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INNOVATION THROUGH MERGER OR ACQUISITION: LEVERAGING STARTUP INTEGRATION FOR CORPORATE COMPETITIVENESS IN THE ENERGY SECTOR WITH A FOCUS ON INTEGRATION MODELS

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Abstract

Focusing on the European energy sector, this research examines how startup acquisitions affect corporate innovation and performance. A mixed-methods design combines expert interviews with a panel study of listed European acquirers. Qualitative findings highlight joint technology and market-seeking motives, showing that success requires dynamic sequencing (autonomy-first) and effective governance of cultural distance and integration pacing. Quantitative analysis reveals that acquisitions do not expand R&D. Instead, they are associated with a persistent decline in long-term profitability. The study contributes by identifying the critical conditions and strategic guidance necessary for effective startup integration.

Keywords: European Energy Sector, Mergers & Acquisitions (M&A), Startup Integration, Corporate Innovation, Strategic Motives, Cultural Challenges, Integration Models, Long-Term Performance

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I. List of Abbreviations

CVC	Corporate Venture Capital
DC	Dynamic Capability
DD	Due Diligence
DiD	Difference-in-Differences
DER	Distributed Energy Resources
EU	European Union
ERP	Enterprise Resource Planning
HSE	Health, Safety & Environment
IOC	International Oil Companies
M&A	Mergers & Acquisitions
OLS	Ordinary Least Squares
PMI	Post-Merger Integration
R&D	Research & Development
RBV	Resource-Based View
ROA	Return on Assets
SG&A	Selling, General and Administrative
SIC	Standard Industrial Classification
SME	Small and Medium-sized Enterprise
TTM	Time-To-Market
UK	United Kingdom
VIF	Variance Inflation Factor

1 Introduction

In recent years, established European utilities and energy companies have increasingly acquired younger, entrepreneurial firms to accelerate their transformation. Examples include Shell's acquisition of home battery provider sonnen, EnBW's acquisition of battery storage specialist SENEC, ENGIE's acquisition of EV-charging company EVBox, and E.ON's majority stake in grid-software startup envelio. These transactions illustrate a broader pattern of incumbents buying entrepreneurial ventures to gain access to digital capabilities, new customer interfaces, and innovative business models that are difficult to develop internally at the required speed.

This development takes place against the backdrop of a profound transformation of the European energy sector. With the European Green Deal and the European Climate Law, the European Union (EU) has committed to cut greenhouse gas emissions by at least 55% by 2030 (relative to 1990) and to reach climate neutrality by 2050 (European Commission 2023). Meeting these targets requires investments in renewable generation and grid infrastructure, as well as new digital, flexible, and customer-centric energy solutions (Costa-Campi et al. 2024). Concurrently, a dynamic startup ecosystem has emerged around clean and digital energy solutions (Greven et al. 2023). These young firms create software for grid optimization, flexibility platforms, storage management, e-mobility, and customer-centric services, frequently outpacing incumbents in the adoption of data-driven business models (Wasilewska et al. 2022). Within the scope of this thesis, "startup" denotes young, innovation-driven firms with scalable business models that utilize digital and/or clean-energy technologies. For established utilities and energy companies, such startups represent both potential competitors and valuable partners for acquiring new technologies, talent, and innovative work practices.

Traditional innovation approaches in the energy sector, dominated by large-scale, internally driven research & development (R&D) in a capital-intensive and highly regulated environment, often struggle to keep pace with this dynamic (Hoppe et al. 2018; Hess and Siegwart 2013). In

response, many incumbents have adopted open innovation approaches and a portfolio of corporate-startup engagement modes, including accelerators, incubators, strategic partnerships, and corporate venture capital, as well as more high-commitment instruments such as mergers and acquisitions (M&A) of startups (Weiblen and Chesbrough 2015; Sbampato et al. 2025; Pereira et al. 2022; Niemczyk et al., 2022). Among these, acquisitions are particularly consequential because they entail the full integration, or at least majority control, of the startup and its resources into the incumbent's organizational structure.

While these acquisitions are anticipated to facilitate digital transformation and capability renewal, they also present fundamental challenges. The conditions under which acquiring a startup enhances long-term innovation and competitiveness remain uncertain, as do the integration approaches most effective for leveraging startup capabilities and managing cultural differences between corporates and startups to foster, rather than impede, innovation. This study addresses these issues by examining how startup acquisitions in the European energy sector can serve as a strategic mechanism to enhance innovation and corporate competitiveness.

1.1 Relevance of the Topic

In light of these developments, startup acquisitions have gained prominence as an innovation instrument for energy-sector incumbents. Empirical work indicates that established firms increasingly acquire startups to access external technologies, digital capabilities, and entrepreneurial talent that are difficult to develop internally at the required speed (Pereira et al. 2022; Niemczyk et al., 2022; Wasilewska et al. 2022). In the European energy sector, these dynamics are closely linked to the energy transition, as corporations seek to reposition themselves in emerging domains such as decentralized generation, storage, flexibility, and e-mobility (Greven et al. 2023).

At the same time, research shows that the energy industry faces substantial innovation challenges, while R&D investment and innovation output remain relatively low compared to

other sectors (Costa-Campi et al. 2024). This tension between high innovation needs and limited internal R&D reinforces the appeal of external innovation instruments, including M&A.

Research on the effects of acquisitions on innovation confirm that their impact is highly contingent. Some types of acquisitions and knowledge combinations enhance innovation, whereas others have no effect or even reduce innovative performance (Ahuja and Katila 2001; Cloodt et al. 2006). More recent work on technological M&A similarly highlights that outcomes depend on factors such as technological relatedness, absorptive capacity, and the interplay between internal R&D and acquired knowledge (Sevilir and Tian 2012; Suo et al. 2023). More broadly, reviews and meta-analyses of M&A performance document substantial heterogeneity and often modest average value creation (Haleblian et al. 2009; King et al. 2004). This ambiguity is particularly pronounced for innovation-oriented deals, where the objective is not only to realize cost or scale synergies but also to combine distinct knowledge bases, routines, and organizational cultures.

Most studies adopt a cross-sector perspective and do not fully account for the specific conditions of the energy sector, such as high capital intensity, regulatory constraints, system-critical infrastructure, and strong policy-driven transition dynamics (Hess and Siegwart 2013; Wasilewska et al. 2022). Moreover, prior work tends to examine either strategic motives, integration models, cultural dynamics, or performance effects in isolation, providing limited insight into how these dimensions interact over time in practice. Empirical studies frequently rely on short-term financial indicators, and there is relatively little evidence on the long-term innovation and performance consequences of startup acquisitions in energy markets

These dynamics form the foundation of the research problem addressed in this study: how innovation can be achieved through M&A by leveraging startup integration as a driver of corporate competitiveness within the European energy sector. The topic is therefore relevant both academically, as it contributes to a more integrated understanding of innovation-oriented

M&A in a sector undergoing profound transformation, and practically, as it addresses a strategic instrument that is increasingly used by energy-sector incumbents despite persistent uncertainty about its effectiveness.

Specifically, the thesis contributes by refining existing perspectives on innovation-oriented acquisitions in regulated, asset-intensive sectors in three ways: (1) it shows that post-acquisition innovation is associated with a temporal "autonomy first, hybrid later" integration sequence, (2) it highlights cultural distance as a structural barrier embedded in compliance and safety systems, and (3) it documents that startup acquisitions in the European energy sector do not expand R&D investment and are associated with persistent profitability declines.

1.2 Research Objectives and Questions

Addressing the identified research gap, this thesis examines how M&A of startups can enhance innovation and corporate competitiveness in the European energy sector. The analysis focuses on the motivations for corporations to acquire or collaborate with startups, the integration and transformation of external capabilities within established organizations, and the resulting long-term innovation and performance outcomes.

These issues are examined using a mixed-methods research design that combines qualitative and quantitative approaches. The qualitative component explores how strategic motives, integration models, and cultural dynamics shape post-acquisition innovation, drawing on expert interviews, while the quantitative component analyzes long-term impacts on firms' innovation activity as well as financial performance using panel data on listed energy companies.

From these objectives, the following four research questions are derived:

1. *What strategic and innovation-related motives drive energy-sector corporations to acquire startups?* (Chapter **Error! Reference source not found.**)
2. *How do different integration models shape innovation outcomes after acquisition?* (Chapter 5)

3. *How and to what extent do organizational and cultural differences influence post-acquisition innovation outcomes?* (Chapter 6)
4. *What are the long-term effects of startup acquisitions on firms' innovation activity and financial performance?* (Chapter 7)

Together, these questions guide the empirical and theoretical analysis of this thesis and provide the foundation for understanding how innovation through M&A of startups can be leveraged as a strategic driver of corporate competitiveness in the energy sector.

1.3 Thesis Structure and Overview

The structure of this thesis progresses from conceptual foundations to empirical investigation and synthesis. Chapter 2 establishes the research context, defines key concepts, and develops the theoretical framework underpinning the study. By drawing on ambidexterity theory, the resource-based view, and dynamic capabilities, this chapter provides a basis for analyzing how innovation-oriented M&A of startups influence corporate competitiveness in the energy sector and clarifies the relationship between these theoretical perspectives and the research questions. Chapter 3 presents the methodology, detailing the rationale for employing a mixed-methods research design and outlining both qualitative and quantitative components. This chapter describes the sampling and data collection procedures for expert interviews, and a high-level description of the quantitative analysis, with full methodological details reported in Chapter 7. The following chapters present the empirical findings. Chapters 4 to 6 provide qualitative results on strategic motives, integration models, and cultural dynamics in corporate-startup acquisitions, emphasizing the interaction of these dimensions in practice and their influence on post-acquisition innovation processes. Chapter 7 offers a quantitative analysis of the long-term effects of startup acquisitions on firms' innovation activity and financial performance, evaluating the conditions under which such acquisitions contribute to sustained competitive advantage.

Chapter 8 integrates insights from both qualitative and quantitative components, identifying overarching patterns and mechanisms that connect acquisition strategies with innovation outcomes and situating these findings within a broader theoretical and managerial context. Chapter 9 concludes the thesis by summarizing key insights, outlining theoretical and practical contributions, and identifying limitations and directions for future research on how established firms can utilize entrepreneurial acquisitions to sustain innovation and competitiveness in the evolving energy landscape.

2 Theoretical Framework

This chapter introduces the definitions, contextual specifications, and theoretical foundations that guide the research and analysis. It combines Ambidexterity Theory, the Resource-Based View (RBV), and the Dynamic Capability (DC) framework to explain how firms balance efficiency and innovation, leverage unique resources, and adapt to environmental change. Together, these perspectives provide the conceptual basis for understanding how corporate-startup acquisitions influence innovation and performance in the energy sector. Chapter 4-7 will further expand on this foundation, integrating previous research and theoretical insights.

2.1 Definitions

This section clarifies the key terms used in the thesis. The definitions follow established academic usage and are tailored to corporate-startup acquisitions in the energy sector.

2.1.1 Startup & Corporation

A *startup* is commonly understood as a young, innovation-driven firm pursuing scalable growth under conditions of significant uncertainty. It is characterized by novelty, risk, adaptability, and a temporary organizational structure. Blank (2013) defines a startup as a "temporary organization" in search of a scalable and repeatable business model, while Ries (2011) highlights its role in creating new products or services under conditions of extreme uncertainty. The European Startup Monitor (2017) adds that startups are firms less than ten years old,

operating with innovative technologies or business models, and aiming for high growth. Freeman and Engel (2007) describe startups as fluid, adaptive entities with minimal formal structure, where innovation is informal, problem-driven, and shaped by rapid experimentation. Founders serve as central decision-makers, and learning is iterative rather than procedural.

In contrast, *corporations* are defined as large, established organizations with formalized structures, routines, and a focus on efficiency. They follow a "systematic innovation" model, that relies on standardized R&D processes, division of labor, and strategic alignment with existing business lines, and is shaped by bureaucratic processes, long-term planning, and risk management, often limiting responsiveness to disruptive change (Freeman and Engel 2007).

2.1.2 Energy Sector Definition and Specifications

While many studies of corporate-startup collaborations have focused on high-tech and digital (Steiber and Alänge 2021; Gutmann and Lang 2022; Rigtering and Behrens 2021), the energy sector specifically presents a distinct context. For this study, the energy sector is defined broadly to encompass industries engaged in the production, conversion, transmission, distribution, and enabling of energy systems across both conventional sources (e.g., oil, gas, nuclear) and renewable sources (e.g., wind, solar, hydro) (Wasilewska et al. 2022). This definition also includes upstream and downstream energy activities, as well as providers of energy infrastructure, grid operations, and related industrial technologies, such as engineering, equipment, and services supporting energy generation, storage, and efficiency.

It is shaped by three interrelated characteristics that are especially relevant in the context of M&As: capital intensity, regulatory complexity, and innovation dynamics.

Capital intensity arises from the need to develop and maintain large-scale infrastructure with long asset lifecycles, creating substantial entry barriers and favors established firms with robust financing and operational scale (Acs and Audretsch 1987). Regulatory complexity arises from dense, multi-level governance structures, long-term policy frameworks, and stringent safety

and environmental standards, which strongly influence investment decisions, market access, and technology deployment. Innovation dynamics are characterized by a tension between path-dependent, asset-heavy legacy systems and the rapid emergence of new technologies such as renewables, storage, smart grids, and digital energy services. Incumbent firms, often shaped by risk-averse cultures and legacy infrastructure, may struggle to generate disruptive innovation internally (Hess and Siegwart 2013). As a result, they frequently turn to external innovation through acquisitions of startups or clean-tech ventures (Wasilewska et al. 2022).

2.1.3 Competitiveness

Competitiveness refers to an organization's ability to create and sustain value, adapt to change, and outperform rivals. In startup acquisition, it is a multidimensional construct linked to strategic, technological, and organizational capabilities. Feurer and Chaharbaghi (1994) argue that competitiveness depends on delivering value to customers and shareholders while navigating a dynamic competitive environment. Varga (2023) underscores innovation as a critical enabler of competitiveness, noting that more innovative firms consistently outperform less innovative peers. In the energy sector, competitiveness through startup acquisition may involve access to emerging technologies, integration of entrepreneurial culture, and greater capacity for radical innovation (Greven et al. 2023).

From a quantitative perspective, competitiveness can be operationalized as a firm’s ability to generate superior financial performance relative to its peers. In empirical research, this is commonly proxied by Return on Assets (ROA), which reflects how efficiently a company utilizes its total assets to produce net income (Penman 2013). A higher ROA indicates stronger managerial effectiveness, resource utilization, and overall operational competitiveness. In this study, ROA serves as a key measure of firm competitiveness, capturing the financial outcomes that result from strategic and innovation-related activities such as startup acquisitions.

2.1.4 Innovation

In the context of this study, M&A is viewed as a strategic mechanism to acquire external technological capabilities and thereby strengthen a firm's competitive advantage. Innovation is not limited to internal R&D but extends to leveraging newly acquired knowledge, assets, and expertise to drive technological and organizational advancement (Suo et al. 2023). Similarly, Sevilir and Tian (2012) assess innovation through patent volume and novelty, finding a positive correlation between acquisition activity and innovation output.

Across the thesis, innovation is understood in a broad sense as the development, implementation, and scaling of new or significantly improved products, services, processes, and organizational arrangements that enhance firms' technological and market capabilities. In the qualitative chapters, this includes outcomes such as time-to-market (TTM) for post-acquisition launches, the pace and robustness of innovation pipelines, and the effective recombination of startup and corporate resources following acquisition.

Although widely studied, innovation remains a multifaceted concept, especially in the context of open innovation and corporate-startup acquisitions. Dezi et al. (2018) note the lack of a unified definition, reflecting the complexity of measuring innovation outcomes across different strategic contexts. For the quantitative analysis of long-term firm performance, and given that R&D forms a core component of innovation, this study defines innovation through firms' R&D expenditure, which serves as an input-based proxy when analyzing the long-term effects of startup acquisitions on innovativeness. R&D spending captures the financial resources a firm allocates to internal and external innovation efforts, including product development, process improvement, and technology advancement. This measure reflects the strategic commitment to innovation and the capacity to absorb and develop new knowledge, even if it does not directly quantify innovation outputs such as patents or products. This input-oriented approach aligns with established empirical research, which considers R&D expenses as a reliable indicator of firms' innovative potential (Fernández et al. 2019; Skala 2019; Jalilvand and Kim 2013).

2.2 Theoretical Lenses

The following subsections outline the three theoretical perspectives that guide the analysis: Ambidexterity Theory, the Resource-Based View, and the Dynamic Capability framework.

2.2.1 Ambidexterity Theory

Ambidexterity addresses the challenge of balancing two fundamentally different logics: exploiting existing capabilities for efficiency and exploring new opportunities for adaptation. Survival and performance depend on managing this balance effectively. Exploitation emphasizes refinement, implementation, and efficiency, while exploration involves variation, experimentation, and innovation. Both can be pursued simultaneously when organizational design and context support it (March 1991; Raisch and Birkinshaw 2008; Moreno Luzon and Valls Pasola 2011; Jalilvand and Kim 2013).

Two archetypal approaches exist. *Structural ambidexterity* separates exploration and exploitation into distinct units (or temporal cycles), with senior leaders integrating the two streams. This approach enables focus but generates coordination costs and risks related to misaligned incentives and knowledge-transfer barriers. Evidence shows that integration choices – specifically the pace, depth, and locus of integration – shape post-merger outcomes and the trajectory of synergy realization, highlighting the need to balance structural linkage for efficiency with autonomy for learning (Tushman and O'Reilly 1996; Moreno Luzon and Valls Pasola 2011). *Contextual ambidexterity*, in contrast, treats ambidexterity as a behavioral capability within a single business unit. Individuals are empowered to shift between alignment and adaptability when supported by an appropriate organizational context. Empirical work shows that four attributes – discipline, stretch, support, and trust – form the non-substitutable conditions enabling ambidextrous behavior and superior performance outcomes (Gibson and Birkinshaw 2004; Moreno Luzon and Valls Pasola 2011; Ghoshal and Bartlett 1994).

In post-acquisition settings, the coordination-autonomy dilemma becomes particularly acute. Excessive integration can suppress exploratory search, whereas excessive autonomy can delay or prevent synergy capture. Ambidextrous integration mechanisms, such as selective coupling, phased integration, or joint working routines, help navigate this tension (Markides 2013; Dao and Strobl 2019; Puranam et al. 2006). Research further suggests that the required intensity of these mechanisms depends on strategic relatedness and environmental uncertainty, underscoring the multi-level nature of ambidexterity and the importance of enabling knowledge flows while sustaining both exploration and exploitation.

2.2.2 Resource-Based View

The RBV explains sustained competitive advantage arising from a firm's ability to control and deploy heterogeneous resources such as tangible assets, organizational routines, specialized knowledge, and capabilities. These resources create advantage when they are valuable, rare, inimitable, and non-substitutable (VRIN) and are protected by isolating mechanisms that deter imitation (Barney 1991; Wernerfelt 1984; Wernerfelt 1995; Reed and Defillippi 1990). Building on Penrose's concept of the firm as a bundle of productive resources, RBV theorists argue that advantage endures when firms possess resource positions that competitors cannot easily replicate due to causal ambiguity, social complexity, or path dependence (Penrose 1959; Wernerfelt 1984; Barney 1991; Xie 2021). In this logic, performance differences arise not from market position but from the unique configuration and protection of a firm's resource base.

The Knowledge-Based View (KBV) extends RBV by treating knowledge as a resource. Because much of a firm's expertise is tacit, firm-specific, and co-specialized, companies internalize knowledge creation and integration to coordinate it more efficiently than markets can (Conner and Prahalad 1996; Grant 1996). Competitive advantage thus depends on continuous development, absorption, and integration of knowledge through learning processes

and organizational routines, with capability evolution shaped by mechanisms such as socialization, shared problem-solving, and knowledge recombination (Teece 2007).

2.2.3 Dynamic Capabilities

DCs build on the RBV by clarifying how firms maintain competitive advantage when conditions shift quickly. Instead of relying on existing resource stocks, they emphasize the firm's capacity to renew itself continuously. In this view, advantage stems from the ability to combine, develop, and adjust internal and external competences as circumstances change, directing attention to the higher-order routines that enable such adaptation (Teece 2007; Teece et al. 1997; Eisenhardt and Martin 2000). These capabilities consist of identifiable organizational processes – such as product development, strategic decision-making, and alliance or acquisition routines – that transform existing assets into new configurations and maintain evolutionary and entrepreneurial fitness.

Teece's (2007) *Sensing-Seizing-Reconfiguring* framework articulates the foundations of DCs:

1. *Sensing* involves systematic scanning, experimentation, and interpretation to identify and shape emerging opportunities.
2. *Seizing* concerns mobilizing resources, selecting technologies and product architectures, and designing viable business models to capture value.
3. *Reconfiguring* (or transforming) entails realigning tangible and intangible assets, structures, and complementarities to maintain evolutionary fitness and escape path dependencies.

A central mechanism enabling DCs is absorptive capacity (ACAP), the firm's ability to recognize, assimilate, transform, and exploit external knowledge. ACAP comprises two components: potential ACAP (acquisition and assimilation), which supports strategic flexibility, and realized ACAP (transformation and exploitation), which converts knowledge into innovation outputs. Through ACAP, firms renew their resource base by integrating technologies and competencies sourced externally through alliances or acquisitions.

Within this framework, acquisitions represent a *seizing* mechanism: a means to access critical external knowledge or capabilities. Whether they contribute to strategic renewal, however, depends on post-acquisition integration choices that balance coordination and autonomy – a tension highlighted in research on knowledge-intensive acquisitions (Puranam et al. 2006). Governance structures must preserve tacit and co-specialized knowledge while enabling the combinations required for reconfiguration, both key foundations of DCs (Teece 2007).

In sum, ACAP and the sensing-seizing-reconfiguring cycle explain how firms turn external knowledge and assets into sustained performance. They also clarify why acquisitions may catalyze strategic renewal in some cases but merely reinforce exploitative routines in others.

