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ORIGINAL ARTICLE

What Drives the Effectiveness of Proof-of-Concept Projects?

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ABSTRACT

This paper examines the mechanisms underlying the effectiveness of Proof-of-Concept programmes (PoCs) in advancing the technological maturity of research inventions. We developed a conceptual framework at the intersection of dynamic capabilities and academic entrepreneurship literature and conceptualized how four relevant mechanisms guide successful technology valorisation through PoCs at different levels: sensing and seizing capacities of research teams, characteristics of the external network – specifically, timing of contact and geographical location – and the nature of the research invention, distinguishing between science-based and engineering-based inventions. Using a sample of 94 PoC projects, we adopted a microfoundational perspective and applied fuzzy-set Qualitative Comparative Analysis to understand whether and how different mechanisms and their interplay contribute to the effectiveness of PoC projects. Our analysis revealed that the combinations of these mechanisms depend on the nature of inventions. Our results contribute to the PoC literature and provide practical implications for policymakers and decision-makers, TTOs and research teams.

Keywords: Technological maturity; Proof-of-Concept programmes; PoC; microfoundations; Qualitative Comparative Analysis; fsQCA.

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INTRODUCTION

Despite their breakthrough potential (Munari et al., 2018), up to 75% of research inventions never reach the market (Swamidass, 2013), due to obstacles such as the funding gap (Munari et al., 2016) and their embryonic nature (Jensen & Thursby, 2001). The funding gap refers to the scientists' lack of financial resources to translate their inventions into successful commercial applications (Munari et al., 2017). This gap mainly stems from the inventions' embryonic nature, characterised by low technological maturity and long development timeframes for valorisation, making them highly risky and unattractive to private investors (Gulbranson & Audretsch, 2008; Rasmussen & Rice, 2012).

While traditional, linear models of technology transfer (TT) — typically centred on patents' commercialisation — are well-suited for the valorisation of research inventions characterised by clear technological trajectories and clear application domains, research inventions grounded in novel scientific principles (such as those in fundamental sciences) face higher levels of technological uncertainty (Fleming, 2001). Their valorisation processes — although relying on a small number of patents with high breakthrough potential (Wagner and Wakeman, 2016) —are inherently more complex, lengthy, and less linear than traditional models (Hayter et al., 2018; Jacobson et al., 2013). As variations in technological uncertainty of inventions entail differences in the extent of the obstacles encountered during their valorisation process — with inventions with clearer technological trajectories and grounded in applied knowledge domains facing fewer barriers (Wagner and Wakeman, 2016) — research inventions of different nature would require distinct mechanisms to enable their technological maturity advancement. The extant literature is silent on a strategic issue that can have a profound impact on research valorisation policies.

To address this issue, this study investigates the mechanisms that characterise the valorisation process of research inventions of different nature (i.e., science-based and engineering-based) within the context of Proof-of-Concept programmes (PoCs). More specifically, it aims to answer the following question:

How does the interplay between learning mechanisms contribute to the valorisation of research inventions of different nature within PoCs?

Over the past few decades, PoCs have gained increasing relevance, attracting academic interest and widespread adoption worldwide (Munari et al., 2017; Rasmussen & Sørheim, 2012). PoCs represent formal TT instruments that enable research teams to engage in the valorisation of their scientific inventions through both formal and informal mechanisms (Battaglia et al., 2021a) – such as interacting with entities outside academic boundaries (Maia & Claro, 2013; McAdam et al., 2009). As such, PoCs foster a more dynamic valorisation process that departs from traditional, linear TT models (Hayter et al., 2018). PoCs target the early stages of the TT process by providing funding, networking, mentoring, and entrepreneurial training. They directly involve research teams in activities of searching for, acquiring, and recombining external information and knowledge to develop their research inventions (McAdam et al., 2009), ultimately aiming to demonstrate their technical and commercial feasibility (Munari et al., 2018). These activities are carried out by teams in the PoC setting, constrained by limited funding (typically around €50,000) and a short implementation period, usually lasting around 6-12 months.

