Technovation 128 (2023) 102878

Contents lists available at ScienceDirect

Technovation

journal homepage: www.elsevier.com/locate/technovation

Exploring the pathways of learning from project failure and success in new product development teams

Marco Balzano [a,b,*], Giacomo Marzi [c]

[a] Department of Management, Ca' Foscari University of Venice, 873 Cannaregio, S. Giobbe, 30121, Venice, Italy
[b] KTO Research Center, SKEMA Business School, 60 Rue Fedor Dostoïevski, 06902, Sophia Antipolis, France
[c] IMT School for Advanced Studies Lucca, Piazza San Francesco 19, 55100, Lucca, Italy

ARTICLE INFO

Keywords:
Team learning
Project failure
Project success
Learning pathways
New product development
Fuzzy-set qualitative comparative analysis

ABSTRACT

In today's business environment, New Product Development (NPD) teams play a pivotal role in propelling innovation. Within NPD teams, both successful and failed projects contribute in enhancing learning processes, yet the epistemological pathways activated by successful projects differ distinctly from those stimulated by failed projects. In this study, we investigate the pathways towards team learning in the context of successful and failed NPD projects using fuzzy-set Qualitative Comparative Analysis (fsQCA). Drawing from the team learning literature, we examine which configurations of project characteristics (complexity and uncertainty), interpersonal team characteristics (innovation norms, cohesion, and decision-making autonomy), and environmental characteristics (technological and market turbulence) lead to NPD team learning. Our analysis identifies three configurations of factors tied to NPD team learning in successful projects and four configurations in failed projects. In successful projects, project and team characteristics are core in enhancing team learning. In failed projects, together with team characteristics, core conditions are represented by project complexity, uncertainty, while environmental characteristics play a dual role.

1. Introduction

In today's business environments, innovation is a critical driver of success (Maslach, 2016), and New Product Development (NPD) teams play a pivotal role in fostering innovative products that that satisfy consumer needs and contribute to revenue growth (Açıkgöz et al., 2023; Akgün et al., 2007). In this perspective, successful NPD projects can trigger virtuous circles for firms, leading to learning paths, reinforcing organisational processes, and improving their competitive position (Madsen and Desai, 2010). However, NPD projects can also encounter various challenges that lead to failure (García-Quevedo et al., 2018). These challenges could be due to project complexity and uncertainty, team-level issues, inadequate project management, lack of resources, poor market research, and environmental turbulence, among the other factors (Carbonell and Rodriguez-Escudero, 2020; Dayan and Elbanna, 2011; Marzi, 2022). Still, while project failures may appear setbacks, they can also serve as valuable learning opportunities for NPD teams (Leoncini, 2016). In this view, failure can be just as crucial as success in terms of learning.

Iconic examples of NPD failures include the Ford Edsel, the Sony Betamax, the Apple Newton, and many others (Gilbert, 2019). For instance, the Ford Edsel launched in 1957, was marketed as a mid-size car with innovative design features and advanced technology (Garber, 2023). However, the vehicle failed to meet sales expectations and was poorly received by consumers. The failure of the Ford Edsel provided valuable lessons for the Ford Motor Company, including the need to prioritise consumer feedback and market research in subsequent product launches. This approach contributed to the success of vehicles such as the Mustang, F-Series pickup truck, and Taurus sedan.

The Sony Betamax, introduced in 1975, was an early videocassette format that offered superior technical capabilities compared to its competitor VHS (Gilbert, 2019). Despite this advantage, it failed to gain widespread adoption due to its high price and limited availability. The Betamax failure highlighted the need fot balancing technical superiority with practicality and affordability (Belson, 2006; Gilbert, 2019). Sony learned from this experience and applied these lessons in subsequent product launches, such as the Walkman and the PlayStation, both of which gained massive market share due to their affordability and appeal to consumers (Belson, 2006). The Apple Newton, launched in 1993 as a personal digital assistant, was meant to be a revolutionary product that

* Corresponding author. Department of Management, Ca' Foscari University of Venice, 873 Cannaregio, S. Giobbe, 30121, Venice, Italy.
E-mail addresses: marco.balzano@unive.it (M. Balzano), giacomo.marzi@imtlucca.it (G. Marzi).

https://doi.org/10.1016/j.technovation.2023.102878
Received 3 March 2023; Received in revised form 16 August 2023; Accepted 18 September 2023
Available online 10 October 2023

would change how people work and communicate (Bajarin, 2022). Unfortunately, the product was plagued by technical issues, and consumers found it difficult to use. The high price further limited its appeal, and the product ultimately failed to gain widespread adoption (Gilbert, 2019). The failure of the Apple Newton at that time underscored the importance of user experience and the need to develop user-friendly products that meet customer needs. Apple learned from this experience and applied these lessons in subsequent product launches, such as the iPod, iPhone, and iPad, which revolutionised their respective markets by offering intuitive interfaces and seamless user experiences (Bajarin, 2022). These NPD projects failed to meet consumer needs and were ultimately withdrawn from the market. However, the failure of these products provided valuable insights into the importance of market research, product design, and consumer preferences.

Overall, NPD failures can be costly and detrimental to a firm's short-term success, but they can also provide learning opportunities (Deichmann and Ende, 2014; Rhaiem and Amara, 2021). In fact, when NPD teams experience failure, it presents an opportunity for reflection and analysis. By identifying what went wrong, NPD teams can implement strategies which could prevent similar failures in the future, leading to improved performance over time. As well, studying successful outcomes is equally important as it allows teams to understand what works well and replicate those practices in future projects (Deichmann and Ende, 2014).

Despite the numerous insights that can be gained from NPD project failure, existing literature has mainly focused on successful projects, while little is known about the pathways through which NPD teams learn from failure and the differences in team learning when dealing with NPD project failure or success (Madsen and Desai, 2010; Rhaiem and Amara, 2021). Moreover, previous literature mainly focuses on NPD team success as an outcome variable (e.g. Dayan and Elbanna, 2011), devoting limited attention to different outcome variables such as NPD team learning. Through a systematic examination of successful projects, NPD teams can identify beneficial strategies and practices that contributed to their success, thereby increasing their understanding of how to attain similar outcomes in future endeavours. This reflection process forms a crucial part of their knowledge base. In contrast, analysing less successful instances can highlight ineffective practices. Such insights provide learning opportunities that could enhance the team's collective knowledge base, serving as a reference for improving their future performance.

Grounded on the above, this study aims to conduct a holistic analysis of the pathways through which NPD teams learn from project failures and successes. Specifically, we explore NPD teams' learning pathways both from failure and success. Via a fsQCA analysis, we show that the learning pathways differ significantly from failure and success in the context of NPD. The remainder of this study is structured as follows. The next section presents the theoretical background of the study. Section 3 describes the method, Section 4 presents the results that emerged from the study, and Section 5 offers a detailed discussion. Section 6 presents the study's limitations and concluding remarks.

2. Theoretical background

2.1. Team learning: an overview

Organisational viability in the medium and long term is significantly influenced by the ability of organisations to learn from their experiences (Maslach, 2016). In this perspective, learning processes are characterised by their routine-based nature, dependence on historical events, and target-oriented approach (Levitt & March 1988). As organisations participate in various activities and confront diverse challenges, they accumulate a wealth of knowledge that they can utilise to inform their decision-making processes and future actions (Huber, 1991). Accumulating knowledge allows organisations to identify patterns, establish connections, and develop new understandings that can be applied in future scenarios (Fiol and Lyles, 1985). This knowledge, gained through experience, serves as the foundation for learning processes, highlighting the close relationship between the two. As organisations apply the newfound knowledge to their operations, they can make adjustments and improvements that enhance their effectiveness and efficiency, further emphasising the close link between experience and learning processes (Huber, 1991; Senge, 1990).

Over the years, scholars highlighted the relevant role of learning processes in NPD literature (e.g. Knudsen et al., 2023; Marzi et al., 2020). In organisational settings, team learning plays a crucial role in the organisational learning process (Huber, 1991; Senge, 1990) as it helps to create a learning-oriented culture, encourages the spread of new ideas and best practices, and provides valuable feedback for organisational decision-making (Levitt & March 1988; Liao et al., 2008). From a conceptual standpoint, team learning can significantly enhance organisational learning by disseminating experiences and knowledge among teams within the organisation. In this exchange process, team members actively communicate their individual expertise and experiences, absorbing new insights from their colleagues in the process. This enriches the shared knowledge base within the organisation. Through continuous exchanges, the collective knowledge and skillsets within the team are bolstered, enhancing their problem-solving capacities. The cycle of knowledge sharing and assimilation becomes a critical mechanism in teams, supporting and promoting continuous learning, development, and innovation within the organisation. Thus, teams within organisations serve as a gathering place for individuals possessing a diverse array of skills and perspectives to collaborate and work towards a shared objective (Nellen et al., 2020). This collaboration leads to the creation of more comprehensive and sophisticated solutions while affording team members opportunities for personal and professional growth through the process of mutual learning (Argote et al., 2021; Bradley and Aguinis, 2022). In the context of NPD, team learning represents the collective process that occurs within a group of individuals collaborating on a project, deeply rooted in the acquisition, sharing, and application of knowledge and skills (Carbonell and Rodriguez-Escudero, 2020; Sarin and McDermott, 2003). Such a collective learning experience extends beyond personal gain, contributing to an overall enhancement of individual and team performance, promoting effective cross-functional collaboration, optimising project management strategies, and offering a platform for understanding and mitigating potential mistakes.

In unpredictable and dynamic business contexts, Volatility, Uncertainty, Complexity, and Ambiguity (VUCA) are embedded in NPD processes (Mack et al., 2016). Accordingly, the dynamics that influence NPD team learning, encompass a multitude of factors, ranging from task interdependence or project characteristics, to team characteristics, to environmental dynamics. As such, the project, team, and environmental characteristics that we will examine further embody VUCA elements, providing a rich context for exploring the dynamics that enhance or inhibit learning within NPD teams. For example, task or project complexity and uncertainty could significantly influence NPD team learning due to the need for continuous adaptation in response to changing circumstances (e.g. De Toni and Pessot, 2021). Teams are forced to be flexible and continuously learn to successfully navigate these complex projects (Bosch-Rekveldt et al., 2011; De Toni and Pessot, 2021; Vidal et al., 2011) These contexts stimulate learning while being challenging for teams if they lack the necessary skills or resources.

