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DESIGNING HACKATHONS FOR CORPORATE INNOVATION AND COMPETITIVE ADVANTAGE: AN OPEN-INNOVATION PERSPECTIVE

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Abstract

Purpose: The study aims to examine how the structural design of corporate hackathons and team-level interaction processes influence innovation outcomes, with a particular focus on prototype quality, originality, and feasibility. The research contributes to the understanding of hackathons as instruments of corporate innovation within an open-innovation framework.

Methodology: An exploratory mixed-method research design was applied, combining qualitative observations and quantitative evaluations of eight interdisciplinary teams participating in a five-day corporate hackathon. Data were analysed to identify relational patterns between hackathon design characteristics, team microdynamics, and innovation outcomes assessed by an expert jury.

Findings: The results indicate that innovation performance is systematically associated with two key dimensions: Organizational Clarity and Team Competence. Clear problem formulation and accessible mentorship were identified as critical design factors positively influencing technical feasibility and overall project quality. Teams demonstrating higher levels of complementary expertise and effective collaboration produced more original and implementable solutions.

Originality: The study develops a Hackathon Design Framework that integrates structural design elements, team-level processes, and innovation outcomes into a unified conceptual model. By conceptualising corporate hackathons as temporary open-innovation systems, the research advances theoretical understanding of short-term innovation mechanisms and provides practical guidance for organisations seeking to enhance innovation capability and competitive advantage through hackathon-based initiatives.

Keywords: corporate hackathon, open innovation, innovation management, organizational design, competitive advantage.

JEL index: O31, O32, O36, G34

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1. Introduction

Contemporary organizations operate in environments characterized by accelerating technological change, intensifying global competition, and shortening innovation cycles. These pressures have driven a fundamental shift from traditional, closed R&D systems toward more permeable, collaborative approaches broadly conceptualized as open innovation (Chesbrough, 2003; Chesbrough & Bogers, 2014). Open innovation emphasizes the purposive inflow and outflow of knowledge across organizational boundaries to enhance innovation performance and renew competitive advantage (Bogers et al., 2017; Randhawa et al., 2016). Some research has shown that public policy and innovation ecosystems play a critical enabling role in entrepreneurship and innovation performance, demonstrating that supportive institutional environments enhance startup development and competitive advantages (Guliyev et al., 2025). Yet, despite widespread adoption of open-innovation practices, firms continue to struggle with implementing agile mechanisms that enable rapid experimentation, cross-functional collaboration, and accelerated learning.

Within this context, corporate hackathons have proliferated as a distinct form of temporary, high-intensity collaboration designed to stimulate creativity, recombine distributed knowledge, and generate early-stage prototypes under time constraints (Briscoe & Mulligan, 2014; Komssi et al., 2015). Originally emerging from software communities, hackathons have evolved into strategic tools used by corporations to mobilize diverse

participants, explore emerging technologies, and catalyze intrapreneurial behavior (Feldmann & Teuteberg, 2021; Franco et al., 2022; Brambilla et al., 2022). Recent literature positions hackathons as temporary open-innovation structures capable of enabling rapid boundary-spanning interactions that are difficult to achieve within routine organizational processes (Nolte et al., 2020).

Despite their growing popularity, scholarly understanding of how hackathon design and team-level dynamics contribute to innovation outcomes remains limited. Three major knowledge gaps persist.

First, theoretical positioning is fragmented. Hackathons have been interpreted through diverse lenses—open innovation (Mehta & Shah, 2022), intrapreneurship (Frederiksen & Brem, 2017), dynamic capabilities (Wildemeersch et al., 2023), and team creativity (Gerber et al., 2012)—yet existing research rarely integrates these perspectives into a coherent framework explaining why hackathons generate value.

Second, empirical studies remain predominantly descriptive, often based on qualitative case studies that map structures and participant experiences but seldom test relationships between organizational conditions, team competencies, and performance outcomes.

Third, hackathons function not only as innovation mechanisms but also as micro-organizational environments that temporarily relax hierarchy, encourage experimentation, and alter collaboration norms. However, their implications for firms' broader open-innovation capabilities and competitive advantage remain under-theorized.

To address these gaps, this study adopts an open-innovation perspective to examine the determinants of hackathon performance in a corporate context. Using data from a five-day corporate innovation hackathon, we apply correlation analysis, regression analysis, and exploratory factor analysis to identify structural and behavioral drivers of project outcomes.

Unlike prior studies that treat hackathons primarily as operational or pedagogical tools, this research advances open-innovation theory by conceptualizing corporate hackathons as temporary open-innovation systems and empirically identifying the latent structural and team-level drivers of hackathon performance. Through quantitative analysis and the introduction of the Open-Innovation Hackathon Lifecycle Framework, the study bridges micro-level team dynamics with macro-level strategic outcomes—offering a theoretically integrated and empirically grounded model that addresses longstanding fragmentation in hackathon research.

The paper is organized as follows. Section 2 presents a synthesis of the relevant literature, outlining the conceptual foundations of hackathons within open-innovation and corporate innovation research. Section 3 details the research design and methodological procedures used to examine the determinants of hackathon performance. Section 4 reports the empirical findings from the multi-source dataset. Section 5 integrates these insights to identify the key structural and team-level drivers of effective hackathon outcomes and introduces the Hackathon Design Framework. The final section discusses theoretical and managerial implications, acknowledges limitations, and offers promising directions for future research.

2. Theoretical Background: Hackathons Through the Lens of Open Innovation

2.1. Open Innovation as a Strategic Framework

Open innovation (OI) has become one of the most influential paradigms for understanding how firms create appropriate value in dynamic and uncertain environments. In contrast to closed internal R&D models, open innovation assumes that organizations must purposefully manage knowledge inflows and outflows to accelerate internal innovation and expand markets through external knowledge exploitation (Chesbrough, 2003; Chesbrough, Vanhaverbeke & West, 2017). Firms increasingly rely on distributed sources of expertise, including customers, universities, startups, and external communities, to recombine heterogeneous knowledge and develop new products and services (Dahlander & Gann, 2010; Laursen & Salter, 2006).

Recent research emphasizes that OI is not merely an access mechanism to external ideas—it is a dynamic capability enabling organizations to sense, absorb, and mobilize dispersed knowledge (Yun et al., 2020; Falcke & Zobel, 2024). Open-innovation activities allow firms to build trust with partners, reduce uncertainty, and accelerate experimentation by leveraging collective intelligence beyond organizational boundaries. As digital transformation reshapes innovation logics, firms increasingly adopt agile and temporary organizational forms—such as hackathons—as operational vehicles for activating OI capabilities at scale (Brambilla et al., 2022; Franco et al., 2022).

2.2. Corporate Hackathons as Temporary Open-Innovation Systems

Studies highlight how digital transformation and collaboration between diverse stakeholders strengthen entrepreneurial innovation and adaptive capacity across small and large economies (Radović-Marković,2025). Hackathons as innovation facilitators have become an important method. Hackathons—intensive, time-bounded events where interdisciplinary teams collaboratively prototype solutions—have evolved from grassroots developer gatherings to strategic corporate innovation instruments (Briscoe & Mulligan, 2014; Komssi et al., 2015). In corporate settings, hackathons represent a form of structured open innovation, enabling firms to mobilize diverse internal and external actors (employees, students, partners, customers) around complex and exploratory problems (Mehta & Shah, 2022).