We develop a conceptual framework to investigate the mechanisms supporting advancements of technological maturity of research inventions of different nature through PoCs. In developing the conceptual framework, we build on and integrate the PoC literature (Gulbranson & Audretsch, 2008) and the dynamic capability theory (Teece, 2007). We test the framework using a sample of 94 projects developing research inventions within PoCs. We adopt a microfoundational perspective (Contractor et al., 2019) to understand the development of sensing and seizing capabilities within teams and employ a fuzzy-set Qualitative Comparative Analysis (Ragin, 2000) to identify the interplay of mechanisms for significant advancement of technological maturity of research inventions. Our results highlight that (1) no single mechanism in isolation drives the technological maturity advancement of research inventions; rather, their combination is essential, and (2) the effective combination of these mechanisms is contingent upon the nature of the research invention. The study contributes to the PoC literature and provides relevant insights for policymakers and decision-makers, TTOs and research teams.

THEORETICAL BACKGROUND

PoCs have been described as learning instruments (Battaglia et al., 2021a), enabling the development of learning capacities within research teams (McAdam et al., 2010). We advance this perspective by suggesting that PoCs enable teams to develop dynamic capabilities, specifically sensing and seizing capacities (Teece, 2007; Zollo & Winter, 2002).

The design of PoCs facilitates the development of these capabilities. They share a similar structural design across countries (Munari et al., 2017), which has been defined as critical to address the obstacles associated with research inventions that limit their technological maturity advancement and subsequent commercialisation (Munari & Toschi, 2021). The structure of PoCs is characterised by three different and interconnected phases: preparatory, evaluation, and execution (Battaglia et al., 2021b). During the preparatory phase, research teams submit the proposal required for the application to the programme. Specifically, they submit an action plan, containing a technical description of the invention to develop, prospective markets for their inventions and defining a possible sustainability plan. During the evaluation phase, submitted projects are assessed by a committee of experts - typically professional investors, entrepreneurs, and researchers in the relevant field - who determine which projects are awarded a PoC grant. Finally, awarded projects enter the execution phase, during which teams implement their PoC project by engaging in activities to advance the technological maturity of their research inventions, ultimately aiming at demonstrating their technical and commercial feasibility (Munari et al., 2017; 2018).

The development of sensing capabilities begins as early as the PoC preparatory phase. “Sensing capacity” refers to the ability to sense and shape opportunities and threats (Teece, 2007), which results from systematic activities of searching, scanning, and exploring external information (Katila and Ahuja, 2002). Within PoCs, teams begin engaging in sensing activities to prepare the documentation required for the application, in which a preliminary evaluation of prospective markets for the invention is conducted (Battaglia et al., 2021a). Therefore, since the initial PoC phase, teams are forced to move beyond their laboratories to search and scan the external environment, enabling them to identify and/or recognise potential opportunities in turbulent environments (Teece, 2007; Zollo and Winter, 2002). By engaging in sensing activities, teams establish contacts outside academia, representing sources of information as well as prospective contacts for the future commercialisation of the invention (Battaglia et al., 2021a; McAdam et al., 2009). The development of sensing capacities may be fostered by elements that can be captured by terms such as search, scan, creation, experimentation, learning, identification, and discovery (Teece, 2007). In the context of science valorisation, it encompasses activities such as participating in conferences and seminars, interacting with private and public entities and conducting internal R&D activities for the maturity advancement of the invention (Heaton et al. 2019; Yuan et al., 2018).

“Seizing capacity” refers to the use and recombination of new knowledge gained through external search with the internal knowledge base to capture value from previously sensed opportunities (Teece, 2007). It involves the mobilisation of internal and external resources and competencies, and it usually requires making strategic choices (Teece et al., 2016). In our context, it encompasses activities aimed at understanding market requirements, using new materials or functions, developing the necessary competencies to address new problems, as well as attracting external entities to support their future commercialisation (Baglieri et al., 2014; Yuan et al., 2018).

The development of sensing and seizing capabilities is therefore crucial within PoCs. While sensing allows teams to identify the needs and/or the problems that new research could address, and identify valuable applications over possible alternatives (McAdam et al., 2009), seizing enables teams to advance the technological development of the invention, by demonstrating its feasibility and legitimising it on the market (Teece, 2007).