Also, interpersonal team characteristics can impact NPD team learning. For example, innovation norms that encourage experimentation and risk-taking can foster an environment that supports learning, promoting a culture of continuous learning and generating new ideas (Zellmer-Bruhn and Gibson, 2006). Still, innovation norms might lead to groupthink if dissenting opinions and critical thinking are discouraged (Brockman et al., 2010). Likewise, highly cohesive teams are more likely to have smooth communication and collaboration, while teams with low cohesion may struggle to reach consensus on important issues (Post, 2015). However, cohesion can limit NPD team learning if it is too high, leading to an overemphasis on maintaining unity at the expense of considering different perspectives, or if it is too low, leading to conflict and reduced productivity (Tekleab et al., 2016). Another key aspect is the decision-making autonomy of teams. On the one hand, decision-making autonomy enables the team to be nimble and flexible in its decision-making process, leading to better NPD learning outcomes and supporting collective learning (Brockman et al., 2010). On the other hand, decision-making autonomy can limit the team's ability to learn and grow if it is too low, limiting team members' ability to respond to changing circumstances, or if it is too high, leading to confusion and ineffective decision-making (Brockman et al., 2010; Gerwin and Moffat, 1997).

Additionally, environmental dynamics could affect NPD team learning. For example, NPD team learning can be impacted by market and technological turbulence (Belassi and Tukel, 1996). Indeed, market and technological turbulence can provide teams with new challenges and opportunities for learning. Teams can learn about emerging trends, technologies, and best practices that can help them remain competitive (Madsen and Desai, 2010). The pressure to perform and innovate in a rapidly changing environment can drive teams to continuously improve and learn from their experiences (Fredberg and Pregmark, 2022). However, market and technological turbulence can also hinder NPD team learning. Rapid changes in the market or technological landscape can disrupt established processes, create ambiguity and uncertainty, and limit the availability of resources (Liao and Hu, 2007).

2.2. The role of failure and success in learning processes

Organisations learn differently from failures and successes (Correani et al., 2020; Rhaiem and Amara, 2021). Upon experiencing success, decision-makers might believe that their current organisational knowledge accurately represents reality and might be reluctant to invest in further knowledge development (Lant, 1992). This could lead to disregarding external information and simplifying decision-making processes (Madsen and Desai, 2010). Also failure could play a role in NPD learning processes (Leoncini, 2016; García-Quevedo et al., 2018; Madsen and Desai, 2010). The notion that failure can serve as a learning source has been widely acknowledged as a crucial aspect of achieving future success (Ahn et al., 2005; Guzzini et al., 2018). Cyert and March (1963) observed that failure serves as a challenge to the stability of organisational knowledge, indicating that existing models are inadequate and need to be discarded. This prompts organisations to engage in problemistic search, which is characterised by a greater sense of urgency and is more likely to result in the adoption of new and divergent ideas (March, 1981). Failure also catalyses problems, challenges old assumptions, and fosters innovation (Dahlin et al., 2018; Khanna et al., 2016; Shepherd et al., 2011).

Madsen and Desai (2010) focused on two specific factors that may influence learning processes: the magnitude of failure and the prior base of failure experience within an organisation. Diverging from the "small losses" hypothesis (Hayward, 2002), which posits that organisations learn more from small failures than from large failures, the authors propose that organisations may learn more from large failures due to their greater visibility and magnitude (Dillon and Tinsley, 2008), while small failures may be disregarded or perceived as successes. Overall, studies have shown that in many situations organisations can learn more through experience with failure rather than experience with success (Baum and Dahlin, 2007; Madsen and Desai, 2010). Still, despite the existence of compelling theoretical arguments, the relative effectiveness of learning processes from both successes and failures remains empirically underinvestigated.

2.3. Project characteristics and team learning

The effects of project characteristics such as complexity and uncertainty on NPD team learning can vary depending on the team's previous experiences with project failures or success (Tatikonda and Rosenthal, 2000). The importance of project complexity and uncertainty in determining learning outcomes is significant. This is particularly evident in the NPD process, where the fuzzy front end, which refers to the early stages of project development, is characterised by high levels of uncertainty, confusion and difficulty in identifying a clear direction (Stevens, 2014). The fuzzy front end is influenced by various factors, including market trends, consumer demand and competition, and presents a unique opportunity for firms to explore multiple pathways towards their desired outcome. Nevertheless, uncertainty in the NPD process extends beyond the early stages as consumer demand, technology and competition evolve and change. If a team has experienced success in previous projects, team members may be more confident in their ability to handle complex and uncertain situations and more likely to embrace new challenges as opportunities for learning and development (Doloi et al., 2011). On the other hand, if a team has experienced failures in previous projects, they may be more cautious and risk-averse in the face of uncertainty and may struggle to effectively handle complex projects (Edmondson et al., 2001).

In general terms, project complexity and uncertainty could have both positive and negative effects on NPD team learning in an organisational context (Bosch-Rekveldt et al., 2011; De Toni and Pessot, 2021; Vidal et al., 2011). The positive effects of project complexity on team learning in an organisational context can be substantial and far-reaching (Edmondson and Nembhard, 2009). Complex projects allow team members to engage in meaningful and challenging work (Doloi et al., 2011), leading to higher levels of motivation and job satisfaction (Van Der Vegt et al., 2000). The diverse nature of complex projects often requires team members to learn new skills, knowledge and techniques, leading to increased professional development and growth (Edmondson and Nembhard, 2009; Vidal and Marle, 2008). Additionally, the collaboration and problem-solving often required to complete complex projects can increase knowledge sharing among team members (Rosen et al., 2020). These factors can contribute to a culture of learning within the organisation, fostering a sense of shared purpose and promoting continuous improvement (Thomas and Mengel, 2008).

Similarly, project uncertainty can have a positive impact on NPD team learning in several ways. First, uncertainty can create an environment that fosters creativity and innovation (Bellis et al., 2022; Niosi, 1999; Pellizzoni et al., 2019). The unpredictable nature of the project outcomes can challenge team members to think outside the box, come up with new solutions, and experiment with new approaches (Dayan and Elbanna, 2011). This can lead to the discovery of new knowledge and skills as team members are forced to adapt to changing circumstances and find new ways to overcome obstacles (Dayan and Elbanna, 2011). On the other hand, project complexity could also lead to negative effects on NPD teams. Excessive project complexity can lead to decreased motivation and job satisfaction among team members as they become overwhelmed by the demands of the project (De Toni and Pessot, 2021). This can lead to decreased productivity and reduced learning, as team members may be less inclined to share their knowledge and experience with others (Shepherd et al., 2011). Additionally, the stress and pressure associated with complex projects can lead to burnout, further reducing the effectiveness of team members and the organisation's overall performance (Akgün et al., 2007; Carbonell and Rodriguez-Escudero, 2020). Moreover, complex projects can also lead to decreased communication and collaboration among team members (Shepherd et al., 2011). Indeed, due to the high level of complexity, it may be difficult for team members to understand each other's roles and responsibilities, leading to misunderstandings, miscommunication and conflict. Following similar paths, we argue that project uncertainty can have negative impacts on NPD team learning in several ways. Firstly, uncertainty can increase stress levels among team members, which can negatively impact their motivation to learn (Carbonell and Rodriguez-Escudero, 2020). The unpredictability of project outcomes can create pressure on team members to deliver results, which can result in a focus on achieving project goals at the expense of learning and development. When there is uncertainty about project outcomes, team members may be unsure about what is expected of them and what their role is in the project. This can lead to confusion, miscommunication, and decreased focus on learning, which can negatively impact the team's performance and ability to achieve its goals (Shepherd et al., 2011).

Proposition 1. *Project complexity and project uncertainty are conditions that could affect NPD team learning with different configurations depending on past failures or successes together with the interplay of both team and environmental characteristics.*

2.4. Interpersonal team characteristics and NPD team learning

Teams themselves, as key units in organisations, are fundamental elements in the analysis of NPD team learning processes. Recent advancements in NPD practices have encouraged the adoption of an agile mindset. This approach enables teams to refine their processes and adjust their routines iteratively, guided by ongoing learning and the demands of a dynamic environment (Meier and Kock, 2021; Pellizzoni et al., 2019). We argue that several team characteristics reflect such an agile mindset. Importantly, interpersonal team characteristics, such as innovation norms, cohesion, and decision-making autonomy (Stock, 2014), are key in shaping the way a team approaches learning processes (Zellmer-Bruhn and Gibson, 2006). If a team has experienced success in previous projects, they may feel more confident in their abilities and be more open to taking risks and trying new approaches (Doloi et al., 2011). This can lead to greater innovation and more effective learning, as team members are more likely to experiment and challenge the status quo. However, if a team has experienced failure in the past, team members may become more risk-averse and less likely to take on new challenges (Edmondson, 2011). In this case, interpersonal team characteristics might be determinant, as the team works together to overcome the challenges they face and make more informed decisions.

For team innovation norms to effectively drive NPD team learning, it is important to communicate and reinforce these norms through organisational processes (Decuyper et al., 2010). This can be achieved through clear expectations and goals, as well as recognition and rewards linked to innovative behaviours. Furthermore, team innovation norms should be flexible and adaptable to changing circumstances, allowing team members to continuously innovate and learn (Stock, 2014). Besides, high levels of cohesion can be fostered through effective leadership and clear communication of goals and expectations (Post, 2015). Regular team-building activities and opportunities for team members to collaborate on projects can also increase cohesion and foster a positive learning environment (Brockman et al., 2010). To maintain high levels of cohesion, it is critical to address conflicts and challenges constructively and openly, promoting a culture of open communication and trust (Tekleab et al., 2009). To ensure that decision-making autonomy positively influences NPD team learning, team members should have the necessary skills and resources to make informed decisions (Stock, 2014). This includes access to information, management support, and opportunities for skill development (Haas, 2006). Clear decision-making processes and guidelines can help ensure that team decisions are made fairly and transparently, promoting trust and collaboration among team members. Providing regular feedback on the outcomes of decisions can enhance NPD team learning, allowing team members to reflect on their experiences and make adjustments for future decision-making (Brockman et al., 2010).