Empirical studies consistently demonstrate that corporate hackathons foster a micro-ecosystem of open innovation by enabling multiple complementary mechanisms. First, they promote knowledge recombination among heterogeneous participants, allowing diverse expertise and perspectives to be combined in novel ways (Franco et al., 2022; Brambilla et al., 2022). Second, hackathons encourage rapid experimentation, closely aligning

with the principles of lean startup methodologies and design thinking through iterative prototyping and testing (Komssi et al., 2015). In addition, they facilitate cross-functional collaboration by bringing together participants from different organizational units, thereby reducing structural silos and enhancing internal integration (Marwan & Soleman, 2025; Tucci et al., 2018). Corporate hackathons also support value co-creation by enabling joint problem definition and solution design with external stakeholders, such as customers, partners, or developers (Prahalad & Ramaswamy, 2004). Finally, these events contribute to the development of absorptive capacity, as teams acquire, assimilate, and transform new knowledge in real time through hands-on experimentation and collaboration (Werlang & Werlang, 2021).

From an OI perspective, hackathons function as temporary boundary-spanning organizations (Seravalli & Simeone, 2016), bringing together distributed knowledge holders under shared goals. This temporary organizational structure reduces bureaucratic rigidity, encourages experimentation without long-term risk, and accelerates insight generation that would otherwise require months of R&D effort.

2.3. Hackathons as Mechanisms for Innovation Performance and Competitive Advantage

Research demonstrates that the enabling elements of hackathons—such as participant diversity, challenge clarity, and mentorship—are strong predictors of innovation quality (Feldmann & Teuteberg, 2021; Brambilla et al., 2022). Diversity of expertise broadens the knowledge search space (Laursen & Salter, 2006), while clear problem framing enhances cognitive alignment and solution feasibility (Serek et al., 2020). Mentorship and expert coaching serve as OI boundary-spanners, facilitating knowledge integration across domains and reducing uncertainty for teams (Mehta & Shah, 2022).

Hackathons can be conceptualized as rapid-cycle open innovation experiments that enable firms to recombine internal and external knowledge under conditions of temporal intensity and low experimentation costs. By accelerating prototype development and facilitating early interaction with users and markets, hackathons reduce uncertainty in the front end of innovation and increase the likelihood that emerging ideas align with strategic and customer needs. Simultaneously, the experiential and team-based nature of hackathons stimulates employee intrapreneurship by encouraging opportunity recognition, risk-taking, and autonomous problem solving beyond formal organizational roles. Hackathons further support strategic renewal by functioning as mechanisms for scanning emerging technologies and identifying entrepreneurial talent, while their project-based and time-bounded structure lowers the cost of experimentation compared to traditional R&D cycles. Through the generation of portfolios of validated prototypes and concept options, hackathons strengthen firms' dynamic capabilities and enhance their capacity to reconfigure resources in response to changing competitive environments. Accordingly, their integration into corporate innovation ecosystems reflects a broader shift toward agile,

participatory, and distributed models of innovation management.

2.4. Research Gap and Theoretical Contribution

This study addresses these gaps by advancing open innovation theory in several important ways. First, it conceptualizes corporate hackathons as temporary open innovation systems that activate both inbound and internal knowledge flows within bounded yet intensive collaborative settings. Second, it empirically identifies key structural factors—such as organizational clarity, mentorship provision, and challenge framing—alongside critical team-level determinants, including team competence, microdynamics, and confidence, that shape innovation performance in hackathon contexts. Third, the study develops an integrative conceptual model that systematically links hackathon design variables to innovation outcomes under the open innovation paradigm, thereby extending existing theory to a novel and increasingly relevant organizational practice.

Despite substantial corporate investment in hackathons, many firms struggle to translate hackathon outputs into sustained innovation outcomes, often resulting in inefficient resource allocation and diminished employee motivation. A clearer understanding of the structural and behavioral determinants of hackathon effectiveness is therefore essential for designing hackathons that generate enduring strategic value rather than short-lived experimentation.

2.5. Hackathons within the Open Innovation Paradigm

Open innovation theory posits that firms increasingly depend on external knowledge flows, boundary-spanning activities, and collaborative search processes to accelerate innovation. Corporate hackathons operationalize these principles by bringing together diverse participants—including employees, external experts, students, and customers—within a shared innovation space. In doing so, they create a low-risk environment for experimenting with emerging technologies while enabling rapid idea exploration beyond formal hierarchical constraints. Through these mechanisms, hackathons function as practical instantiations of open innovation by facilitating inclusive participation, exploratory search, and experimentation under conditions of reduced organizational risk.

Prior studies show that hackathons can serve as "micro-infrastructures of open innovation" (Granados & Pareja-Eastaway, 2019), where organizations absorb, evaluate, and integrate external insights. Yet, empirical evidence remains fragmented regarding which design factors (e.g., mentor accessibility, clarity of goals, team formation processes) determine innovation outcomes. This study addresses this gap by empirically analyzing how hackathon structure influences project feasibility, originality, and overall performance.

2.6. Theoretical Framework and Exploratory Proposition Development

Corporate hackathons operate as temporary open-innovation systems in which organizational structures, distributed knowledge, and team-level actions converge to influence innovation performance. As suggested by Jurgelevičius et al., (2025) in the Open-Innovation Hackathon Lifecycle Framework (Figure 1), hackathon design features serve as structural enablers that shape how teams coordinate, integrate knowledge, and experiment under time pressure. These structural inputs activate microfoundational team processes—such as collaboration quality, psychological safety, iterative problem solving, and knowledge recombination—which in turn drive prototype quality, originality, and feasibility. This multi-level logic is consistent with open-innovation theory, which emphasizes the role of organizational scaffolding in enabling effective boundary spanning and knowledge flows (Chesbrough & Bogers, 2014), as well as with research on team microdynamics in innovation settings (Gerber et al., 2012; Edmondson & Lei, 2014).

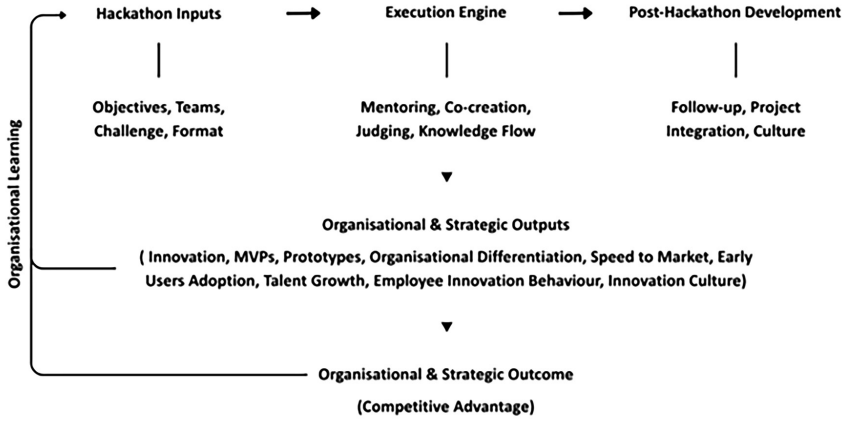


Figure 1. Open-Innovation Hackathon Lifecycle Framework for Corporate Innovation and Competitive Advantage Source: authors' creation

Building on this theoretical foundation, the framework conceptualizes hackathon effectiveness as emerging from the interplay between organizational clarity, team competence, mentorship accessibility, and resource availability on the one hand, and team microdynamics on the other. Clear objectives and transparent evaluation criteria reduce ambiguity and help teams allocate cognitive resources toward creative and analytical tasks. Team competence and skill diversity facilitate knowledge recombination and expand the solution space. Mentorship access and expert guidance act as boundary-spanning mechanisms that accelerate learning and redirect teams when they encounter technical or conceptual dead

ends. These elements shape team microdynamics—communication quality, coordination, trust, confidence, and shared understanding—which are known precursors of high-quality innovation outputs in time-constrained environments.