External networks are essential in developing sensing and seizing capacities (Teece, 2020). In the PoC context, contacts with market players, such as prospective customers, end-users, partners and professional investors, are crucial sources of feedback for the development of early-stage research inventions, positively influencing their advancement in terms of technological maturity (Battaglia et al., 2021a; McAdam et al., 2009). The relevance of external networks lies not only in enabling feedback collection and guiding development (Maia & Claro, 2013) but also in the specific characteristics of these interactions, such as their timing and geographical location (Hughes & Kitson, 2012). Timing refers to the temporal aspect of teams' interactions. Specifically, teams can generate external contacts before, during or both before and during the PoC participation. Before PoCs, teams may possess a personal network of contacts interested in the invention, which is typically declared at the time of PoC application. Furthermore, during PoC project execution, teams can expand existing networks or create new ones in the case of no pre-existing contacts. Beyond their temporal dimension, these interactions can also differ in terms of geographical location. Geographical proximity between teams and external entities (Boschma, 2005) favours connections by facilitating face-to-face interactions and promoting knowledge spill-overs (D'Este et al., 2013; Maietta, 2015). This is particularly relevant in settings characterised by information asymmetries, as in the case of research inventions, where the market is unable to precisely assess their value (Landry et al., 2007).

Finally, the nature of the research invention is a relevant source of heterogeneity in PoC, as it shapes how teams relate to the external environment, thereby impacting the type of commercialisation process (Bailey et al., 2025; Battaglia et al., 2021b). Potentially, it might influence both the extent to which teams can develop sensing or seizing capacities, as well as the characteristics of the established networks. Following Autio (1997), we can distinguish between science-based and engineering-based research inventions. Science-based research inventions are based on fundamental knowledge, which is generic in nature. Based on scientific principles, such inventions can address a relatively wide range of industrial applications. In contrast, engineering-based research inventions are typically based on applied knowledge and address specific needs within defined industrial applications, often characterised by competing technologies. The different nature of research inventions exerts influence on their maturity advancement. Specifically, science-based inventions are typically associated with more complex and lengthy development paths than engineering-based inventions, due to their more exploratory nature (Battaglia et al., 2021b).

We develop a conceptual framework (Figure 1) that links these factors and illustrates their interactions, thereby identifying the relevant mechanisms that influence the effectiveness of PoC projects. The advancement of technological maturity of research inventions through PoCs is influenced by the sensing and seizing capabilities developed by teams and by the characteristics of their external network, namely, the timing of contact and the geographical location. These network characteristics also contribute to shaping the teams' sensing and seizing capabilities. Furthermore, the nature of the invention affects both the development of dynamic capabilities and the configuration of the external network, thereby ultimately influencing the advancement of technological maturity.

METHOD AND DATA

Our sample comprises 94 PoC projects that developed research inventions between 2016 and 2021 under two funding programmes run within five Italian universities. The two programmes were equivalent in structure, objectives and procedures. They shared the same application criteria, duration (maximum nine months), amount of funding (maximum €50,000), and allowable expenditures. During the application process, teams were required to submit detailed documentation, including a description of the invention, team composition, the Technology Readiness Level (TRL) at the time of application, the target TRL to be achieved through PoC participation, an execution plan, a description of preliminary potential application environment(s) of the invention, and information on the initial external network. During project execution, teams submitted midterm and final reports, documenting the activities performed, challenges encountered, external contacts established, early-stage commercialisation efforts and the final TRL achieved. This information was systematically collected into an ad hoc database. To our knowledge, this database is the first to provide comprehensive, project-level information in the PoCs context. The two PoCs considered in the study share a similar structure, aims, and characteristics with those implemented at the national level in Italy (e.g., PoC promoted by the Italian Ministry of Economic Development), as well as with the ERC PoC introduced by the European Research Council (ERC) as part of the Horizon 2020 programme (Munari & Toschi, 2021).

