minimally sufficient conditions for campaign success. The symbol '○' means the absence of the condition, and '■' represents the presence of the condition. Empty cells indicate that the presence or absence of the condition does not affect the results ('do not care' conditions). The table also reports raw coverage, unique coverage, and consistency for each configuration, indicating the robustness and significance of the combinations identified in the analysis.

Overall, our findings align with signaling theory (Ahlers et al., 2015; Cumming et al., 2021), which highlights the role of credible signals in mitigating information asymmetry between entrepreneurs and investors. However, whereas prior research has mainly examined individual signals separately, our configurational approach demonstrates how multiple factors interact to shape investor decisions in ECF.

Configuration 1, the most robust empirical case, suggests that high radicalness in projects can lead to campaign success even without creativity and irrespective of the presence of IP protection. In such cases, the perceived disruptive potential of the innovation

Table 1
Description and codification of outcome and conditions.

Type	Name	Description	Source	Justification	Codification
Outcome	Campaign success (Campsucc)	Measures the success of the ECF campaign as the ratio between the initial target amount and the funds raised	Platform records	Dependent variable	Fuzzy value
Condition	Radical innovation (Rad)	Measures the perceived level to which the project is radically innovative. A high rating in this condition denotes a project that breaks away from current conventions or standards, offering something significantly new	Questionnaire	Reflects the project's perceived radical innovativeness	Fuzzy value
Condition	Team creativity (Creat)	Represents the perceived level of creativity of the team behind the project. Teams with a high score in this condition are considered particularly original and ingenious in their approach to project development	Questionnaire	Reflects the funding team's perceived creativity	Fuzzy value
Condition	Prior patent (Patent)	Refers to the filing of at least one patent before the launch of the ECF campaign	Questionnaire	Proxy for observable prior patent applications filed by promoters	Crisp value
Condition	Prior trademark (Trademark)	Refers to filing at least one trademark before the launch of the ECF campaign.	Questionnaire	Proxy for observable prior trademark filing	Crisp value

Table 2
Calibration of data.

	Full membership	Cross-over point	Full non-membership
Rad	4.33	3.50	2.87
Creat	4.95	3.95	3.38
Campsucc	1.81	1.02	0.55
Patent	1.00		0.00
Trademark	1.00		0.00

Note: Table 2 reports the data calibration for outcome and conditions.

Table 3
Necessary conditions.

	Consistency	Coverage
Rad	0.96	0.60
Creat	0.91	0.69
Patent	0.58	0.46
Trademark	0.73	0.45

Note: Table 3 reports the analysis of necessary conditions.

Table 4
Pathways to the success of the ECF campaigns.

Configuration #	1	2	3	4
Rad	■	○	■	
Creat	○			○
Patent			■	○
Trademark		■	○	
Raw coverage	0.7368	0.3508	0.1368	0.3171
Unique coverage	0.1715	0.0347	0.0513	0
Consistency	0.8887	0.8804	0.7564	0.8453
Solution coverage	0.8311			
Solution consistency	0.8376			

Note: Table 4 reports the fsQCA results leading to the success of the ECF campaigns.

itself may outweigh weaker creative or formal IP signals. Configuration 3 indicates that when intellectual property accompanies radical innovation, technological protection through patents becomes more effective than branding through trademarks (Chan and Parhankangas, 2017; Le Pendeven and Schwienbacher, 2023). These two configurations together suggest that ECF investors particularly reward projects grounded in radical technological innovation.

When radical innovation is absent, as in Configuration 2, trademarks alone can still support campaign success by signaling the project's credibility and market legitimacy (Mendonça et al., 2004). This is because trademarks generally require the product to have reached the market, providing a form of validation. Finally, Configuration 4 shows that successful campaigns may also emerge without high creativity or IP protection, possibly due to other informal factors not captured in this study (Vismara, 2016).