The propositions presented in Table 1 are intended as exploratory propositions rather than confirmatory hypotheses. In contrast to hypotheses, which specify directional and testable causal relationships derived from well-established theory, exploratory propositions serve as theory-informed heuristic devices that guide pattern detection in empirically under-theorized phenomena. Given the emergent and context-dependent nature of corporate hackathons, the existing literature does not yet provide sufficiently stable theoretical foundations to warrant strict hypothesis testing. Accordingly, these propositions are formulated to sensitize the analysis to theoretically meaningful relationships without imposing strong a priori assumptions regarding causality or effect direction.

Importantly, the conceptual relationships in Table 1 are not ad hoc but are grounded in and synthesized from prior research on open innovation, team dynamics, knowledge integration, and innovation management. Constructs such as organizational clarity, team competence, mentorship effectiveness, knowledge integration, and collaboration quality have been repeatedly identified in the literature as critical antecedents of innovation outcomes in project-based and temporary organizational settings. The table integrates these established insights within the specific context of hackathons, thereby extending existing theories to a novel empirical setting. In this sense, Table 1 represents a conceptual synthesis that bridges fragmented strands of prior research and provides a structured analytical framework for examining how hackathon design features and team-level processes may jointly shape innovation outcomes.

Table 1. Theoretically Informed Propositions Linking Hackathon Design, Team Microdynamics, and Innovation Outcomes

Conceptual Relationship	Exploratory Proposition
Organizational Clarity → Innovation Outcomes	P1: Effective communication of organizational clarity during the hackathon—reflected in clear goals, expectations, resources, and evaluation criteria—are likely to be associated with stronger innovation outcomes.
Team Competence → Innovation Outcomes	P2: Teams exhibiting higher competence, including domain expertise, diverse skills, and problem-solving ability, are likely to generate more impactful innovation outcomes.
Mentorship Effectiveness → Innovation Outcomes	P3: Greater accessibility and relevance of mentorship support may strengthen the relationship between organizational clarity and innovation outcomes.
Knowledge Integration → Innovation Outcomes	P4: Teams that more effectively integrate heterogeneous knowledge—through sharing, combining, and applying diverse expertise—tend to produce more feasible, original, and higher-quality prototypes.
Team Collaboration Quality → Innovation Outcomes	P5: Better of collaboration quality, including communication, coordination, and trust, are likely linked to improved innovation outcomes.

Conceptual Relationship	Exploratory Proposition
H6. Hackathon Design (Structural Inputs) → Team Microdynamics	P6: Well-structured hackathon design elements—such as clear challenge framing, thoughtful team formation, and adequate resource availability—*appear to positively influence* team microdynamics, including collaboration, knowledge integration, and team confidence.
Team Microdynamics → Innovation Outcomes	P7: Stronger team microdynamics—such as effective collaboration, psychological safety, and iterative problem solving—*may help explain* how hackathon design features relate to innovation outcomes.

Source: authors' creation

In line with the exploratory nature of this study and the limited team-level sample (N = 8), the relationships implied by the framework are articulated as theoretically informed propositions rather than confirmatory hypotheses. These propositions synthesize prior research on hackathons, open innovation, and team dynamics while providing empirically testable expectations for subsequent analysis. Together, they capture the mechanisms through which hackathon design and team processes jointly shape innovation outcomes, forming a coherent theoretical basis for the empirical investigation that follows.

3. Research Methodology

The methodological design of this study is framed as an exploratory, qualitative–quantitative descriptive investigation grounded explicitly in open-innovation theory. This study adopts an exploratory, theory-building orientation (Edmondson & McManus, 2007), appropriate for emerging phenomena with limited prior empirical grounding. Given the limited empirical work examining hackathons as temporary open-innovation structures, an exploratory approach was essential for uncovering the structural, organizational, and team-level mechanisms that shape innovation performance.

This study examined a single corporate hackathon event—the Hack4Business 5-Day Startup Bootcamp—organized by CIE Forge, an automotive-industry company based in Marijampolė, Lithuania. The hackathon followed a five-day hybrid structure, beginning with an online kick-off session on Monday evening and transitioning into an intensive full-day, on-site collaboration period at the company's facilities. A total of 34 participants formed eight interdisciplinary teams, each composed of four to five members with complementary roles (e.g., developers, designers, data researchers, and business leads). Although the sample size is modest, the unit of analysis at the team level is well aligned with the hackathon's design structure, ensuring analytical validity within an exploratory research scope. The participant composition reflects the cross-functional and interdisciplinary characteristics typical of corporate hackathon environments, enabling diverse knowledge recombination and boundary-spanning collaboration under time-compressed conditions.

The study employs a mixed-methods descriptive strategy, integrating qualitative insights derived from hackathon documentation, event observations, and expert feedback

with quantitative data drawn from jury evaluations and participant surveys. This dual-level design allows for both conceptual elaboration—linking hackathon characteristics to open-innovation constructs such as boundary spanning, knowledge recombination, and absorptive capacity - and empirical pattern identification. Quantitatively, the study applies correlation analysis, regression analysis, and exploratory factor analysis not for hypothesis testing but for detecting emergent relationships among design variables (e.g., challenge clarity, mentorship, team dynamics, etc) and innovation outcomes (feasibility, originality, overall project quality, etc). Qualitatively, the interpretation of these results is anchored in an established open-innovation theory to contextualize how temporary innovation structures activate knowledge flows and collaborative processes. Together, this methodology provides a systematic yet flexible framework appropriate for early-stage theorizing, enabling the development of a more integrated conceptual understanding of how hackathons function as vehicles for corporate innovation and competitive advantage.

In the first stage, structured narrative literature review informed by PRISMA principles (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was applied to conduct a literature review. This process involved identifying, screening, and selecting relevant scientific publications to establish the theoretical foundation and research gap of the study.

In the second stage, an empirical survey was designed and administered, consisting of a set of structured questions measured using a Likert scale. The survey aimed to collect quantitative data reflecting participants' attitudes, perceptions, and behaviors related to the main constructs of the study. Based on the literature review, 7 propositions were formulated and subsequently tested using the collected data.

In the third stage, the study applied exploratory correlation analysis, simple regression diagnostics, and an indicative factor analysis to investigate emerging patterns among the identified variables. Given the small number of teams (N = 8), these techniques were used not to test hypotheses statistically but to uncover consistent relational tendencies and to assess the plausibility of the proposed conceptual linkages. This analytical stage allowed the identification of directionally meaningful associations and latent structures that inform, rather than confirm, the theoretical propositions advanced in this study.

3.1. Analysis of Literature Review applying PRISMA principles

This research adopted the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to enhance the transparency, reproducibility, and methodological rigor of the literature review and analysis process (Figure 1) (Posso Pacheco et al., 2025). A comprehensive literature search was conducted across two major academic databases — Scopus and Web of Science — covering studies published between 2020 and 2025. The PRISMA protocol structured the entire process of identification, screening, eligibility assessment, and inclusion of relevant research. The initial search produced 504 records, which were refined by eliminating duplicates and screening titles and abstracts for

relevance. Following the application of predefined inclusion and exclusion criteria, 17 studies were ultimately retained for qualitative synthesis. The search strategy was built using the Boolean query: "Corporate hackathon" AND "Innovation.