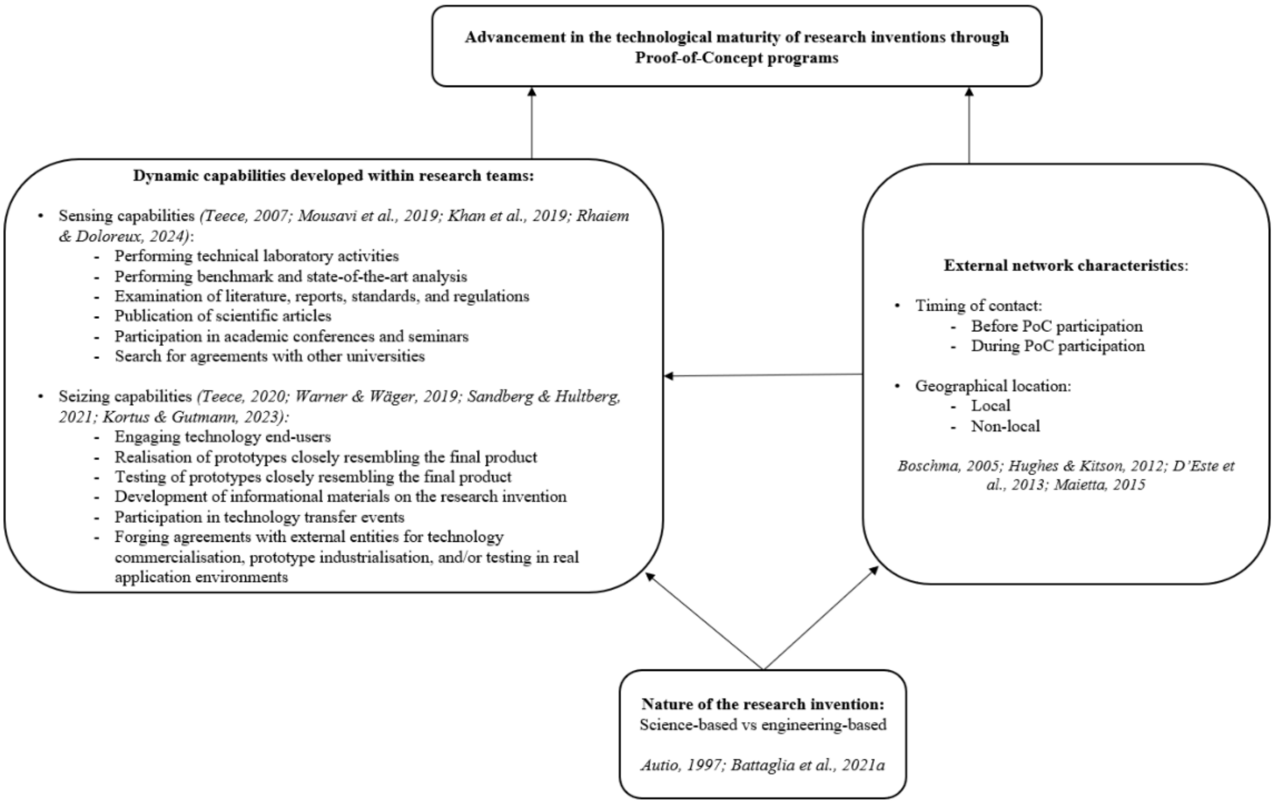

Fig. 1. Conceptual framework of mechanisms influencing the technological maturity advancement of research inventions in PoCs

The variables employed in our analysis were derived from the relevant factors outlined in the conceptual framework. To capture the dynamic capabilities developed within research teams, we adopted a microfoundational perspective (Contractor et al., 2019). This perspective aims at understanding macro-concepts and macro-outcomes by examining underlying actions and processes of micro-level entities, identifying proximate causes of phenomena at a lower level of analysis (Felin et al., 2015). We identified and mapped a set of micro-level activities carried out by teams during project execution through a rigorous analysis of the midterm and final reports submitted by teams. These micro-level activities were then classified within the sensing and seizing framework, based on the original theoretical framework (Teece 2007; Teece et al., 2016) and further empirical literature (Rhaiem & Doloreux, 2024; Khan et al., 2019). To ensure robustness, we triangulated our classification with theory on the microfoundations of dynamic capabilities (Teece, 2007, 2020). Specifically, sensing-related activities include: performing technical laboratory activities; performing benchmark and state-of-the-art analysis; examination of literature, reports, standards, and regulations; publication of scientific articles; participation in academic conferences and seminars; search for agreements with other universities (Teece, 2007; Mousavi et al., 2019; Khan et al., 2019; Rhaiem & Doloreux, 2024). In contrast, seizing-related activities comprise: engaging technology end-users; realisation of prototypes closely resembling the final product; testing of prototypes closely resembling the final product; development of informational materials on the research invention; participation in technology transfer events; forging agreements with external entities for technology commercialisation, prototype industrialisation, and/or testing in real application environments (Teece, 2020; Warner & Wäger, 2019; Sandberg & Hultberg, 2021; Kortus & Gutmann, 2023). We employed the number of different micro-activities carried out by teams as a proxy for the extent to which sensing and seizing capabilities were developed within research teams. Accordingly, these two measures serve as the variables representing dynamic capabilities in our analysis.