3 Methodology

This chapter outlines the methodological approach adopted for the study. The research follows a mixed-methods design that integrates qualitative and quantitative analyses to investigate how strategic motives, cultural collaboration, and integration models in corporate-startup acquisitions influence innovation outcomes. The qualitative component introduced in Section 3.1 constitutes the primary focus of this thesis, while a complementary quantitative analysis described in Section 3.2 examines the long-term effects of startup acquisitions on innovation activity and firm performance (Creswell and Creswell 2018).

The qualitative component explores mechanisms and perceptions underlying innovation through startup integration, providing depth and contextual understanding. The quantitative analysis extends these insights by examining long-term effects of startup acquisitions on innovation outcomes and financial performance. Combining the two enables triangulation and enhances explanatory power, offering both detailed process insight and broader empirical validation consistent with mixed-methods guidance (Creswell and Creswell 2018).

3.1 Qualitative Methodology

This section outlines the qualitative methodology underpinning the study, explaining the research design, sampling strategy, data collection procedures, and analytic approach that inform the empirical chapters.

3.1.1 Research Design and Justification

The study applies an exploratory qualitative design grounded in an interpretivist-constructivist worldview, using semi-structured expert interviews as the primary data collection method. This stance assumes that meanings are socially co-constructed and that knowledge emerges through interaction with participants and context, rather than being discovered as objective fact (Creswell and Creswell 2018). The research logic combines deductive propositions derived from theory with iterative refinement as empirical insights evolve, reflecting the iterative nature of qualitative theorizing (Shah 2025).

Analytically, Template Analysis was employed as the primary frame (King, Brooks, and Tabari 2018). This approach offered a structured yet flexible framework for theme development, accommodating both a priori sensitizing concepts and emergent insights. Following King et al. (2018), successive versions of the template were compared and refined to ensure analytical coherence and representativeness of the data.

3.1.2 Participants and Sampling / Case Selection

The participants in the interviews were expert informants directly involved in acquisitions or collaboration between corporates and startups in the European energy sector. The sample included M&A managers, corporate venture professionals, startup executives, and consultants with experience from pre-deal evaluation to post-deal collaboration. Purposive sampling was applied to ensure respondents were appropriate for the research aims and possessed relevant experiential knowledge of the phenomenon under study (Lim 2025). To enhance transparency and trustworthiness, participant information and contextual details were documented in a way that allows readers to assess relevance while preserving confidentiality (Shah 2025). In total, N

= 13 expert interviews (≈55-70 minutes; one interview of 38 minutes) were conducted with 4 M&A managers, 3 corporate venture development managers, 3 consultants, 2 chief operating officers, and 1 startup executive. The number of interviews was determined pragmatically, balancing diversity of perspectives with time and access constraints. Appendix A provides an anonymized overview (role, sector, interview date, and duration) to support assessment of relevance while preserving confidentiality.

3.1.3 Data Collection and Interview Procedure

Semi-structured expert interviews served as the principal data source, focusing on deal motives, cultural collaboration, integration design, and innovation outcomes. The semi-structured interview guide was developed collaboratively by the research team and structured around three core domains: (1) strategic motivations for corporate-startup acquisitions or alliances, (2) integration models and their influence on innovation potential, and (3) cultural challenges affecting post-acquisition collaboration. An initial draft of the guide was prepared based on literature on corporate-startup collaboration and M&A success factors, then pilot-tested internally to ensure conceptual coverage and clarity. The guide was refined to improve sequencing and neutrality of wording. Before each interview, information about the interviewee's professional background and role was reviewed to enable context-sensitive questioning. During data collection, the researchers generally followed the guide while allowing limited adjustments to question order or phrasing where needed. Each interview concluded with approximately 15 minutes for the interviewee to ask questions or provide additional comments. The finalized interview guide is included in Appendix B. This format offered a balance between comparability across interviews and flexibility for probing emerging topics (Lim 2025). Interviews were held via secure videoconferencing, a modality that is increasingly mainstream and acceptable for qualitative research when handled with care for rapport and privacy (Lim 2025). Each interview lasted about 60 minutes and was audio-

recorded with consent. Transcripts were produced verbatim, reviewed for accuracy and speaker labeling, and de-identified prior to analysis.

Established ethical guidance was followed by obtaining informed consent, protecting participant confidentiality through pseudonyms, restricting raw data access to the research team, and securely storing recordings and transcripts in access-controlled folders until analysis was complete, in accordance with institutional data protection requirements (Creswell and Creswell 2018; Lim 2025).

3.1.4 Data Analysis Approach

Template Analysis was organized into five structured stages drawing on the flexible, iterative process described by King et al. (2018):

1. *Familiarization.* Repeated reading of transcripts and preliminary noting of insights regarding motives, cultural interfaces, and integration mechanisms *(*see Appendix C for summarized interview content used during familiarization).
2. *Initial coding.* Application of descriptive codes to capture strategic intent, collaboration patterns, governance choices, and innovation implications, combining a priori and emergent categories.
3. *Template construction.* Hierarchical clustering of codes into a preliminary template integrating theoretical and inductively derived categories.
4. *Refinement.* Iterative revision of the template as further transcripts were analyzed, ensuring conceptual clarity and fit.
5. *Thematic synthesis and pattern matching.* Usage of the final template to interpret and present higher-order themes, comparing perspectives across acquisition contexts and relating them back to the conceptual framework, while documenting analytic decisions as part of the audit trail.

Coding was conducted in MAXQDA Analytics Pro and Microsoft Excel, which enabled systematic organization of the code hierarchy and consistent application of Template Analysis. The structured codebook included fields for code ID, level, definition, inclusion and exclusion criteria, illustrative indicators, and the linked hypotheses. An excerpt of the final qualitative code dictionary is provided in Appendix D. Each coded segment was automatically linked to metadata such as interview ID, date, speaker, and timecode, ensuring traceability. Versioned code systems, analytic memos, and template iterations are referenced in the appendix as part of quality assurance and documentation of analytical decisions, forming the study's audit trail (King et al. 2018; see Appendix E). The analytical process within these stages involved systematic transformation of transcript data, as detailed below.

Building on the template-based coding described above, the interview data underwent an additional layer of analysis that moved from descriptive codes to mechanisms and higher-order patterns. In this study, codes denote analytically meaningful segments that capture what participants said about motives, cultural interfaces, integration arrangements, and innovation outcomes. Mechanisms denote recurring causal logics that explain why particular behaviors or outcomes tend to occur under specific conditions. Patterns denote higher level clusters of related mechanisms that summarize how these causal logics combine across cases and hypotheses.

During coding, each segment that was relevant to the conceptual framework and the hypotheses domains was assigned to one or more hypotheses and labeled with its evaluative direction. Examples of coded and paraphrased segments used in this process are provided in Appendix F. Segments were eventually marked as supporting, contradicting, or neutral with respect to the hypothesized relationship. Starting from this coded and labeled material, the researchers then developed mechanisms for each thematic domain and hypothesis. An excerpt of the mechanism summaries is reproduced in Appendix G. For every major code family, they reviewed the underlying quotations and paraphrased them into short analytic summaries that focused

explicitly on the “because” or “in order to” elements in participants’ accounts. Attention was paid to co-occurring codes, sequences of events within interviews, and similarities in explanation across different organizations and roles. Candidate mechanisms were formulated as concise statements of causal logic. They were retained only if they recurred through multiple interviews or cases and were specific enough that contrary cases could, in principle, challenge them. This procedure is consistent with Template Analysis guidance that emphasizes pattern finding and prioritization rather than mere counting of codes.

In the next step, mechanisms were grouped into a small number of higher-order patterns for each hypothesis. The resulting pattern summaries are presented in Appendix H. This involved clustering mechanisms that describe related constellations of conditions, actions, and outcomes, for example, mechanisms that linked governance choices, cultural interfaces, and innovation effects. Patterns thus served as an intermediate layer between the coded data and the conceptual framework. They summarized how different mechanisms tended to co-occur, how they varied across acquisition contexts, and where boundary conditions appeared. Patterns are therefore the primary analytic unit in the empirical chapters, rather than individual mechanisms.

Hypotheses were then assessed through a structured pattern-matching logic that used these patterns and their underlying coded segments as the main evidence base. For each hypothesis, coded segments and their evaluative labels were organized systematically, linking interview excerpts, mechanisms, and patterns. The research team examined whether the dominant patterns were supported mainly by reinforcing segments, whether there was substantial contradictory evidence, and how this balance related to the theoretical expectations outlined in the literature review. Contradictory evidence was examined at the pattern level and used to refine mechanisms, identify scope conditions, or qualify the overall degree of support. This procedure enabled a transparent link from individual coded segments, through mechanisms and patterns, to the final assessment of each hypothesis.

To ensure transparency in interpretation, hypotheses were evaluated using a simple qualitative support heuristic. A hypothesis is considered "strongly supported" when the majority of relevant patterns and their underlying mechanisms align with the predicted relationship; "partially supported" when supporting and contradicting patterns appear in roughly comparable strength; and "not supported" when contradictory patterns dominate. These criteria were applied consistently across hypotheses, with patterns serving as the primary analytic unit.

3.1.5 Reflexivity

Recognizing that interpretation is influenced by researcher position, reflexive discussions were conducted throughout data collection and analysis to identify assumptions and assess potential biases. These reflections supported consistency in coding and interpretation, ensuring that individual perspectives did not dominate analytic outcomes. Reflexivity was maintained as an integral element of research trustworthiness, following recommendations to balance disclosure and neutrality in qualitative reporting (Finlay 2002).

3.2 Quantitative Methodology

To complement the qualitative analysis, the study incorporates a quantitative component that examines whether corporate-startup acquisitions are associated with long-term changes in firm performance and innovation activity. This component tests, at scale, whether the patterns observed in the qualitative chapters are reflected in broader firm-level outcomes. The analysis draws on a panel dataset combining acquisition information from Crunchbase with financial data from Compustat Global for European and UK firms between 2000 and 2025. Performance is measured through ROA, and innovation through log-transformed R&D expenditure. The empirical strategy employs Ordinary Least Squares (OLS) analyses and Difference-in-Differences (DiD) models with firm and year fixed effects, comparing acquirers to matched control firms. Given the methodological detail of the quantitative study, the full data construction process and empirical strategy are presented comprehensively in Chapter 7.

4 Integration Models

4.1 Introduction and Research Relevance

This chapter examines how post-acquisition integration models shape innovation outcomes and TTM in energy sector corporate-startup acquisitions. It focuses on three archetypes – full integration, partial autonomy, and hybrid symbiosis – and their different effects on short-term speed and longer-term innovation. It contributes by showing how integration design operationalizes exploration-exploitation balance and by highlighting energy-specific contingencies such as regulation, grid interdependence, and safety-critical operations that intensify the coordination-autonomy dilemma.

Integration models influence how firms reconfigure resources and align structures after a deal, affecting the way the acquirer and target combine their activities (Bodner and Capron 2018). They determine capability transfer, inventor retention, and product-release pace. High levels of structural integration can involve coordination costs that may affect workflow speed and innovation, while appropriate integration choices help firms recombine and redeploy resources after the deal (Bodner and Capron 2018). Post-acquisition performance varies widely, with studies showing that acquisition outcomes are highly heterogeneous (Haleblian et al. 2009; King et al. 2004), suggesting integration design as a key performance moderator.

In the energy sector, these dynamics are acute: utilities acquire startups for renewables, storage, and digital grid solutions, but must operate within capital-intensive, regulated systems where innovations must interoperate safely with legacy assets. Coordination demands for compliance and grid reliability often clash with the need for startup autonomy and speed. This chapter therefore links integration design to innovation and TTM outcomes and derives hypotheses on how structural choices affect both.

4.2 Literature Review

This review synthesizes Post-merger Integration (PMI) research to explain how integration models affect innovation outcomes and TTM, and how these mechanisms instantiate Ambidexterity, RBV, and DC in the energy sector corporate-startup acquisitions (Bodner and Capron 2018; Chen et al. 2016).

4.2.1 Post-acquisition Integration Models and Innovation Outcomes

Prior PMI work distinguishes three archetypes, each mapping a different resolution of the coordination-autonomy dilemma (Bodner and Capron 2018).

Full Integration: In full integration, the startup is absorbed into the corporate hierarchy with shared systems, reporting lines, and standardized processes. This may increase coordination and standardization by aligning systems, processes, and structures across the acquiring and target firms (Bodner and Capron 2018; Van Oorschot et al. 2022). In energy deals, this often entails corporate grid protocols, safety standards, unlocking efficiencies, but clashing with agile startup practices. However, post-acquisition efforts to integrate the target's inventors with the acquirer's R&D may affect the target's inventor productivity, especially when the acquiring firm has stronger technological capabilities (Sears and Hitt 2023). Empirical evidence indicates structural integration often delays the first post-deal launch relative to autonomous approaches, supporting more frequent subsequent launches through pipeline scale-up (Puranam et al. 2003).

Partial Autonomy: Under preservation, the acquired startup retains decision rights, local routines, and a distinct organizational identity, typically remaining a separate unit with its own R&D cadence and product roadmaps while interfacing selectively with the parent. This configuration may limit disruption to the startup's existing work practices and development routines, helping it maintain its pre-acquisition innovation activities (Bodner and Capron 2018; Van Oorschot et al. 2022). The trade-off may involve weaker cross-unit coordination, which could slow diffusion and scaling of incremental enhancements and potentially complicate downstream commercialization in large, asset-heavy organizations such as utilities (Bodner and

Capron 2018; Van Oorschot et al. 2022). In energy contexts, preservation may be necessary when startups develop novel grid-edge technologies or Distributed Energy Resources (DER) management solutions that require freedom from corporate bureaucracy to iterate rapidly.

Hybrid Integration: Hybrid designs combine selective structural alignment with retained autonomy, for example, establishing explicit coordination interfaces for platforms, compliance, or market access while granting R&D decision rights and preserving agile development practices. In practice, this entails joint planning for integration points (data, safety, interconnection) and shared-service access (procurement), coupled with separate product teams and governance tailored to exploration. Hybrid designs combine selected areas of structural alignment with continued organizational separation, which may allow firms to coordinate where needed while preserving the startup's established ways of working.

These innovation and TTM outcomes arise through three mechanisms. First, autonomy may limit disruptions to the startup's existing development routines, while early structural integration may interrupt ongoing work and affect post-acquisition innovation performance (Sears and Hitt 2023; Bodner and Capron 2018). Second, structural alignment increases coordination by standardizing processes and integrating tasks across units, which may support more consistent post-acquisition operations (Van Oorschot et al. 2022). Third, hybrid designs may reduce causal ambiguity by creating selective coordination interfaces while maintaining local exploratory discretion. Integration choices can interact with the degree of resource similarity or complementarity between acquirer and target, potentially shaping the recombination of co-specialized resources (Chen et al. 2016). In the energy sector, where legacy infrastructure and regulatory compliance create high interdependence, strategic demands push toward coordination, yet early preservation may be needed to avoid slowing nascent ventures in renewables, grid flexibility, and digital operations.

4.2.2 Time-to-Market after Acquisition

Post-acquisition TTM is sensitive to integration intensity: structural consolidation introduces coordination costs and process changes that create an initial "integration shock" (Puranam et al. 2003). In energy acquisitions, this dynamic amplifies when targets navigate utility-grade certification, grid interconnection standards, and regulatory approvals that add coordination overhead. Over longer horizons, differences in product launch rates between integrated and more autonomous units tend to diminish as integration issues are resolved and innovation trajectories mature (Puranam et al. 2003; 2006). High levels of structural integration may affect the target's ongoing activities and innovation performance, whereas maintaining appropriate autonomy can limit such effects (Bodner and Capron 2018). These findings reveal an intertemporal trade-off: early autonomy may preserve first-launch speed, while later alignment may be required for sustained scaling and integration into energy system operations (Puranam et al. 2003; 2006).

4.3 Theoretical Perspective and Derivation of Hypotheses

This section applies the ambidexterity, RBV and DC perspectives to integration choices in the energy sector corporate-startup M&A. On this basis, it develops hypotheses on how alternative PMI architectures influence TTM and post-acquisition innovation outcomes.

4.3.1 Application of Theoretical Perspectives

From an Ambidexterity perspective, integration choices instantiate the exploration-exploitation balance: preservation emphasizes exploration by protecting local search and experimentation; absorption emphasizes exploitation by standardizing processes and leveraging scale; hybrid/symbiosis attempts to enable both by combining selective coordination with retained discretion across units (Puranam et al. 2006; Greven et al. 2023). In the energy sector, this tension is especially visible where startups explore emerging technologies such as distributed energy resources or grid-scale storage while incumbents exploit established generation and transmission assets. The temporal dimension of renewables innovation cycles, where early-

stage breakthroughs require freedom from rigid corporate processes, makes autonomy critical, yet scaling across a grid demands later-stage coordination that only integrated structures have.

From an RBV perspective, acquisitions involve redeploying and combining the resources of the acquirer and target, and integration choices shape how effectively these resources are brought together after the deal (Bodner and Capron 2018; King et al. 2004). Energy-sector applications highlight this distinction: tacit knowledge about novel battery chemistries or AI-driven load forecasting must be shielded from disruptive integration, while codified assets like metering data protocols or safety inspection procedures can be standardized across corporate units to achieve economies. Interoperability between legacy grid infrastructure and new digital platforms intensifies the need for careful resource selection in integration design.

From a DC perspective, post-acquisition integration can be seen as a reconfiguration process through which the acquirer adapts and combines resources to support future innovation.

Together, these perspectives suggest that autonomy can support early innovation speed, while greater coordination and structural alignment help with scaling and reliability, which helps to explain the appeal of hybrid models that try to combine both (Bodner and Capron 2018; Greven et al. 2023). The broader literature does not identify a universally superior integration model; outcomes vary widely across acquisitions, underscoring the importance of context-sensitive analysis (King et al. 2004).

4.3.2 Hypotheses

Prior research highlights that integration choices can affect both short-term efficiency and longer-term innovation capability, and debates remain about the optimal level and timing of integration across contexts (Puranam et al. 2003). On this basis, the following hypotheses on integration models are formulated:

H1: *Higher levels of structural integration increase coordination costs and operational disruption, delaying the first post-acquisition product launch; conversely, greater organizational autonomy preserves exploratory capacity and responsiveness, reducing delays.*
H2: *Hybrid integration models that combine selective structural alignment with retained decision autonomy foster sustained innovation more effectively than either full integration or complete autonomy.*

4.4 Results

This section reports the main empirical findings for H1 and H2 from the expert interviews with European energy-sector practitioners, focusing on how post-acquisition integration models shape TTM for the first post-acquisition launch and longer-term innovation outcomes.

4.4.1 Results for H1 – Integration vs Autonomy and Time-to-Market

Across interviews, structural autonomy is seen as a precondition for preserving the development cadence that motivated the acquisition: keeping the startup as a separate entity with its own teams, tools, and routines allows it to continue launching features and pilots at roughly the pre-deal pace (I-H1-P1). Early-stage startups are viewed as particularly vulnerable to disruption from early absorption into a large utility, with interviewees emphasizing the importance of preserving their specialized teams and development processes (Interviewees A, D, J). One founder emphasized that autonomy was a hard condition for the deal, noting that they *"remained autonomous and are now gradually moving into a hybrid setup"* (Interviewee J) and that *"if they had wanted full integration from the start, we would not have agreed to the deal."* Several interviewees linked autonomy to maturity; as one M&A practitioner put it, *"the timing depends on the maturity and performance of the startup. If it's still growing fast, you don't want to slow it down. But once it stabilizes, integration makes sense to realize cost and learning benefits"* (Interviewee D), while others cautioned against early integration.

At the same time, interviewees are clear that acquisition itself introduces additional governance, even when the startup remains structurally autonomous (I-H1-P2). Founders now report to corporate boards or investment committees, face formal budget cycles, and must comply with energy-sector requirements on data protection, IT security, and grid-safety standards. One executive contrasted startup and corporate pacing around pilots:

"The startup is ready to start a pilot tomorrow. They say, 'Let's just do it.' The corporate side says, 'Wait, we need legal approval, data-protection clearance, maybe IT security has to sign off,' so weeks or even months can pass before anything happens." (Interviewee D)

Another interviewee highlighted that once a startup sits under a large utility, lapses in topics such as data protection, tax questions, or transfer pricing *"may not hurt much when you are a small independent startup,"* but *"if a large corporation stands behind it, the impact can be significant"* (Interviewee J) and fines or regulatory consequences scale with group revenues.

This tension is reinforced by energy-sector specifics. Many acquired solutions interact with physical grid assets, metering infrastructure, or billing platforms. Utilities operate safety-critical infrastructure and cannot allow newly acquired startups to deploy unvetted software into grid operations or customer interfaces. Interviewees stress that this is particularly acute in hardware-related and storage businesses where the corporate *"always has to go-to-market with 100%"* (Interviewee C), since a failure in a few hundred installed units can create warranty claims, safety incidents, and reputational damage at group level. Even under autonomy, decision-making thus shifts from purely local control to a dual regime in which corporate-level risk oversight and resource allocation become relevant for TTM.

While autonomy is seen as necessary to protect speed, interviews also show that it can clash with the slower planning and budgeting cycles of energy incumbents (I-H1-P3, I-H1-P4). Corporate managers face an intertemporal dilemma: rapidly scaling pilots can overload grid-operations teams or collide with existing platform strategies. One expert described how

decisions on new storage facilities in a large group can require escalation *"directly to the global CEO,"* where *"to get a meeting with the CEO, you have to go through ten to twelve committees."* (Interviewee J) Interviewees report that when an acquired unit outpaces established business units, it can be deliberately slowed or channeled into specific units to protect group-level coherence (Interviewees C, I).