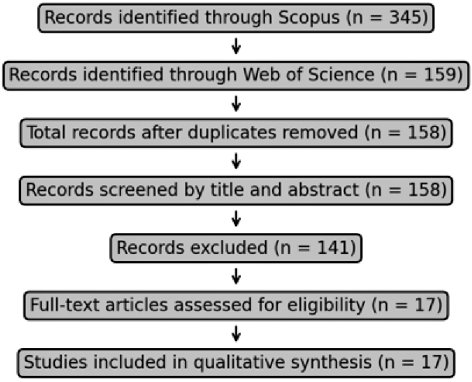


Figure 2. PRISMA Flow Diagram for Hackathon Literature Review

Source: authors' creation

The inclusion criteria for article selection required that sources be published in English, peer-reviewed and open-access, and directly address digital or innovation-driven organizational methodologies, with a particular focus on hackathon-related strategies. Articles were excluded if they focused solely on physical branding without incorporating innovation or digital components, or if they offered only general managerial commentary lacking methodological depth.

Through a systematic screening procedure - comprising title and abstract assessment, full-text evaluation, and relevance analysis - 17 articles of high relevance were ultimately selected from an initial set of 158 shortlisted studies. The selected publications demonstrated strong methodological quality, theoretical significance, and clear alignment with the study's central themes of innovation processes, intrapreneurship, and agile strategy formation through hackathons.

Following the PRISMA-guided literature review principles, critical elements underpinning the organization of hackathons were identified and presented in Table 2.

Table 2. Key Methodological Elements of Corporate Hackathons Across Lifecycle Stages

Hackathon Lifecycle stage	Element	Definition	Authors
Before hackathon	Identification of objectives	Innovation creation	Heller et al., 2023; Nolte et al., 2020
		Connect to early adopters	Di Fiore, 2013
		Learning organization	Schulten et al., 2024; Hogan, M. 2022
		Corporate branding	Uffreduzzi, 2017
		Talent engagement & recruitment	Trainer et al., 2016
		Team building and collaboration	
	Identification of challenges and problem statement	Technology focus challenge	Heller et al., 2023; Angarita et al., 2020; Briscoe 2014
		Nontechnology focus challenge	
	Type of Hackathon	Virtual	Bertello et al., 2022; Paganini et al., 2020
		Physical	
		Hybrid	
	Background of participants	Tech background teams only	Beck et al., (2020), Pe-Than et al., 2020; Banal-Estañol et al., 2019
		Mixed teams with various backgrounds	
	Team formation	Formation before hackathon	Nolte et al., 2018
		Formation on hackathon day	Porras et al., 2021
	Selection of jury and mentors	Experts from industry	Chala et al., 2024; Nolte et al., 2020
		Academicians	
	Secure funding	internal budget allocation	Folk et al., 2024; Granados et al., 2018
		sponsorship models	
		stakeholders buy-in	
	Prizes	Financial	Folk et al., 2024; Granados et al., 2018
		Nonfinancial	
Execution	Opening ceremony, Rules and kick off	Event kickoff and expectations setting	Aryana et al., 2019; Panchapakesan et al., 2019; Karlsen et al., 2017
	Mentorship	Guidance from internal/external experts during event	Chala et al., 2024; Nolte et al., 2020
	Jury assessment and voting	Evaluation by panel or public; selection of winners	Milićević et al., 2024
	Networking	Informal/team collaboration sessions	Folk et al., 2024; Feder, 2021

Hackathon Lifecycle stage	Element	Definition	Authors
Post Hack-athon	Follow up and support programs	Project incubation, internal scaling, continued support	Kamariotou et al., 2022; Chan et al., 2020

Source: authors' creation

3.2. Data collection

Data for this study were collected using a multi-source, mixed-method approach designed to capture both quantitative and qualitative dimensions of hackathon performance. Two primary data sources were utilized: (1) a post-event participant survey, and (2) a jury evaluation scorecard assessing project outcomes.

The participant survey gathered structured data from all hackathon participants immediately after the event. A total of 34 individual responses were collected, representing eight interdisciplinary teams. The survey instrument included Likert-scale items and open-ended questions to assess critical hackathon design and team factors—such as clarity of objectives, team formation process, resource accessibility, mentorship quality, collaboration processes, and perceived innovation outcomes (see appendix). The inclusion of both closed and open-ended items enabled triangulation between quantitative trends and qualitative insights.

The jury evaluation scorecard, completed by five corporate experts serving as judges, provided an independent assessment of each team's project along dimensions of technical feasibility, originality, and overall project quality. These scores were used to complement participant self-assessments and to provide a multi-perspective evaluation of hackathon performance.

Data collection was conducted immediately following the five-day hackathon event in 2025, using an online survey platform and standardized evaluation forms. Data triangulation was achieved through convergence of participant feedback, jury assessments, and qualitative commentary.

All respondents participated voluntarily and were informed of the study's purpose and confidentiality measures. Data were anonymized prior to analysis to ensure ethical compliance and objectivity. This multi-source approach enhances both the construct validity and robustness of findings, ensuring that results capture diverse perspectives on the hackathon's open-innovation dynamics.

3.3. Measures and Variables

This study employed multiple data sources and measurement constructs designed to capture both the structural components of the hackathon and the resulting project outcomes, consistent with prior research on open-innovation and hackathon performance (Komssi et al., 2015; Feldmann & Teuteberg, 2021; Franco et al., 2022).

3.3.1. Independent Variables – Hackathon Structural Components

Building on the open-innovation framework, three principal dimensions were operationalized: Organizational Clarity, Mentorship Quality, and Team Competence.

1. Goal and Challenge Clarity (Organizational Clarity). Measured through four Likert-scale items (1 = strongly disagree; 7 = strongly agree) assessing how clearly participants understood the hackathon's objectives, evaluation criteria, and task scope (e.g., "The objectives of the hackathon were clearly defined"). Individual responses were averaged at the team level to produce a Goal Clarity Index ($\alpha > 0.80$).
2. Mentorship Quality and Access. Captured using three survey items evaluating mentor availability and usefulness (e.g., "Mentors were easily accessible when needed"). These responses were aggregated to form a Mentorship Support Score. Higher values indicate more positive assessments of mentoring quality, reflecting the degree of external support within the open-innovation process.
3. Team Competence and Dynamics. This construct encompasses elements of skill diversity, prior collaboration, planning, and psychological safety. Items such as "Our team covers diverse skills," "We had a clear division of roles," and "I feel confident in our team's ability to deliver results" were combined into a Team Competence Index ($\alpha > 0.85$), capturing the collective capability of each team.

In addition, an Organizational Support Composite Index was computed by averaging ratings on items concerning the availability of resources, sufficiency of time, and clarity of post-event continuation opportunities. These measures align with theoretical antecedents of innovation success identified in open-innovation literature (Laursen & Salter, 2006; Mehta & Shah, 2022).

3.3.2 Dependent Variables – Innovation Performance Outcomes

The primary dependent variable was the jury-evaluated project score, representing an external assessment of each team's output. A panel of five corporate judges evaluated projects on seven standardized criteria:

- Innovativeness and Creativity
- Technological Feasibility
- Business Viability and Value Creation
- User Experience and Simplicity
- Scalability and Growth Potential
- Risk Management and Reliability
- Presentation Quality

Each criterion was scored on a 0–100 scale. The overall project score was computed as the arithmetic mean of the seven criteria, assigning equal weight (~14.3%) to each. Additionally, a binary outcome variable distinguished prize-winning (coded 1) and non-winning (coded 0) teams.