To capture the PoC factor related to the nature of the research inventions, we analysed the application forms, focusing on the invention descriptions, potential application environments, and technological benchmarks. Following Autio (1997) and Battaglia et al. (2021b), we classified inventions in our sample as either science-based or engineering-based according to their breadth of potential applications, namely the generic or specific nature of their industrial application. Specifically, we employed a Boolean variable assuming a value of 1 for engineering-based inventions and 0 for science-based ones. Examples of this classification are reported as follows. Project 150 represents a relevant example of science-based inventions, consisting of realising porous carbon electrodes through a CO_2 laser-writing process. In the application form, the team highlighted the invention's generic nature:

> "[The invention] can be applied to energy devices and in particular, but not only, in systems for converting hydrogen into electricity and in systems for producing hydrogen from renewable electricity".

Project 41 developed an engineering-based invention concerning an electromechanical gearshift, targeting a specific industrial sector:

> "The project aims at engineering an innovative electromechanical gearshift for the bicycle market. […] The goal is to address consolidated bicycle market segments, namely road and mountain bikes".

Within the sample, we identified 57 projects developing engineering-based inventions and 37 science-based ones.

We employed four Boolean variables to capture the factors related to the characteristics of the external network. Two variables refer to the timing of external contacts – namely, "initial network existence" and "PoC network existence". The former captures whether the team had already established external contacts before the PoC participation and takes the value 1 if at least one external contact was declared in the application form. The latter captures whether the team established new contacts with entities other than those reported in the application form during PoC execution. This variable takes the value 1 if at least one new external contact was declared in the midterm and/or final report.

The remaining two variables relate to the geographical location of the external network. We classified each contact declared by the teams as either local or non-local. Following D'Este et al. (2013), we measured the distance between the location of each declared contact and the team's university as the crow flies, and adopted a 150 km threshold for the classification (Maietta, 2015). Contacts located within 150 km of the team were classified as local; otherwise, they were classified as non-local. We then defined two Boolean variables: "local network existence", which takes the value 1 if the team had at least one local contact, and 0 otherwise, and "non-local network existence", which takes the value 1 if the team had at least one non-local contact and 0 otherwise.

We employed fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 2000) to identify different pathways leading to the technological maturity advancement of the inventions during PoCs. Following relevant variables identification, fsQCA involves three main steps (Greckhamer et al., 2008): data calibration, necessary condition analysis, and sufficient condition analysis.

Outcome

Our outcome is the technological maturity advancement of research inventions. Consistent with the literature on science valorisation, it is measured considering the starting point (the baseline) and the final point in the TRL scale reached by means of the project execution (Klessova et al., 2020; 2022). To assess this advancement, we employed the TRL values reported by the research teams, whose accuracy is further assessed by the PoC committees of experts at the beginning and at the end of the programme. Specifically, we relied on the difference between the final TRL achieved by research teams through PoC project execution and the initial TRL declared at the time of their application to the programme. As the TRL scale does not reflect dissimilarities in the advancement of technological maturity of research inventions in different fields (e.g., Peters et al., 2017), we adopted a weighted scoring system to measure the progression from one TRL step to the next, considering as baseline the minimum TRL step achieved in our sample (Klessova et al., 2022). Ideally, TRL steps could be weighted based on the human resources required to progress from one TRL to the immediate subsequent level (Klessova et al., 2022); however, as team compositions were stable during PoCs, such an approach was not applicable. The advancement of technological maturity of each invention is thus represented by the cumulative score derived from all the TRL step increases achieved during PoC participation.

Causal conditions

Following Greckhamer et al. (2013), we employed seven causal conditions to capture the relevant factors influencing the advancement of technological maturity of research inventions of different nature through the PoC projects. Table 1 summarises the characteristics of the outcome and the causal conditions, including their operationalisation, set type, calibration rules, and descriptive statistics.