Several interviewees also describe creeping integration as a pragmatic but risky response. Even when a startup is initially held separate, the accumulation of coordination points – joint planning meetings, shared sales processes, growing dependence on corporate IT – gradually pulls it into the corporate matrix. One practitioner observed that once majority ownership is established and no explicit "special rules" are defined, the startup is progressively drawn into the group's ERP and tax structures and subjected to standard HR and compliance policies, noting that *"as soon as you drag them through all the cumbersome processes, they sink"* (Interviewee I). Dependence on a single large energy corporate as an "anchor customer" reinforces this dynamic: instead of many smaller customers, one huge one, *"who has certain demands… also slows you down somewhere"* (Interviewee B), trading local speed for system-level constraints. Overall, structural autonomy helps preserve pre-acquisition speed to first deployment by protecting local teams, tools, and routines from early disruption. Acquisition adds governance friction and new interfaces with corporate risk, compliance, and budgeting. Highly autonomous startups can also generate tensions with the slower, capital-intensive pacing of utilities, leading to deliberate slowdowns or gradual, unplanned integration. The patterns are consistent with H1's core claim that higher structural integration tends to delay TTM relative to more autonomous configurations, while the effect is moderated by sector-specific constraints and corporate choices on pacing and strategic alignment.

4.4.2 Results for H2 – Hybrid Models and Sustained Innovation

The interviews portray hybrid integration neither as universally superior nor as inherently problematic; its innovation effects depend on timing and interface design (I-H2-P1, I-H2-P2). Respondents described these hybrid setups as “harbor-type” hybrids, a specific subtype of hybrid integration, in which the startup remains legally and operationally separate while being connected through defined interfaces such as shared sales channels, platform APIs, or jointly governed product roadmaps (Interviewees C, L). When such hybrids are introduced only after the startup has established a stable product and internal organization, they are seen as powerful mechanisms to combine exploratory capacity with access to corporate scale. One interviewee characterized this as the *“most elegant way,”* namely *“a separate entity with good, well-defined interfaces”* (Interviewee I) that allows the startup to keep its own systems and culture while plugging into the corporate where it adds value. Another respondent describes a staged path in which the startup initially remains autonomous and then gradually transitions into a hybrid setup, aligning HR, compliance, and data systems while keeping product development and local culture more independent (Interviewee H). This staged approach illustrates how hybrids sequence integration, starting from autonomy and then adding structured interfaces.

By contrast, hybrids introduced too early – when the startup is still immature and basic routines are not yet stabilized – are often described as harmful for innovation. Interviewees report failure modes where loosely connected hybrids without clear technical governance le to safety incidents and reputational damage, especially in storage and hardware-related businesses. One respondent recalled a case in which a storage startup’s products were sold under a utility brand with limited technical oversight:

“They sold storage units that later caught fire. When the connection model is only lightly governed, you end up with massive [...] costs and reputational damage.” (Interviewee F)

Others highlight the opposite failure mode: over-bureaucratic hybrids in which the startup formally remains a separate entity but is de facto embedded in corporate IT, HR, and approval

processes, turning integration into what one interviewee described as *"a downgrade from an innovation and culture perspective"* (Interviewee J). In such pseudo-hybrids, the unit carries the overhead of corporate processes without the clarity, mandate, or resource backing of a fully integrated business.

In the energy context, these timing issues are amplified by system-integration requirements. Hybrid models that rely on shared digital platforms or grid interfaces must respect strict quality and reliability standards. Several interviewees stress the importance of well-defined technical quality gates and digital interfaces between the startup's software and the corporate's grid or customer platforms. When these interfaces are missing or only informally specified, hybrid setups either stall due to compliance concerns or progress in an ad hoc way that later proves difficult to scale (Interviewees B, G, I). As one advisor put it for grid-related solutions, the corporate *"cannot just go to market with 80%"* (Interviewee C) quality in hardware-like offerings; in practice, this pushes utilities either toward more structured hybridization with clear standards or toward throttling rollout until the startup's solution matures.

Across interviews, governance design emerges as the central lever that determines whether hybrids enable or undermine sustained innovation (I-H2-P3, I-H2-P4). Respondents emphasize three elements: retention and motivation of founders and key experts, clear decision rights between the startup and the corporate, and a stable mandate without frequent reorganization. One interviewee summarized the role of governance by noting that startups are *"best off in a corporate when they are as far away as possible from the legacy organization"* (Interviewee L), with clearly defined interfaces rather than being *"dragged through all the cumbersome processes"* (Interviewees I, L) from day one. Poorly designed hybrids can result in either gradual absorption – as reporting requirements, system-integration projects, and corporate policies progressively strip away autonomy – or in configurations where the unit remains

formally separate but lacks clear P&L responsibility or embedded portfolio governance, limiting both investment support and strategic clarity (Interviewees E, I, K).

Incentive alignment is another recurring theme. Respondents highlight that earn-out structures, equity participation, and performance metrics that explicitly reward joint innovation projects – not just standalone startup growth or core-utility KPIs – are critical to keep founders engaged and encourage knowledge transfer rather than defensive behavior. One corporate M&A lead stressed that, as a founder, they *"would never sell [their] company to a corporation without an exit perspective"* (Interviewee F) and that attractive upside participation (for example via earn-outs or profit-based schemes) is necessary *"especially if I sell a majority"* (Interviewees B, I).

Overall, hybrid integration models can support sustained innovation in energy-sector startup acquisitions, but only under specific conditions. They tend to work when they follow an initial phase of protective autonomy, when technical and organizational interfaces are clearly defined, and when governance and incentive systems are deliberately designed to preserve startup motivation while enabling knowledge diffusion and scaling. Conversely, early or poorly specified hybrids either fail to leverage complementary assets or erode the startup's exploratory capabilities. This pattern provides qualified support for H2 and underscores the importance of timing, governance, and sector-specific constraints.

4.5 Discussion and Conclusion

The empirical findings for H1 and H2 can now be interpreted in light of the theoretical framework (ambidexterity, RBV, and DCs) and the specific context of European energy-sector acquisitions. This section first discusses autonomy, integration, and TTM (H1), then hybrid models and sustained innovation (H2), before closing with a brief synthesis and transition to the cultural perspective in the next chapter.

4.5.1 Discussion of H1 – Autonomy, Integration, and Time-to-Market

H1 proposed that higher structural integration increases coordination costs and operational disruption immediately after acquisition, delaying the first post-acquisition product launch, whereas greater autonomy would preserve exploratory capacity and responsiveness. The interview results align with this mechanism (Puranam et al. 2003; Bodner and Capron 2018) but reveal moderating effects from energy-sector characteristics and corporate pacing choices.

In line with prior PMI work (Puranam et al. 2003; Bodner and Capron 2018), interviewees portray full absorption as disruptive for tacit knowledge flows and product focus, confirming that early integration can disrupt routines and delay initial launches (Puranam et al. 2003). Autonomy allows exploratory routines to continue with minimal interruption, but findings also show that even under autonomy, acquisition introduces additional governance layers, reflecting the need for energy utilities to exercise oversight over safety, regulatory compliance, and capital allocation. Autonomy therefore mitigates but does not eliminate post-acquisition slowdowns.

Viewed through RBV and DCs, integration choices shape how co-specialized resources – startup software and hardware capabilities on the one hand, grid and customer platforms on the other – are recombined (Chen et al. 2016; Bodner and Capron 2018). Early full integration can damage the startup's tacit, team-level capabilities before they are transferred, while portfolio-style autonomy may fail to embed the startup into the corporate system (Sears and Hitt 2023).

The E.ON-gridX acquisition in Germany illustrates this logic (see Appendix I, Case 1*)*. Following E.ON's investment, gridX remained a separate company and was later placed within the E.ON One digital subsidiary, preserving its technology stack and development cadence while integrating with E.ON primarily via APIs and co-developed use cases.

At the same time, the interviews highlight that utilities sometimes deliberately trade off speed for coherence. When an autonomous startup's expansion plans outpace group investment cycles or conflict with infrastructure programs, corporate actors may slow rollouts or demand tighter alignment with portfolio strategies. In energy systems with long asset lifetimes and regulatory

oversight, such decisions are partly driven by risk and capacity constraints rather than mere bureaucracy. The direction of H1 therefore holds, but its magnitude depends on how strongly system integration and regulatory commitments push the acquirer to reassert control.

In sum, the evidence supports the core of H1 – structural integration tends to delay TTM relative to autonomy – but only in a qualified way. Autonomy is strongly associated with faster first deployments, yet acquisition-induced governance friction and deliberate pacing choices mean that speed is rarely unaffected. H1 is best characterized as partially supported: its basic mechanism is visible, moderated by energy-sector constraints and corporate strategy.

4.5.2 Discussion of H2 – Hybrids, Sustained Innovation, and Sectoral Constraints

H2 stated that hybrid integration models combining selective structural alignment with retained decision autonomy would foster sustained innovation more effectively than either full integration or complete autonomy. The empirical material confirms that well-designed hybrids can combine exploration and exploitation (Puranam et al. 2006; Bodner and Capron 2018; Greven et al. 2023) but also shows that many hybrid arrangements fail when introduced too early or governed loosely. Hybrids are thus better understood as conditional enablers rather than universally superior designs.

Thematically, the interviews emphasize an “autonomy first, hybrid later” trajectory. This pattern is consistent with prior work on post-acquisition reorganization and hybrid integration models (Van Oorschot et al. 2022). Early phases rely on hold-separate or portfolio-like autonomy to protect exploratory routines and stabilize the product (Puranam et al. 2003). Once the startup has a robust offering and internal structure, selective hybridization – via shared sales, digital platforms, or joint road mapping – is introduced to leverage corporate scale and diffuse capabilities across the group (Bodner and Capron 2018).

However, the same interviews document clear failure modes. Under-governed hybrids, where startups interface with corporate brands or infrastructure without sufficient technical and safety

oversight, can lead to quality incidents and reputational damage. Over-bureaucratic hybrids, in which the startup is separate but tied into corporate IT, HR, and approval processes, risk reproducing the disadvantages of full integration without providing clarity on mandate and accountability (Van Oorschot et al. 2022). In both cases, the hybrid label masks either insufficient or excessive coupling, and the misalignment erodes innovation performance.

Governance emerges as the differentiating factor (Bodner and Capron 2018; Van Oorschot et al. 2022). Effective hybrids feature clear decision-right allocations, specified technical quality gates, and explicit scope boundaries. They also rely on incentive structures that preserve founder and key-expert motivation, for instance via equity participation or earn-out mechanisms that reward joint value creation rather than siloed KPIs.

The E.ON-envelio case illustrates a mature harbor-type hybrid configuration *(*see Appendix I, Case 2*)*. Following E.ON's majority acquisition, envelio remained an independent company but was integrated into E.ON's digital transformation agenda via a high-resolution digital twin of its low- and medium-voltage grids and a set of grid-planning and connection-management applications. The case exemplifies how preserved product-development autonomy combined with deep integration into grid-planning processes and digital platforms can turn a startup solution into a sustained innovation engine rather than a one-off pilot.

Overall, the empirical patterns and the envelio case partially support H2. Hybrid integration can foster sustained innovation more effectively than pure autonomy or full absorption, but only when it follows a phase of protective autonomy, interfaces and quality gates are clearly defined, and governance and incentives are aligned with long-term capability building. Hybrids used as a default from day one, or implemented without clear scope and accountability, often produce confusion, bureaucracy, or safety risks rather than superior innovation outcomes.

4.5.3 Conclusion

Across H1 and H2, the evidence suggests that, in European energy-sector startup acquisitions, early autonomy with light but necessary governance is critical to preserve TTM, while staged and well-governed hybrid models can later support scaling and sustained innovation. Integration design thus functions as a key operational lever that translates strategic acquisition intent into concrete innovation trajectories, but its effects are conditional on sector-specific constraints, timing, and governance quality. Neither full absorption, pure autonomy, nor hybrids are universally optimal; their performance depends on how they are configured (King et al. 2004; Haleblian et al. 2009).

At the same time, many mechanisms identified in this chapter – founder retention, motivation under changing incentives, resistance from legacy units, and perceptions of downgrade or loss of identity under integration – point to cultural and people-related dynamics. These aspects are not fully captured by structural integration alone. The next chapter therefore examines how cultural distance, perceived cultural fit, and interaction patterns at the corporate-startup interface shape the same innovation and time-related outcomes, and how these cultural dynamics condition the structural mechanisms discussed in this chapter.

5 Results and General Discussion

Building on the insights from chapters 4-7, the following sections synthesize the integrated findings of this thesis to explain why these mechanisms recur across different analytical lenses and how they collectively shape acquisition outcomes in the energy sector. This combined discussion then provides the foundation for deriving managerial implications, specifically, how incumbents can design acquisition processes, integration architectures and governance arrangements that better preserve innovative potential and mitigate the structural barriers identified throughout the analysis.

5.1 Comparative Insights

A comparative reading of the 4 individual chapters reveals explanatory patterns that only become visible when these analytical lenses are placed in direct conversation. While each chapter is internally coherent, comparing them side-by-side exposes structural tensions and interdependencies that cannot be inferred from any single chapter alone.

The first comparative insight highlights a fundamental tension between strategic intent and operational reality. Chapter 4 indicates that incumbents pursue acquisitions primarily to access scarce technological capabilities, accelerate TTM relative to internal R&D cycles, and enter new markets rapidly. However, the findings in Chapter 5 suggest that these benefits are most likely to materialize when integration effectively shields the startup's exploratory routines, specifically through early autonomy. When motives and integration are compared directly, a structural contradiction becomes visible: incumbents appear to acquire startups for their speed, flexibility, and informality, yet frequently implement integration processes that enforce governance, compliance, and decision structures which tend to constrain these very attributes. The comparative lens thus reveals that while acquisitions are typically motivated by exploration logics, they are often implemented through exploitation architectures. This incompatibility offers an explanation for why the strategic promise of "speed" is frequently compromised by operational mechanisms of control.

A second comparative insight emerges when contrasting structural integration models with cultural dynamics. Models such as hybrid integration (including harbor-type units) or staged pathways appear in Chapter 5 as structurally viable options for balancing autonomy and coordination. Yet, Chapter 6 demonstrates that these models are embedded in an organizational context defined by strict reliability, compliance, and safety routines. Consequently, what appears structurally coherent on paper often faces significant strain under cultural pressure, as assurance demands, IT security reviews, and multi-layered approvals reshape the daily experience of integration. In the analyzed cases, the comparison suggests that structural

autonomy was often insufficient without being accompanied by cultural autonomy. Integration is therefore not merely a neutral structural choice but acts as an intervention into a dense web of cultural norms. This insight clarifies why formally similar integration models may produce vastly different outcomes across different cases.

The third comparative insight suggests a link between cultural friction and long-term financial performance. Chapter 6 reports persistent micro-frictions such as decision escalation, compliance-driven re-engineering, and the potential loss of startup identity that appear to impair speed and morale. Chapter 7 shows that these frictions are associated with a distinct financial trajectory: acquirers, who are initially larger, more profitable, and more innovation-active than non-acquirers, experience a statistically significant decline in ROA post-acquisition. This deterioration tends to intensify over the medium and long term, without being compensated by any significant increase in R&D investment. When read together, a micro-macro mechanism becomes evident: cultural frictions appear to accumulate into "structural drag," which is reflected financially over time in the analyzed firms. This comparative perspective helps explain why acquisitions with strong strategic logic and formally well-designed integration plans may nevertheless underperform. The findings thus suggest that culture functions as a central, often hidden operational mechanism through which financial value erosion can occur.

5.2 Integrated Results

Synthesizing the qualitative patterns with the quantitative results offers a tentative explanation for the post-acquisition trajectory observed in this sample. The pattern described in Chapter 7, in which the sample acquisitions are not associated with higher R&D expenses but coincide with lower ROA, can be plausibly linked to the specific operational patterns of integration identified in the interviews. The evidence indicates that the integration process in the energy sector often risks converting high-growth assets into high-cost liabilities through a convergence of structural drag, innovation substitution, and value inversion.

This transformation appears to create a financial manifestation of compliance-driven re-engineering. The quantitative analysis indicates a persistent decline in ROA post-acquisition among treated firms, a trend that finds plausible granular explanation in the "structural drag" identified qualitatively. The interviews indicate that integration in the analyzed cases was frequently not limited to financial consolidation but often triggered a comprehensive process wherein startups were required to meet corporate IT security standards, redesign hardware to align with grid procurement norms, and adopt heavy-duty HSE protocols. Economically, this suggests a significant reallocation of human capital. Resources within the startup are diverted from value-creating activities, such as product development and sales, to value-preserving activities centered on compliance. Consequently, the observed ROA decline appears not as a temporary fluctuation but as a sustained trajectory, as the acquired asset tends to adopt the higher cost structure of the incumbent without necessarily retaining the revenue growth velocity of a startup. The "governance overhead" identified in the qualitative analysis may thus be viewed as a primary driver of the "profitability erosion" measured in the quantitative analysis.

Beyond this cost dynamic, a critical integrated finding concerns the stagnation of internal R&D expenditures post-acquisition. When viewed alongside the qualitative motives, this points toward a mechanism of innovation substitution. Incumbents in the sample appeared to utilize acquisitions not to augment their innovation capacity, but largely to replace inefficient internal R&D efforts. The qualitative patterns reveal that managers often view the acquired startup as a "ready-made solution" to a capability gap. However, as the integration process frequently constrains the startup within the incumbent’s slower decision-making cycles, defined as the exploitation architecture, this substitution often proves inefficient. The incumbent ceases internal development, keeping R&D flat, while simultaneously slowing down the external asset, which lowers ROA. The result appears to be a net loss in total innovation velocity. The

acquisition may function as a dampening mechanism for internal transformation rather than a stimulant, masking the need for organic renewal while failing to deliver inorganic growth.

This operational challenge seems further compounded by a mechanism of Value Inversion, driven by "Safety" and "Reliability" acting as non-negotiable cultural hard systems. The strategic value of the startup typically lies in its variance, its ability to operate outside standard grid protocols to offer flexibility or digital aggregation. However, the integration process is often designed to minimize variance. By enforcing corporate standards to mitigate reputational and operational risk, the acquirer risks eroding the very competitive advantage it sought to purchase. The integration process thus tends to function as a "regression to the mean," often leading the acquired unit to become as reliable, and as slow-growing, as the core business. In summary, the combined evidence suggests that the European energy sector faces significant structural challenges in metabolizing external innovation. The observed underperformance appears to be neither purely strategic nor purely financial, but operational: the interaction between the sector's regulatory imperative for stability and the startup's imperative for speed creates a potentially "sterilizing" environment, prioritizing compliance over experimentation and risking the conversion of agile market challengers into expensive corporate departments.

5.3 Theoretical Implications

The findings provide three contextual refinements to existing perspectives on innovation-oriented acquisitions in regulated, asset-intensive sectors. First, they indicate that effective post-acquisition innovation tends to follow a temporal "Autonomy First, Hybrid Later" sequence. Second, they show that cultural distance operates as a structural barrier embedded in compliance and safety systems. Third, they document that startup acquisitions in the European energy sector do not expand R&D and are associated with persistent profitability declines.

First, the analysis suggests a refinement of Organizational Ambidexterity Theory by questioning the sufficiency of purely structural solutions in the energy sector. Classical

literature typically frames the tension between exploration and exploitation as a structural dilemma, often solved through spatial separation (Tushman and O'Reilly 1996). However, the findings indicate that structural separation alone may be insufficient to prevent the encroachment of the incumbent's exploitation architecture, particularly regarding compliance and safety routines. Consequently, this study indicates an extension of the theory by positing that ambidexterity in regulated sectors may function primarily as a temporal capability rather than merely a structural one. The identified success pattern of "Autonomy First, Hybrid Later" suggests that the integration of exploration and exploitation benefits from being sequenced over time. This nuances the integration perspectives of Puranam et al. (2006) by showing that early hybridization, often advocated for synergy realization, can, under certain conditions, act as a disruptive force that potentially erodes the very exploratory capabilities the firm sought to acquire.

Furthermore, the results suggest a contextual refinement of the RBV by indicating that cultural distance operates not merely as soft friction, as often discussed in M&A literature (Cartwright & Schoenberg, 2006; Stahl & Voigt, 2008), but frequently manifests as a structural barrier codified in hard systems. While Barney (1991) posits that competitive advantage stems from controlling valuable, rare, and inimitable resources, the findings challenge the assumption that legal ownership grants functional access to these resources. In the energy sector, regulatory and safety protocols appear to act as isolating mechanisms internal to firms. This refines the concept of ACAP (Zahra and George, 2002; Cohen and Levinthal, 1990). In regulated industries, ACAP may be constrained less by lack of knowledge overlap and more by rigidity in internal compliance architectures. Even where incumbents appear able to sense and seize opportunities through strategic acquisitions (Teece, 2007; Teece et al., 1997), "hard" cultural systems can impede the transformation and reconfiguration of these assets. Thus, in this context, RBV-based

explanations of post-acquisition performance may need to incorporate the firm's ability to create "regulatory safe zones" as a critical antecedent to effective resource exploitation.

Finally, the findings contribute to the debate on M&A performance. While meta-analyses by King et al. (2004) have long established that M&A often fails to create value, and Christofi et al. (2019) highlight the ambiguity of innovation outcomes, this mixed-methods evidence offers a potential causal explanation for the energy sector. The combination of flat R&D expenditures (Chapter 7) and strong strategic motives (Chapter 4) suggests that incumbents use acquisitions to compensate for the inaction of their internal innovation engines. This implies that M&A act in many cases as a substitute for, rather than a complement to, internal R&D (Hitt et al., 1991). Moreover, the persistent decline in ROA in the panel data aligns with negative performance trajectories predicted in literature (e.g., Kwon et al. 2018) but suggests this may be attributed not solely to overpayment or lack of strategic fit, but to the potential "sterilization" of the asset's growth potential through corporate reliability routines.

5.4 Managerial Implications

The integrated findings of this thesis offer several concrete implications for managers in energy corporates and for startup founders considering acquisition offers. While the theoretical contributions offer explanations for the performance challenges frequently observed in this sector, the managerial implications illustrate how these structural tensions might be addressed through more deliberate strategy formulation, integration design, and cultural governance.