On the other hand, innovation norms could create pressure to conform to groupthink, where dissenting opinions are suppressed in the interest of unanimity (Brockman et al., 2010). This can lead to missed opportunities for learning and growth, as well as decreased creativity and innovation in the long term. Also, cohesion can have negative impacts on NPD team learning (Wise, 2014). When teams are too cohesive, they may become resistant to diversity (Tekleab et al., 2016). This could hinder the emergence of new ideas and perspectives, as team members are more likely to rely on the opinions of their peers rather than engage in critical thinking and reflection. This can lead to a lack of openness and a reluctance to challenge one another, which are critical components of effective NPD team learning. Finally, decision-making autonomy, or the extent to which teams are given control over their own processes, can negatively affect NPD team learning. When teams have too much autonomy, they may become insular, relying only on their own expertise and knowledge (Gerwin and Moffat, 1997). This could lead to a lack of exposure to new ideas and a failure to tap into the resources and expertise of others, both of which are crucial for NPD team learning. Teams with high levels of autonomy may also become less accountable for their actions, which can lead to a lack of transparency and decreased opportunities for feedback, reflection, and learning (Brockman et al., 2010). Thus, we develop the following:

Proposition 2. *Innovation norms, cohesion and decision-making autonomy are conditions that could affect NPD team learning with different configurations depending on past failures or successes together with the interplay of both project and environmental characteristics.*

2.5. Environmental uncertainty and NPD team learning

The impact of environmental characteristics such as technological and market turbulence on NPD team learning can vary depending on previous project failures or successes (Belassi and Tukel, 1996). For teams that have experienced success in the past, technological and market turbulence can be seen as opportunities to learn, leading to further success (Madsen and Desai, 2010). The team may be more resilient and better equipped to handle change (Kirkman et al., 2018). However, for teams that have suffered from previous project failures, technological and market turbulence can be viewed as threats, potentially hindering their ability to learn and effectively respond to new challenges (Madsen and Desai, 2010). These teams may require more support and resources to overcome the impact of previous failures and build the confidence necessary for successful learning.

In an organisational context, environmental characteristics play a crucial role in shaping the learning process of teams (Bresman and Zellmer-Bruhn, 2013). We argue that technological and market turbulence, in particular, can positively impact NPD team learning by fostering an environment of innovation and creativity. Specifically, technological advancements can provide teams with new tools and resources that enhance their ability to learn (Edmondson et al., 2001), while market turbulence can drive organisations to adapt to new and changing market conditions, leading to the development of new skills and knowledge (Paladino, 2008). The combination of these environmental factors creates a dynamic and challenging environment that promotes continuous learning. Moreover, the pressure to innovate and adapt to new technologies and market conditions fosters a sense of urgency and motivation within teams (Fredberg and Pregmark, 2022). In this context, teams are forced to quickly develop and implement new ideas, skills, and strategies to remain competitive. In addition, environmental turbulence can increase the demand for cross-functional and interdisciplinary collaboration (Buganza et al., 2009).

However, we argue that environmental characteristics can also have a negative impact on NPD team learning. Indeed, the rapid pace of technological change and volatile market conditions can create an uncertain environment that undermines knowledge transfer and learning processes (Liao and Hu, 2007). Thus, the constant need to adapt to new technologies and market conditions can lead to a lack of stability and predictability, making it difficult for teams to focus on their learning goals. The pressure to continuously innovate and adapt can lead to a culture of fear and uncertainty within organisations, making it difficult for teams to engage in open discussions about their learning needs and challenges (Fredberg and Pregmark, 2022). Team members may

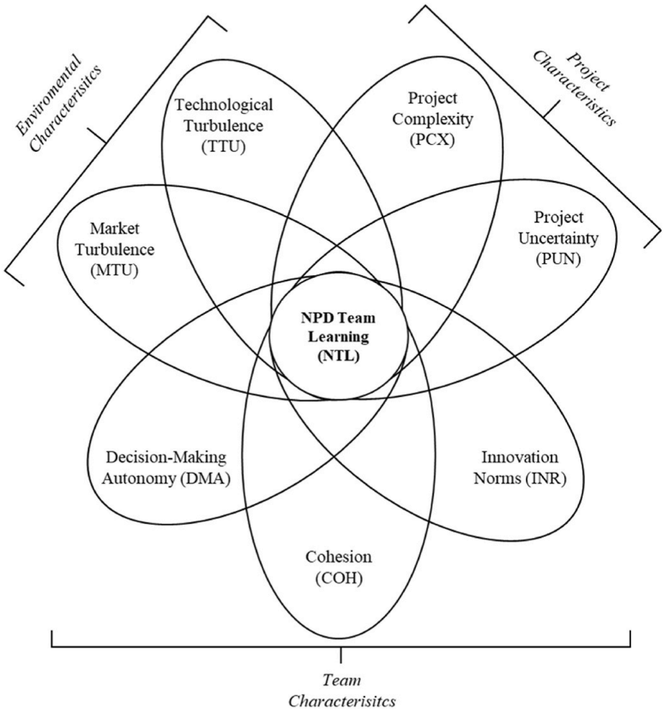

Fig. 1. Theoretical model.

experience a sense of intimidation that deters them from acknowledging their limitations or seeking assistance from others, hindering the sharing of knowledge and expertise that is essential for effective NPD team learning. Furthermore, the focus on innovation and adaptation can lead to a prioritisation of short-term goals over long-term development, hindering the investment of time and resources into the learning process. In such a scenario, teams may be too busy dealing with immediate challenges to focus on developing the skills and knowledge necessary for long-term success. This can lead to a lack of preparedness for future challenges, undermining the sustainability and resilience of organisations. Building on these arguments, we present:

Proposition 3. *Technological and market turbulence are conditions that could affect NPD team learning with different configurations depending on past failures or successes, together with the interplay of both project and team characteristics.*

Fig. 1 shows our theoretical model. We suggest that NPD team learning depends on how multiple conditions interact and combine rather than on how specific factors affect it directly. Following Pappas and Woodside (2021), we used an asymmetric approach to find multiple ways to achieve the same outcome.

3. Method

3.1. Sample and setting

In exploring our propositions, this study used a survey to collect data from managers working in SMEs and large manufacturing firms actively engaging in NPD activities. We began by assessing the content validity of a preliminary version of the questionnaire with managers from firms of various sizes. We then revised and administered it to a sample of NPD project managers in manufacturing firms who have managing roles and authority over the NPD process in their organisations. To enhance the reliability of our analysis, we incorporated two pre-screening questions into the survey. First, we inquired about the number of projects the participants were concurrently involved in, excluding those engaged in multiple projects to minimise instances of simultaneous team memberships (O'Leary et al., 2011) and divergence in membership models (Mortensen, 2014). Second, we questioned the extent of their participation throughout the entire NPD project, i.e. from ideation to product launch. We set a minimum participation threshold of 70% for the activities of the NPD project, discontinuing the data collection for participants falling below this threshold. Lastly, for the question pertaining to learning from failure, we instructed participants to recall only their most recently completed NPD project, where their involvement was substantial (i.e. more than 70%).

We focused on United Kingdom manufacturing firms for three main reasons. First, United Kingdom manufacturing firms represent a

Table 1
Sample Characteristics.

Respondents' Characteristics					
Age			*Gender*		
18–30	23	7.47%	Male	225	73.05%
31–45	141	45.78%	Female	83	26.95%
46–60	132	42.86%			
>60	12	3.90%			
Industry Expertise			*NPD Expertise*		
1–5 years	11	3.57%	1–5 years	14	4.55%
6–10 years	84	27.27%	6–10 years	85	27.60%
>10 years	213	69.16%	>10 years	209	67.86%
Firms' Characteristics					
Size (Employee Number)			*Manufacturing Sector (NACE)*		
5–20	11	3.57%	Computer and Electronics	73	23.70%
21–50	51	16.56%	Electrical and Machinery	71	23.05%
51–250	81	26.30%	Metallic	23	7.47%
251–500	86	27.92%	Motor Vehicles and Transports	64	20.78%
>500	79	25.65%	Pharmaceutical	65	21.10%
			Plastics and Non-metallic	12	3.90%
Technological Level					
High-Tech	171	55.52%			
Low-Tech	137	44.48%			
Grand Total	**308**				

significant and growing segment of the global manufacturing industry (Statista, 2023). Second, a recent report by Deloitte reported that the United Kingdom leads the world in technology innovation due to various initiatives that support its development (Down, 2022). The United Kingdom has a diverse range of high-tech and low-tech manufacturing firms allowing it to cover a broad range of NPD projects. Third, the United Kingdom's national economic strategy is based on open innovation practices and digital business, further allowing a diversity of NPD projects and project management practices inside our sample. As a result, 308 responses were received, all of which passed the manipulation checks included in the questionnaire. Table 1 summarises the sample's characteristics.

3.2. Bias control

To avoid single-source bias, we collected a sample of senior and middle managers from SMEs and large firms in various manufacturing sectors (Bianchi et al., 2019). We did not mention the model in Fig. 1 to prevent directional responses that could bias the interviewees' attention towards the relationships examined in this study (Groves et al., 2011). We attempted to minimise social desirability bias by ensuring confidentiality and asking general questions about the organisation and its members' behaviour. Moreover, the institutional items were less prone to social desirability bias because they did not pertain to individual behaviours or performance (Groves et al., 2011). We also inserted three attention check questions in the survey text and excluded respondents who failed more than one attention check.

To check whether response bias could have undermined the validity of our data, we also conducted a series of robustness tests (Podsakoff et al., 2003). We tested response bias with independent sample t-tests. We found no significant differences when comparing early and late respondents or randomly split groups of respondents on control variables such as age, gender, firm location, size, industry, and technology level. Similarly, we checked common method bias with Harman's single factor test (29.72%) and the marker variable; both tests showed no relevant issues. The VIF for multicollinearity showed an acceptable level (see Chatterjee and Hadi, 2006) for all variables involved in the study ($\mu = 3.61$, tolerance >0.20), with no variable scoring above 5.

3.3. Measures and reliability

In this study we employed scales that were previously validated in published research to ensure the validity of the constructs. All items were measured on a seven-point Likert scale, from "(1) Strongly disagree" to "(7) Strongly agree", and slightly modified to fit the context of NPD. In particular, NPD Product Success (NPS) has been measured through the scale provided by Dayan and Elbanna (2011). The scale measures the extent to which the developed products meet the managers' expectations regarding sales volume and profitability. This measure has been used for the median split discussed in the next subsection.

Our dependent variable, NPD team learning, has been measured through the scale proposed by Sarin and McDermott (2003). In their study, Sarin and McDermott (2003) describe NPD team learning in the context of NPD projects as "the degree to which processing of team experience changes the nature and range of potential team actions" (p. 735). This dynamic interpretation emphasises that NPD team learning is not a static acquisition of knowledge but an ongoing process that continually shapes the team's repertoire of actions and decisions. Through the continuous learning cycle inherent in NPD projects, team members are equipped to respond more adeptly to similar situations in the future, applying the valuable insights gained to various aspects within and beyond the project's boundaries.