Tab. 1. Overview of the outcome and causal conditions

Outcome/causal conditions	Description	Set type	Calibration rules	Descriptive statistics			
				Mean	SD	Min	Max
Technological maturity advancement	*Captures the technological maturity advancement of the research invention during PoC*	*Fuzzy*	*1: if the total score is ≥10* *0.67: if the total score is between 7 and 9* *0.33: if the total score is between 4 and 6* *0: if the total score is ≤3*	*6.89*	*3.72*	*1*	*16*
Engineering-based	*Capture the nature of the research invention developed in the PoC project*	*Crisp*	*1: if the invention is engineering-based* *0: if the invention is science-based*	*0.60*	*0.49*	*0*	*1*
Sensing	*Captures the extent of sensing capabilities by considering the number of activities linked to sensing in which the team engaged*	*Fuzzy*	*1: ≥3 sensing activities* *0.67: 3 sensing activities* *0.33: 2 sensing activities* *0: 1 sensing activities*	*2.95*	*1.03*	*1*	*5*
Seizing	*Captures the extent of seizing capabilities by considering the number of activities linked to sensing in which the team engaged*	*Fuzzy*	*1: ≥3 seizing activities* *0.67: 2 seizing activities* *0.33: 1 seizing activities* *0: 0 sensing activities*	*1.60*	*1.42*	*0*	*6*
Initial network existence	*Capture whether the team had already established contacts before PoC participation*	*Crisp*	*1: at least 1 initial external contact* *0: otherwise*	*0.31*	*0.46*	*0*	*1*
PoC network existence	*Capture whether, during the PoC, the team had contacts with entities differing from those in the application form*	*Crisp*	*1: at least one new external contact during PoC* *0: otherwise*	*0.48*	*0.50*	*0*	*1*
Local network existence	*Captures whether the team had local contacts (within 150 km)*	*Crisp*	*1: at least one local contact* *0: otherwise*	*0.54*	*0.50*	*0*	*1*
Non-local network existence	*Captures whether the team had non-local contacts (over 150 km)*	*Crisp*	*1: at least one non-local contact* *0: otherwise*	*0.32*	*0.47*	*0*	*1*

RESULTS

The necessary condition analysis (NCA) enabled the identification of the causal conditions that are necessary for a substantial advancement of technological maturity of research inventions through PoCs (Schneider & Wagemann, 2012). To assess their necessity, we employed a standard 0.90 consistency threshold (Ragin, 2007). As none of the causal conditions exceeded the threshold, we conclude that none of the mechanisms alone – the development of sensing and seizing capabilities, external network characteristics and the nature of the invention - enables the outcome achievement. Therefore, their combination is imperative to obtain the outcome. The results from NCA are shown in Figure 2.

The sufficient condition analysis (SCA) allowed identifying the combinations of causal conditions (i.e., configurations) sufficient for the outcome (Greckhamer et al., 2008). For the SCA, we set the frequency threshold at two and the consistency threshold at 0.75 (Pappas & Woodside, 2021). The solution yielded an overall coverage of 0.47 and consistency of 0.83, and provides six configurations for technological maturity advancement of inventions during PoCs. Among them, configurations one (C1) and two (C2) are the most relevant, as the others can be considered as adjustments of these two key configurations. C1 and C2 are shown in Figure 3.

C1 and C2 reveal distinct pathways to the advancement of technological maturity for different types of research inventions. C1 refers to science-based research inventions. For their maturity advancement, teams must develop a high level of sensing capabilities, while the level of seizing capabilities is irrelevant. Therefore, during PoCs, science-based teams should prioritise the development of sensing capabilities by engaging in activities aimed at searching and scanning the external environment to gain market and technological knowledge, while seizing capabilities development is not central to the outcome. Considering the network, the advancement of technological maturity is enabled by the creation of a network of contacts during project execution, with geographical proximity playing a fundamental role, as it facilitates informal and face-to-face interactions and knowledge spill-overs.

C2 concerns engineering-based research inventions. As narrower application scopes characterise these inventions, their technological maturity advancement is enabled by prioritising the development of seizing capabilities through the engagement in activities aimed at capturing value. This process entails the establishment and utilisation of both local and non-local networks of contacts during PoCs, to enhance the prospects of future commercialisation of the inventions.