A first implication concerns how incumbents frame the strategic rationale for acquisitions. The findings indicate that the value of startups may stem not only from their technological capabilities but also from their positioning within emerging regulatory niches and digital ecosystems. Managers are therefore advised to assess acquisition targets as ecosystem connectors rather than merely as standalone assets. This requires a broader strategic evaluation that considers the target's role in shaping future market positions and the fit between its

interfaces and the incumbent's go-to-market architecture. Viewing acquisitions through an ecosystem lens, rather than purely as technology purchases, may help broaden integration considerations beyond asset absorption.

A second implication concerns integration design and the default operating model. The findings suggest that early autonomy can help preserve startup speed, identity, and technical momentum. Managers should therefore consider avoiding the imposition of corporate routines immediately after closing. An emerging pattern across cases points to non-integration models as a potentially effective early-stage approach. In this setup, the burden of proof is effectively reversed: rather than justifying why a startup should remain autonomous, integration leaders would justify why any specific corporate process must be imposed. This structural sanctuary allows the acquired asset to potentially maintain its development velocity during the critical post-acquisition phase, helping to mitigate the resulting culture shock that frequently contributes to loss of key talent.

A third implication concerns the sequencing of integration. The findings suggest that integration may benefit from being paced rather than front-loaded. Managers are advised to consider an "Autonomy-first, Hybrid-later approach", where selective coupling is introduced typically only after the startup's routines and business model have stabilized. This suggests that integration may be more effective when treated as a multi-year, phased process rather than a single structural shift at closing. Instruments such as transitional hybrid structures or sandboxed environments can support this sequencing by creating intermediate organizational spaces that aim to protect the startup while enabling learning and the gradual development of interfaces.

A fourth implication concerns cultural due diligence, governance, and the management of hard systems. In the analyzed context, cultural distance appears to be largely structural rather than interpersonal, manifesting through documentation requirements, HSE processes, budgeting cycles, IT security protocols, and grid compliance rules. Managers in similarly regulated contexts may benefit from assessing cultural interfaces during due diligence, including aspects

such as development cadences, decision-making styles, safety norms, and assurance expectations. After the acquisition, cultural bridging requires more than communication workshops. It requires the deliberate design of interface structures and, where appropriate, reverse integration mechanisms, that is, targeted adaptations on the incumbent side, such as tailored HSE templates, dedicated IT interfaces, or adjusted approval processes, which allow the corporate to connect to the startup without fully imposing its heavy-duty architectures. Effective governance in this context likely relies on the deployment of boundary spanners, individuals who possess the cultural fluency to navigate both worlds and can negotiate exemptions or adapt corporate policies to fit the specific risk profile of the startup.

A fifth implication concerns the retention and protection of entrepreneurial talent. The qualitative and quantitative findings highlight the central role of founders and core engineers as carriers of tacit knowledge and exploratory routines. Managers should therefore prioritize their retention through long-term incentives, meaningful decision rights, and protection from bureaucratic overload. Furthermore leadership roles need to be designed with care. The cases suggest that transitioning founders into compliance-heavy corporate roles may risk undermining their innovative contributions. They should thus remain in product and technical leadership roles, supported by corporate sponsors who shield them from administrative burdens.

A sixth implication concerns financial expectations and resource allocation. The quantitative results show no significant changes in internal R&D spending and suggest an association between acquisitions and subsequent declines in profitability, which may relate to structural frictions identified in the qualitative analysis. Managers should therefore treat integration costs not as temporary disruptions but as potential long-lasting financial burdens arising from the mismatch between entrepreneurial and corporate operating systems. Business cases should explicitly price in these costs, including assurance work, IT alignment, and the potential

deceleration of product development. If a deal's valuation depends on rapid integration that risks slowing down the startup's operations, the acquisition may face heightened challenges in delivering the expected value. Consequently, decision-makers should consider alternative forms of engagement, such as venture clienting or minority investments, which may in many cases offer superior routes to technological access without the overhead of full ownership.

Taken together, these implications show that acquisition success in the energy sector depends on a firm's ability to align structural, cultural and temporal dimensions. Strong strategic logic is not enough. Integration must be paced, culture must be governed deliberately, and hybrid structures must be designed with care. By following these principles, energy incumbents can better preserve the innovative potential of the startups they acquire and increase the chances that acquisitions support not only short-term market positioning but also long-term competitiveness and innovation-led renewal.

5.5 Contribution to Literature

While the theoretical implications address specific refinements to strategic management constructs within the boundaries of the energy sector, the broader contribution of this thesis lies in its methodological design, its bridging of disciplinary silos between strategy and policy, and its potential transferability to the management of critical infrastructure. This study addresses distinct gaps identified in the systematic literature review regarding the fragmentation of M&A research and the ambiguity of innovation outcomes in the energy sector.

A primary and distinct contribution of this work is methodological. As critically noted by Haleblian et al. (2009), the field of M&A scholarship has historically been characterized by a methodological divide. Quantitative studies, exemplified by the empirical analysis of Kwon et al. (2018), have robustly documented that acquisitions frequently result in negative abnormal returns and a decline in financial performance. However, due to their reliance on aggregated secondary data, these studies face an explanatory limit, as they generally cannot observe the

internal organizational processes that generate these negative outcomes. Conversely, qualitative studies provide rich descriptions of cultural clashes and integration difficulties but often lack the sample size to claim generalizable financial causality. This thesis helps to bridge this divide through a robust mixed-methods design. By triangulating the micro-level evidence from expert interviews with the macro-level trends from panel data, it aims to illuminate the black box of post-merger performance. The analysis suggests that the soft frictions identified in the qualitative investigation – such as specific compliance delays, IT security vetoes, and decision escalation – are not merely anecdotal operational nuances. Rather, they appear to serve as quantifiable antecedents of the hard profitability decline observed in the quantitative analysis. In doing so, this study responds directly to the call by Christofi et al. (2019) for multi-dimensional research that explores the causal links between post-merger integration dynamics and tangible innovation and financial performance metrics.

Furthermore, this thesis contributes to the literature by addressing the disciplinary disconnect between strategic management theory and energy policy research. Traditionally, strategic management literature, grounded in the RBV, treats industry regulation as an exogenous control variable, acting as a fixed constraint that affects all firms equally. Conversely, energy policy literature typically focuses on technical grid stability and market design, largely ignoring the internal organizational dynamics of the firms operating within that market. Our findings suggest a need to reconsider this separation by indicating that, in the context of the energy transition, regulation tends to act as an endogenous organizational variable. The data indicates that external grid codes and safety protocols are frequently internalized into the firm's management structure, effectively shaping its DCs. Regulation appears not just as a boundary condition but significantly influences the internal clock speed of innovation. This extends the ecosystem perspective proposed by Adner (2017), arguing that for incumbents in critical industries, the ability to internalize external innovation may be constrained less by strategic intent or capital

availability than by the rigidity of their internal compliance architectures. This establishes a theoretical imperative to view regulatory competence not just as a legal necessity, but potentially as a central component of organizational design strategy.

Finally, while empirically grounded in the European energy sector, the study's contributions likely extend to the broader management of legacy industries and high-reliability organizations facing disruption. The mechanisms identified here, specifically the phenomenon of sterilizing integration and the structural clash between exploratory and reliability-oriented cultures, may offer relevant insights for other asset-heavy, safety-critical sectors such as healthcare, aerospace, transportation, and defense. This thesis provides a conceptual lens for analyzing innovation barriers in environments where organizational culture is anchored in safety and obligations. It highlights that in such industries, a significant barrier to renewal appears to be not a lack of resources or market opportunity, but what is often described as the immune reaction of the installed base against the variability introduced by startups. By conceptualizing this reaction as a predictable structural force rather than a failure of leadership or poor cultural fit, the study offers a foundation for future research into the governance of innovation in high-reliability organizations. This suggests that standard M&A playbooks developed in lightly regulated sectors such as software or consumer goods often do not translate well to critical infrastructure contexts, making a more tailored approach to corporate renewal in the physical economy necessary.

6 Conclusion

This chapter summarizes the thesis' findings, outlines its limitations, and proposes directions for future research. It closes by discussing what startup acquisitions imply for innovation and performance in the European energy sector and for incumbents navigating the energy transition.

6.1 Summary of Key Findings

This thesis examined how startup acquisitions by large energy corporations are associated with innovation and firm performance outcomes in the European energy sector. While the quantitative analysis offers robust long-term evidence, the qualitative component complements it by providing the detailed mechanisms and interpretive insights. It combined qualitative interview and case evidence with a quantitative panel analysis to explore how strategic motives, integration choices, and cultural dynamics relate to long-term outcomes. The four research questions are summarized below and then linked to highlight the study's overarching insights.

Addressing the first research question – namely, *what strategic and innovation-related motives drive energy-sector corporations to acquire startups* – the findings show that startup acquisitions by European energy incumbents are driven by a combined strategic logic of technology sourcing and market expansion. Technologically, acquisitions serve as decisive "build-vs-buy" shortcuts. Incumbents utilize startups to bridge internal gaps and bypass slow R&D cycles, gaining immediate access to critical assets like battery storage or digital grid applications. Simultaneously, these deals secure strategic positions in emerging markets, providing rapid entry into complex regulatory environments and access to digital customer interfaces that utilities struggle to build organically. Crucially, these motives are inextricably linked to achieve organizational ambidexterity. The goal is to simultaneously explore new capabilities and exploit market opportunities. However, this creates a fundamental "coordination-autonomy dilemma": acquirers must integrate the startup to realize market synergies without destroying the agile culture that made the technology valuable.

Addressing the second research question – namely*, how different integration models shape innovation outcomes after acquisition* – the evidence indicates that integration models have distinct, time-dependent effects. High structural integration increases coordination, standardization, and compliance work, which slows product development and experimentation, whereas preserved decision autonomy protects speed in the early post-acquisition phase. Over

longer horizons, purely autonomous setups struggle to scale innovations across the group, while hybrids that combine selective alignment with retained product and team autonomy perform better when introduced after an autonomy phase and built on interfaces and decision rights. The integration hypotheses are thus partially supported: autonomy benefits early innovation, and well-governed hybrids can support later scaling, but no single model dominates across contexts.

Addressing the third research question – namely*, how and to what extent organizational and cultural differences influence post-acquisition innovation outcomes* – the findings show that cultural distance appears as a stable starting condition, grounded in assumptions about risk, decision-making, and coordination and reinforced by regulation, safety, and asset-management logics. These differences influence innovation indirectly, through cumulative frictions such as compliance-driven re-engineering, decision escalation, reduced autonomy and identity, increased coordination effort at the corporate-startup interface. Perceived cultural fit reduces these effects only when translated into governed autonomy, tailored KPIs, identity-preserving structures, and boundary-spanning roles that sustain psychological safety. Cultural fit thus acts as a relational capability rather than a static similarity and supports the cultural hypotheses.

Addressing the fourth research question – namely*, what the long-term effects of startup acquisitions on firms' innovation activity and financial performance are* – the quantitative analysis shows differentiated pattern of long-term effects. Innovation input, measured by R&D expenditure, does not change significantly after acquisitions, indicating that external innovation neither systematically displaces nor expands R&D budgets. Profitability, measured by ROA, declines significantly, with stronger negative effects in the medium and long term. The results are consistent with the innovation-input hypothesis of no systematic increase in internal R&D and the profitability hypothesis of a sustained deterioration in ROA.

Overall, the findings provide three contextual contributions. First, they show that innovation through startup acquisitions in the European energy sector tends to follow a temporal

“autonomy first, hybrid later” sequence, indicating that ambidexterity operates primarily as a temporal capability in this setting. Second, they reveal that cultural distance functions as a structural barrier embedded in compliance and safety systems, which constrains ACAP and shapes post-acquisition innovation. Third, they report an “innovation-profitability paradox”: acquisitions leave R&D unchanged and coincide with profitability drops.

6.2 Limitations of the Study

This section outlines the main limitations of the study, clarifying the contextual boundaries of the findings and the methodological constraints inherent in both analyses.

6.2.1 Qualitative Analysis Limitations

The qualitative analysis focuses on European energy-sector incumbents and their startup acquisitions, a context characterized by capital intensity, regulatory oversight, and safety-critical operations. These features are central to the mechanisms identified but may limit transferability to less regulated or more R&D-intensive sectors such as pure software. The findings should therefore be interpreted as context-bound rather than universally generalizable. The interview sample primarily reflects the perspectives of managers, founders, and advisors involved in corporate-startup deals. This creates potential for retrospective rationalization, self-serving bias, and incomplete information on failed or aborted transactions. Template analysis and cross-case comparison help mitigate these risks, but the data relies on respondents’ recollections and interpretations. The number of interviews is modest but in line with comparable studies, and coding was conducted systematically, yet no formal inter-coder reliability coefficients were calculated. Instead, consistency was pursued through independent review, iterative refinement of the coding template, and joint discussion of mechanisms and patterns. Finally, the qualitative work concentrates on majority acquisitions and harbor-type models; joint ventures, minority stakes, and venture-client arrangements are included only indirectly and may exhibit different dynamics.

6.2.2 Quantitative Analysis Limitations

The quantitative analysis is based on observational panel data and cannot fully eliminate residual unobserved time-varying factors, despite the use of two-way fixed effects, DiD designs, and robustness checks. Causal interpretations rest on assumptions such as parallel pre-treatment trends, which cannot be tested exhaustively. Acquisition data are drawn from publicly available startup databases and manually screened. While this reduces misclassification, it does not remove reporting bias toward digitally visible or better-documented transactions. The study focuses on acquisitions of energy-related startups, consistent with observed sectoral acquisition behavior. As such, the analysis primarily reflects outcomes in related-knowledge transactions. On the outcome side, the study focuses on ROA and R&D expenditure as core indicators of performance and innovation input. These measures do not capture all relevant dimensions such as patent output, launch success, or ESG outcomes. The limited number of treated firms and the sparse observations in later event-time windows reduce statistical precision in the long-run estimates, reflecting inherent constraints of the dataset. Overall, these limitations concern scope and measurement detail more than the internal logic of the empirical approach.

6.3 Future Research Directions

First, future research could conduct cross-sector and cross-mode comparisons. Comparing energy with sectors such as financial services or industrials would clarify which mechanisms stem from regulation and asset intensity and which generalize more broadly. Systematic contrast between full acquisitions, joint ventures, minority stakes, and venture clienting would indicate when incumbents should prefer collaboration modes other than outright ownership.

Second, integration models and sequencing warrant more explicit study. The pattern of "autonomy first, hybrid later" observed here has not been tested systematically. Longitudinal case studies and panel data that track integration choices, coupling intensity, and interface design over time could show how different sequences affect innovation and scaling.

Third, future work could further open the "black box" of culture, incentives, and structural distance. This includes examining how boundary-spanning roles, governance forums, and incentive and retention schemes shape cultural bridging, innovation outcomes, and the retention of key individuals. Operational indicators for structural cultural distance and governed autonomy would help incorporate these mechanisms into large-sample studies.

Fourth, methodological extensions could link qualitative and quantitative work more tightly. Larger samples with richer innovation and performance measures (for example patents, product launches, network positions, or ESG scores) and more detailed integration variables would allow closer tests of the mechanisms proposed here. Mixed-methods designs that combine process tracing in selected deals with panel evidence across firms would be valuable.

6.4 Final Reflections

This thesis shows that startup acquisitions in the European energy sector are neither quick fixes for innovation deficits nor guaranteed sources of value. They are complex strategic bets that must balance entrepreneurial speed with infrastructural reliability. Whether they contribute to the energy transition depends less on the promise of the target technology and more on incumbents' ability to pace integration, manage cultural interfaces, and design hybrid models that genuinely combine exploration with the demands of safety-critical, regulated systems.

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IV. Appendices

A. Anonymized Interviewee Overview

This appendix lists the anonymized interviewees included in the qualitative sample. To protect confidentiality, individuals are identified only by an Interviewee ID (A–M) and a high-level functional role descriptor. The complete interview transcripts are available in the online repository in the folder Interview Transcripts.

#	Anonymized Interviewees
1	Interviewee A (Venture Building Lead)
2	Interviewee B (Manager Venture Clienting)
3	Interviewee C (Chief Operating Officer)
4	Interviewee D (Managing Partner)
5	Interviewee E (Senior M&A Manager)
6	Interviewee F (Project Manager M&A)
7	Interviewee G (Innovation & Venture Growth)
8	Interviewee H (Senior Consultant M&A)
9	Interviewee I (Senior Investment Manager)
10	Interviewee J (Founder and Managing Director)
11	Interviewee K (Project Lead M&A)
12	Interviewee L (Manager Energy Consultancy)
13	Interviewee M (Management Consultant)

B. Semi-Structured Interview Guide

The following semi-structured interview guide was used during all 13 expert interviews. Guiding questions and follow-up probes were adapted to the interviewee's role and the specific case context. The complete interview transcripts are available in the online repository in the folder Interview Transcripts.

Strategic Motives for Startup Acquisitions and Collaborations

Sub-topic	Guiding question	Example follow-up probes
Background & role	Could you briefly describe your role and your experience with M&A and startup collaboration in the energy sector?	Types of transactions involved (acquisitions, JVs, minority investments, partnerships, CVC); Perspective and responsibilities; Exposure to different acquisition stages; Number of cases and timeline; Industry segments involved; Degree of operational vs. strategic involvement.
Case context	Could you outline one or two concrete cases of collaborations or acquisitions between an energy corporate and a startup that you were involved in?	Core business of both firms; Startup maturity (early, Series A/B, scale-up); Strategic rationale at the time; Integration expectations; Interviewee's specific involvement; How the opportunity originated (scouting, CVC, partnership, inbound).
Overall motives	What are the main motives or objectives behind your company's collaborations or acquisitions with startups?	Relative importance of technology access, time-to-market, digitalization, shortage of talent, regulatory pressure, ESG goals; Historical evolution of motives; Differences between BU-driven and corporate-driven motives; Weight of financial vs. strategic logic.
Technology sourcing & build-vs-buy	What role does access to new technologies play when deciding to acquire or partner with a startup rather than developing a solution internally?	Internal resource gaps; Cost and speed of internal development; Perceived uniqueness of startup technology; Risks of obsolescence; Integration complexity; Complementarity with existing platforms; Expected synergies vs. cannibalization risks.
Market expansion & positioning	To what extent are collaborations or acquisitions with startups used to expand into new markets or reposition the company strategically?	Examples of expansion into new segments or geographies; Strategic defensiveness vs. offensiveness; Competitive landscape at the time; Whether the startup offered regulatory, commercial, or customer-access advantages; Role of acquisitions in portfolio diversification.

Future role of startups	How do you expect the role of startups in your company's innovation and growth strategy to evolve?	Expected importance of startup acquisitions vs. partnerships/CVC/incubation; Anticipated strategic domains where startups will matter most; Internal capability gaps to address; Long-term positioning of startup collaboration within the innovation operating model.

Integration Models and their Impact on Innovation

Sub-topic	**Guiding question**	**Example follow-up probes**
Transition to integration	How would you characterize the overall integration approach between the corporate and the startup in the described cases?	Degree of structural integration; Autonomy expectations; Level of planned vs. emergent integration; Alignment with deal thesis; Early constraints from IT/security/compliance; Speed of post-close organization setup.
Choice of integration model	Which integration model was used and why was this approach chosen?	Alternative models considered; Trade-offs between control and autonomy; Risk appetite of leadership; Resource availability; Influence of pre-deal cultural and operational assessments; Lessons from previous deals.
Setup before first launch	What was integrated and what remained independent before the first joint product or solution launch, and for what reasons?	Integration of core vs. peripheral functions; Critical interfaces (IT, cybersecurity, procurement, go-to-market); Approaches to systems compatibility; Temporary workarounds to maintain speed; Early misalignments or bottlenecks.
Impact on time-to-market	How did the integration setup influence the time-to-market for the first general availability or market launch?	Critical path mapping; Approval gates with highest delays; Security/compliance/legal bottlenecks; Cross-departmental dependencies; Leadership interventions; Mitigations that worked or did not work; Difference between perceived and actual blockers.
Lessons for future deals	What lessons do you draw for choosing integration models in future startup acquisitions or collaborations?	Conditions for choosing autonomy vs. integration; Suitability of hybrid setups; Ideal sequencing of integration steps; Early mistakes to avoid; Success patterns; Recommendations for future deals in similar contexts.

Cultural Challenges and Cultural Integration

Sub-topic	**Guiding question**	**Example follow-up probes**
Importance of culture	How important is organizational culture for the success or failure of startup acquisitions and collaborations?	Cases where culture was decisive; Comparison of cultural vs. operational blockers; Organizational awareness of culture; Extent of cultural discussions pre- and post-

		deal; Leadership's engagement with cultural issues.
Cultural distance	Where do you see the biggest cultural differences between corporates and startups?	Decision-making logic; Speed expectations; Risk appetite; Ownership mindset; Communication style; Hierarchy and bureaucracy; Compliance orientation; Example scenarios where clashes occurred.
Effects of cultural differences	How have cultural differences affected collaboration and innovation, both negatively and positively?	Examples of friction; Misalignment in expectations; Slowed execution; Lost opportunities; Positive complementarity; Joint learning effects; Situations where tension produced better solutions.
Cultural assessment & due diligence	To what extent are cultural aspects assessed before a deal, for example during due diligence or partner selection?	Explicit tools or frameworks used; Signals used to infer cultural fit; Influence of cultural assessments on integration design; Historical evolution of cultural due diligence; Organizational ability to judge founder intentions and cultural resilience.
Cultural fit in practice	What were the main cultural success factors and obstacles in day-to-day collaboration?	Differences in communication rituals; Meeting formats; Degree of formality; Transparency norms; Situations where problems escalated; Role of middle management; Practices that helped bridge gaps.
Measures to bridge cultures	Which measures have been taken to bridge cultural differences and support collaboration?	Coaching or leadership support; Bridging roles; Integration manager effectiveness; Joint offsites/workshops; Co-location; Shared planning rituals; Incentives/KPI alignment; Gaps in the support structure.
Organizational learning	How capable has your organization become in working with and integrating startups culturally?	Evolution of organizational maturity; Standardised tools or playbooks; Lessons from past failures; Persistent cultural blockers; Recommendations for improving future cultural integration.