Our independent variables include project, team and environmental-level constructs. Regarding project level, NPD Project Complexity (PCX) has been measured following Sarin and McDermott (2003) and is depicted as the extent to which the process of development is challenging and inherently difficult. The measure of NPD Project Uncertainty (PUN) relies on Dayan and Elbanna (2011). Such a measure explores to what extent NPD teams experienced project uncertainty, and it primarily involves a lack of clear information and complexity in predicting outcomes. It arises when necessary information is ambiguous or incomplete, and project results are difficult to foresee. Essentially, it underscores the challenges and unpredictability inherent in innovative processes.

Regarding team level, NPD Team Innovation Norms (INR) refer to the established and articulated expectations, standards, and acceptable behaviours relating to generating innovative ideas within the NPD team. These norms provide a well-defined understanding of what actions are deemed suitable and which are not when fostering innovation. They serve as a guideline for team members, outlining their responsibilities in creating innovations, thus encouraging consistent innovative behaviour (Stock, 2014). NPD Team Cohesion (COH) refers to the interpersonal relationships and a strong sense of team spirit among members. It also includes the satisfaction derived from being a part of the team and the desire to remain a part of it. These factors contribute to a more collaborative, supportive, and effective working environment, facilitating NPD (Stock, 2014). NPD Team Decision-making Autonomy (DMA) reflects an NPD team's independence and discretion in defining and executing their tasks and methods. This includes the team's ability to choose the way to carry out the work, decide on the order of task completion, and define required activities and methods for task fulfilment. Autonomous decision-making contributes to flexibility, adaptability, and a sense of ownership within the team, thereby potentially increasing efficiency and innovation (Stock, 2014).

Regarding the environmental level, Market Turbulence (TTU) is a construct that refers to the volatility and unpredictability of customer preferences and needs in a given industry. It captures the extent to which customer preferences change over time, the continuous search for new products, and the variation in product-related needs between new and existing customers. High market turbulence suggests a dynamic and rapidly evolving marketplace, requiring firms to be agile and responsive to maintain a competitive edge (Dayan and Elbanna, 2011). Technological Turbulence (NTU) captures the rate of technological change and innovation within an industry, including developing and applying new product ideas. It considers the pace at which technology used in product development is changing and the extent to which technological breakthroughs are enabling a large number of new product ideas. High technological turbulence indicates a fast-evolving technological landscape, necessitating organisations to be innovative, adaptable, and forward-looking (Dayan and Elbanna, 2011).

To estimate the underlying latent constructs representing the survey items, we relied on the statistical doctrine of congeneric approaches, which contend the increase in accuracy estimation and representativity of latent constructs (McNeish and Wolf, 2020). In doing so, we employed the CLC Estimator software (Marzi et al., 2023a). Maximum likelihood estimation method has been selected for the weights imputation. The table below (Table 2) shows the full list of items, reliability and AVE. McDonald's Omega was always above 0.70 and met the minimum requirement, confirming the internal consistency and reliability of the measures (Groves et al., 2011). Moreover, the AVE values were well above 0.50, supporting the convergent validity of the constructs' measures.

3.4. Fuzzy-set qualitative comparative analysis (fsQCA)

In this study, we relied on a fuzzy-set Qualitative Comparative Analysis (fsQCA). fsQCA integrates quantitative and qualitative approaches by avoiding the limitations of methodologies that rely only on direct relationships, such as structural equation modelling (Pappas and Woodside, 2021). fsQCA merges the depth of qualitative case study techniques and the broader applicability of quantitative methods. fsQCA fills a niche between exploratory and hypothesis-testing research.

Table 2
Items and Reliability of Latent Variables.

	Omega	AVE
Think about the last project you participated in relation to the development of a new product:		
New Product Success - NPS (Dayan and Elbanna, 2011)	0.83	0.64
The product met or exceeded volume expectations.		
The product met or exceeded sales expectations.		
The product met or exceeded the first-year number expected to be produced and commercialised.		
Overall, the product met or exceeded sales expectations.		
The product met or exceeded return on investment (ROI) expectations.		
NPD Project Complexity - PCX (Sarin and McDermott, 2003)	0.81	0.61
The product developed by our NPD team was technically complex to develop.		
Our NPD team had to use non-routine technology to develop the product.		
The development process associated with the product was relatively simple (R).		
The development of this product required pioneering innovation.		
The product developed by our NPD team is/was complex.		
NPD Project Uncertainty - PUN (Dayan and Elbanna, 2011)	0.74	0.59
How confident were the NPD team members that they were making the right choice?		
To what extent were the goals of this NPD project clear for the participants?		
It was not at all clear what kind of information we should collect so as to finish the NPD project.		
We were very uncertain about the actions that should be taken to finish the NPD project.		
It was very difficult to predict the outcomes of the NPD project.		
Was there a need for extra information before finishing the NPD project?		
NPD Team Innovation Norms - INR (Stock, 2014)	0.81	0.63
In our NPD team it is clear what is acceptable behaviour for innovation generation and what is not acceptable.		
In our NPD team it is clear what members are expected to do in terms of generating innovations and they do it.		
In our NPD team we have clear standards for the innovation behaviour of the team members.		
NPD Team Cohesion - COH (Stock, 2014)	0.84	0.65
In our NPD team, members generally like the other members.		
In our NPD team, members like to stay in this team.		
In our NPD team, there is a high team spirit.		
In our NPD team, members appreciate each other personally.		
In our NPD team, members enjoy being a member of this work unit.		
NPD Team Decision-making Autonomy - DMA (Stock, 2014)	0.79	0.61
Our NPD team is able to choose the way to go about the work in the team.		
Our NPD team decides autonomously how to fulfil its tasks.		
Our NPD team defines our tasks independently.		
Our NPD team defines the required activities and methods to fulfil our tasks autonomously.		
Our NPD team defines the order of task completion autonomously.		
Market Turbulence - MTU (Dayan and Elbanna, 2011)	0.82	0.66
Customers' preferences changed quite a bit over time in our industry.		
Customers tended to look for new products all the time in our industry.		
New consumers tend to have product-related needs that are different from those of our existing customers.		
We are witnessing demand for our product and services from customers who never bought them before.		
Technological Turbulence - TTU (Dayan and Elbanna, 2011)	0.78	0.63
The technology used in the product developed was rapidly changing.		
The technology in our industry was changing rapidly.		
A large number of new product ideas have been made possible through technological breakthroughs in our industry.		
NPD Team Learning - NTL (Sarin and McDermott, 2003)	0.83	0.65
Being a part of this NPD team has been a great learning experience for the team members.		
Member's experience with the NPD team is likely to help them perform better in cross-functional teams in the future.		
Member's experience with the NPD project is likely to help them perform better on product development projects in the future.		
NPD team members are likely to repeat the mistakes made here on other projects (R).		
Due to their experience on this project, NPD team members will be better prepared to handle similar situations.		
Members are likely to apply the lessons learned on this NPD project to other areas in the organisation.		

Summary coefficients of Confirmatory Factor Analysis (CFA) follow: CFI = 0.92; SRMR = 0.004; RMSEA = 0.07.
Items indicated with an (R) have undergone reversal during the data gathering process.

Instead of testing hypotheses, fsQCA generates propositions to determine membership in particular configurations or pathways (Woodside, 2013). When causality in a research phenomenon is multiple, for instance, the outcome depends on a set of factors, fsQCA is a suitable analysis method (Pappas and Woodside, 2021). Instead of estimating the net effects of the independent variables on the outcome, fsQCA examines the relationships between an outcome and all binary combinations of the independent variables. This methodological approach enables identifying relevant configurations that ensure the outcome condition (Ragin, 2009; Pappas and Woodside, 2021). According to Ragin (2009), applying fsQCA can overcome several limitations of traditional, linear, and test theory, as the method allows for causal asymmetry, neutral permutation, and limited diversity. In fsQCA, a configuration represents a combination of factors or situations that are favourable, unfavourable, or non-existent. As a result, the primary aim of fsQCA is to identify key configurations that lead to specific outcomes and identify instances that share a particular set of requirements (Pappas and Woodside, 2021).

To classify NPD projects among the high-performing and low-performing, we applied the median split approach (MacCallum et al., 2002) on the median value of the new product success scale by Dayan and Elbanna (2011) with a crossover value of 4.62. The use of median split to transform a continuous variable in a dichotomous one has been widely applied in social and psychological science (e.g. Homburg et al., 2011; O'Brien and O'Toole, 2021). In our case, median split helps identifying high-performing and low-performing NPD projects based on their reported project success. Indeed, aspirations are the minimum level of performance that decision-makers consider acceptable in NPD projects. Performance exceeding this level is considered successful, while performance falling below it is deemed a failure. (Cyert & March 1963; Madsen and Desai, 2010). As a result, we posited that NPD projects exceeding the value of the median split are deemed "High--Performing NPD projects (HP-NPD)" and are thus labelled as "successful NPD projects". Conversely, NPD projects falling below the median split value are classified as "Low-Performing NPD projects (LP-NPD)" and are consequently labelled as "failed NPD projects". Finally, we employed the reporting framework for fsQCA-based studies presented in Marzi et al. (2023b). Such a framework allowed us to graphically compare the various fsQCA solutions (Fig. 2) with the theorised baseline model (Fig. 1).