To illustrate these configurations, we refer to two ECF campaigns funded on the CrowdfundMe platform. Lighthouse Biotech, a MedTech venture developing a radical liquid biopsy technology ("DropH") for isolating circulating tumor cells, fits Configuration 3. The project combines radical innovation with a multidisciplinary team and patented technological solutions, signaling credibility through formal IP protection rather than branding. In contrast, Heaven, a food and beverage startup offering high-quality plant-based products, aligns with Configuration 2. Instead of relying on radical innovation, Heaven highlights branding elements such as trademark registration and strong market positioning to convey legitimacy and differentiate itself in a competitive market. These examples show how different ventures can achieve success through distinct combinations of signaling strategies.

From a practical perspective, these results offer actionable insights for entrepreneurs and platform managers. Campaign designers should emphasize project radicalness wherever relevant, as it consistently underpins successful fundraising outcomes. Teams should actively communicate their creativity –through videos, prototypes, updates, or collaborations –to strengthen investor confidence. Platform managers might also develop campaign templates that encourage founders to showcase IP protection or branding elements, especially for less radical projects. Such initiatives can help investors better assess diverse innovations and reduce decision-making uncertainty.

4. Additional results

To assess the robustness of the configurational solution, we performed a leave-one-out (LOO) sensitivity test. The analysis was conducted by iteratively removing one case at a time before running the fsQCA. Across the 42 iterations, the configurations remained

identical in 36 cases (86 % of the sample), indicating that the overall results are highly stable.

To further investigate the relationship among innovation-related dimensions and the success of ECF campaigns, we estimated regressions with the following baseline structure:

$$\text{Campsucc} = f[\text{Rad}, \text{Creat}, \text{Patent}, \text{Trademark}] \quad (1)$$

where all variables correspond to those employed in the fsQCA and reported in Table 1.

Table 5, column 1, shows results for the OLS estimator, which broadly align with the main results. In particular, the variable *Rad* shows a positive effect, while the variable *Creat* shows a negative, non-significant coefficient. However, in an additional analysis (not reported) using bootstrap standard errors, the coefficient remains negative but becomes statistically significant. Even if the two empirical approaches (fsQCA and regression analysis) are not directly comparable, this pattern is consistent with the first fsQCA configuration, in which the presence of the variable *Rad* and the absence of the variable *Creat* were positively associated with campaign success. Given the categorical and ordered nature of the dependent variable, we employed Ordered Logit and Ordered Probit models, the results of which are reported in Columns 2 and 3, respectively. The results further confirm the patterns observed in the OLS analysis. In both specifications, *Rad* exhibits a positive and significant effect, whereas *Creat* shows a negative, though non-statistically significant, coefficient. These findings are consistent with the first fsQCA configuration, once again highlighting the positive role of *Rad* and the negative association of *Creat* with campaign success. To further strengthen the robustness checks, Table 6 reports the marginal effect analyses derived from the ordered models. We estimate both ordered logit and ordered probit models. Since the results are consistent across specifications, we focus on the ordered logit as the leading benchmark in the discussion.

The marginal effects by outcome provide further insights into the explanatory variables' roles. For *Rad*, the results indicate a consistent pattern: it significantly decreases the probability of falling into the lowest outcome category (outcome 1, $dy/dx = -0.684$, $p < 0.05$), while it increases the likelihood of higher outcomes, although these effects reach conventional significance levels in outcomes 2 and 3. In turn, higher *Rad* values are associated with a shift away from the least successful outcome toward more favorable categories. By contrast, *Creat* displays the opposite tendency, increasing the likelihood of outcome 1 and decreasing the probabilities of outcomes 2–4, though none of these coefficients are statistically significant.

5. Conclusions

This exploratory study investigates how innovation-related factors –project radicalness, team creativity, and intellectual property –combine to influence the success of ECF campaigns. Using fsQCA on a sample of 42 campaigns launched on Italian platforms, we find that radicalness and team creativity are necessary conditions for campaign success. Intellectual property plays a more contingent role: it strengthens the positive impact of radical projects when supported by patents or compensates for a lack of radicalness through trademarks. These results suggest that ECF investors are particularly responsive to signals that convey strong transformative potential in radical and creative projects. The findings highlight the usefulness of fsQCA for identifying complex, context-specific configurations of success and confirm that there is no single path to successful campaigns. Instead, different combinations of strengths lead to positive outcomes depending on organizational and environmental contexts.