C. Summaries of Interviews

This appendix provides structured summaries of the expert interviews conducted for the qualitative analysis. For readability and confidentiality, the appendix does not reproduce full transcripts; instead, it reports a standardized synopsis for each interviewee, including (1) the anonymized interviewee's background and organizational role and (2) a condensed conversation summary capturing the main themes relevant to the study's research questions and hypotheses. The complete interview transcripts are available in the online repository in the folder Interview Transcripts.

Interviewee	Background	Conversation Summary
Interviewee A	The interviewee works in the corporate innovation and venturing department of a large European energy company. The role involves managing the interface between the corporate core and external startups, specifically focusing on early-stage partnerships and venture clienting.	The interviewee characterizes the corporate organization as a "tanker" with a strong "corporate immune system" that tends to reject agile, external entities. A central theme of the conversation is the "Build vs. Buy" decision. The interviewee argues that internal development is often too slow and expensive due to rigid processes and a lack of specific capabilities. Consequently, cooperation with startups is described not just as an option, but as a strategic necessity to act as "speedboats" that can test new business models and technologies faster than the core organization. Much of the discussion revolves around the cultural clash between the corporate entity and startups. The interviewee notes that integrating a startup too deeply ("hugging it to death") destroys the very agility and culture that made it valuable in the first place. Therefore, the interviewee advocates for governance models that maintain a degree of distance, such as Venture Clienting or specific partnership vehicles, rather than full integration which often leads to friction and loss of speed.
Interviewee B	The interviewee holds a strategic management position focused on	The interviewee outlines that the company's acquisition strategy is strictly derived from its broader corporate strategy, specifically the transition towards decarbonization and

Interviewee	Background	Conversation Summary
	M&A and portfolio strategy within a major utility. The responsibilities include assessing potential targets and ensuring that acquisition activities align with the broader corporate decarbonization goals.	customer-centric energy solutions. The discussion highlights that acquisitions are primarily used to secure market positions in emerging segments where the company needs to establish a footprint quickly. "Strategic Fit" is highlighted as the decisive gatekeeper criterion; financial metrics alone are insufficient if the target does not support the long-term roadmap. The conversation also details the post-acquisition phase, where the interviewee emphasizes a preference for limited integration. The stated goal is to preserve the target's identity, brand, and market approach while providing backend support (e.g., financing, scaling). The interviewee argues that "leaving them alone" regarding operations is often crucial to prevent the large corporate structure from suffocating the acquired company's innovative capacity.
Interviewee C	The interviewee is an innovation manager focused on digital business models and customer-facing technologies. The role involves monitoring market trends and responding to the competitive threat posed by new, agile market entrants.	The interviewee discusses the pressure the company faces from new, agile competitors (referred to as "attackers") entering the market with superior digital customer journeys and bundled offerings. The conversation reveals that the corporation looks to startups to understand these new market dynamics and to "keep a finger on the pulse" of the industry. Engaging with startups is described as a way to identify trends that the internal organization might miss due to its focus on existing assets. A significant part of the discussion concerns the transfer of capabilities. The interviewee explains that beyond the technology itself, the corporation aims to learn from the working methods and "spirit" of the startups. However, the interviewee admits that transferring this culture back into the core organization is difficult. The conversation concludes with reflections on the necessity of hybrid models where the startup retains autonomy but collaborates closely with corporate business units to drive mutual growth and organizational learning.

Interviewee	Background	Conversation Summary
Interviewee D	The interviewee works at the intersection of corporate strategy and venture building. The role involves evaluating "Make or Buy" scenarios and managing the operational implementation of new business ventures.	The interviewee provides a detailed look at why the corporation chooses to work with external ventures instead of building solutions in-house. A recurring theme is the "cost of delay" and the internal complexity that makes self-development inefficient for certain digital innovations. The interviewee argues that external ventures serve as a mechanism to inject new DNA and different ways of thinking into the business units, effectively challenging the status quo. The conversation delves into the friction between corporate standard processes (IT security, compliance, procurement) and the needs of startups. The interviewee describes these internal processes as major hurdles that can slow down or even kill the momentum of a collaboration. Furthermore, the interviewee discusses the role of the venture unit as a "bridge builder," translating between the two worlds to manage corporate expectations while protecting the startup from administrative overload.
Interviewee E	The interviewee is an investment manager in a Corporate Venture Capital (CVC) unit. The focus is on identifying high-growth energy tech companies for financial investment and strategic partnership opportunities.	The interviewee draws a sharp distinction between the speed of the corporate organization and that of startups. "Speed" is cited repeatedly as a primary differentiator and a key reason for investment. The interviewee explains that the corporation invests in startups to participate in market developments that are moving too fast for the internal R&D cycles to catch up with. The conversation also covers the regulatory environment. The interviewee notes that startups are often better at navigating specific, niche regulatory frameworks or entering new geographic markets where the corporate entity lacks local expertise. Acquisitions or investments are therefore used as shortcuts to enter these regulated spaces. Regarding integration, the interviewee expresses strong skepticism towards full integration. The preferred approach discussed is to let the startups operate as stand-alone entities or portfolio companies to maximize their growth

Interviewee	Background	Conversation Summary
		potential, arguing that the corporate "bear hug" often stifles the innovation that led to the investment in the first place.
Interviewee F	The interviewee works in Business Development and Strategy. The role focuses on the transformation of the company from a traditional energy utility into a customer-centric service provider, specifically regarding decentralized energy solutions (PV, storage, etc.).	The interviewee describes the strategic shift from selling electrons to selling energy services. A central theme is the "completeness" of the product portfolio. The interviewee explains that acquisitions are often necessary to fill specific gaps in the offering (e.g., adding battery storage technology to an existing solar portfolio) that the company cannot fill organically. The "Build vs. Buy" logic is prominent; the interviewee states that developing these solutions internally would take "far too long" and be too expensive compared to acquiring a specialized player. The conversation also addresses the challenge of integrating different business models. The interviewee notes the difficulty of aligning the traditional, asset-heavy utility world with the fast-paced, software-driven models of acquired startups. The summary highlights that while the strategic intent is to offer a unified solution to the end customer, the operational integration often faces friction due to different IT and sales cultures.
Interviewee G	The interviewee is involved in Technology Scouting and Innovation Management. The role entails identifying emerging technologies that the corporate entity lacks and managing pilot projects to assess their viability before deeper engagement.	The focus of this conversation is heavily on technical competence and the "Build vs. Buy" trade-off regarding R&D. The interviewee states that the corporation often lacks deep domain expertise in specific emerging technologies (e.g., digital platforms or specific sensor tech). Startups are viewed as essential sources of this specialized "Tech Know-How." The interviewee describes a structured process of using pilot projects to test the maturity of a technology. If a technology is deemed critical but missing in-house, the preference is to "buy it in" rather than attempting to replicate the learning curve, which is described as inefficient. The conversation implies that acquisition is often the most logical step to secure a technology once it has proven its value in a pilot phase,

Interviewee	Background	Conversation Summary
		effectively bypassing the internal development risks.
Interviewee H	The interviewee works in International Market Expansion. The role involves identifying opportunities for the company to enter new geographic markets and managing the complexities of cross-border growth.	The interviewee discusses strategies for entering foreign markets, emphasizing that organic entry ("greenfield") is often hampered by a lack of knowledge regarding local regulations, permitting processes, and cultural specifics. Acquiring local startups or SMEs is described as a strategic shortcut to gain immediate "Regulatory and Market Access." The interviewee explains that buying a player with an existing license to operate, established networks, and a local team is significantly faster and less risky than building operations from scratch. The conversation also touches on the difficulties of cross-border integration, noting that while the acquisition provides the entry ticket, harmonizing the different corporate cultures across borders remains a significant operational challenge.
Interviewee I	The interviewee holds a position in Digital and IT Management. The focus is on the digital infrastructure of the utility and the integration of new software solutions into the legacy IT landscape.	The interviewee focuses on the structural constraints of legacy IT systems. The conversation highlights that the corporate IT landscape is optimized for stability, security, and critical infrastructure protection, not for speed or agility. Startups are therefore engaged to provide rapid "digital layers" or customer-facing apps that the internal IT cannot deliver quickly enough. However, the interviewee extensively discusses the friction that arises when these agile solutions must be integrated into the secure corporate grid. The summary highlights IT security, compliance, and data protection as major bottlenecks. The interviewee describes a tension where the business side wants to move fast with the startup, but the IT side acts as a brake to ensure system integrity, often stalling the value realization of an acquisition or partnership.
Interviewee J	The interviewee works in the field of New Energy	The conversation revolves around the high risks and costs associated with deep-tech sectors like hydrogen. The interviewee

Interviewee	Background	Conversation Summary
	Technologies, specifically focusing on complex deep-tech sectors such as hydrogen. The role involves building ecosystems and partnerships to enable new value chains.	explains that the investment required and the technical uncertainty are so high that no single company can successfully develop the entire value chain alone. Partnerships, joint ventures, and acquisitions are described as "ecosystem plays" designed to share risk and combine complementary capabilities (e.g., generation + storage + distribution). The interviewee emphasizes that in these nascent fields, the corporation is still in a learning phase. M&A and close cooperation are used to understand the technical feasibility and economic viability of new technologies. The conversation suggests that the motivation here is less about immediate market share and more about securing a stake in a future infrastructure where the standards are not yet defined.
Interviewee K	The interviewee is a Corporate Strategy and M&A Manager. The role focuses on identifying acquisition targets that allow the company to scale its commercial operations and consolidate market share.	The interviewee frames acquisitions primarily as a tool for market consolidation and growth in maturing segments. The discussion highlights that when a market segment (like residential solar or e-mobility) begins to mature, the corporation seeks to acquire the "market leader" or a strong player to instantly secure a significant market share. The interviewee notes that "Customer Access" is a central challenge for the utility, and acquiring startups with an established user base and sales funnel is a key mechanism to solve this. The conversation is less focused on R&D or novel technology and more on commercial scaling. The interviewee argues that buying a company with a proven sales engine and customer relationships is often the only way to catch up with competitors who have moved faster.
Interviewee L	The interviewee works in Product Management and Customer Experience (CX). The focus is on digital customer interfaces and	The interviewee focuses on the interface with the end customer. The conversation highlights that startups often possess superior capabilities in user experience (UX) and customer-centric design—areas where the traditional utility struggles due to legacy billing systems and a focus on infrastructure. The motive for acquisition is often to obtain

Interviewee	Background	Conversation Summary
	improving the user journey for energy products.	this "Customer Interface" or specific digital sales channels. However, the interviewee provides a critical perspective on integration. A key theme is the warning that integrating these agile, customer-facing units into the rigid corporate backend (ERP systems) often degrades the user experience. The interviewee cites this mismatch between the slick startup front-end and the clumsy corporate back-end as a key failure mode in past integrations, often leading to customer churn post-acquisition.
Interviewee M	The interviewee holds a role in R&D and Technology Management. The responsibilities include overseeing technical development and managing the transition of external technologies into the corporate R&D pipeline.	The interviewee discusses the critical importance of human capital in technology acquisitions. The conversation emphasizes the "Acqui-hiring" aspect, noting that buying the physical technology (code or hardware) is useless without the team that understands it. The interviewee explains that retention of the founders and key engineers is the critical success factor for value creation. The discussion also covers the "Not-Invented-Here" syndrome. The interviewee describes internal resistance, where corporate R&D teams may reject or criticize external solutions because they view them as a threat or inferior to their own work. Managing this friction during the handover phase is described as a major challenge. The summary highlights that the acquisition is often just the starting point of a difficult process to get internal buy-in for the new technology.

D. Excerpt Code Dictionary

This appendix presents an excerpt of the final qualitative code dictionary used to analyze the interview material. The complete codebook is available in the Excel file Documentation_Qualitativ_Analysis in the online repository. Codes are organized hierarchically across three main domains (Strategic Motives, Integration Models, Cultural Challenges) with multiple subcodes at different levels of abstraction. For each code, the dictionary reports a unique Code ID, code level, code name, and an operational definition that guided consistent coding across cases. In addition, the Excel file documents inclusion and exclusion rules, exemplary coded segments, and linked hypotheses. The excerpt reproduced here illustrates the structure, logic, and granularity of the overall coding scheme.

Code ID	Code level	Code name	Operational definition
MOTIVE.1	1	Tech Access	Motives to cooperate with or acquire startups to obtain new technologies, IP, technical solutions, or technical capabilities that are missing or too slow/expensive to build internally.
MOTIVE.1.1	2	Tech Speed	Use of startup collaboration or acquisition to accelerate development and reduce time from idea to prototype/market, *as a strategic motive*.
MOTIVE.1.2	2	Tech Know-How	Motives to access the startup's technical knowledge, engineering skills, data science expertise, or domain-specific R&D capabilities.
MOTIVE.1.3	2	Tech Complement	Motives where startup technologies complement and strengthen the incumbent's existing technology base or product architecture.
MOTIVE.2	1	Knowledge Transfer	Motives to learn from startups and transfer knowledge, practices or routines into the incumbent, beyond pure technology ownership.
MOTIVE.2.1	2	Knowledge Talent	Motives focused on retaining or accessing the startup's people as carriers of critical knowledge and capabilities.
MOTIVE.2.2	2	Organizational Learning	Motives to expose the incumbent to startup routines to stimulate organizational learning and capability renewal.

Code ID	Code level	Code name	Operational definition
MOTIVE.3	1	Market Expansion	Motives to cooperate with or acquire startups in order to enter or expand in new product/service markets, customer segments, or geographies.
MOTIVE.3.1	2	Market Competition	Motives to strengthen competitive position, pre-empt rivals, or avoid disruption by acquiring/partnering with startups.
MOTIVE.3.2	2	Market Customers	Motives to gain access to the startup's existing customers, user communities, or market relationships.
MOTIVE.4	1	Strategic Fit	Motives that relate to the strategic fit of the startup with the incumbent's long-term strategy, portfolio, and positioning in the energy transition.
MOTIVE.4.1	2	Strategic Diversification	Motives to diversify the incumbent's business model towards new services, platforms, data-driven offerings, or adjacent value pools.
MOTIVE.5	1	Regulatory Environment	Motives driven or enabled by regulatory and policy frameworks supporting innovation-oriented corporate-startup activity.
MOTIVE.6	1	Challenges	Perceived risks, barriers or downsides of using startup cooperation/acquisition as a strategic tool for technological or market innovation.
MOTIVE.6.1	2	Challenge: Build vs Buy	Considerations when deciding between internal development and external startup acquisition/partnership (or consultancy) as alternative ways to innovate.
MOTIVE.6.2	2	Challenge: Speed	Motives and perceived challenges arising from the difference between corporate and startup speed, as a driver to work with startups.
INTMOD.1	1	Structural Integration Model	Chosen organizational model post-deal (absorption, hybrid/selective alignment, separation).
INTMOD.1.1	2	Full Absorption	Brand/team/processes absorbed into corporate structures.
INTMOD.1.2	2	Hybrid/Selective	Mix of shared assets/controls with retained autonomy (incl. 100% sub under innovation with own brand/policy carve-outs).
INTMOD.1.2.1	3	Co-Creation / Joint Development	Joint product/feature development while entities remain separate; dual GTMs possible.

Code ID	Code level	Code name	Operational definition
INTMOD.1.2.2	3	Shadow/Implicit Control	De-facto or contractual control via dependence, options, blocking minority, veto/joint-control rights.
INTMOD.1.3	2	Separate / Hold-separate	Operate externally for a period; minimal coupling.
INTMOD.1.4	2	Asset/Capability Carve-in / Lift-out (IP/asset/team)	Acquire IP/patents/assets and/or lift out key team (“acqui-hire”) to integrate capability internally; entity may be dismantled.
INTMOD.2	1	Decision Rights & Autonomy	Distribution of decision rights between startup/sub and corporate.
INTMOD.2.1	2	Roadmap rights	Who decides product priorities and release timing.
INTMOD.2.2	2	Budget/Capex rights	Who controls spend, pilot funding, capex approvals.
INTMOD.2.3	2	Ops/HR/Hiring rights	Who controls day-to-day ops, team structure, key hires.
INTMOD.3	1	Linking Mechanisms / Interfaces	Coordination bridges enabling work across entities.
INTMOD.3.2	2	Coordination & Customer-Dependency Friction	Handoffs/approvals or dominant anchor-customer dependence (acquirer as main customer) that slows or enables delivery/launch.
INTMOD.3.1	2	Human Bridges & Ambassadors	Dedicated people bridging orgs (liaisons, translators, mixed core teams, secondments).
INTMOD.3.1.1	3	Embedded Corporate Technologist (seconded tech lead)	Technologist embedded with authority to enforce safety/quality gates and align tech with promises.
INTMOD.3.3	2	Stakeholder / Portfolio Orchestration (PoC/PMO)	Fixed PoCs/PMO orchestrating touchpoints across legal/IT/ops and portfolio/BUs to realize synergies/combined offers.
INTMOD.3.4	2	Fast-Track Pilot Processes / Sandboxes	Lightweight NDA/procurement/IT sandboxes to run pilots quickly.
INTMOD.3.5	2	Systems & Compliance Fit Friction	IT/security/data/compliance refactoring that delays launch/integration.
INTMOD.4	1	Pacing & Sequencing of Integration	Timing/phasing from autonomy to alignment/absorption.
INTMOD.4.1	2	Stage-Gated Integration Policy	Autonomy until maturity/traction, then phased alignment.

Code ID	Code level	Code name	Operational definition
INTMOD.4.2	2	Overintegration Risks	Harms from too-early/tight absorption (team loss, stall).
INTMOD.4.3	2	Layered Integration Path (Admin→Tech→ Teams)	Orderly sequence: admin/reporting, then systems/data, then teams.
INTMOD.4.4	2	Transitional Harbor Model (Innovation unit → BU)	Temporary hosting under innovation (lighter governance) before docking into a BU or divestment.
INTMOD.5	1	Location / Colocation Choices	Physical proximity/face-time choices for onboarding/integration.
INTMOD.6	1	Context & Integration Drivers	Context shaping model choice and tightness.
INTMOD.6.3	2	Proximity-to-Core & Similarity/Complementarity (Driver)	Core adjacency/overlap vs complementarity used (often with capability criticality) to set integration tightness.
INTMOD.6.1	2	Regulatory / Capital Constraints (Driver)	Licenses/capital needs forcing tighter integration or slowing autonomy.
INTMOD.6.2	2	Maturity/Scale Threshold (Driver)	Minimum maturity/scale before integration is viable.
INTMOD.6.4	2	Strategic Control / Asset Ownership (Driver)	Need to own/control critical tech/asset (vendor risk, long contracts) drives acquisition over clienting/licensing.
INTMOD.7	1	Governance Locus & Scope Boundaries	Who owns decisions and what is permitted.
INTMOD.7.1	2	Governance Mechanisms (Investor/Board/Coach)	Formal forums/roles shaping rights without day-to-day ops (advisory/controlling boards, non-operational corporate MD/portfolio manager oversight).
INTMOD.7.2	2	Incentives & Goal Alignment	KPI/bonus/earn-out alignment affecting cooperation/innovation.
INTMOD.7.3	2	Product-vs-Process Scope Boundaries	Policies limiting venture work to process/not product.
INTMOD.7.4	2	Technical Governance & Quality Gatekeeping	Structural checks & balances: empowered tech oversight (vs sales), safety/quality gates, matrix coverage.

Code ID	Code level	Code name	Operational definition
INTMOD.7.5	2	Policy Carve-outs / Softened Corporate Policies	Deliberate relaxation of corporate policies/compliance burden for innovation-hosted subs to preserve speed.
INTMOD.8	1	Outcomes	Observable effects on first-launch speed and sustained innovation.
INTMOD.8.1	2	First-launch Time-to-Market	Speed to first release/launch post-deal.
INTMOD.8.2	2	Sustained Innovation Outcomes	Longer-term innovation capability/pipeline after integration.
CULT.1	1	Cultural Distance	Perceived gap between corporate and startup norms, values, or behaviors that hinders collaboration or agility.
CULT.1.a	2	Perceived Incompatibility	Fundamental mismatch or irreconcilable cultural assumptions.
CULT.1.b	2	Cultural / National Clash	Tensions linked to national or organizational norms (hierarchy, formality).
CULT.1.c	2	Performance vs Compliance Orientation	Meritocracy/performance focus vs quota/compliance/box-ticking orientation affecting decisions/speed.
CULT.1.d	2	General Cultural Differences	Descriptive contrasts without clear evaluative claim or outcome.
CULT.1.d.1	3	Corporate	Traits ascribed to the corporate side.
CULT.1.d.2	3	Startup	Traits ascribed to the startup side.
CULT.1.e	2	Not-Invented-Here / Silo Protectionism	Defensive “we can do it ourselves” stance blocking external startup ideas; copycat projects.
CULT.2	1	Cultural Fit	Perceived alignment of working styles, values, or norms enabling smoother collaboration.
CULT.2.a	2	Bridging Mechanisms	Practices/routines intentionally used to build or strengthen cultural alignment.
CULT.2.a.1	3	Interface & Level Matching	Map who talks to whom (hierarchy/knowledge parity) and align tools/rituals.
CULT.2.a.2	3	Independent Mediation/Facilitators	Neutral third parties (often psychology-trained) mediate conflicts/coach counterparts.
CULT.2.a.3	3	Leadership Tandem/Personality Match	Personality-based pairing of counterpart leaders/founders for durable collaboration.
CULT.2.a.4	3	Top-Management Sponsorship & Escalation Cadence	Active senior sponsorship with regular reviews and fast escalation to unblock integration.