3.5. Calibration and necessary conditions

In this study, we followed Pappas and Woodside (2021) to calibrate multi-item scales. The values were all calibrated on a fuzzy scale considering the following three thresholds: the original value covering 5% of the data values, which was the point of full non-membership (fuzzy score = 0.05); the original value covering 50% of the data values, which was the crossover point (fuzzy score = 0.50); and the original value covering 95% of the values, which was the point of full membership (fuzzy score = 0.95). Therefore, the rank of each causal condition spanned from 0 to 1, representing the categories from "no membership" to "full membership", respectively (Ragin, 2009). Table 3 shows the statistics and calibration values for all conditions. Along with

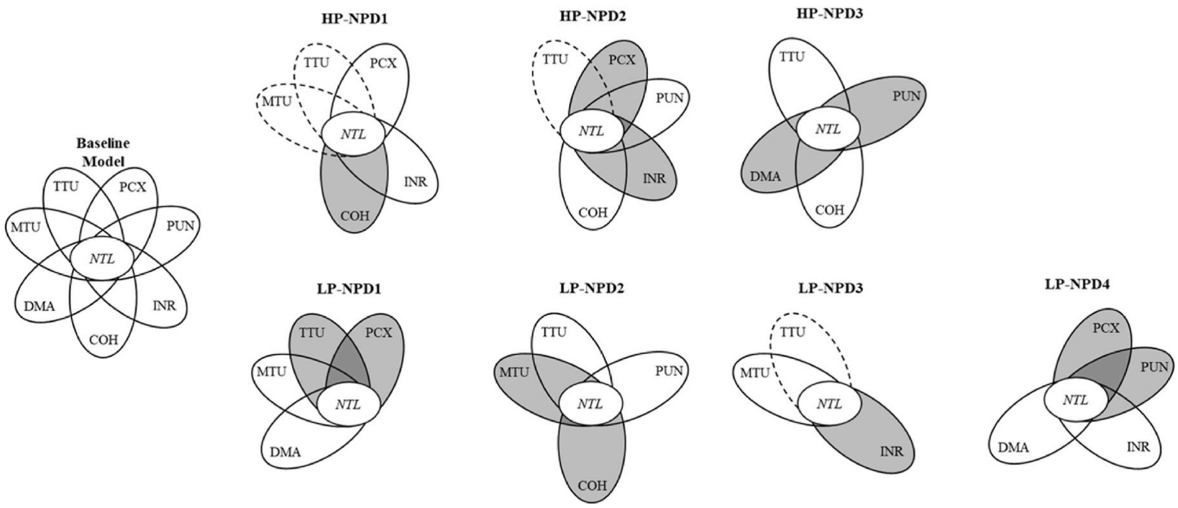

Fig. 2. Graphical Representation of fsQCA Solutions
Note: Bold lines indicate the presence of a condition, dashed lines indicate its absence. Solid-filled circles indicate the presence of a core condition, dashed-filled circles indicate the absence of a core condition. Absence of circles indicate "do not care" condition.

Table 3
fsQCA Calibration.

Constructs	Mean	SD	Min	Max	Fuzzy Score		
					0.05	0.50	0.95
High-Performing NPD Projects (HP-NPD)							
Project Complexity (PCX)	3.67	1.77	1.00	6.94	1.20	3.44	6.57
Project Uncertainty (PUN)	4.37	1.76	1.19	7.00	1.35	4.88	6.85
Innovation Norms (INR)	4.46	1.84	1.00	7.00	1.00	4.84	7.00
Cohesion (COH)	5.12	1.47	1.00	7.00	1.19	5.33	7.00
Decision-Making Autonomy (DMA)	4.70	1.62	1.20	7.00	1.20	5.34	6.80
Market Turbulence (MTU)	4.38	1.66	1.24	6.87	1.26	4.51	6.56
Technological Turbulence (TTU)	4.26	1.72	1.00	7.00	1.00	4.32	7.00
NPD Team Learning (NTL)	4.87	1.63	1.12	7.00	1.29	5.44	6.76
Low-Performing NPD Projects (LP-NPD)							
Project Complexity (PCX)	4.29	1.63	1.12	7.00	1.19	4.38	6.80
Project Uncertainty (PUN)	5.13	1.78	1.00	7.00	1.17	5.81	7.00
Innovation Norms (INR)	4.17	1.80	1.00	7.00	1.00	4.03	6.66
Cohesion (COH)	3.80	1.60	1.35	7.00	1.67	3.21	6.49
Decision-Making Autonomy (DMA)	4.35	1.81	1.14	6.81	1.20	4.82	6.72
Market Turbulence (MTU)	4.49	1.72	1.00	7.00	1.25	5.03	6.73
Technological Turbulence (TTU)	4.74	1.71	1.32	7.00	1.32	4.68	7.00
NPD Team Learning (NTL)	4.43	1.85	1.00	6.86	1.17	4.54	6.83

calibration, it was important to test the necessity of each condition.

Within the methodological framework of fsQCA, variables could manifest in multiple ways: they could be embedded in a solution (present), entirely excluded (absent), or fall into the "do not care" group. This latter group implies that a condition's presence or absence is not shaping a specific configuration's outcome (Pappas and Woodside, 2021). Core conditions indicate elements with a marked causal connection with the intended outcome, shaping the configuration's result. In contrast, peripheral elements represent conditions that hold a marginal (but significant) role in determining a causal relationship with the outcome, suggesting their influence on the configuration's result is comparatively lower than core conditions (Fiss, 2011; Pappas and Woodside, 2021). We tested whether any of the seven conditions were necessary and always present (or absent) for NPD team learning. According to Pappas and Woodside (2021), all levels of our conditions were below the threshold of 0.9, indicating that the condition variables cannot explain the results individually, but combinations need to be identified.

4. Results

We examined how different combinations of our seven causal conditions could lead to NPD team learning by using the fsQCA truth table analysis. We set a frequency threshold of four and a consistency threshold of 0.90 (Pappas and Woodside, 2021) to include 80% of the cases (Ragin, 2009). The fsQCA results showed multiple high-performing and low-performing NPD project configurations. We tested the robustness of the solutions by changing the crossover points for calibration (±25%) as suggested by Fiss (2011). The solutions remained stable with minor permutation changes and numerical values.

To further assess the reliability of the median split procedure, we undertook multiple robustness checks, adjusting the median split value

Table 4
SolutioHns for High-performing NPD Projects.

Configurations	Solutions		
	HP-NPD1	HP-NPD2	HP-NPD3
Project Complexity (PCX)	•	●	
Project Uncertainty (PUN)		•	●
Innovation Norms (INR)	•	●	
Cohesion (COH)	●	•	•
Decision-Making Autonomy (DMA)			●
Market Turbulence (MTU)	⊗		
Technological Turbulence (TTU)	⊗	⊗	•
Consistency	0.83	0.82	0.84
Raw Coverage	0.59	0.57	0.43
Unique Coverage	0.08	0.07	0.02
Overall Solution Consistency	0.83		
Overall Solution Coverage	0.72		

Note: Black circles (●) indicate the presence of a condition, and circles with "x" (⊗) indicate its absence. Large circle: core condition; small circle: peripheral condition; blank space: "do not care" condition.

Table 5
Solutions for Low-performing NPD Projects.

Configurations	Solutions			
	LP-NPD1	LP-NPD2	LP-NPD3	LP-NPD4
Project Complexity (PCX)	●			●
Project Uncertainty (PUN)		•		●
Innovation Norms (INR)			●	•
Cohesion (COH)		●		
Decision-Making Autonomy (DMA)	•			•
Market Turbulence (MTU)	•	●	•	
Technological Turbulence (TTU)	●	•	⊗	
Consistency	0.88	0.75	0.83	0.82
Raw Coverage	0.47	0.39	0.37	0.36
Unique Coverage	0.16	0.06	0.05	0.03
Overall Solution Consistency	0.80			
Overall Solution Coverage	0.71			

Note: Black circles (●) indicate the presence of a condition, and circles with "x" (⊗) indicate its absence. Large circle: core condition; small circle: peripheral condition; blank space: "do not care" condition.

by intervals of 1, 2, and 3 standard deviations. These modifications produced notably divergent fsQCA solutions, underscoring that the median split value is positioned at a juncture where NPD projects, both above and below this value, manifest considerable differences in their outcomes. Additionally, we examined the robustness of the median split value in the face of industry variations (firm size, industry, and technological level). With the median at 4.62, we executed reliability tests by fashioning subsamples with the aid of the stipulated control variables. The resulting fsQCA analysis demonstrated that the findings were in alignment with the consolidated data across the various sub-samples. Tables 4 and 5 present the fsQCA's results. There are seven configurations: three for high-performing NPD projects (HP-NPD) and four for low-performing NPD projects (LP-NPD). Both sets have high coverage and consistency levels (Ragin, 2009). Table 4 shows that the solution coverage for high-performing NPD projects explains 72% of the cases (i.e. a 0.72 coverage).

Table 5 shows that the overall solution coverage for low-performing NPD projects can explain 71% of the cases (i.e. a coverage of 0.71). The non-specularity of the solutions between high and low-performing NPD projects corroborates the correctness of the method, as the results follow different paths towards the outcome variable, namely, NPD team learning.

The various combinations suggest that NPD teams learn differently and with different pathways when an NPD project performs high as compared to a low-performing one. Fig. 2 graphically summarises the configurations associated with high-performing NPD projects and low-performing NPD projects.

4.1. High-performing NPD projects – successful NPD projects

In the context of HP-NPD projects, our analysis has revealed three key solutions instrumental in driving NPD team learning outcomes. The first solution (HP-NPD1) underscores the importance of project complexity, innovation norms, team cohesion, and decision-making autonomy in achieving NPD team learning outcomes. Specifically, HP-NPD1 shows that team cohesion is the only core condition of the configuration, while project complexity and team innovation norms represent peripheral conditions to team cohesion. At the same time, HP-NPD1 exhibits a learning pathway requiring the absence of market and technological turbulence. The second solution (HP-NPD2) emphasises the role of market turbulence in achieving NPD team learning outcomes. HP-NPD2 highlights that project complexity and team innovation norms are core conditions to reach the outcome variable, supported by the peripheral role of project uncertainty and team cohesion. Technological turbulence should be absent in such a configuration. The third solution (HP-NPD3) highlights the importance of project uncertainty and decision-making autonomy to achieve NPD team learning outcomes. Also, team cohesion and technological turbulence play a peripheral role in such an outcome.

Upon examining the impact of each variable, our study indicates that team cohesion, innovation norms, and decision-making autonomy play a critical role in facilitating NPD team learning in high-performing projects. Overall, our analysis of high-performing projects indicates that NPD team learning is centred on highly cohesive teams, the promotion of innovation norms, and the granting of decision-making autonomy to the team. An important role is also played by project level variables. In fact, it emerges that learning outcomes are typically fostered by teams with highly developed interpersonal team characteristics. For optimal learning outcomes, team cohesion requires the absence of environmental turbulence, allowing teams to improve interpersonal relatioships and enhancing their learning (see HP-NPD1). Interestingly, some degree of project complexity (HP-NPD2) and project uncertainty (HP-NPD3) is functional to enhance learning outcomes, when combined with innovation norms and decision-making autonomy, respectively.

