

RICHIESTA ASSEGNO DI RICERCA

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PROGETTO DI RICERCA

“New Product Development methodologies in an uncertain world”

Proponente:

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1. Scientific relevance of the project

Failure is still a common option in New Product Development (NPD), with many NPD projects failing to meet their time, cost, and quality targets (Bianchi, Marzi, and Guerini 2020). In a landscape characterised by increasing levels of uncertainty, firms are faced with the need to use different NPD processes to develop projects with different characteristics to have a more specialised development approach and improve NPD performance. In line with this need, many firms have deployed various NPD methodologies. Indeed, beyond the dominant Stage-Gate process (Cooper 1990), firms have started to deploy other approaches such as Agile (Beck et al. 2001), Design Thinking (Brown 2008), and Lean Startup (Ries 2011), as stand-alone practices or hybridised with the Stage-Gate model to cope with rapid market and technological change and hard-to-detect consumer preferences (Magistretti et al. 2019). However, despite the deployment of multiple methodologies, firms still rely heavily on a “one-size-fits-all” approach and tend to use a single process to conduct most NPD projects, regardless of the context in which the project takes place (De Vasconcelos Gomes et al. 2022). This research proposal seeks to address this issue.

2. Theoretical background

NPD is crucial for organizational success, involving the creation of new products or services for the market (Schilling and Hill 1998). Over the past three decades, the Stage-Gate model (Cooper 1990) has dominated NPD, providing a linear framework with stages requiring top management approval

at gating points (Cooper 2008). However, this model struggles to adapt to the modern business environment, characterized by rapidly changing customer preferences (Cooper and Sommer 2016a; 2016b). Its rigidity can stifle creativity and hinder quick responses to market changes (MacCormack et al. 2012; Sommer et al. 2015). To address these challenges, firms are increasingly adopting alternative methodologies like Design Thinking, Lean Startup, and Agile, which emphasize iteration and customer-centricity.

Design Thinking represents a paradigm shift in innovation management, emphasizing human-centered problem-solving approaches (Brown 2008). It is rooted in principles of empathy (Carlgren, Rauth, and Elmquist 2016), creativity (Micheli et al. 2019), and collaboration (Davis 2010). This methodology encourages multidisciplinary teams to deeply understand end-users' needs, desires, and pain points (Dell'Era et al. 2020). The Design Thinking process begins with a user-focused approach to understand the requirements of the product or service's end-users (Liedtka 2015). By empathizing with users and employing ethnographic tools such as contextual interviews and observations, Design Thinking frames problems from the users' perspective to identify and clarify challenges (Buchanan 1992). Following problem definition, the methodology advances to an idea generation stage, using creative techniques like brainstorming and mind mapping to explore a broad range of solutions (Micheli et al. 2019). Rapid prototyping and testing allow for cost-effective and validation of the most promising ideas with users, culminating in solution concepts that resonate with the target audience (Beverland, Wilner, and Micheli 2015). This iterative process of problem framing, idea generation, and user testing ensures that the final product or service meets real customer needs, thereby increasing the likelihood of a successful new product launch.

The Lean Startup methodology, initially developed for entrepreneurial ventures, has gained widespread recognition across various organizational contexts (Ries 2011). Unlike traditional approaches that rely on detailed, pre-defined business plans, Lean Startup advocates for iterative product development and rapid market introduction to gather early feedback (Blank 2013). The core principle of Lean Startup is that customer value is often unknown at the outset, prompting product designers to 'get out of the building' from day one to discover what customers truly want (Blank 2020). This methodology employs a build-measure-learn cycle focused on rapid experimentation and validated learning to understand customer value (Edison et al. 2018). Lean Startup encourages the use of Minimum Viable Products (MVPs), early-stage prototypes that include core features for

testing product and business hypotheses and gathering user feedback (Ghezzi and Cavallo 2020). By testing assumptions quickly through MVPs, organizations can assess market viability, learning from real-world feedback to decide whether to persevere with, pivot, or abandon an idea, thus minimizing wasteful spending (Eisenmann, Ries, and Dillard 2013). This iterative experimentation and hypothesis testing help firms refine their offerings and optimize their value propositions, facilitating the discovery of a suitable product/market fit.