4. Analytical Procedures

4.1. Data Aggregation and Preparation

Given that evaluation scores were assigned per team, all individual survey responses were aggregated to the team level. For each construct, the team mean was computed. Prior to analysis, survey indices were standardized (z-scores) to ensure comparability across constructs and to mitigate potential scale-related bias.

$$\bar{X}_{team} = \frac{\sum_{i=1}^{n} x_i}{n}$$

This yielded an analytic dataset of n = 8 teams, with independent (survey-based indices) and dependent (jury scores) variables standardized for comparison. Following data standardization, the aggregated dataset served as the input for subsequent correlational, regression, and factor analyses described in Section 4.2

4.2. Quantitative Analysis

Due to the small sample size, all analyses were exploratory rather than confirmatory. Correlation Analysis. Pearson and Spearman correlation coefficients were computed to examine associations between hackathon design factors (goal clarity, mentorship, team competence) and performance criteria (e.g., innovativeness, feasibility). This dual approach allowed verification of robustness across parametric and non-parametric methods.

Regression Analysis. Simple linear regressions were conducted for the strongest bivariate relationships to estimate effect sizes:

$$Yj = \beta 0 + \beta 1\ Xj + \varepsilon j$$

where Yj is the outcome score and Xj the predictor (e.g., mentorship quality).

The coefficient of determination (R^2) was used to gauge practical significance, rather than relying solely on p-values due to limited statistical power.

The predictor (e.g., mentorship quality). The coefficient of determination (R^2) was used to gauge practical significance, rather than relying solely on p-values due to limited statistical power.

Group Comparison. Mean differences between prize-winning and non-winning teams were examined to explore whether successful teams systematically scored higher on perceived support, mentorship, or competence.

To explore potential latent structures within the survey instrument, an Exploratory Factor Analysis (EFA) was conducted using the individual-level responses (N = 34). Although the primary unit of analysis for the study is the team (N = 8), EFA was performed at the individual level because factor extraction relies on item-level covariance patterns that require substantially larger sample sizes than group-level analyses can provide. The resulting

factors were therefore interpreted conceptually at the team level rather than treated as statistically validated team-level constructs. In line with best practices for small-sample exploratory research, the EFA serves as a secondary triangulation tool—offering structural insight into how survey items cluster—rather than as a confirmatory test of the theoretical model. Thus, the factor-analytic results complement, but do not replace, the correlation and regression analyses, supporting the study's broader aim of identifying theoretically plausible patterns rather than establishing definitive causal relationships.

To examine patterns within the quantitative data, both descriptive and inferential techniques were employed. We first performed a group comparison between prize-winning and non-winning teams across the survey measures. The winner group consisted of three teams (top three projects), and the non-winner group included the remaining five teams. Given the small and unequal group sizes, we considered the Mann–Whitney U test, a non-parametric alternative to the independent-samples t-test, suitable for comparing two independent groups when distributional assumptions cannot be met. This test ranks data and evaluates whether one group systematically exhibits higher or lower scores than the other.

However, due to the exploratory scope and small sample (N = 8 teams), we did not emphasize formal hypothesis testing. Instead, we focused on descriptive mean differences between groups on key variables such as team confidence, perceived mentorship quality, and collaborative effectiveness. This approach allowed us to identify meaningful trends while maintaining alignment with the exploratory, theory-building aim of the study.

All quantitative analyses were conducted using R (version 4.3.2; R Core Team, 2024), utilizing the stats, psych, and ggplot2 packages for computation and visualization.

4.3. Qualitative Analysis

To complement the statistical analysis, qualitative data were analyzed to contextualize observed quantitative trends and uncover experiential mechanisms underlying innovation performance. Open-ended survey responses were analyzed using thematic content analysis following Braun and Clarke's (2006) six-step procedure. Two researchers independently reviewed the data to identify recurring patterns and concepts, generating initial inductive codes that were then grouped into higher-order themes. Through iterative comparison and discussion, four dominant themes emerged:

- Team Collaboration – reflections on teamwork, communication, and synergy;
- Time Pressure – perceptions of stress, pacing, and time constraints;
- Resource Adequacy – assessments of available support, mentorship, and materials;
- Organizational Satisfaction – evaluations of event structure, clarity, and facilitation.

These themes map onto core open-innovation dimensions—namely, knowledge sharing, boundary spanning, and absorptive capacity. Inter-coder reliability was verified using Cohen's $\kappa = 0.82$, indicating strong agreement. The analysis was conducted using NVivo 14, and discrepancies were resolved through discussion to ensure interpretive consistency.

The qualitative layer enriched the quantitative findings by revealing how participants perceived learning, experimentation, and organizational support within the hackathon, providing deeper insight into how temporary innovation structures foster open-innovation processes.

To uncover underlying dimensions of the hackathon experience, an exploratory factor analysis (EFA) was conducted on approximately 40 Likert-scale items from the participant survey. We used principal component analysis (PCA) as the extraction method with varimax rotation to maximize interpretability of the factors. The suitability of the data for factor analysis was verified by a Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy of 0.78 and a significant Bartlett's Test of Sphericity ($p < .001$), confirming internal coherence among items.

Following standard criteria, factors with eigenvalues greater than 1.0 were retained. Two interpretable factors emerged, explaining a substantial portion of the variance:

- Factor 1: Team Competence, characterized by high loadings on items related to team dynamics, confidence, skill diversity, and collaborative performance;
- Factor 2: Organizational Clarity, characterized by high loadings on items related to clarity of objectives, mentor support, and resource accessibility.

These latent factors align closely with theoretical constructs proposed by Jurgelevičius et al. (2025), which emphasize team capability and organizational support as key determinants of hackathon success. The EFA findings thus reinforced the theoretical premise that hackathons function as temporary open-innovation systems where both team-level and organizational factors jointly influence performance.

4.4. Reliability and Validity

All reliability and validity assessments adhered to standard psychometric guidelines (Hair et al., 2019), ensuring robustness of the measurement model. All multi-item constructs demonstrated strong internal consistency, with Cronbach's α values exceeding 0.70, meeting the accepted reliability threshold (Nunnally, 1978). Exploratory Factor Analysis (EFA) with varimax rotation confirmed construct validity, revealing two primary latent dimensions—Organizational Clarity and Team Competence—that jointly explained a significant proportion of total variance (>60%). The Kaiser–Meyer–Olkin (KMO) measure (0.78) and Bartlett's test of sphericity ($p < 0.001$) supported data adequacy for factor analysis. Methodological triangulation (participant surveys, jury assessments, and qualitative responses) further reinforced the robustness of interpretations and minimized common-method bias. All statistical analyses were conducted using the R statistical environment (version 4.3.2; R Core Team, 2024), ensuring transparency and replicability.

5. Results

This section presents findings from an embedded single-case study of a corporate hackathon, with eight teams as embedded units of analysis. Multiple data sources were integrated, including participant surveys (N = 34), jury evaluations, and qualitative feedback. Given the small number of teams, the analysis is exploratory and comparative, focusing on cross-team patterns rather than statistical inference.