4.2. Low-performing NPD projects – failed NPD projects

In contrast to our analysis of the HP-NPD projects, our examination of the LP-NPD projects revealed four solutions that lead to NPD team learning outcomes. In LP-NPD1, project complexity and technological turbulence are core conditions in fostering the outcome variable, secondarily supported by team decision-making autonomy and market turbulence. Thus, high project complexity and uncertainty levels, coupled with technological turbulence, can enhance NPD team learning outcomes. In LP-NPD2, core conditions are team cohesion and market turbulence, whereas peripheral conditions include project uncertainty and technological turbulence. The LP-NPD2 solution underlines the positive impact of team cohesion on NPD team learning outcomes. Specifically, high levels of team cohesion, coupled with project complexity and project uncertainty, can lead to positive NPD team learning outcomes. In LP-NPD3, team innovation norms are core conditions together with the peripheral role of market turbulence and the absence of technological turbulence. Finally, in LP-NPD4, project complexity and uncertainty are core conditions, with the marginal support of team innovation norms and decision-making autonomy. LP-NPD4 highlights the positive impact of project uncertainty and technological turbulence on NPD team learning outcomes.

Thus, our results indicate that team cohesion, innovation norms, and decision-making autonomy are significant drivers of learning for NPD team. Importantly, in low-performing projects it emerges that also project-level and environmental-level variables occupy a prominent position in enhancing NPD team learning. For example, multiple solutions indicate that project complexity can highly affect NPD team learning. Overall, to ameliorate the learning outcomes of NPD teams in low-performing projects, our analysis underscores the importance of building cohesive teams, advocating for innovation norms, and granting decision-making autonomy. Interestingly, the proposed configurations also underscore that, together with team-level variables, teams should consider project complexity and uncertainty as valuable learning sources. Finally, our data highlight the dual role of environmental (both market and technological) turbulence. While it can foster learning in certain conditions (e.g. see solutions LP-NPD1 and LP-NPD2), there are instances where the learning process benefits from its absence (e.g. see solution LP-NPD3).

5. Discussion

5.1. Theoretical implications

At a theoretical level, this study provides novel insights that could contribute in various research domains. First, it enriches the extant research on NPD team learning (Carbonell and Rodriguez-Escudero, 2020; Nellen et al., 2020) and NPD practices (Knudsen et al., 2023; Marzi et al., 2020; Oehmen et al., 2014) by addressing the relative scarcity of studies focused on failed NPD projects (Forsman, 2021; Madsen and Desai, 2010; Rhaiem and Amara, 2021). This study moves beyond merely analyzing NPD team success (e.g. Dayan and Elbanna, 2011) and adds depth to the existing literature by conducting a comparative analysis of the key determinants of NPD team learning outcomes in both successful and failed projects. It identifies multiple configurations of conditions enhancing to NPD team learning and emphasises the importance of considering project-level, team-level, and environmental-level factors. Specifically, in successful projects, the study indicates that interpersonal team characteristics are key in fostering NPD team learning outcomes. Interestingly, also project-level variables are relevant, while multiple solutions require the absence of environmental turbulence to optimise team learning processes. On the other hand, in failed projects, project complexity, uncertainty, technological and market turbulence, in combination with interpersonal team characteristics, play a prominent effect on NPD team learning outcomes.

Second, this study contributes to the NPD practices literature by investigating NPD teams and their outcomes, offering insights into both successful and failed NPD projects (Knudsen et al., 2023; Marzi et al., 2020; Meier and Kock, 2021). For failed NPD teams, recognising and managing project complexity, uncertainty, and environmental turbulence can lead to improved NPD learning outcomes. Although associated with difficulties, these factors can prompt a learning response that identifies and addresses operational shortcomings, potentially converting low performance into a platform for team growth. Moreover, interpersonal team characteristics, including team cohesion, innovation norms, and decision-making autonomy, are key across all performance levels. Enviromental characteristics like market and technological turbulence can stimulate NPD team learning opportunities, especially coming from previously failed projects. In the context of failed projects, the results suggest that market turbulence prompted teams to adapt to changing customer demands and competitive pressures, promoting continuous learning. At the same time, technological turbulence might have encouraged teams to consistently upgrade their knowledge and skills. Through a comparative analysis of the learning pathways, this research improves our understanding of the factors that influence NPD team performance and the development of new products. Indeed, the findings reveal that learning from both successes and failures is crucial for enhancing NPD team learning and facilitating the development of innovative products.

Third, we believe this study could bring value to the sense-making literature (e.g. Boisot and Child, 1999; Gell-Mann, 1994; Weick, 1995). In particular, it sheds light on the differential epistemological trajectories NPD teams navigate after project outcomes. Successful projects tend to see teams gravitate towards inherent project and team characteristics, hinting at a potential strategy to reduce complexity. In contrast, failures push teams to confront external factors and complexities, pointing towards an absorptive approach. By charting how NPD teams assimilate, interpret, and act on their experiences, the study underscores the pivotal role of sensemaking in enhancing adaptability and strategic orientation in today's intricate business landscape. Thus, from a sense-making perspective, these findings highlight the dynamic nature of team interpretation and action, emphasising the essence of sensemaking as a continuous, iterative process.

Fourth, this study underscores the value of embracing complexity and uncertainty as catalysts for positive outcomes (e.g. Garud et al., 2011; Niosi, 1999), even when a team had just encountered a failure. As organisations and individuals confront an increasingly dynamic and unpredictable environment, the insights gleaned from this research offer practical and actionable guidance on navigating through ambiguity and uncertainty to promote growth, innovation, and sustained success. The emergent phenomenon of serendipity, or the search that leads to an unintended positive outcome, can arise from such dynamic conditions (Balzano, 2022). In this scenario, the present study underscores the relevance of acknowledging the advantages of navigating through ambiguous and unpredictable scenarios, particularly in light of the dynamic and rapidly evolving landscape of contemporary times. Indeed, the study highlights the importance of adopting a growth mindset that embraces learning and experimentation to cope with ambiguity and uncertainty. By reframing complexity as an opportunity for growth and development rather than a barrier to success, individuals and organisations can leverage the potential benefits of navigating through uncertain conditions more effectively.

5.2. Practical implications

This study also has a number of practical implications. The obtained findings can be leveraged by organisations to develop better practices and policies that facilitate learning from both failures and successes, thereby improving project outcomes and enhancing overall organisational performance. Interestingly, when teams have dealt with prior failures, both market and technological turbulence present a double-edged sword. While, at times, less turbulence can promote team learning, in other instances, a certain degree of turbulence can aid teams in leveraging their experience and enhancing their learning processes. This effect is less pronounced when teams have previously encountered prior successes, as project-level and team-level variables become more significant in enhancing team learning outcomes in such cases.

Thus, from a managerial perspective, this study provides guidance for NPD teams aiming to enhance their performance by drawing lessons from both successful and failed projects. Specifically, we compare the learning pathways adopted by teams across these project outcomes. Our findings underscore the importance of team-level factors. Regardless of the outcome of previous projects, it is crucial for organisations to focus on nurturing a cohesive team, promoting innovation norms, and granting decision-making autonomy to ensure team cohesion.

Complexity and uncertainty can be seen as catalysts for positive team outcomes. To effectively manage these inherent challenges, it is key to nurture a growth and agile mindset that champions learning and experimentation (Meier and Kock, 2021). This implies adopting a proactive attitude towards ambiguity, interpreting it as an avenue for advancement and evolution instead of perceiving it as an obstacle to success. Consequently, organisations should foster adaptability in response to uncertainty while concurrently recognising complexity and uncertainty as integral conditions of business landscapes (Pellizzoni et al., 2019). By developing the capacity to flexibly adjust to changing circumstances and maintain a sense of purpose and direction amidst uncertainty, teams can more effectively weather the challenges of volatile and dynamic environments. Leveraging diverse perspectives and expertise can be highly beneficial when navigating turbulent scenarios (Mack et al., 2016). Drawing on the viewpoint of a diverse range of stakeholders, organisations can develop more nuanced strategies for managing uncertainty and turbulence.

5.3. Future research avenues

While this study sheds light on the key determinants of NPD team learning outcomes in NPD projects by comparing the routes on how NPD teams learn differently from failure and success, it also opens multiple avenues for future research. A first research avenue could enrich our understanding of NPD learning outcomes, both in cases of failure and success. For example, future research could consider individual-level factors, such as personality traits and cognitive styles, and organisational-level factors, such as organisational culture and business strategy, that may concurrently impact NPD team learning outcomes in NPD projects (Ferreira et al., 2020; Nellen et al., 2020). Sarin and McDermott (2003) highlighted the relevance of leadership characteristics within NPD teams on their learning. Accordingly, future research could also assess the concurrent role of leadership in facilitating team learning from failure and success, examining how different leadership styles and behaviours can impact NPD team learning outcomes.

Learning from failure and success is crucial for the success of teams (Deichmann and Ende, 2014; Madsen and Desai, 2010; Muehlfeld et al., 2012). However, not all learning mechanisms and strategies might be equally effective, and it is important for firms to compare and evaluate different approaches to identify the most effective ones. This can help firms to develop more effective learning and development programs for NPD teams. Thus, a second research avenue could compare the effectiveness of different learning mechanisms and strategies employed by NPD teams to learn from failure and success, including informal and formal learning (Bednall and Sanders, 2017; Bunderson and Boumgarden, 2010) and individual versus collective learning (Brockman et al., 2010; Knapp, 2010), providing firms with further insights into the development of effective learning and development programs for NPD teams. Indeed, research has shown that both informal and formal learning is important for teams to learn (Bednall and Sanders, 2017). Informal learning is often more effective for complex and ambiguous problems where there is no clear solution. It allows NPD teams to experiment, explore, and learn through trial and error. On the other hand, formal learning is more effective for well-defined problems (Bunderson and Boumgarden, 2010). It allows NPD teams to learn best practices, techniques, and methodologies that can be applied to similar problems in the future.

A third avenue of research could investigate the medium- and long-term effects of learning from both failure and success on NPD team performance and innovation success (Forsman, 2021), considering the potential impact of learning on future projects and outcomes, shedding light on how teams can improve their future outcomes, creating a culture of continuous improvement and innovation, and managing risk (Dillon and Tinsley, 2008). Studying the impact of learning on NPD team performance and innovation success can also guide organisations in the identification of potential areas for improvement in their NPD processes, helping them understand the long-term benefits of investing in NPD team learning (Edmondson, 2011).