Code ID	Code level	Code name	Operational definition
CULT.2.a.5	3	Integration Core Team & Ambassadors	Cross-entity core squad of translators/bridge-builders championing daily collaboration.
CULT.2.a.6	3	Colocation & High-Contact Onboarding	Early intensive face-to-face time and structured onboarding to build trust/speed.
CULT.2.a.7	3	Role/Authority Transfer to Startup Experts	Place startup experts in key decision roles so their practices are adopted.
CULT.2.a.8	3	Shared Objectives & KPI Alignment	Align objectives and incentives across entities to reduce goal conflict and enable progress.
CULT.2.a.9	3	Fast-Track Pilot & Sandbox Paths	Lightweight legal/procurement/IT-security paths that bypass standard bureaucracy for pilots.
CULT.2.a.10	3	Dedicated Partnership Owner & Resourcing	Named full-time owner and protected capacity so collaboration isn't a side project.
CULT.2.a.11	3	On-Site Leadership Presence & Rhythm	Regular, visible leadership presence at startup site to sustain alignment and confidence.
CULT.2.b	2	Autonomy-Control Balance	Hybrid arrangements preserving startup agility while maintaining corporate alignment.
CULT.2.b.1	3	Locational Integrity (Keep Site/Core Team Intact)	Preserve startup location and intact core team to maintain momentum/dynamism post-acq.
CULT.2.b.2	3	Policy-Light Operating Zone ("Cleanroom")	Ring-fenced ways-of-working with reduced corporate policies to keep startup speed while integrating.
CULT.2.b.3	3	Phased Integration Roadmap	Deliberate "keep distant first, integrate slowly" path with defined interfaces and gradual absorption.
CULT.2.c	2	Purpose/Identity Alignment	Mission/identity congruence (e.g., climate transition vs O&G legacy) influencing motivation/collab.
CULT.2.d	2	Cultural Fit Screening (Pre-deal/Pre-collab)	Pre-deal or pre-collaboration assessment/negotiation of cultural fit or autonomy.
CULT.2.d.1	3	Joint Work Trial (Pre-deal/Pre-collab)	Time-boxed joint sprint/workshop to surface cultural compatibility before commitment.
CULT.2.d.2	3	Informal Chemistry	Get-to-know sessions between leaders to gauge rapport/vision fit (no joint work).

Code ID	Code level	Code name	Operational definition
		Meetings (Pre-deal/Pre-collab)	
CULT.2.d.3	3	Behavioral DD Indicators (Founder/Top Team)	Observe founder/top-team cues as proxies for responsibility/reliability/fit.
CULT.2.d.4	3	Reporting & Control Expectations (Pre-deal Alignment)	Early alignment on reporting cadence, KPIs, instruction rights to avoid perceived loss of entrepreneurial status.
CULT.2.d.5	3	Founder Prior Corporate Experience (Fit Predictor)	Founder/top-team prior big-company experience predicts smoother integration/realistic expectations.
CULT.2.d.6	3	Cultural Fit Deprioritized (Product-First Deal Logic)	Deals where culture screening is treated as irrelevant/side-issue vs capability/product focus.
CULT.2.e	2	Cohesion/We-Feeling	Small-team identification/social cohesion enabling trust, speed, collaboration; may dilute with scale.
CULT.3	1	Cultural Learning & Adaptation	Mutual learning, mindset shifts, or new routines developed post-acquisition.
CULT.3.a	2	Localized/Unit-Level Learning	Corporate units near the startup adopt selected startup practices on a small, departmental scale.
CULT.3.b	2	Ambidexterity Orientation (Explore-Exploit)	Explicit aim to build explore-exploit capability as a cultural/operating norm.
CULT.4	1	Cultural Consequences	Outcomes of cultural (mis)alignment for trust, motivation, collaboration, innovation.
CULT.4.a	2	Innovation Impact	Culture → innovation outcomes (speed, creativity, NPD).
CULT.4.b	2	Retention & Motivation Outcomes	Culture-linked turnover and motivation effects.
CULT.4.b.1	3	Turnover/Exit	Departures driven by cultural misfit or values conflict.
CULT.4.b.2	3	Retention Mechanisms/Incentives	Tools mitigating attrition or sustaining motivation post-acq.
CULT.4.b.3	3	Non-Financial Retention Drivers (Autonomy & Fairness)	Retention via real autonomy, fair treatment, respectful governance.

Code ID	Code level	Code name	Operational definition
CULT.4.c	2	Social Identity Dynamics (In-group/Out-group)	Us-them dynamics post-announcement that hinder collaboration/trust.

E. Excerpt Audit Trail

This appendix provides an excerpt of the qualitative coding audit trail documenting how the code dictionary evolved over the course of the analysis. The full audit trail is available in the Excel file Documentation_Qualitativ_Analysis in the online repository. Each entry records the version, date, analyst, change type (e.g., add, split, merge, rename), codes affected, and the rationale for the modification. The excerpt illustrates the iterative refinement of the coding scheme and enhances transparency, reliability, and traceability of the analytic process.

Version	Topic	Change Type	Code(s) Affected	Reason for Change
V0 → V1	Integration Model	Add	INTMOD.9 Shadow Integration / Implicit Acquisition INTMOD.10 Governance Locus & Scope Boundaries	Repeated mention of "shadow acquisition" and implicit ownership → distinct mechanism of hybrid control.
V0 → V1	Integration Model	Add	INTMOD.3.1 Human / Interface Dependence	Transcript shows personal bridging and mediation as linking mechanisms.
V1 → V2	Integration Model	Add	INTMOD.2.2; INTMOD.3.3; INTMOD.4.1; INTMOD.7.1	Transcript introduces distinct mechanisms: governance forums, orchestrated interfaces, maturity-based staging, and regulatory/capital drivers.
V2 → V3	Integration Model	Add	INTMOD.1.2 ; INTMOD.1.3 ; INTMOD.2.3 ; INTMOD.4.2 ; INTMOD.8.2 ; INTMOD.8.3	Transcript C introduced recurring mechanisms: integration maturity thresholds, compliance barriers, incentive misalignment, cross-entity integration teams, premature integration risks, co-creation hybrids, and talent/learning transfer.
V3 → V4	Integration Model	Add	INTMOD.3.4 Fast-Track Pilot Processes / Sandboxes	Transcript D details fast-track NDA/procurement and sandboxing to bypass bureaucracy.
V3 → V4	Integration Model	Add	INTMOD.4.3 Layered Integration Path (Admin→Tech→Teams)	Transcript D gives explicit admin→tech→teams sequencing.

Version	Topic	Change Type	Code(s) Affected	Reason for Change
V4 → V5	Integration Model	Merge	INTMOD.1 + INTMOD.8 + INTMOD.9 → INTMOD.1 Structural Integration Model	Duplicative model constructs
V4 → V5	Integration Model	Move	INTMOD.1.1 Knowledge Transfer & Learning → INTMOD.11.2 Outcomes – Sustained Innovation	Outcome, not a structure
V6→V7	Cultural Challenges	Add	CULT.2.b.1 Locational Integrity (Keep Site/Core Team Intact)	Distinct design decision to preserve team/site as cultural asset (“intrinsic momentum”).
V6→V7	Cultural Challenges	Add	CULT.2.a.11 On-Site Leadership Presence & Rhythm	Leadership cadence on-site identified as success/failure lever beyond generic sponsorship.
V6→V7	Cultural Challenges	Add	CULT.2.d.3 Behavioral DD Indicators (Founder/Top Team)	Recurrent behavioral screening (signals, reliability) distinct from chemistry meetings or joint trials.
V7→V8	Cultural Challenges	Add	CULT.2.b1 2 Policy-Light Operating Zone (“Cleanroom”)	Recurring mechanism: buffered “cleanroom” governance enabling portfolio startups to act quickly despite corporate bureaucracy.
V8→V9	Cultural Challenges	Add	CULT.1.e Not-Invented-Here / Silo Protectionism	Recurrent barrier: NIH/silo culture blocks startup ideas, spawns internal copy projects.
V8→V9	Cultural Challenges	Add	CULT.2.d.4 Reporting & Control Expectations (Pre-deal Alignment)	Deal-breaker is fear of control/loss of status; align reporting/authority pre-deal.
V8→V9	Cultural Challenges	Add	CULT.2.d.5 Founder Prior Corporate Experience (Fit Predictor)	Prior corp exposure reduces culture shock; improves collaboration odds.

Version	Topic	Change Type	Code(s) Affected	Reason for Change
V9→V10	Cultural Challenges	No change	—	Evidence maps cleanly to existing nodes (2.b Autonomy-Control Balance; 4.b.2 Retention Mechanisms/Incentives; 2.d Cultural Fit Screening) without gaps.
V10→V11	Cultural Challenges	Add	CULT.2.b.3 Phased Integration Roadmap	Captures “far from core first, gradual integration” guidance not covered by 2.b.1/2.b.2.
V11→V12	Cultural Challenges	Add	CULT.2.d.6 Cultural Fit Deprioritized (Product-First Deal Logic)	Evidences culture treated as by-product in product deals; antecedent driver.
V12→V13	Cultural Challenges	Add	CULT.3.b Ambidexterity Orientation (Explore-Exploit)	Frequent theme: need to develop explore-exploit culture; learning target.

F. Excerpt Segments

This appendix presents an excerpt of the paraphrased interview segments used in the qualitative analysis, compiled separately for each hypothesis. For each coded segment, the table reports the interview ID, coded segment ID, paraphrase, assigned codes, linked hypotheses, and the evidence direction (supporting, contradicting, neutral). The paraphrases condense the original statements while preserving their substantive meaning, enabling transparent comparison across interviews and cases. The full set of paraphrased segments by hypothesis is available in the Excel file Documentation_Qualitativ_Analysis in the online repository.

Interview ID	Coded Segment ID	Paraphrase	Codes	Linked Hypo-theses	Evidence Direction
Interview_02	199	Interviewee describes a stepwise model where the corporate typically starts with a minority stake that may later become a majority stake, allowing risk to be managed as the startup matures and scales.	INTMOD.1	H1 H2	Neutral
Interview_01	209	Interviewee outlines three preferred models—minority/majority stakes with autonomy, wholly owned but operationally autonomous subsidiaries, and fully independent venture-client pilots—while mature M&A targets tend to be integrated over time.	INTMOD.1	H1 H2	Neutral
Interview_10	252	Interviewee states that they initially remained autonomous and are now progressively moving toward a hybrid integration model.	INTMOD.1	H1 H2	Neutral
Interview_10	31	Context: Interviewee says the corporate is investing heavily in the energy transition, situating cultural dynamics within sectoral change.	CULT	H1,H3	neutral
Interview_01	45	Interviewee reiterates that this caution contributes to cultural distance from startups.	CULT.1	H1	supports

Interview ID	Coded Segment ID	Paraphrase	Codes	Linked Hypo-theses	Evidence Direction
Interview_09	259	Uses the “heavy tanker vs. agile tender” analogy to underline corporation-startup cultural distance.	CULT.1	H1	supports
Interview_01	1	The segment explains that corporates depend on startups to regain innovation speed and offset internal rigidity, enabling them to stay technologically competitive.	1.1; 6.2; 6	H1	supports
Interview_01	2	The speaker highlights how startups provide capabilities and know-how that corporates lack, helping them close portfolio gaps and enhance internal skill sets.	1.1; 2; 2.2; 3.1	H1	supports
Interview_01	3	The company invests in startups specifically to obtain missing technologies or expertise, showing a clear motivation to strengthen internal technological resources.	1.3; 2	H1	supports

G. Excerpt Mechanisms

This appendix presents an excerpt of the mechanism overview used to synthesize qualitative findings across interviews and cases. The full mechanism table is available in the Excel file Documentation_Qualitativ_Analysis in the online repository. For each mechanism, the table reports the Mechanism ID, the connected cross-case Pattern ID, a concise mechanism label, and a 2-3 sentence summary of the underlying causal logic. In addition, it lists the typical dominant codes that empirically ground the mechanism, the direction of evidence relative to the respective hypothesis (supporting, contradicting, neutral), and an overall strength assessment. These mechanisms served as the analytical basis for deriving the cross-case patterns discussed in the results chapter.

Mechanism ID	Connected Pattern ID	Mechanism label	Mechanism summary (2-3 sentences)
M-H1-M1	M-H1-P1	External Technology & IP Access Solves Internal Capability Gaps	Corporates acquire startups because they lack the internal capabilities, IP, and technological depth required to build emerging digital or energy-tech solutions. Startups provide mature EMS systems, software stacks, algorithms, and specialized know-how that are too slow or impossible to develop in-house. Acquisition becomes the most efficient and sometimes the only path to internalize critical technologies.
M-H1-M2	M-H1-P2	Build-vs-Buy Logic & Venture Clienting Protect Optionality	Corporates attempt internal development but frequently fail due to technological complexity, lack of talent, and slow processes. This triggers the build-vs-buy decision, where firms increasingly rely on venture clienting to test solutions before committing to acquisition. When the technology proves mission-critical and internal build is infeasible, acquisition becomes the preferred route.
M-H1-M3	M-H1-P1	Startups as Capability Feeders & Organizational Learning Interfaces	Corporates rely on startups for fresh digital skills, entrepreneurial working styles, and organizational learning that they cannot develop internally. Startups act as capability feeders, exposing corporate teams to new problem-solving approaches, ecosystems, and technical

Mechanism ID	Connected Pattern ID	Mechanism label	Mechanism summary (2-3 sentences)
			know-how. Acquisitions formalize and secure this inflow of capabilities when cooperation alone is insufficient.
I-H1-M1	I-H1-P1, I-H1-P3	Autonomy / hold-separate protects speed	When the startup remains structurally separate (hold-separate, harbor, separate unit) and retains roadmap/budget/ops rights, product work continues at "startup speed". Corporate processes are largely bypassed in the early phase, allowing faster first launches.
I-H1-M2	I-H1-P2	Integration & corporate machinery slow TTM	Full absorption or early deep integration triggers corporate IT/security, ERP/tax, HR, budgeting and multi-level governance. These interfaces add approval loops and rework, which systematically delay first launches by weeks or months.
I-H1-M3	I-H1-P1, I-H1-P3	Stage-gated / hybrid paths manage speed vs. control	Venture clienting, pilots, accelerators and "cooperate-then-buy" logics allow the corporate to test solutions quickly in a lighter structure. Ownership and heavy integration are postponed until product fit and risk are clearer, balancing early speed with later control.
C-H1-M1	C-H1-P1	Stability & risk-avoidance vs "try-it-now" experimentation	Energy/utility corporates optimize for core stability/predictability (especially after shocks), while startups optimize for growth, experimentation and risk acceptance. The opposing risk/speed logics create a deep, persistent culture gap.
C-H1-M2	C-H1-P1	Governance & compliance perfectionism vs performance "good-enough"	Corporate compliance/cybersecurity and perfection standards (100% readiness, quota/metric HR, CEO escalations) displace the startup's 80/20 and merit/performance logic. The perfection vs sufficiency gap is repeatedly named as a core distance driver.
C-H1-M3	C-H1-P1	Decision rights & ownership locus:	Corporates use dispersed ownership, multi-stakeholder consensus and central

Mechanism ID	Connected Pattern ID	Mechanism label	Mechanism summary (2-3 sentences)
		consensus/centralized vs autonomous/concentrated	sign-offs; startups have concentrated ownership and act with high autonomy and personal responsibility. This decision-rights architecture difference sustains perceived distance.

H. Patterns

This appendix presents the full set of cross-case patterns developed from the qualitative analysis. Patterns are higher-order analytical constructs that cluster multiple mechanisms into coherent causal configurations used to evaluate the hypotheses. For each pattern, the list provides its label, the mechanisms it comprises, and a concise description of the underlying causal logic. Together, these patterns form the central analytical layer linking coded interview segments and mechanisms to the empirical findings reported.

M-H1-P1 – Technology acquisition as a strategic necessity

Mechanisms included: M-H1-M1; M-H1-M3
Pattern description: Cases where corporates rely on startup investments and acquisitions to secure critical technologies, IP, know-how and capabilities they cannot build internally, making external tech sourcing a core strategic logic.

M-H1-P2 – Build-vs-buy logic and external speed

Mechanisms included: M-H1-M2; M-H1-M4
Pattern description: Cases where internal development is perceived as too slow, risky or expensive, so corporates use venture clienting and later acquisitions as build-vs-buy tools to access working solutions faster and bridge internal speed gaps.

M-H1-P3 – Strategic market and ecosystem expansion enabled by startup technology

Mechanisms included: M-H1-M5
Pattern description: Cases where corporates use startup technologies to expand into new digital markets, customer segments and energy ecosystems such as EMS, IoT, building automation or platforms, positioning themselves in emerging value chains.

M-H2-P1 – Market expansion through startup-led entry

Mechanisms included: M-H2-M1; M-H2-M3
Pattern description: Cases where corporates acquire or cooperate with startups to enter new markets, geographies, or customer segments that are hard to access internally.

M-H2-P2 – Customer-access & go-to-market reinforcement

Mechanisms included: M-H2-M2; M-H2-M4
Pattern description: Cases where startups provide superior customer access, sales channels, or user proximity that corporates lack.

M-H2-P3 – Geographic and regulatory market access

Mechanisms included: M-H2-M1; M-H2-M5
Pattern description: Cases where corporates use startups to overcome geographic, political, or regulatory barriers that hinder internal market entry.

I-H1-P1 – Autonomy-based speed models

Mechanisms included: I-H1-M1, parts of I-H1-M3
Pattern description: Cases where hold-separate/harbor + decision rights allow startups to keep pre-acquisition pace and ship first products quickly.

I-H1-P2 – Integration friction and over-integration

Mechanisms included: I-H1-M2, I-H1-M4, spillover from I-H1-M7
Pattern description: Cases where early/full integration loads startups with corporate IT, compliance, HR and governance, causing significant delays and sometimes damaging teams and innovation.

I-H1-P3 – Stage-gated / harbor ambidexterity

Mechanisms included: I-H1-M3, parts of I-H1-M1, I-H1-M6
Pattern description: Cases where firms deliberately use pilots, VC, connection/harbor units and phased ownership to combine early speed with later control and integration.

I-H1-P4 – Context- and strategy-driven trade-offs

Mechanisms included: I-H1-M5, I-H1-M6
Pattern description: Cases where regulatory/asset risk and strategic positioning motives lead firms to accept slower TTM in exchange for safety, control, or platform/portfolio logic.

I-H2-P1 – Hybrids as enabler of sustained innovation – but only beyond pure hold-separate

Mechanisms included: I-H2-M1, I-H2-M2
Pattern description: Across several cases, hybrid and harbor/innovation-unit models allow startups to preserve their exploratory working style while leveraging corporate assets (brand, sales, platforms) for scaling. Compared to pure hold-separate/portfolio approaches, these setups create more knowledge diffusion, capability transfer, and joint innovation - but only when actual interfaces and some degree of integration exist.

I-H2-P2 – Failure modes: under-governed or over-bureaucratic hybrids destroy long-term innovation

Mechanisms included: I-H2-M3, I-H2-M4, I-H2-M7
Pattern description: The data reveals two clear failure modes: (1) overly loose connection/hybrid models lacking technical governance, leading to safety issues and loss of trust; (2) over-bureaucratic integration with heavy processes and misaligned incentives that drive away talent and dilute product focus. Cultural and process frictions amplify these effects and explain why formally similar hybrid setups produce very different innovation outcomes.

I-H2-P3 – Governance, incentives and scope design as the real success factors of hybrids

Mechanisms included: I-H2-M5, parts of I-H2-M2 & I-H2-M7
Pattern description: Across interviews, governance design consistently emerges as the key lever: clear decision rights, technical quality gates, explicit scope boundaries (what the unit is and is not allowed to build), and incentives that reward joint innovation rather than silo goals. When this architecture is sound, hybrids deliver superior long-term innovation and learning; when weak or inconsistent, hybrid advantages collapse — regardless of the formal label "hybrid vs full integration."

I-H2-P4 – Temporal ambidexterity: staged integration paths condition sustained innovation

*Mechanisms included***:** I-H2-M6, parts of I-H2-M1 & I-H2-M2
*Pattern description***:** Many firms use deliberate time-based sequences (VC / venture-clienting / harbor → later BU/majority integration) to balance exploration and exploitation across the lifecycle. These paths allow early protected startup work at high speed, followed by structured capability transfer once governance and process maturity are in place. Mistimed transitions — too early or too late — weaken both innovation output and the effective use of corporate resources, even when the setup is formally "hybrid."

C-H1-P1 – Deep value and governance oppositions

Mechanisms included: C-H1-M1, C-H1-M2, C-H1-M3
Pattern description: Cases where sharply different goals, risk appetites and decision-rights architectures (stability/compliance/consensus vs experimentation/"good-enough"/autonomy) hard-wire a deep sense of cultural distance even before any integration move is made.

C-H1-P2 – Routines and scale as structural distance

Mechanisms included: C-H1-M4, C-H1-M5
Pattern description: Cases where contrasting day-to-day coordination habits and the "tanker vs tender" scale/legacy gap make collaboration feel slow and cumbersome, embedding cultural distance in routines and organisational mass rather than in attitudes alone.

C-H1-P3 – Deliberately preserved "otherness"

*Mechanisms included***:** C-H1-M6, C-H1-M8
*Pattern description***:** Cases where corporates use acquisitions and partnerships to access external speed, talent and learning while keeping startups as distinct capability nodes, intentionally maintaining cultural distance instead of trying to absorb it.

C-H1-P4 – Identity-driven stickiness (and softening)

*Mechanisms included***:** C-H1-M7
*Pattern description***:** Cases where self-selection, identity and retention choices make cultural distance sticky over time, but unusually open individuals and deliberate practice work can selectively soften that distance regardless of formal deal or ownership model.

C-H2-P1 – Assurance and interface friction

*Mechanisms included***:** C-H2-M1, C-H2-M6
*Pattern description***:** Cases where strict compliance/IT/security standards and incompatible corporate systems create extra gates, rework and tooling rebuilds, so the startup's 80/20 rhythm is replaced by slow, approval-heavy delivery and launches slip.

C-H2-P2 – Decision and planning drag

*Mechanisms included***:** C-H2-M2, C-H2-M5
*Pattern description***:** Cases where multi-stakeholder sign-offs and long corporate planning cycles collide with founder-led, weekly iteration, stretching decision times until market windows close and breaking the startup's learning and momentum.

C-H2-P3 – Autonomy loss and continuity breaks

*Mechanisms included***:** C-H2-M4
*Pattern description***:** Cases where post-acquisition loss of ownership and control demotivates key people, triggering exits and knowledge fragmentation that directly reduce innovation throughput.