To enhance analytical coherence, quantitative indicators (survey indices and jury scores) are used as descriptive tools for within-case comparison, while qualitative insights support interpretation of underlying mechanisms. The results are organized around two analytically integrated dimensions that consistently differentiated higher- and lower-performing teams.

5.1. Cross-Team Patterns in Hackathon Performance

Across teams, organizational clarity and mentorship accessibility emerged as salient conditions associated with stronger innovation outcomes. Teams reporting clearer challenge framing, transparent evaluation criteria, and accessible mentors consistently achieved higher jury scores, particularly in technical feasibility and overall project quality. These patterns suggest that clear organizational scaffolding enables teams to allocate effort more effectively and navigate technical uncertainty during time-constrained innovation work.

In parallel, team competence and microdynamics differentiated performance levels. Teams characterized by complementary skills, clear internal roles, psychological safety, and collective confidence tended to deliver more coherent solutions and higher-quality presentations. These teams were also more likely to translate ideas into implementable prototypes, indicating that internal coordination and trust are critical in short-cycle innovation settings.

Rather than treating these relationships as statistically predictive, the analysis highlights systematic contrasts between teams, supporting an explanatory logic consistent with an embedded case study design.

5.2. Integrated Interpretation of Survey Structure

To support cross-team comparison and reduce analytical complexity, an exploratory factor analysis of individual-level survey responses (N = 34) was conducted as a data-reduction and pattern-identification tool, not as a confirmatory technique. Two latent dimensions emerged that closely aligned with observed performance differences across teams:

- Team Competence, capturing skill diversity, coordination quality, psychological safety, and team confidence.
- Organizational Clarity, capturing clarity of objectives, mentor accessibility, resource availability, and organizer communication.

These two dimensions provide a parsimonious structure linking organizational design and team-level processes to innovation outcomes. Importantly, they mirror the qualitative contrasts observed between higher- and lower-performing teams, reinforcing the robustness of the identified mechanisms across data sources.

5.3. Synthesis

Taken together, the results indicate that hackathon outcomes are shaped by the interaction between organizational clarity and team competence, rather than by isolated factors. Teams performed best when clear structural guidance was coupled with strong internal microdynamics. This integrated pattern supports the study's theoretical framing of corporate hackathons as temporary open-innovation systems, where organizational scaffolding and team-level processes jointly enable innovation performance.

Given the exploratory nature of the study and the limited number of teams, these findings are interpreted as analytical insights within a bounded case, providing a foundation for theory development and future comparative research rather than statistical generalization.

5.4. Synthesis of Analytical Results and Integrated Interpretation

The three applied analytical approaches—correlation analysis, regression analysis, and factor analysis—collectively provide a coherent and mutually reinforcing understanding of the determinants of hackathon success. Despite the exploratory nature of the analyses due to the limited sample size, the results demonstrate a consistent pattern linking organizational clarity, mentorship, and team competence to positive project outcomes.

Both the correlation and regression analyses highlight similar key predictors of performance. In both models, mentor accessibility and clarity of hackathon objectives emerged as significant factors associated with higher jury evaluations, particularly in the categories of technical feasibility, innovation, and overall quality. The consistency between the correlational and regression findings strengthens the validity of these results, suggesting that teams benefit from structured guidance and well-defined expectations during the hackathon process.

Meanwhile, the factor analysis provides a broader structural understanding of these relationships. It identified two dominant latent dimensions—Team Competence and Organizational Clarity—that collectively explain the underlying mechanisms driving successful performance. The "Organizational Clarity" factor aligns conceptually with the significant variables in both the correlation and regression analyses (e.g., clear goals, mentor access, and well-organized event structure). Similarly, the "Team Competence" factor complements the behavioral findings from the correlation analysis, such as effective teamwork dynamics, psychological safety, and confidence, which were linked to higher presentation quality and innovation ratings.

Importantly, none of the three analyses produced contradictory findings; instead, they

converge on the same conceptual conclusion—that both internal team dynamics and external organizational support jointly shape hackathon outcomes. While the regression results quantify the relative predictive influence of individual factors, and the correlation analysis maps their direct relationships, the factor analysis offers a more systemic view, integrating these findings into broader conceptual dimensions.

In summary, although exploratory, the integrated evidence indicates that the most successful hackathon outcomes arise when strong team capabilities are coupled with clear, well-supported organizational structures. This dual-pillar perspective provides actionable implications for both practitioners and researchers: organizers should focus not only on structuring challenges and ensuring expert availability but also on fostering team environments that promote psychological safety, iterative collaboration, and confidence. The synthesis thus offers a theoretically grounded and empirically substantiated foundation for advancing research on hackathon design and corporate innovation processes.

6. Discussions

The findings of this study support a multi-level Hackathon Design Framework (Figure X), which positions corporate hackathons as temporary open-innovation systems in which organizational design structures, team microfoundations, and innovation outcomes are dynamically interconnected. This framework synthesizes the empirically derived patterns from the correlation, regression, and factor analyses with established theoretical perspectives in open innovation, microfoundations, and team-level innovation research.

Within this framework, organizational design factors—including challenge clarity, resource accessibility, mentorship availability, and structured communication—serve as the foundational scaffolds that shape team behavior and the quality of knowledge flows during the hackathon. These elements correspond to what the factor analysis identified as Organizational Clarity, a latent dimension that strongly influenced innovation outcomes across multiple jury evaluation criteria. This aligns with open-innovation theory, which emphasizes the importance of institutional structures in enabling purposeful knowledge exchange and reducing uncertainty in collaborative innovation settings.

At the behavioral level, the framework highlights team microdynamics—such as psychological safety, knowledge sharing, collaborative quality, and confidence—as the mechanisms through which participants transform structural inputs into creative and feasible solutions. These components reflect the latent factor of Team Competence, which emerged consistently across the dataset. The strong association of team microdynamics with innovation performance echoes the microfoundations literature, which argues that organizational capabilities originate from cognitive, relational, and behavioral processes within teams.

By integrating these dimensions, the framework provides a process-based explanation of how hackathon design choices shape innovation performance. Organizational design factors influence team microdynamics, which in turn generate project-level innovation

outputs—originality, prototype quality, and feasibility. These short-cycle outcomes then contribute to broader organizational-level impacts, such as capability renewal, intrapreneurial activation, and cultural shifts toward experimentation. This multi-layered pathway aligns with dynamic capabilities theory and extends prior hackathon research by demonstrating how event-level mechanisms aggregate into long-term strategic effects.

Importantly, the conceptual framework is consistent with the patterns observed in the empirical analysis, providing a coherent model that captures both the structural and behavioral determinants of hackathon success. It thus offers a theoretically grounded and empirically informed lens for understanding how hackathons operate not merely as idea-generation events but as structured micro-environments for capability development and competitive advantage.