A fourth area of research could investigate the nuances of the correlation between NPD team learning outcomes and other crucial factors, such as team innovation, creativity, satisfaction, as well as NPD performance, in both successful and failed project scenarios. By engaging in learning activities, teams can improve their ability to innovate and generate creative solutions to problems (Bosch-Rekveldt et al., 2011; De Toni and Pessot, 2021). Exploring the relationship between NPD team learning outcomes and other outcomes can help organisations better understand how NPD team learning impacts these important outcomes. For example, team innovation and creativity can be positively impacted by NPD team learning. When team members are exposed to new ideas and perspectives, they can generate more innovative and creative solutions to problems (Levitt & March 1988; Liao et al., 2008).

6. Conclusions and limitations

This study presents an empirical investigation into the factors that influence NPD team learning. Specifically, by analysing both cases of project failures and project successes, this study highlights the relevance of the project, interpersonal team, and environmental characteristics in shaping NPD team learning outcomes. Our data suggest that failure and success lead to different pathways towards NPD team learning.

Despite its contributions, this study has a number of limitations that need to be considered. One limitation is that it was conducted in the manufacturing industry, with a focus on SMEs, and therefore the generalizability of the findings to other industries may be limited. Self-reported data were used in the study, which may introduce bias and affect the validity of the results. Our study focused only on individuals engaged in a single project at the time, thus not considering role changes in multiple NPD projects. Still, we acknowledge that cross-functional team members navigating multiple contexts may exhibit divergent learning pathways. Furthermore, the study only examined NPD team learning outcomes at a single point in time without considering potential changes in these outcomes over the course of a project. Additionally, our core unit of analysis was centred on project managers, as opposed to other team members. This focus could potentially curtail the generalizability of our findings, as the varied experiences of different team members may shape their perception of NPD team learning pathways in different ways.

To conclude, we hope that this study will prove valuable for organisations seeking to evaluate the benefits of investing in NPD team learning strategies. We also hope that, by drawing on the insights obtained from our research, organisations can enhance their NPD processes and maximise team learning. In this regard, this study could represent a step forward in developing a detailed understanding of effective and efficient NPD learning processes. At the same time, this study could offer new insights to managers on enhancing team learning in ever-evolving business landscapes.

Data availability

The authors do not have permission to share data.

Acknowledgments

We wish to express our sincere gratitude to the Editor-in-Chief Wim Vanhaverbeke for his guidance and invaluable support. We also extend our thanks to the handling editor for managing the review process with utmost professionalism. We deeply appreciate the anonymous reviewers for their insightful critiques, and for dedicating their time and technical expertise. Special thanks also go to the participants of the R&D Management and IPDMC conferences. Their constructive feedback on earlier versions of the study has been key in refining our research.

References

Açıkgöz, A., Acikgoz, F., Günsel, A., Latham, G.P., 2023. The relationship between imperfect information and performance speed: the mediation of improvisation in new product development teams. Technovation 121, 102636.
Ahn, J.H., Kim, M.S., Lee, D.J., 2005. Learning from the failure: experiences in the Korean telecommunications market. Technovation 25 (1), 69–82.
Akgün, A.E., Byrne, J.C., Lynn, G.S., Keskin, H., 2007. Team stressors, management support, and project and process outcomes in new product development projects. Technovation 27 (10), 628–639.
Argote, L., Lee, S., Park, J., 2021. Organisational learning processes and outcomes: major findings and future research directions. Manag. Sci. 67 (9), 5399–5429.
Bajarin, T., 2022. Pen computing and apple's Newton message pad's impact on today's mobile computing. Available at: https://www.forbes.com/sites/timbajarin/2022/11/08/pen-computing-and-apples-newton-message-pads-impact-on-todays-mobile-computing/. (Accessed 4 February 2023).
Balzano, M., 2022. Serendipity in management studies: a literature review and future research directions. Manag. Decis. 60 (13), 130–152.
Baum, J.A., Dahlin, K.B., 2007. Aspiration performance and railroads' patterns of learning from train wrecks and crashes. Organ. Sci. 18, 368–385.
Bednall, T.C., Sanders, K., 2017. Do opportunities for formal learning stimulate follow-up participation in informal learning? A three-wave study. Hum. Resour. Manag. 56 (5), 803–820.
Belassi, W., Tukel, O.I., 1996. A new framework for determining critical success/failure factors in projects. Int. J. Proj. Manag. 14 (3), 141–151.
Bellis, P., Verganti, R., Trabucchi, D., 2022. Let's move on! How pair collaboration activates resilience toward innovation crises. Eur. Manag. J. (in press).
Belson, K., 2006. In sony's stumble, the ghost of Betamax. Available at. https://www.nytimes.com/2006/02/26/business/in-sonys-stumble-the-ghost-of-betamax.html. (Accessed 7 February 2023).
Bianchi, M., Marzi, G., Zollo, L., Patrucco, A., 2019. Developing software beyond customer needs and plans: an exploratory study of its forms and individual-level drivers. Int. J. Prod. Res. 57 (22), 7189–7208.