From a practical perspective, these insights encourage startups and emerging firms to frame their crowdfunding strategies by

Table 5
Innovation-related dimensions and success of ECF campaigns.

VARIABLES	(1) Campsucc	(2) Campsucc	(3) Campsucc
Rad	0.231* (0.121)	3.022* (1.713)	1.688* (0.901)
Creat	-0.197 (0.133)	-2.821 (1.876)	-1.551 (1.064)
Patent	-0.002 (0.057)	-0.082 (0.659)	-0.015 (0.385)
Trademark	-0.008 (0.075)	0.180 (0.759)	0.093 (0.444)
Constant	0.416*** (0.091)		
/cut1		0.496 (1.184)	0.299 (0.725)
/cut2		2.376* (1.245)	1.407* (0.747)
/cut3		3.848*** (1.414)	2.161*** (0.807)
Observations	42	42	42
R-squared	0.093		

Note: Table 5 reports the regression results on the impact of the innovation-related dimension on the success of ECF campaigns. Column (1) reports the estimated coefficients from the OLS regressions, Column (2) from the ordered logit model, and Column (3) from the ordered probit model. The definitions of all variables are provided in Table 1. ***, **, and * indicate significance at the 1 %, 5 %, and 10 % levels, respectively. Robust standard errors are reported in parentheses.

Table 6
Margins prediction –Ordered logit model.

	Delta-method				
	dy/dx	std. err.	z	P > z	[95 % conf. interval]
predict(outcome (4))					
Rad	0.129	0.108	1.19	0.234	−0.084 0.342
Creat	−0.120	0.102	−1.18	0.238	−0.321 0.079
predict(outcome (3))					
Rad	0.260	0.150	1.73	0.083	−0.034 0.555
Creat	−0.243	0.175	−1.39	0.165	−0.587 0.100
predict(outcome (2))					
Rad	0.294	0.178	1.66	0.098	−0.054 0.642
Creat	−0.275	0.196	−1.4	0.162	−0.659 0.110
predict(outcome (1))					
Rad	−0.684	0.335	−2.04	0.041	−1.340 −0.027
Creat	0.639	0.391	1.63	0.103	−0.128 1.406

Note: Table 6 reports marginal prediction from Ordered probit model.

integrating innovative potential with strategic positioning, thereby aligning more effectively with investor expectations and improving their chances of success (e.g., [Vismara, 2018](#)). As ECF continues to evolve, these findings provide valuable guidance for building a more dynamic, resilient, and innovation-oriented financing ecosystem.

Like most survey-based studies, this research has limitations. First, the relatively small sample size, based solely on Italian platforms, limits the generalizability of the results. Second, platform-specific characteristics may introduce biases, as campaigns differ across platforms in terms of industry, size, and founder profiles.

Future studies could extend this work by conducting cross-country comparisons to examine whether innovation signals function similarly across institutional contexts or by exploring industry-specific relationships among radicalness, creativity, and intellectual property. Another promising direction is to study how innovation signals evolve over the course of a campaign, through updates or investor engagement, to capture the temporal dynamics of signaling in crowdfunding.

Overall, this study emphasizes the importance of examining configurations of innovation-based signals rather than isolated factors, offering practical insights for entrepreneurs and platform managers seeking to improve equity crowdfunding fundraising strategies.

CRedit authorship contribution statement

Carlotta Bottaro: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Fabrizio Cesaroni:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Funding acquisition, Data curation, Conceptualization. **Mattia Fasano:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation. **Raffaele Stagliano:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Funding acquisition, Data curation, Conceptualization.

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Data availability

Data will be made available on request.

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