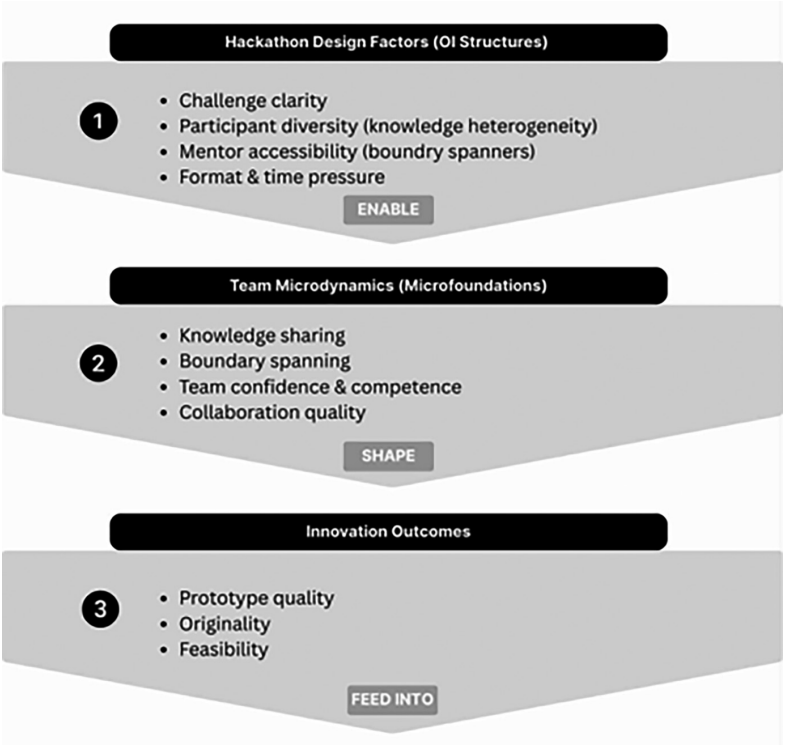




Figure 3. Hackathon Design Framework: Implications for Corporate Innovation and ompetitive Advantage

Source: authors' creation

The findings of this study support a multi-level conceptual model in which hackathon outcomes arise from the interaction of organizational design structures and team-level microfoundations, which together shape short-term innovation outputs and long-term capability development. The model synthesizes empirically derived factors with established theoretical perspectives in open innovation and microfoundations research (Figure 3).

In line with open-innovation theory and recent calls for deeper integration of structural and behavioral determinants of hackathon performance (Chesbrough & Bogers, 2014; Nolte et al., 2020), this study provides an empirically grounded analysis of how hackathon design, mentorship dynamics, and team-level microfoundations jointly influence innovation outcomes. The findings converge across correlation analysis, exploratory regression models, and factor analysis, revealing a coherent set of mechanisms that structure how temporary innovation events activate knowledge flows, collaboration processes, and early-stage value creation.

6.1. Reinterpreting Results Through the Lens of Open Innovation Theory

The results demonstrate that organizational clarity, operationalized through clear challenge statements, transparent evaluation criteria, resource accessibility, and structured communication, is strongly associated with higher innovation outcomes. This supports earlier research positioning clarity and challenge framing as critical enablers of cognitive alignment and effective problem-solving in temporary innovation environments (Heller et al., 2023; Aryana et al., 2019). From an open-innovation perspective, well-defined objectives reduce uncertainty and facilitate knowledge integration by ensuring that

heterogeneous participants share a common interpretive frame (Laursen & Salter, 2006). Our data reinforce this logic: teams reporting higher clarity produced more original and feasible prototypes, confirming H1 and extending prior qualitative insights with quantitative evidence.

Similarly, the salience of mentorship accessibility emerges clearly in both correlational and regression analyses. Mentor support—functioning as a boundary-spanning mechanism—was the strongest predictor of technical feasibility, aligning with literature that characterizes mentors as intermediaries who translate complex domain knowledge, accelerate feedback loops, and scaffold learning during fast-paced innovation processes (Chala et al., 2024; Mehta & Shah, 2022). This confirms P3, offering empirical support for theoretical work that positions mentors as crucial absorptive-capacity activators (Zahra & George, 2002) and facilitators of rapid experimentation characteristic of lean innovation cycles (Komssi et al., 2015).

The quantitative findings also highlight the significance of team competence and microdynamics, corresponding to the second latent factor derived from the EFA. Psychological safety, clear role distribution, skill complementarity, and team confidence were strongly linked to presentation quality and perceived innovation success. These results directly support P2, P4, and P5, and resonate with microfoundations literature, which argues that team-level cognitive and relational mechanisms shape the emergence of organizational capabilities (Teece, 2007; Beck et al., 2020). The results reinforce prior claims that hackathons can foster temporary microstructures in which knowledge sharing, cross-role interaction, and iterative learning are amplified (Pe-Than et al., 2020; Franco et al., 2022).

6.2. Integrating Empirical Findings Into the Emergent Conceptual Model

Synthesizing these patterns, the study advances an Emergent Conceptual Model of Hackathon Performance Drivers, depicting hackathon design factors, team microdynamics, and innovation outcomes as interdependent mechanisms that collectively shape organizational learning and strategic renewal. The model reflects the layered causal logic identified in the analyses:

- Hackathon design factors—challenge clarity, participant diversity, mentor access, and resource sufficiency—serve as the structural antecedents of innovation performance, confirming arguments that hackathons are intentionally engineered open-innovation structures (Brambilla et al., 2022).
- Team microdynamics—knowledge sharing, collaboration quality, boundary spanning, and team confidence—mediate the effects of structural design on performance outcomes, supporting P6 and P7 and aligning with the microfoundations literature on innovation (Teece, 2007).
- Innovation outputs—originality, prototype quality, feasibility—represent the immediate results of dynamic interaction between structure and behavior, consistent

with findings from Feldmann and Teuteberg (2021), Feder (2021), and Milićević et al. (2024).

- These outputs, when embedded within broader corporate innovation systems, reinforce organizational-level outcomes such as innovation capability, intrapreneurial activation, cultural shifts toward experimentation, and enhanced cross-functional collaboration. This aligns with research positioning hackathons as vehicles for capability development and organizational learning (Nolte et al., 2018; Granados & Pareja-Eastaway, 2019).
- Over time, these organizational-level changes contribute to long-term competitive advantage, confirming the extended logic of open innovation and dynamic capabilities theory (Teece, 2007; Obradović et al., 2021).

This multi-level structure demonstrates that hackathons function not simply as ideation events but as temporary open-innovation systems that orchestrate microfoundational team dynamics and macro-level organizational learning processes.

6.3. Contributions to Hackathon and Open-Innovation Research

This study advances hackathon and open-innovation scholarship through three interrelated contributions.

1. Empirical Identification of Two Latent Mechanisms Structuring Hackathon Performance

The EFA revealed two robust latent dimensions—Organizational Clarity and Team Competence—that jointly explain the majority of variance in innovation outcomes. This provides the first quantitative validation of theoretical assumptions advanced by recent hackathon research (Heller et al., 2023; Jurgelevičius et al., 2025), which has primarily relied on descriptive or qualitative evidence. By empirically isolating these mechanisms, the study clarifies the underlying structure of temporary innovation systems.

2. Demonstration of Mentorship as a Core Boundary-Spanning Mechanism in Open Innovation

The study shows that mentor accessibility is the strongest predictor of technical feasibility, exceeding the influence of other structural design factors. This finding empirically substantiates the theoretical claim that mentors act as boundary-spanning intermediaries who accelerate knowledge recombination, reduce uncertainty, and enhance absorptive capacity in time-compressed innovation environments. This contribution extends open-innovation theory by specifying how expert scaffolding operates within short-cycle innovation events.

2. Theoretical Integration Across Micro–Macro Levels of Innovation Processes

By integrating structural design inputs, team-level microfoundations, and project-level innovation outcomes into a unified conceptual model, the study addresses long-recognized fragmentation in hackathon research. It connects open-innovation structures with microfoundational processes (knowledge sharing, role clarity, psychological safety) and demonstrates how these jointly shape innovation performance. This integration contributes a

multi-level process perspective that unites previously disconnected streams of research on hackathon design, team dynamics, and organizational learning.