Originally developed for software development, Agile methodologies have expanded to manufacturers, offering a more efficient product development process (Annosi, Foss, and Martini 2020). The Agile Manifesto's 12 principles (Beck et al. 2001) prioritize flexibility over planning, collaboration over contracts, work over documentation, and people over processes (Magistretti et al. 2019). Agile teams work in short, time-boxed iterations known as "*sprints*", during which they develop a few priority features that may or may not be included in the final product (Sommer et al. 2015). Regular and frequent reassessment of priorities, driven by customer feedback and emerging market conditions, ensures that development efforts remain aligned with customer needs (Cooper and Sommer 2016a). Agile methodologies embed flexibility into the development process, allowing continuous product modification based on customer testing results until the product meets expectations, rather than adhering to rigid, pre-defined project parameters (Cooper and Sommer 2016b). This combination of iterative development, customer involvement in the back-end, and flexibility enhances alignment with user requirements, enabling organizations to respond quickly to evolving market trends and seize innovation opportunities.

While each of these methodologies can potentially enhance new product performance in uncertain conditions, choosing the wrong one may result in suboptimal outcomes or even hinder the innovation process (Annosi et al. 2022). Therefore, it is crucial for organizations to determine which methodology to apply in various uncertainty scenarios (Marzi 2022). This proposal aims to investigate how uncertainty influences the effectiveness of these methodologies on new product performance, identifying the conditions under which each approach is most effective.

Additionally, since organizations can develop other methodologies for new products and rely on different variables to select which NPD process to activate for a specific project, this proposal aims

to identify the design principles and a framework that organizations can use to build a decision-making tool for selecting the appropriate NPD methodology based on their unique contexts.

3. Research objectives

Considering the presented scenario, the objectives of the current research project are to address the following issues:

Investigate the moderating impact of different uncertainty dimensions on NPD methodologies.

This involves understanding how different types of uncertainty (e.g., ambiguity and volatility) influence the effectiveness of practices. The collaborator will explore the moderated impact of methodologies such as Design Thinking, Lean Startup, and Agile on project performance. These methodologies have garnered significant attention in recent literature, however their effectiveness is contingent on various uncertainty factors. Indeed, although these methodologies are recognized as suitable for uncertain environments, it is crucial to disentangle the moderating effects of different dimensions of uncertainty (e.g., ambiguity and volatility) to determine under which conditions each methodology is most effective, thus maximizing the benefits of their adoption. To fill this gap, this proposal aims to answer the following research question: *which of the three methodologies (Design Thinking, Lean Startup, Agile) should a firm activate to maximize new product performance under different conditions of uncertainty?*

Develop activation guidelines for NPD methodologies. This involves creating a framework that organizations can use to design a decision-making tool to help managers select the most suitable NPD methodology among those used in their organizational context, based on relevant variables. The second level seeks to expand the investigation to other innovation methodologies (e.g., DMAIC, TRIZ) and additional contingencies not solely related to uncertainty. In the context of NPD, the coexistence of multiple methodologies introduces complexity and ambiguity that become difficult to manage in the absence of formal activation guideline. *“Which NPD methodology should I activate for this project?”* a manager might ask. If firms do not invest in building a holistic understanding of each NPD methodology, fragmented perceptions and interpretations may emerge among managers. Such fragmentation can sow seeds of discord, with different managers advocating different NPD processes based on their individual interpretations and experiences. As a result, managers often

resort to heuristics or generalised rule-of thumb approaches to decision-making. While these heuristics may be effective in the short-term, they are not necessarily consistent with the broader strategic goals of the organisation, or the specific requirements of a given NPD project. As such, this research proposal aims to answer the following research question: *How can we inform the creation of a decision-making tool aimed at selecting the most suitable NPD process for a given project?*

4. Working plan

The current project is organized into five work packages. These work packages include both the (preliminary) theoretical examination of the topic and the empirical investigation of the issues that have been presented in the above sections.

Work-package 1: Literature review and theoretical framework (Months 1-6)

- Conduct a comprehensive literature review on NPD methodologies and uncertainty in NPD
- Develop a theoretical framework outlining the hypothesized relationships between uncertainty and NPD methodologies
- Design the research methodology, including qualitative and quantitative data collection methods.
- Develop survey instruments and interview guides
- Obtain ethical approvals and necessary permissions.

Work-package 3: Data Collection (Months 7-15)

- Conduct surveys and interviews with NPD managers and teams across various industries.

Work-package 4: Data Analysis (Months 16-19)

- Analyze the collected data using statistical methods to identify patterns and relationships.
- Test the hypotheses developed in the theoretical framework.

Work-package 5: Article writing and dissemination (Months 7-24)

- Compile the research findings into two papers
- Present findings at academic conferences and industry workshops.

Table 1. project GANTT

WP	task	2025												2026											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WP 1	Literature review	█	█	█	█	█	█																		
WP 2	Research design							█	█	█															
WP 3	Data collection										█	█	█	█	█	█									
WP 4	Data analysis																█	█	█	█					
WP 5	Articles writing																				█	█	█	█	

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