Boisot, M., Child, J., 1999. Organizations as adaptive systems in complex environments: the case of China. Organ. Sci. 10 (3), 237–252.
Bosch-Rekveldt, M., Jongkind, Y., Mooi, H., Bakker, H., Verbraeck, A., 2011. Grasping project complexity in large engineering projects: the TOE (Technical, Organizational and Environmental) framework. Int. J. Proj. Manag. 29 (6), 728–739.
Bradley, K.J., Aguinis, H., 2022. Team Performance: Nature and Antecedents of Nonnormal Distributions. Organization Science.
Bresman, H., Zellmer-Bruhn, M., 2013. The structural context of team learning: effects of organisational and team structure on internal and external learning. Organ. Sci. 24 (4), 1120–1139.
Brockman, B.K., Rawlston, M.E., Jones, M.A., Halstead, D., 2010. An exploratory model of interpersonal cohesiveness in new product development teams. J. Prod. Innovat. Manag. 27 (2), 201–219.
Buganza, T., Dell'Era, C., Verganti, R., 2009. Exploring the relationships between product development and environmental turbulence: the case of mobile TLC services. J. Prod. Innovat. Manag. 26 (3), 308–321.
Bunderson, J.S., Boumgarden, P., 2010. Structure and learning in self-managed teams: why "bureaucratic" teams can be better learners. Organ. Sci. 21 (3), 609–624.
Carbonell, P., Rodriguez-Escudero, A.I., 2020. The effect of transactive memory systems on job stress of new product development teams: moderating effects of project complexity and technological turbulence. IEEE Trans. Eng. Manag. 69 (4), 1432–1446.
Chatterjee, S., Hadi, A.S., 2006. Regression Analysis by Example. Wiley, New York, NY.
Correani, A., De Massis, A., Frattini, F., Petruzzelli, A.M., Natalicchio, A., 2020. Implementing a digital strategy: learning from the experience of three digital transformation projects. Calif. Manag. Rev. 62 (4), 37–56.
Cyert, R.M., March, J.G., 1963. A Behavioral Theory of the Firm. Prentice Hall, Englewood Cliffs, NJ.
Dahlin, K.B., Chuang, Y.T., Roulet, T.J., 2018. Opportunity, motivation, and ability to learn from failures and errors: Review, synthesis, and ways to move forward. Acad. Manag. Annals 12 (1), 252–277.
Dayan, M., Elbanna, S., 2011. Antecedents of team intuition and its impact on the success of new product development projects. J. Prod. Innovat. Manag. 28 (s1), 159–174.
De Toni, Pessot, E., 2021. Investigating organisational learning to master project complexity: An embedded case study. J. Bus. Res. 129, 541–554.
Decuyper, S., Dochy, F., Van den Bossche, P., 2010. Grasping the dynamic complexity of team learning: An integrative model for effective team learning in organisations. Ed. Res. Rev. 5 (2), 111–133.
Deichmann, D., Ende, J.V.D., 2014. Rising from failure and learning from success: the role of past experience in radical initiative taking. Organ. Sci. 25 (3), 670–690.
Dillon, R.L., Tinsley, C.H., 2008. How near-misses influence decision making under risk: a missed opportunity for learning. Manag. Sci. 54, 1425–1440.
Doloi, H., Iyer, K.C., Sawhney, A., 2011. Structural equation model for assessing impacts of contractor's performance on project success. Int. J. Proj. Manag. 29 (6), 687–695.
Down, D., 2022. Fast 50 Insight Report 2022. Available at: https://www2.deloitte.com/uk/en/pages/private-markets/articles/fast50-insight-report-2022-about.html. (Accessed 9 February 2023).
Edmondson, A.C., 2011. Strategies for learning from failure. Harv. Bus. Rev. 89 (4), 48–55.
Edmondson, A.C., Nembhard, I.M., 2009. Product development and learning in project teams: the challenges are the benefits. J. Prod. Innovat. Manag. 26 (2), 123–138.
Edmondson, A.C., Bohmer, R.M., Pisano, G.P., 2001. Disrupted routines: team learning and new technology implementation in hospitals. Adm. Sci. Q. 46 (4), 685–716.
Ferreira, J.J.M., Fernandes, C.I., Ferreira, A.F.F., 2020. Wearing failure as a path to innovation. J. Bus. Res. 120, 195–202.
Fiol, C.M., Lyles, M.A., 1985. Organisational learning. Acad. Manag. Rev. 10 (4), 803–813.
Fiss, P.C., 2011. Building better causal theories: A fuzzy set approach to typologies in organization research. Acad. Manag. J. 54 (2), 393–420.
Forsman, H., 2021. Innovation failure in SMEs: a narrative approach to understand failed innovations and failed innovators. Int. J. Innovat. Manag. 25 (9), 2150104.
Fredberg, T., Pregmark, J.E., 2022. Organisational transformation: handling the double-edged sword of urgency. Long. Range Plan. 55 (2), 102091.
Garber, D., 2023. Learning from the mistakes of the Edsel. https://www.funded.today/blog/learning-from-the-mistakes-of-the-edsel. (Accessed 8 January 2023).
García-Quevedo, J., Segarra-Blasco, A., Teruel, M., 2018. Financial constraints and the failure of innovation projects. Technol. Forecast. Soc. Change 127, 127–140.
Garud, R., Gehman, J., Kumaraswamy, A., 2011. Complexity arrangements for sustained innovation: lessons from 3M Corporation. Organ. Stud. 32 (6), 737–767.
Gell-Mann, M., 1994. Complex Adaptive Systems, vol. 19. Addison-Wesley, pp. 17–45.
Gerwin, D., Moffat, L., 1997. Withdrawal of team autonomy during concurrent engineering. Manag. Sci. 43 (9), 1275–1287.
Gilbert, B., 2019. 25 of the biggest failed products from the world's biggest companies. Available at: https://www.businessinsider.com/biggest-product-flops-in-history-2016-12?r=US&IR=T. (Accessed 10 February 2023).
Groves, R.M., Fowler Jr., F.J., Couper, M.P., Lepkowski, J.M., Singer, E., Tourangeau, R., 2011. Survey Methodology. John Wiley & Sons.
Guzzini, E., Iacobucci, D., Palestrini, A., 2018. Collaboration for innovation and project failure. A dynamic analysis. Econ. Innovat. N. Technol. 27 (8), 695–708.
Haas, M.R., 2006. Knowledge gathering, team capabilities, and project performance in challenging work environments. Manag. Sci. 52 (8), 1170–1184.
Hayward, M.L., 2002. When do firms learn from their acquisition experience? Evidence from 1990-1995. Strat. Manag. J. 23, 21–39.
Homburg, C., Müller, M., Klarmann, M., 2011. When should the customer really be king? On the optimum level of salesperson customer orientation in sales encounters. J. Market. 75 (2), 55–74.
Huber, G.P., 1991. Organisational learning: the contributing processes and the literatures. Organ. Sci. 2 (1), 88–115.
Khanna, R., Guler, I., Nerkar, A., 2016. Fail often, fail big, and fail fast? Learning from small failures and R&D performance in the pharmaceutical industry. Acad. Manag. J. 59 (2), 436–459.
Kirkman, B.L., Stoverink, A.C., Mistry, S., Rosen, B., 2018. Bouncing back together: toward a theoretical model of work team resilience. Acad. Manag. Rev. 43 (2), 383–409.
Knapp, R., 2010. Collective (team) learning process models: a conceptual review. Hum. Resour. Dev. Rev. 9 (3), 285–299.
Knudsen, M.P., Von Zedtwitz, M., Griffin, A., Barczak, G., 2023. Best practices in new product development and innovation: results from PDMA's 2021 global survey. J. Prod. Innovat. Manag. 40 (3), 257–275.
Lant, T.K., 1992. Aspiration level adaptation: an empirical exploration. Manag. Sci. 38, 623–644.
Leoncini, R., 2016. Learning-by-failing. An empirical exercise on CIS data. Res. Pol. 45 (2), 376–386.
Levitt, B., March, J.G., 1988. Organisational learning. Annu. Rev. Sociol. 14 (1), 319–338.
Liao, S.H., Hu, T.C., 2007. Knowledge transfer and competitive advantage on environmental uncertainty: an empirical study of the Taiwan semiconductor industry. Technovation 27 (6–7), 402–411.
Liao, S.H., Fei, W.C., Liu, C.T., 2008. Relationships between knowledge inertia, organisational learning and organisation innovation. Technovation 28 (4), 183–195.
MacCallum, R.C., Zhang, S., Preacher, K.J., Rucker, D.D., 2002. On the practice of dichotomisation of quantitative variables. Psychol. Methods 7 (1), 19.
Mack, O., Khare, A., Krämer, A., Burgartz, T. (Eds.), 2016. Managing in a VUCA World. Springer.
Madsen, P.M., Desai, V., 2010. Failing to learn? The effects of failure and success on organisational learning in the global orbital launch vehicle industry. Acad. Manag. J. 53 (3), 451–476.
March, J.G., 1981. Footnotes to organisational change. Adm. Sci. Q. 26, 563–577.
Marzi, G., 2022. On the nature, origins and outcomes of over featuring in the new product development process. J. Eng. Technol. Manag. 64, 101685.
Marzi, G., Balzano, M., Egidi, L., Magrini, A., 2023. CLC estimator: a tool for latent construct estimation via congeneric approaches in survey research. Multivariate Behav. Res.
Marzi, G., Ciampi, F., Dalli, D., Dabic, M., 2020. New product development during the last ten years: the ongoing debate and future avenues. IEEE Trans. Eng. Manag. 68 (1), 330–344.
Marzi, G., Balzano, M., Egidi, L., Magrini, A., 2023a. CLC Estimator: a tool for latent construct estimation via congeneric approaches in survey research. Multivariate Behav. Res. (in press).
Marzi, G., Marrucci, A., Vianelli, D., Ciappei, C., 2023b. B2B digital platform adoption by SMEs and large firms: pathways and pitfalls. Ind. Market. Manag. 114, 80–93.
Maslach, D., 2016. Change and persistence with failed technological innovation. Strat. Manag. J. 37 (4), 714–723.
McNeish, D.M., Wolf, M.G., 2020. Thinking twice about sum scores. Behav. Res. Methods 52 (6), 2287–2305.
Meier, A., Kock, A., 2021. Agile R&D units' organization beyond software—developing and validating a multidimensional scale in an engineering context. IEEE Trans. Eng. Manag. 69 (6), 3476–3488.
Mortensen, M., 2014. Constructing the team: the antecedents and effects of membership model divergence. Organ. Sci. 25 (3), 909–931.
Muehlfeld, K., Rao Sahib, P., Van Witteloostuijn, A., 2012. A contextual theory of organisational learning from failures and successes: a study of acquisition completion in the global newspaper industry, 1981–2008. Strat. Manag. J. 33 (8), 938–964.
Nellen, L.C., Gijselaers, W.H., Grohnert, T., 2020. A meta-analytic literature review on organisation-level drivers of team learning. Hum. Resour. Dev. Rev. 19 (2), 152–182.
Niosi, J., 1999. Fourth-generation R&D. J. Bus. Res. 45 (2), 111–117.
O'Brien, S., O'Toole, T., 2021. The effectiveness of role autonomy in influencing job pursuit intentions of customer-oriented frontline job seekers. Psychol. Market. 38 (3), 504–523.
O'Leary, M.B., Mortensen, M., Woolley, A.W., 2011. Multiple team membership: a theoretical model of its effects on productivity and learning for individuals and teams. Acad. Manag. Rev. 36 (3), 461–478.
Oehmen, J., Olechowski, A., Kenley, C.R., Ben-Daya, M., 2014. Analysis of the effect of risk management practices on the performance of new product development programs. Technovation 34 (8), 441–453.
Paladino, A., 2008. Analysing the effects of market and resource orientations on innovative outcomes in times of turbulence. J. Prod. Innovat. Manag. 25 (6), 577–592.
Pappas, I.O., Woodside, A.G., 2021. Fuzzy-set qualitative comparative analysis (fsQCA): guidelines for research practice in information systems and marketing. Int. J. Inf. Manag. 58, 102310.
Pellizzoni, E., Trabucchi, D., Buganza, T., 2019. When agility meets open innovation: two approaches to manage inbound projects. Creativ. Innovat. Manag. 28 (4), 464–476.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879–903.
Post, C., 2015. When is female leadership an advantage? Coordination requirements, team cohesion, and team interaction norms. J. Organ. Behav. 36 (8), 1153–1175.
Ragin, C.C., 2009. Qualitative comparative analysis using fuzzy sets (fsQCA). In: Ragin, C.C., Byrne, D. (Eds.), Configurational Comparative Methods: Qualitative

Comparative Analysis (QCA) and Related Techniques. Sage Publications, pp. 87–121.
Rhaiem, K., Amara, N., 2021. Learning from innovation failures: a systematic review of the literature and research agenda. Rev. Man. Sci. 15, 189–234.
Rosen, Y., Wolf, I., Stoeffler, K., 2020. Fostering collaborative problem-solving skills in science: the Animalia project. Comput. Hum. Behav. 104, 105922.
Sarin, S., McDermott, C., 2003. The effect of team leader characteristics on learning, knowledge application, and performance of cross-functional new product development teams. Decis. Sci. J. 34 (4), 707–739.
Senge, P.M., 1990. The Fifth Discipline: the Art and Practice of the Learning Organization. Doubleday.
Shepherd, D.A., Patzelt, H., Wolfe, M., 2011. Moving forward from project failure: negative emotions, affective commitment, and learning from the experience. Acad. Manag. J. 54 (6), 1229–1259.
Statista, 2023. Manufacturing - United Kingdom. Available at: https://www.statista.com/outlook/io/manufacturing/united-kingdom. (Accessed 12 February 2023).
Stevens, E., 2014. Fuzzy front-end learning strategies: exploration of a high-tech firm. Technovation 34 (8), 431–440.
Stock, R.M., 2014. How should customers be integrated for effective interorganizational NPD teams? An input–process–output perspective. J. Prod. Innovat. Manag. 31 (3), 535–551.
Tatikonda, M.V., Rosenthal, S.R., 2000. Technology novelty, project complexity, and product development project execution success: a deeper look at task uncertainty in product innovation. IEEE Trans. Eng. Manag. 47 (1), 74–87.
Tekleab, A.G., Karaca, A., Quigley, N.R., Tsang, E.W., 2016. Re-examining the functional diversity–performance relationship: the roles of behavioral integration, team cohesion, and team learning. J. Bus. Res. 69 (9), 3500–3507.
Tekleab, A.G., Quigley, N.R., Tesluk, P.E., 2009. A longitudinal study of team conflict, conflict management, cohesion, and team effectiveness. Group & Org. Manag. 34 (2), 170–205.
Thomas, J., Mengel, T., 2008. Preparing project managers to deal with complexity–Advanced project management education. Int. J. Proj. Manag. 26 (3), 304–315.
Van Der Vegt, G., Emans, B., Van De Vliert, E., 2000. Team members' affective responses to patterns of intragroup interdependence and job complexity. J. Manag. 26 (4), 633–655.
Vidal, L.-A., Marle, F., 2008. Understanding projects complexity: implication on project management. Kybernetes 37 (8), 1094–1110.
Vidal, L.-A., Marle, F., Bocquet, J.-C., 2011. Measuring project complexity using the analytic hierarchy process. Int. J. Proj. Manag. 29 (6), 718–727.
Weick, K.E., 1995. Sensemaking in Organizations, vol. 3. Sage.
Wise, S., 2014. Can a team have too much cohesion? The dark side to network density. Eur. Manag. J. 32 (5), 703–711.
Woodside, A.G., 2013. Moving beyond multiple regression analysis to algorithms: calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. J. Bus. Res. 66 (4), 463–472.
Zellmer-Bruhn, M., Gibson, C., 2006. Multinational organisation context: implications for team learning and performance. Acad. Manag. J. 49 (3), 501–518.