In both configurations, the existence of a personal network before PoC participation is not a prerequisite for the outcome.

Causal conditions	Consistency	Coverage
Engineering-based	0.704	0.626
~Engineering-based	0.296	0.406
Sensing	0.718	0.616
~Sensing	0.444	0.646
Seizing	0.670	0.733
~Seizing	0.453	0.482
Initial network existence	0.316	0.552
~Initial network existence	0.684	0.534
PoC network existence	0.586	0.645
~PoC network existence	0.414	0.438
Local network existence	0.658	0.642
~Local network existence	0.342	0.413
Non-local network existence	0.388	0.635
~Non-local network existence	0.612	0.492

Note: ~ indicates the absence of the condition

Fig. 2. Necessary condition analysis for technological maturity advancement of research inventions

	Configurations for the technological maturity advancement of inventions through PoC projects	
Causal conditions	**C1**	**C2**
Engineering-based	⊗	●
Sensing	●	
Seizing		●
Initial network existence	⊗	⊗
PoC network existence	●	●
Local network existence	●	●
Non-local network existence	⊗	●
Consistency	0.88	0.87
Raw coverage	0.14	0.13
Unique coverage	0.03	0.13
Overall solution coverage	0.47	
Overall solution consistency	0.83	

Note: ●: presence of the condition, ⊗: absence of the condition, blank: irrelevance of the condition

Fig. 3. Most relevant configurations for technological maturity advancement of research inventions from sufficient condition analysis

DISCUSSION AND CONCLUSIONS

In this study, we identified the learning mechanisms that influence the advancement of technological maturity of research inventions during PoCs. These mechanisms relate to the development of sensing and seizing capabilities within research teams, allowing them to recognise relevant needs and/or problems and identify valuable market opportunities for their inventions, and to demonstrate feasibility and build legitimacy in the market. Furthermore, external interactions characteristics – timing of contacts and geographical location – influence the advancement of technological maturity by determining when teams can access information and market feedback and how geographical proximity facilitates this access through informal and face-to-face interactions. Ultimately, the distinct nature of the invention influences how teams interact with the external environment, thereby shaping both the development of sensing and seizing capabilities within teams and the characteristics of their external network.

Our analysis reveals two main findings. First, no single mechanism in isolation drives the advancement of technological maturity of inventions; rather, their combination is essential. Second, the effective combination of these mechanisms is contingent upon the nature of the invention. Specifically, depending on whether the invention is science-based or engineering-based, teams should prioritise the development of either sensing or seizing capacities and build external networks with specific characteristics. With particular attention to the dynamic capabilities developed within PoCs, our results reveal that science-based teams need to prioritise the development of sensing capabilities. This finding can be attributed to the high technological uncertainty associated with these inventions, grounded in novel scientific principles (Fleming, 2001; Baglieri & Lorenzoni, 2014). To enable the development of these novel scientific principles, research teams must extensively search, scan and explore external information while engaging in internal laboratory activities to demonstrate the technical feasibility of the formulated principles at the basis of the invention. Furthermore, engaging in sensing activities enables teams to narrow down the range of possible applications of their invention, ultimately identifying the most valuable one. In contrast, for engineering-based inventions that are grounded in established technical knowledge, teams should prioritise the development of seizing capabilities. As these inventions address clearly defined industrial applications, during the PoC project execution teams should focus on aligning the invention with the requirements and specifications of the targeted application, as well as engage in activities aimed at gaining legitimacy within the relevant market, to attract potential investors and partners for further development beyond the PoC project.

This study contributes to the PoC literature by identifying the mechanisms underpinning the effectiveness of PoC projects for different types of inventions. It offers practical implications for policymakers and decision-makers, suggesting that PoCs should be tailored to the nature of the invention, and for teams on how to operate during PoC projects to achieve effective technological maturation of their inventions. Our results also offer implications for TTOs in helping research teams to build a network of external contacts with the characteristics needed for advancing the technological maturity of research inventions.

This study is not without limitations. Although the literature recognises the importance of TTOs in PoCs (Rasmussen & Sørheim, 2012), the nature of our data did not allow us to assess their role in supporting the development of dynamic capabilities within teams. This aspect could be further investigated.

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CONFLICTS OF INTEREST

None to declare.

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