6.4. Practical Implications for Corporate Innovation Management

The findings offer several actionable implications for organizations seeking to enhance the effectiveness of corporate hackathons:

- Invest in design clarity. Because clarity of challenge statements and evaluation criteria was strongly associated with higher innovation outcomes, organizations should allocate time and resources to precise problem framing and onboarding.
- Structure mentorship deliberately. Mentor accessibility emerged as the most influential predictor of feasibility; thus, mentorship should be proactive, coordinated, and embedded into the event rather than provided informally.
- Prioritize skill complementarity and psychological safety in team formation. Teams with diverse skills, clear roles, and strong psychological safety consistently outperformed others, underscoring the importance of deliberate team-building.
- Integrate hackathons into broader innovation governance. Rather than treating hackathons as isolated events, organizations should position them within a portfolio of innovation instruments, ensuring continuity, post-event development, and organizational learning.

These recommendations reinforce calls in the literature for more intentional design of hackathon ecosystems (Falk et al., 2024; Kamariotou & Kitsios, 2022).

6.5. Limitations and Directions for Future Research

The main limitation of this study is the small number of teams (N = 8), which constrains statistical generalizability. This is, however, typical for team-level research in corporate hackathons and consistent with the logic of exploratory theory-building (Edmondson & McManus, 2007). Additionally, the single-event context and partial reliance on self-reported measures may limit external validity. Future research should:

- replicate and validate the findings across multiple hackathons and organizational settings;
- examine longitudinal effects to assess how hackathons contribute to sustained innovation capability development;
- compare digital, hybrid, and physical hackathon formats to understand how structural configurations shape microdynamics and team learning;
- apply machine-learning and fine-grained behavioral analytics (e.g., communication traces, interaction patterns) to uncover latent collaboration mechanisms not detectable through surveys alone.

These avenues would deepen theory development and clarify how hackathon design and team processes contribute to organizational learning and innovation outcomes across contexts.

7. Conclusions

This study set out to examine how corporate hackathons function as temporary open-innovation systems that trigger knowledge recombination, accelerate experimentation, and support early-stage capability development. Drawing on a systematic literature review and an exploratory empirical analysis of a five-day corporate innovation hackathon, the study provides new theoretical and practical insights into the structural and team-level conditions that drive hackathon effectiveness. The findings demonstrate that hackathon outcomes are shaped not by isolated design choices but by the alignment of organizational clarity, team competence, and boundary-spanning mentorship—an integrated mechanism that enables high-quality innovation performance.

7.1 Theoretical Contributions

The study makes three primary contributions to open-innovation and hackathon research. First, the study conceptualizes hackathons as temporary open-innovation systems that activate both inbound and internal knowledge flows. While prior research has acknowledged the collaborative nature of hackathons, this work systematically integrates open-innovation constructs - such as absorptive capacity, boundary spanning, and knowledge recombination - into a unified explanatory model. By doing so, it extends open-innovation theory toward short-cycle, event-based innovation contexts.

Second, the empirical findings reveal two dominant latent mechanisms - Organizational Clarity and Team Competence that jointly predict innovation outcomes. These mechanisms, identified through exploratory factor analysis, provide quantitative validation for theoretical arguments advanced in recent literature about the dual structural and behavioral foundations of hackathon success. This contributes theoretical precision to previously fragmented insights, strengthening the evidence that hackathon performance arises from the intersection of design scaffolds and team microfoundations.

Third, the study offers a layered conceptual model linking hackathon design factors to team microdynamics, innovation outcomes, and organizational-level capability development. This model advances theory by bridging micro- (team), meso- (event design), and macro-level (capabilities, competitive advantage) mechanisms—helping reconcile divergent strands of the literature and positioning hackathons as catalysts of strategic renewal rather than isolated creativity events.

Together, these contributions expand current understandings of how short-cycle innovation mechanisms contribute to organizational capability building and long-term competitive advantage.

7.2 Practical Implications

The findings also provide important implications for managers responsible for designing and implementing corporate hackathons.

First, the results show that organizational clarity - clear objectives, transparent evaluation criteria, and accessible resources - is a foundational driver of successful outcomes. Organizations should therefore invest significant effort in challenge formulation, onboarding, and event communication to ensure shared understanding among interdisciplinary participants.

Second, mentorship accessibility emerged as the strongest predictor of technical feasibility. This underscores the importance of structuring mentorship strategically rather than treating it as an ad hoc support function. Clear mentor roles, scheduled touchpoints, and proactive engagement significantly enhance knowledge integration and reduce technical uncertainty during rapid prototyping.

Third, team competence and microdynamics—including psychological safety, role clarity, and collaborative quality—substantially influence innovation outcomes. These insights suggest that team formation processes should emphasize balanced skills, diversity, and mechanisms for rapid coordination. Facilitators may also cultivate psychological safety through reflective checkpoints and transparent communication practices.

Finally, the study shows that hackathon outcomes can contribute to longer-term organizational benefits, including innovation capability renewal, intrapreneurial activation, and cultural shifts toward experimentation. To capture these gains, organizations should embed hackathons into broader innovation governance structures, ensuring that post-event follow-up mechanisms support continued development of promising ideas.

7.3 Future Research Directions

As an exploratory study, this work also identifies several opportunities for future research.

First, replication across multiple hackathons or organizational settings would strengthen empirical generalizability, enabling more robust testing of the identified mechanisms. Multi-event or multi-firm designs could assess whether the dual-factor structure of Organizational Clarity and Team Competence persists across contexts.

Second, longitudinal studies would allow researchers to evaluate whether hackathon participation contributes to sustained capability development, project implementation, or career trajectories. Such studies could illuminate the long-term pathways through which hackathons embed into open-innovation ecosystems.

Third, future research could explore how digital, hybrid, or fully virtual hackathons alter team dynamics and boundary-spanning processes. Given the rise of remote collaboration, comparative analyses would be valuable in understanding how platform affordances shape innovation outcomes.

Finally, advanced analytical techniques—such as process mining, social network analysis, or machine-learning-based pattern detection—could provide deeper insight into real-time collaboration dynamics and knowledge flows within hackathons.

Overall Conclusion

In sum, this study demonstrates that hackathons offer organizations more than rapid prototyping opportunities—they serve as structured micro-environments for activating open-innovation capabilities. The evidence presented here shows that the interplay between organizational design factors and team microfoundations is central to generating high-quality innovation outcomes and strengthening longer-term innovation capacity. By articulating and empirically grounding these mechanisms, the study contributes to the theoretical consolidation of hackathon research and offers actionable guidance for organizations seeking to leverage hackathons as strategic tools for competitive advantage.

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Ethics Declaration

This study involved voluntary survey participation during a corporate hackathon. No personally identifiable or sensitive data were collected, and all responses were fully anonymized before analysis. As the research did not include interventions, vulnerable populations, or the processing of personal data, formal ethical approval was not required under institutional and GDPR guidelines. Participants were informed about the study's purpose and their right to withdraw. All secondary sources used were publicly available and properly cited.

AI Declaration

This manuscript used an AI language model (ChatGPT by OpenAI) solely to assist with language refinement and formatting clarity. All intellectual content, analysis, and conclusions were generated by the authors. AI-assisted text was reviewed, verified, and edited to ensure accuracy and academic integrity. The authors bear full responsibility for the final content.

Data Availability Statement

The data used to support the findings of this research are available from the corresponding authors upon request.

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