C-H2-P4 – Trust gaps and blocked knowledge flow

*Mechanisms included***:** C-H2-M7, spillover from C-H2-M4
*Pattern description***:** Cases where low perceived fit and "othering" erode psychological safety (often reinforced by earlier autonomy loss), making collaboration guarded and shrinking knowledge sharing, which in turn lowers problem-solving quality and innovation outcomes.

C-H3-P1 – Mission and language alignment

*Mechanisms included***:** C-H3-M1, C-H3-M2
*Pattern description***:** Cases where shared mission/values and a common vocabulary create psychological safety and cut translation overhead, so teams align quickly, experiment more and convert fit into faster, higher-quality innovation.

C-H3-P2 – Governed autonomy for speed

*Mechanisms included***:** C-H3-M3, C-H3-M6, spillover from C-H3-M9
*Pattern description***:** Cases where perceived fit supports clear decision rights, autonomy with light but predictable governance, and aligned KPIs, allowing startups to keep their speed while staying coordinated—highlighting that when this governance spine is missing (H3-M9) outcomes stall despite good chemistry.

C-H3-P3 – Trust-based boundary spanning

*Mechanisms included***:** C-H3-M4, C-H3-M7, H3-M8
*Pattern description***:** Cases where trusted boundary spanners, respectful integration posture and (virtual) co-location build rapport and psychological safety, unlocking tacit knowledge flow and joint problem-solving that visibly improves innovation outcomes.

C-H3-P4 – Fit constrained by hard rules

*Mechanisms included***:** C-H3-M9, C-H3-M10
*Pattern description***:** Cases where team-level cultural fit feels high but unclear governance or hard security/regulatory/ERP constraints dominate, so collaboration feels good yet innovation speed and impact remain limited, showing the boundary conditions of H3.

I. Case Overview – Integration Model Chapter

This appendix provides concise factual summaries of the two acquisition cases referenced in the integration-model analysis. These cases were not part of the qualitative sample and were not used as analytical evidence; rather, they served exclusively as brief real-world illustrations to contextualize the discussion of Hypothesis 1 and Hypothesis 2. Each summary outlines the acquisition background, the integration model applied, and key observable indicators relevant to the chapter's arguments. The purpose of this appendix is solely to document the cases that were cited in the discussion and to provide readers with the underlying factual context.

i.1 Case 1 – E.ON × gridX

Case overview

In 2021 E.ON acquired a majority stake in gridX, a smart grid startup founded in 2016 that develops the XENON platform for connecting and optimizing decentralized energy resources (gridX 2021; E.ON 2021). In 2022 E.ON acquired the remaining shares and positioned gridX as a stand-alone managed company within the innovation-oriented subsidiary E.ON One, explicitly stating that the brand and corporate structure would remain unchanged (E.ON 2022; E.ON One 2023). This corresponds to a hold-separate hybrid integration model in which legal ownership is fully transferred while organizational autonomy and an independent market-facing brand are preserved.

Before and after the acquisition gridX's platform was used in joint projects with E.ON, including an intelligent load-management solution at E.ON's Essen headquarters that dynamically distributes available power across charging points so that more vehicles can charge without grid reinforcement (E.ON 2021). By 2022 devices controlled by XENON had produced around 21 GWh of energy and more than 200,000 charging cycles, and E.ON reported strong growth expectations for revenue and headcount (E.ON 2022). Public communication frames the deal as a key pillar of E.ON's digitalization strategy and a vehicle to scale gridX's platform across E.ON's customer base and grid infrastructure (E.ON 2022; 2021; gridX 2021).

Key integration and innovation facts

- Integration model.
  Majority and later full acquisition, with gridX operating as an autonomous scale-up within E.ON One and retaining its own brand and legal structure (E.ON 2021; 2022).
- Linking mechanisms.
  Joint pilots and platform roll outs, including intelligent load management at E.ON's Essen headquarters and other smart charging applications (E.ON 2021; gridX 2021).
- Speed and scaling indicators.
  Around 21 GWh of energy and more than 200,000 charging cycles processed via XENON in 2022, accompanied by strong growth expectations (E.ON 2022).

Link to integration chapter hypotheses and patterns

- The gridX case supports integration chapter hypothesis I-H1 by showing that a hold-separate, autonomy-preserving model can maintain startup routines while enabling rapid deployment of the technology in the acquirer's infrastructure and customer base.
- It is also relevant for integration chapter hypothesis I-H2, as it exemplifies a hybrid harbor structure where an internal ecosystem subsidiary (E.ON One) provides selective integration while keeping the scale-up organizationally separate.
- Relevant integration patterns (e.g. I-H1-P1 autonomy-based speed, I-H2-P2 harbor structures with pilots and platform integration) are illustrated by the combination of

stand-alone entity status, dedicated linking mechanisms and measurable scaling outcomes.

i.2 Case 2 – E.ON × envelio

Case overview
In December 2021 E.ON acquired a majority stake in envelio, a Cologne-based clean tech software company founded in 2017 as a spin off from RWTH Aachen University (envelio 2021). envelio develops the Intelligent Grid Platform, which enables distribution system operators to build digital twins of their networks, simulate grid behavior and optimize planning and operational decisions, including the assessment of grid connection requests (envelio 2021; Spencer Jones 2025). At the time of the transaction envelio had more than 35 network operators as customers and a team of over 70 employees (envelio 2021).
The acquisition is framed as part of E.ON's open digital energy ecosystem, with envelio remaining an independent company within E.ON Group and continuing to develop its platform (envelio 2021). E.ON One describes its scale-ups as autonomous entities that receive support in scaling and market integration, which again reflects a hold-separate hybrid integration model (E.ON One 2023). Technically, envelio's platform underpins a high resolution digital twin of E.ON's German distribution grid, covering around 700,000 kilometers of infrastructure and data from roughly 55 million network components and more than 180,000 measuring devices, and enables automated processing of more than 410,000 grid connection requests within seconds (Spencer Jones 2025). The technology is also used in customer facing applications such as the SNAP Online Connection Check and in the German demonstrator of the EU TwinEU project (Spencer Jones 2025).

Key integration and innovation facts
- Integration model.
  Majority acquisition with envelio remaining an independent company within E.ON Group, positioned as an autonomous scale-up in an open digital energy ecosystem (E.ON One 2023; envelio 2021).
- Linking mechanisms.
  Deep technical integration via the German grid digital twin and associated applications, including automated grid connection checks and participation in the TwinEU project (envelio 2021; Spencer Jones 2025).
- Speed and system-level impact.
  Coverage of more than one third of Germany's distribution grid, automated processing of hundreds of thousands of grid connection requests within seconds and extensive data integration across millions of components (Spencer Jones 2025).

Link to integration chapter hypotheses and patterns
- The envelio case supports integration chapter hypothesis I-H1 by showing how an autonomy-preserving model can deliver very rapid time-to-connect improvements and operational performance gains when the startup's technology is embedded deeply in grid operations.
- It is central to integration chapter hypothesis I-H2, since it illustrates a mature hybrid harbor configuration in which a software scale-up remains organizationally separate but becomes core infrastructure for grid planning, customer portals and EU-level innovation projects.

- Relevant integration patterns (e.g. I-H2-P3 deep technical integration with sustained autonomy, I-H2-P4 system-level innovation engines) are exemplified by the combination of organizational independence and high degrees of technical and process integration.

J. Main Contrasts between Corporate and Startup Culture

This table summarizes the main contrasts between startup and energy-sector corporate cultures discussed in Section 6.2. It highlights differences in structure, decision-making, risk tolerance, communication, and work roles that underpin the cultural distance and fit mechanisms analyzed in Chapter 6.

Aspect	Startup Culture	Corporate (Energy-Sector) Culture
Structure	Flat, informal	Hierarchical, formalized
Decision-making	Decentralized, rapid	Centralized, multi-layered
Risk tolerance	High, encourages experimentation	Low, emphasizes reliability
Communication	Open, informal	Regulated, formal
Orientation	Mission-driven, creative	Efficiency-driven, performance-focused
Work roles	Broad, overlapping	Specialized, clearly defined

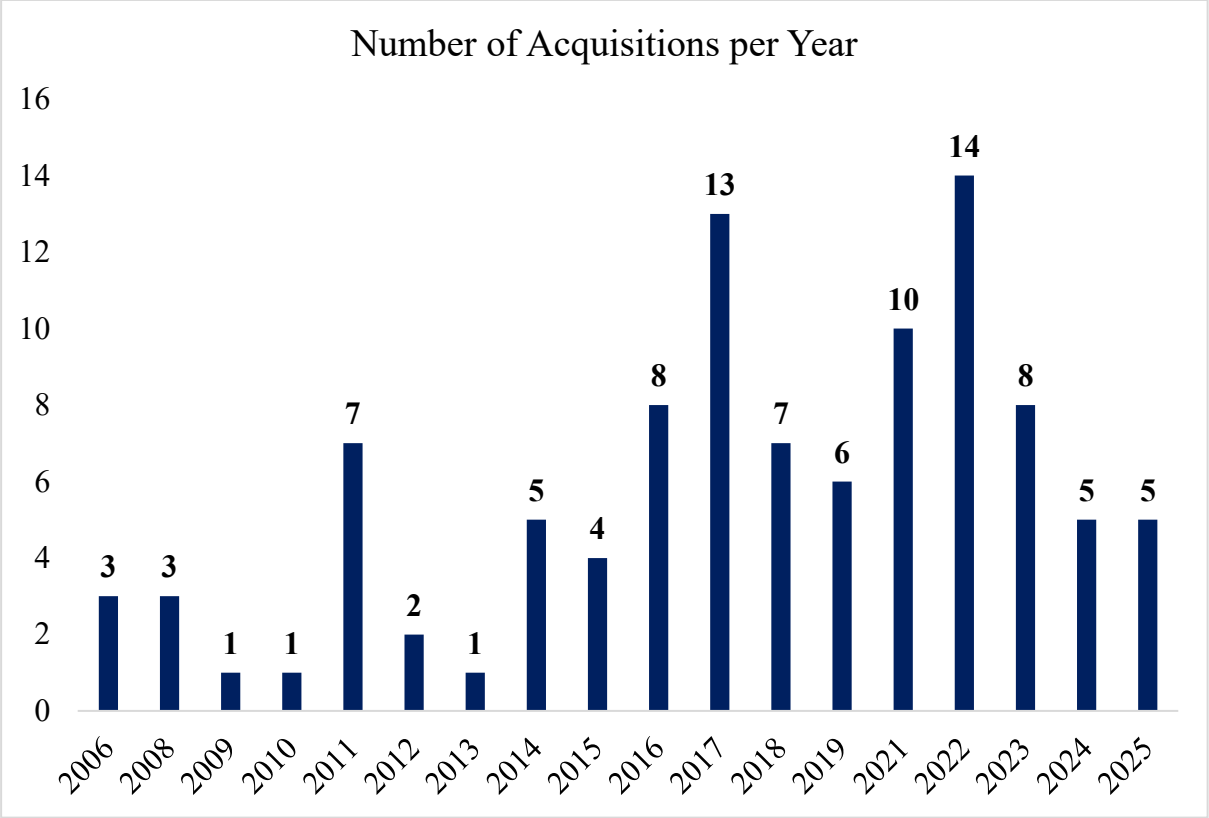
Note on Data and Software (Appendices K-AA):

Unless otherwise indicated, the analyses and tables in Appendices J-Y are based on data extracted from Crunchbase (see excel file crunchbase_data) and Compustat Global for acquirers (see stata file CST_A) and non-acquirers (see stata file CST_NA) (both retrieved on October 6, 2025). All empirical results, diagnostic tests, and figures were produced in Stata 19 (see stata do file do_file, log file log_file).

K. Startup Acquisitions Sample Construction and Filtering Procedure

Step	Filtering Criterion / Description	Data Source	Number of Acquisitions
1. Acquisition Data Import	M&A transactions imported for the years 2000-2025.	Crunchbase online	169,426
2. Sectoral Filtering	Only targets retained active in *energy-related* or *sustainability-oriented* sectors (keywords include: Biofuel, Cleantech, Renewable Energy, Greentech, Recycling, Smart Building, Solar, Sustainability, Waste Management, Water, etc.; based on Kwon et al., 2018).	Crunchbase online	6,704
3. Early-Stage Focus	Targets excluded whose most recent funding round was classified as Private Equity, Secondary Market, Post-IPO Equity/Debt, or Non-equity Assistance to ensure focus on early-stage ventures.	Crunchbase online	1,260
4. Geographic Scope	Only acquisitions retained conducted by firms headquartered in the European Union or the United Kingdom.	Crunchbase	319
5. Startup Definition	Acquirees required to be ≤10 years old and have fewer than 100 employees at the time of acquisition.	Crunchbase/ Company Websites	267
6. Acquirer Criteria	Acquirers excluded with annual revenues below USD 500 million or those operating in Financial Services, Consulting, or VC/PE industries.	Crunchbase / Compustat Global/ Company Websites	**103**

Figure K.1. Number of Startup Acquisitions per Year (2006–2025)



Note: The figure reports the annual number of startup acquisitions included in the final estimation sample after applying all filtering criteria described in Appendix K. The sample covers acquisitions by listed European and UK firms. Data are sourced from Crunchbase and Compustat.

L. Overview of Energy-related Startup Acquisitions

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
02.08.06	CH4 Energy Ltd	VENTURE PRODUCTION PLC	Oil and Gas	Oil and Gas
04.09.06	Rovtech Solutions	FUGRO NV	Electronics, Industrial, Manufacturing, Oil and Gas	Construction, Oil and Gas, Project Management
14.12.06	PEMEAS GmbH	BASF SE	Fuel	Agriculture, Chemical, Industrial Engineering, Manufacturing, Oil and Gas, Product Research
16.09.08	DIREVO Industrial Biotechnology	BAYER AG	Biomass Energy, Biotechnology, Industrial	Biotechnology, Diabetes, Health Care
24.10.08	Semplice Energy	British Gas (CENTRICA)	CleanTech, Energy, Renewable Energy	Energy, Industrial, Oil and Gas, Renewable Energy
12.12.08	Saigon Gas	TOTALENERGIES SE	Management Consulting, Oil and Gas, Service Industry	Energy, Manufacturing, Oil and Gas, Renewable Energy, Solar
01.12.09	H2Gen Innovations	L'AIR LIQUIDE SA	Manufacturing, Oil and Gas, Water Purification	Chemical, Health Care, Industrial, Industrial Manufacturing, Public Safety, Telecommunications
11.03.10	Artificial Muscle Inc.	BAYER AG	Electronics, Energy, Energy Efficiency	Biotechnology, Chemical, Health Care, Life Science, Pharmaceutical
03.03.11	EnergyConnect	JOHNSON CONTROLS-HITACHI AIR	Energy, SaaS, Software	Industrial Engineering, Physical Security, Smart Building
07.04.11	Power Efficiency	BALFOUR BEATTY PLC	Electrical Distribution, Energy, Energy Efficiency	Commercial, Construction, Environmental Engineering, Infrastructure, Smart Building, Sustainability
26.04.11	Inge Watertechnologies	BASF SE	Waste Management, Water, Water Purification	Agriculture, Chemical, Industrial Engineering, Manufacturing, Oil and Gas, Product Research

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
16.08.11	Advanced Telemetry	SIEMENS AG	Energy	Artificial Intelligence (AI), Consulting, Cyber Security, Internet of Things
04.11.11	EXENDIS	ALFEN NV	Energy, Infrastructure, Manufacturing, Renewable Energy	Battery, Electronics, Energy, Energy Efficiency, Manufacturing
18.11.11	Fairchild Industrial Products Company	ROTORK PLC	Hardware, Manufacturing, Oil and Gas, Wholesale	Automotive, Chemical, Electronics, Manufacturing, Oil and Gas, Service Industry
01.12.11	Viridity Software	SCHNEIDER ELECTRIC SE	Data Center, Energy, Enterprise Software, Information Technology, Infrastructure, Software	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
01.05.12	Marine Current Turbines	SIEMENS AG	Energy, Energy Efficiency, Oil and Gas	Artificial Intelligence (AI), Consulting, Cyber Security, Internet of Things
13.11.12	earthmine	NOKIA OYJ	Augmented Reality, Enterprise Software, Intellectual Property, Power Grid	Electronics, Enterprise Software, Internet of Things, Mobile Devices, Telecommunications
24.01.13	SCL Elements	SCHNEIDER ELECTRIC SE	Electrical Distribution, Internet, Internet of Things, Manufacturing, Smart Building, Software	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
26.03.14	Plextronics	SOLVAY SA	Electronics, Energy Storage, Hardware, Lighting	Advanced Materials, Chemical, Chemical Engineering, Manufacturing
23.06.14	Virdia	STORA ENSO OYJ	Agriculture, Biotechnology, Chemical, Clean Energy, Energy, Manufacturing, Renewable Energy	Manufacturing, Paper Manufacturing, Renewable Energy

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
01.07.14	New Enerday	ELRINGKLINGER AG	Electronics, Energy, Fuel Cell, Renewable Energy	Automotive, Manufacturing
01.08.14	Novogy	TOTALENERGIES SE	Biofuel, Chemical, Transportation	Energy, Manufacturing, Oil and Gas, Renewable Energy, Solar
03.09.14	Catacel	JOHNSON MATTHEY PLC	Energy, Fuel Cell, Oil and Gas	Chemical, Information Technology, Manufacturing, Pharmaceutical, Recruiting
13.02.15	AlertMe	British Gas (CENTRICA)	Energy, Home Appliances, Internet, Internet of Things	Energy, Industrial, Oil and Gas, Renewable Energy
10.03.15	GasSecure	DRAEGERWERK AG	Energy, Manufacturing, Oil and Gas, Renewable Energy, Wireless	Health Care, Information Technology, Medical, Medical Device, Sales
11.06.15	BioMCN	OCI NV	Energy, Manufacturing, Natural Resources, Renewable Energy	Chemical, Construction
10.08.15	Grünspar GmbH	EWE-ENERGIEVERSORGUNG WESER	Energy, Internet	Energy, Information Technology, Telecommunications
10.05.16	Green Charge Networks	ENGIE SA	Energy Storage, Power Grid, Renewable Energy	Energy, Hydroelectric, Natural Resources, Oil and Gas, Renewable Energy
07.06.16	MIOX	JOHNSON MATTHEY PLC	Chemical, CleanTech, Water Purification	Chemical, Information Technology, Manufacturing, Pharmaceutical, Recruiting
20.06.16	EnerG2	BASF SE	Advanced Materials, Chemical Engineering, Energy, Energy Storage	Agriculture, Chemical, Industrial Engineering, Manufacturing, Oil and Gas, Product Research
30.06.16	Eniram	WARTSILA OYJ ABP	Clean Energy, Energy, Fuel, Marine Technology, Marine Transportation, Shipping	Analytics, Electronics, Energy, Information Technology, Machinery Manufacturing, Marine Technology, Renewable Energy

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
12.07.16	Gazonor	FRANCAISE DE LENERGIE SAS	Energy, Mineral	Energy, Energy Management, Mining, Oil and Gas
16.09.16	Groom Energy Solutions	EDF	Electronics, Energy, Energy Efficiency	Clean Energy, Electrical Distribution, Energy, Energy Efficiency, Energy Management
19.09.16	Seventh Generation	UNILEVER PLC	Cleaning Products, Green Consumer Goods, Lifestyle	Consumer, Fast-Moving Consumer Goods, Food and Beverage, Manufacturing, Personal Care and Hygiene
13.12.16	Amminex	FORVIA SE	Automotive, Chemical, CleanTech	Automotive, Autonomous Vehicles, Industrial, Manufacturing, Sustainability
15.02.17	Adaptricity	LEONI AG	Energy, Power Grid, Renewable Energy, Software	Industrial Manufacturing
14.03.17	EVBox	ENGIE SA	Charging Infrastructure, CleanTech, Electric Vehicle, GreenTech, Sustainability	Energy, Hydroelectric, Natural Resources, Oil and Gas, Renewable Energy
29.03.17	MAIN Energie	AUDAX RENOVABLES SA	Energy, Renewable Energy	Electrical Distribution, Energy, Renewable Energy
18.04.17	Powerlase Photonics	ANDRITZ AG	Energy Management, Industrial, Industrial Engineering, Innovation Management, Laser, Manufacturing	Energy, Hydroelectric, Industrial, Paper Manufacturing
15.05.17	Greensmith Energy Management Systems	WARTSILA OYJ ABP	Energy, Energy Storage, Renewable Energy, Software	Analytics, Electronics, Energy, Information Technology, Machinery Manufacturing, Marine Technology, Renewable Energy
29.05.17	OneShore Energy	BAYWA AG	Energy, Solar	Energy, Renewable Energy, Solar
07.09.17	Fotech	BP PLC	Consulting, Energy, Industrial, Information Technology, Oil and Gas, Security	Energy, Industrial, Oil and Gas, Renewable Energy

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
12.10.17	NewMotion	SHELL PLC	Automotive, Electric Vehicle, Electronics, Renewable Energy	Energy, Oil and Gas, Renewable Energy
19.10.17	Fenix International	ENGIE SA	Energy Efficiency, Renewable Energy, Solar	Energy, Hydroelectric, Natural Resources, Oil and Gas, Renewable Energy
03.11.17	REstore	CENTRICA PLC	Artificial Intelligence (AI), Clean Energy, Energy, Energy Efficiency, Energy Management, Internet of Things, Recycling, Renewable Energy	Energy, Home Services, Oil and Gas, Renewable Energy
06.12.17	Ascenz	GAZTRANSPORT ET TECHNIGAZ	Analytics, Automotive, Fuel, Information Technology, Shipping, Transportation	Energy, Oil and Gas
06.12.17	EDS HV Group	FISHER (JAMES) AND SONS PLC	Construction, Energy, Industrial Engineering, Real Estate, Renewable Energy	Construction, Infrastructure, National Security, Oil and Gas, Renewable Energy, Transportation
30.12.17	Ogin	VESTAS WIND SYSTEMS A/S	Clean Energy, Information Technology, Manufacturing	Energy, Environmental Engineering, Renewable Energy
02.03.18	Deutsche Energieversorgung	ENBW ENERGIE BADEN-WÜRTTEMBERG AG	Electrical Distribution, Energy, Manufacturing, Renewable Energy	Energy, Energy Management, Service Industry
03.05.18	Vixar	OSRAM LICHT AG	Biotechnology, Electrical Distribution, Electronics, Manufacturing	Consumer Electronics, Lighting, Manufacturing
12.06.18	TrendMiner	SOFTWARE GMBH	Analytics, Artificial Intelligence (AI), Big Data, Business Intelligence, Chemical, Data Mining, Information Technology, Oil and Gas, Predictive Analytics, Software	Big Data, Consulting, Enterprise Software, Software

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
05.08.18	Panoramic Power	CENTRICA PLC	Analytics, Business Development, Energy, Finance, Information Technology, Renewable Energy, Robotics	Energy, Home Services, Oil and Gas, Renewable Energy
09.08.18	Lincoln Clean Energy	ORSTED A/S	Clean Energy, Energy Efficiency, Mining, Renewable Energy, Solar	Energy, Energy Storage, Manufacturing, Renewable Energy, Trading Platform
21.08.18	Subsea Innovation	TEKMAR GROUP PLC	Energy, Manufacturing, Oil and Gas	Industrial Engineering, Industrial Manufacturing, Oil and Gas
20.09.18	G2MOBILITY	TOTALENERGIES SE	Charging Infrastructure, Electronics, Energy, Energy Management, Information Technology	Energy, Manufacturing, Oil and Gas, Renewable Energy, Solar
04.02.19	MIOX	INDUSTRIE DE NORA SPA	Chemical, CleanTech, Water Purification	Electronics, Energy, Industrial Engineering, Manufacturing
07.03.19	Geronimo Energy	NATIONAL GRID	Commercial, Construction, Energy, Environmental Engineering, Renewable Energy	Delivery, Energy, Oil and Gas
17.06.19	ChargePoint Services	ENGIE SA	Charging Infrastructure, Electric Vehicle, Energy	Energy, Hydroelectric, Natural Resources, Oil and Gas, Renewable Energy
18.07.19	Neelogy	SAFRAN SA	Electronics, Energy	Aerospace, Infrastructure, Navigation, Transportation
29.08.19	Smartnodes	LACROIX GROUP SA	Computer, Energy Efficiency, Energy Management, Manufacturing, Software	Consumer Electronics, E-Commerce
01.11.19	FocalSpec	TKH GROUP NV	3D Technology, Electrical Distribution, Electronics, Hardware, Manufacturing	Public Relations
14.01.21	DZ4	ENBW ENERGIE BADEN-WÜRTTEMBERG AG	Consumer, Energy Management	Energy, Energy Management, Service Industry

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
25.01.21	ubitricity	SHELL PLC	Charging Infrastructure, Clean Energy, Electric Vehicle, Environmental Engineering, Renewable Energy	Energy, Oil and Gas, Renewable Energy
15.03.21	Rock Energy AS	NTG NORDIC TRANSPORT GROUP	Energy, Environmental Engineering, Renewable Energy	E-Commerce, E-Commerce Platforms
08.04.21	Seneco	FAGERHULT GROUP AB	Energy, Renewable Energy, Solar	Electronics, Manufacturing, Renewable Energy, Virtual Reality
24.09.21	gridX	E.ON SE	Energy, Internet of Things, Renewable Energy	Energy, Energy Efficiency, Oil and Gas, Renewable Energy, Sustainability
07.10.21	Blueprint Power	BP PLC	Energy, Real Estate, Renewable Energy	Energy, Industrial, Oil and Gas, Renewable Energy
13.10.21	Magma Global	TECHNIPFMC PLC	Manufacturing, Oil and Gas, Product Design	Energy, Oil and Gas, Project Management
12.11.21	Omnisens SA	PRYSMIAN SPA	Electronics, Energy, Manufacturing, Oil and Gas, Optical Communication, Renewable Energy	Information Technology, Manufacturing, Telecommunications
07.12.21	Amply Power	BP PLC	Electric Vehicle, Renewable Energy, Transportation	Energy, Industrial, Oil and Gas, Renewable Energy
17.12.21	envelio	E.ON SE	Analytics, Artificial Intelligence (AI), Cloud Computing, Electrical Distribution, Enterprise Software, Machine Learning, Power Grid, SaaS, Smart Cities, Software	Energy, Energy Efficiency, Oil and Gas, Renewable Energy, Sustainability
01.02.22	East African Crude Oil Pipeline	TOTALENERGIES SE	Mineral, Oil and Gas	Energy, Manufacturing, Oil and Gas, Renewable Energy, Solar

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
01.02.22	Eqinov	ACCIONA SA	Consulting, Environmental Consulting, Management Consulting, Renewable Energy	Energy, Infrastructure, Renewable Energy, Service Industry, Water, Water Purification
17.02.22	EnergySage	SCHNEIDER ELECTRIC SE	Energy, Energy Storage, Marketplace, Price Comparison, Renewable Energy, Solar	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
14.03.22	Aurtra	SCHNEIDER ELECTRIC SE	Energy, Industrial, Industrial Automation, Power Grid, SaaS, Software	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
11.05.22	Autogrid	SCHNEIDER ELECTRIC SE	Analytics, Artificial Intelligence (AI), Cloud Computing, Electric Vehicle, Energy, Energy Storage, Internet of Things, Renewable Energy	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
31.05.22	Repertoire Genesis	EUROFINS SCIENTIFIC	Biotechnology, Product Research, Renewable Energy	Biotechnology, Genetics, Health Care, Life Science, Pharmaceutical
08.06.22	Cable Energia	SHELL PLC	Charging Infrastructure, Electric Vehicle, Renewable Energy	Energy, Oil and Gas, Renewable Energy
14.06.22	Carge	PUBLIC POWER CORPORATION SA	Automotive, Clean Energy, Electric Vehicle, Internet of Things, Mobile Apps, Smart Cities, Software	Energy, Oil and Gas
17.06.22	Akkurate	SANDVIK AB	Battery, Electric Vehicle, Internet of Things, Mobile Devices	Building Material, Industrial, Machinery Manufacturing, Manufacturing, Mining
21.06.22	EV Connect	SCHNEIDER ELECTRIC SE	Automotive, Electric Vehicle, Renewable Energy, Software	Electronics, Energy, Energy Management, Information Technology, Renewable Energy

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
04.08.22	BunkerMetric	ALFA LAVAL AB PUBL	Information Technology, Marine Transportation, Oil and Gas, Software	Energy Efficiency, Industrial, Machinery Manufacturing, Mechanical Engineering, Mining, Test and Measurement
28.09.22	Daystar Power	SHELL PLC	Electronics, Energy, Solar	Energy, Oil and Gas, Renewable Energy
12.10.22	Spherics	SAGE GROUP PLC	Accounting, Environmental Consulting, GreenTech, Software	Business Information Systems, Enterprise Software, Human Resources, Information Technology, Software
02.12.22	PLT energia Srl	ENI SPA	Renewable Energy	Charging Infrastructure, Energy, Energy Efficiency, Oil and Gas, Renewable Energy, Sustainability
10.01.23	Hybrid Energy	JOHNSON CONTROLS-HITACHI AIR	Energy, Manufacturing, Renewable Energy	Industrial Engineering, Physical Security, Smart Building
31.05.23	Zypho	ALIAXIS SA	Energy, Industrial Engineering, Mechanical Engineering, Productivity Tools	Chemical, Manufacturing, Mining, Plastics and Rubber Manufacturing
22.08.23	Heliox	SIEMENS AG	Consumer Electronics, Electronics, Energy, Industrial, Manufacturing	Artificial Intelligence (AI), Consulting, Cyber Security, Internet of Things
24.08.23	Broad Reach Power	ENGIE SA	Energy	Energy, Hydroelectric, Natural Resources, Oil and Gas, Renewable Energy
10.10.23	MIDEL	SHELL PLC	Electrical Distribution	Energy, Oil and Gas, Renewable Energy
10.10.23	MIVOLT	SHELL PLC	Electric Vehicle, Energy	Energy, Oil and Gas, Renewable Energy
04.12.23	Klarsolar	E.ON SE	Clean Energy, Solar	Energy, Energy Storage, Solar
12.12.23	Nash Renewables	TOTALENERGIES SE	Artificial Intelligence (AI), Energy, Renewable Energy	Energy, Energy Efficiency, Energy Management

Announced Date	Acquiree Name	Acquirer Name	Acquiree Industries	Acquirer Industries
09.01.24	Gjosa	LOREAL SA	CleanTech, Water, Water Purification	Beauty, Cosmetics, Fast-Moving Consumer Goods, Personal Care and Hygiene, Women's
29.01.24	Resalta	AGGREKO PLC	Clean Energy, Energy, Energy Efficiency, Energy Management, Renewable Energy	Electrical Distribution, Renewable Energy, Service Industry
08.07.24	Infiniti Energy	AGGREKO PLC	Energy, Renewable Energy	Electrical Distribution, Renewable Energy, Service Industry
16.09.24	enersis	ENBW ENERGIE BADEN-WÜRTTEMBERG AG	Energy, Environmental Consulting, Information Technology, SaaS	Energy, Energy Management, Service Industry
01.11.24	Keenan Recycling	BIFFA PLC	Industrial, Organic, Recycling	CleanTech, Recycling, Service Industry, Transportation, Waste Management
03.04.25	Eco 2 Solar	E.ON SE	Energy, Renewable Energy, Solar	Energy, Logistics, Renewable Energy, Transportation
09.04.25	Havfram	DEME GROUP NV	Construction, Energy, Oil and Gas	Civil Engineering, Construction, Energy, Industrial, Marine Technology
25.04.25	Cable Energia	ACCIONA SA	Charging Infrastructure, Electric Vehicle, Renewable Energy	Energy, Infrastructure, Renewable Energy, Service Industry, Water, Water Purification
21.08.25	WattBuy	SCHNEIDER ELECTRIC SE	CleanTech, Energy, Energy Management	Electronics, Energy, Energy Management, Information Technology, Renewable Energy
19.09.25	Energyworx	ENEL	Analytics, Data Management, Energy, Information Technology, SaaS, Software	Electrical Distribution, Energy

Note: This table presents the set of startup acquisitions that remain after all filtering steps outlined in Appendix X, including sectoral, stage, geographic, and acquirer-related criteria.
Source: Crunchbase as of October 6, 2025.

M. Sample Distribution by Sector and Acquisition Status

	Non-Energy Corporates	**Energy (-related) Corporates**	**Total**
Non-Acquirer	5,446	995	6,442
Acquirer	715	710	1,425
Total	6,161	1,705	7,866

Note: Values represent the number of observations in the panel dataset. Individual firms may appear in multiple years.

	Non-Energy Corporates	**Energy (-related) Corporates**	**Total**
Non-Acquirer	440	74	514
Acquirer	43	20	63
Total	483	94	577

Note: Values represent the number of firms in the panel dataset.

(fic) ISO Country Code	**Frequency**	**Percent** (in %)	**Cumulative** (in %)
DEU	1,416	18.00	18.00
GBR	1,408	17.90	35.90
SWE	1,356	17.24	53.14
FRA	1,277	16.23	69.37
ITA	711	9.04	78.41
FIN	496	6.31	84.72
ESP	453	5.76	90.48
BEL	225	2.86	93.34
NLD	225	2.86	96.20
DNK	200	2.54	98.74
AUT	25	0.32	99.06
GRC	25	0.32	99.38
LUX	25	0.32	99.69
IRE	24	0.31	100.00
Total	7,866	100.00	

Note: Values represent the number of observations in the panel dataset. Individual firms may appear in multiple years.

(fic) ISO Country Code	**Frequency**	**Percent** (in %)	**Cumulative** (in %)
SWE	145	25.13	25.13
GBR	97	16.81	41.94
DEU	83	14.38	56.33
FRA	81	14.04	70.36
ITA	54	9.36	79.72
FIN	37	6.41	86.14
ESP	33	5.72	91.85
DNK	16	2.77	94.63
BEL	14	2.43	97.05
NLD	13	2.25	99.31
AUT	1	0.17	99.48
GRC	1	0.17	99.65
LUX	1	0.17	99.83
IRE	1	0.17	100.00
Total	577	100.00	

Note: Values represent the number of observations in the panel dataset. Individual firms may appear in multiple years.

N. Variable Definitions and Data Sources

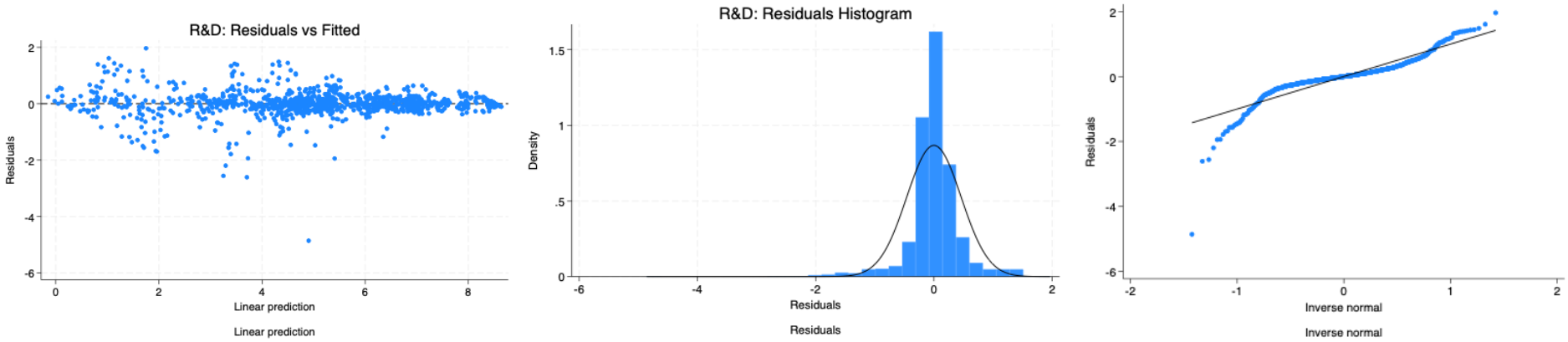
Variable	Definition
(1) Return on Assets (ROA)	Consolidated net income divided by total assets, measuring profitability and operational efficiency. Source: Compustat Global.
(2) Log R&D Expenditure (ln R&D)	Natural logarithm of R&D expenditure, capturing innovation input. Source: Compustat Global.
(3) R&D Intensity (RDI)	Ratio of R&D expenditure to sales (xrd/sale), with missing values set to zero if sales > 0. Source: Compustat Global.
(4) DiD Interaction (did)	Interaction term treat × post, capturing average treatment effect of startup acquisitions. Source: Own construction.
(5) Energy Sector Dummy	Binary variable indicating energy-related firms (SIC 1200-1399, 2900-2999, 4610-4619, 4900-4949). Source: Compustat Global, manual classification.
(6) Firm Size (ln_at)	Natural logarithm of total assets (ln(at)). Source: Compustat Global.
(7) Leverage (lev)	Total debt divided by total assets ((dltt + dlc)/at). Source: Compustat Global.
(8) Cash Ratio (cash)	Cash and equivalents divided by total assets (che/at). Source: Compustat Global.
(9) Capital Intensity (capx_ratio)	Capital expenditures divided by total assets (capx/at). Source: Compustat Global.
(10) SG&A Ratio (sga_ratio)	Selling, General & Administrative expenses divided by sales (xsga/sale). Source: Compustat Global.
(11) Sales Growth (growth)	Year-over-year growth rate in sales ((sale − L.sale)/L.sale). Source: Compustat Global.
(12) Treatment Dummy (treat)	Binary variable equal to 1 for firms that acquired a startup, 0 otherwise. Source: Own construction.
(13) Post-Acquisition Dummy (post)	Binary variable equal to 1 for years after first acquisition. Source: Own construction.
(14) Post Long (post_long)	Captures long-term post-acquisition period, being one for all years five or more after a firm's first startup acquisition and zero otherwise. Source: Own construction
(15) Short-, Medium-, Long-Term Treatment Dummies	Indicate post-acquisition horizons (0-1, 2-4, ≥5 years). Source: Own construction.

O. Diagnostic Tests for the R&D Model (OLS, FE)

Hausman Test for Fixed vs. Random Effects Model (R&D Equation)

Test Specification	Value
χ^2(df)	$\chi^2(6) = 17.38$
Prob > χ^2	0.0080
Decision	Reject H_0 (coefficients differ systematically)
Preferred Model	**Fixed Effects (FE)**

Notes: The Hausman test compares the consistency of the Fixed Effects (FE) and Random Effects (RE) estimators. Since p = 0.0080 < 0.05, the null hypothesis of no systematic difference between FE and RE is rejected. Consequently, the FE specification is preferred for the subsequent analysis.



Shapiro-Wilk Test for Normality of Regression Residuals (R&D Model)

Test	Obs	W	V	z	Prob > z	Decision
Shapiro-Wilk	1,016	0.823	113.536	11.726	0.000	Reject H_0

Notes: The null hypothesis (H_0) of normally distributed residuals is rejected (p < 0.01). This indicates that the residuals deviate significantly from normality. Given the large sample size (N = 1,016), minor deviations from normality are not critical due to the asymptotic properties of the OLS estimator.

Multicollinearity Test (Variance Inflation Factors)

Variable	VIF	1/VIF
Cash ratio (lagged)	1.19	0.843
Leverage	1.16	0.864
Firm size	1.16	0.866
SG&A ratio (lagged)	1.14	0.881
Post long	1.01	0.993
Mean VIF	**1.13**	

Notes: The Variance Inflation Factor (VIF) test assesses potential multicollinearity among regressors. Since all VIF values are far below commonly used thresholds (5 or 10), multicollinearity is not a concern in this model.

Test for Heteroskedasticity (Breusch-Pagan / Cook-Weisberg)

Test	Variable	χ^2(df)	Prob > χ^2	Decision
Breusch-Pagan / Cook-Weisberg	Fitted values of ln_xrd	1.94 (1)	0.164	Fail to reject H_0 (homoskedasticity)

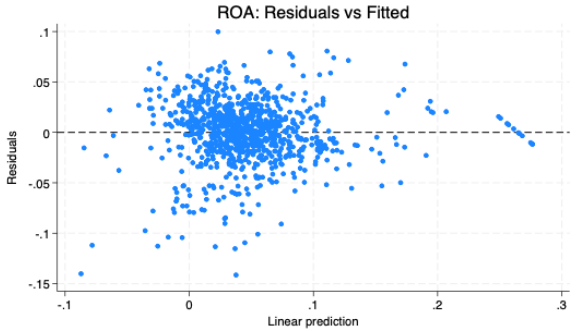
Notes: The Breusch-Pagan / Cook-Weisberg test examines whether the variance of the residuals is constant (homoskedastic).
The test fails to reject the null hypothesis ($p = 0.164$), indicating that heteroskedasticity is not present.

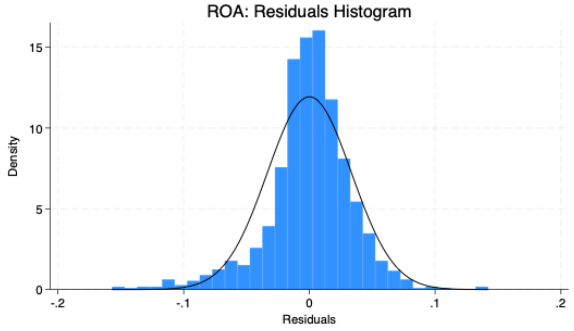
P. Diagnostic Tests for the ROA Model (OLS, FE)

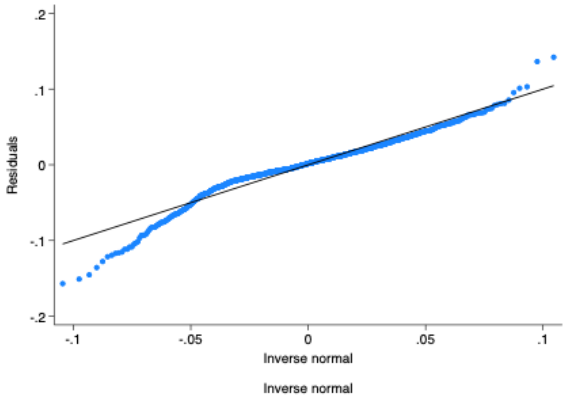
Hausman Test for Fixed vs. Random Effects Model (ROA Equation)

Test Specification	Value
χ^2(df)	$\chi^2(6) = 18.44$
Prob > χ^2	0.0052
Decision	Reject H_0 (difference in coefficients is systematic)
Preferred Model	**Fixed Effects (FE)**

Notes: The Hausman test compares the consistency of the Fixed Effects (FE) and Random Effects (RE) estimators.
Since p = 0.0052 < 0.05, the null hypothesis of no systematic difference between FE and RE is rejected. Therefore, the FE specification is preferred for the ROA model.







Shapiro-Wilk Test for Normality of Regression Residuals (ROA Model)

Test	Obs	W	V	z	Prob > z	Decision
Shapiro-Wilk	1,126	0.94997	35.160	8.858	0.000	Reject H_0

Notes: The Shapiro-Wilk test rejects the null hypothesis (H_0) of normally distributed residuals (p < 0.01).
Although residuals deviate from normality, the large sample size (N = 1,126) ensures that the OLS estimators remain consistent and asymptotically normal according to the Central Limit Theorem.

Multicollinearity Test (Variance Inflation Factors – ROA Model)

Variable	VIF	1/VIF
Leverage	1.13	0.8861
Cash ratio (lagged)	1.12	0.8915
SG&A ratio (lagged)	1.07	0.9349
Firm size	1.07	0.9357
Post long	1.02	0.9799
Mean VIF	**1.08**	

Notes: All VIF values are far below the conventional threshold of 5, indicating that multicollinearity is not a concern in the ROA regression model.

Test for Heteroskedasticity (Breusch-Pagan / Cook-Weisberg – ROA Model)

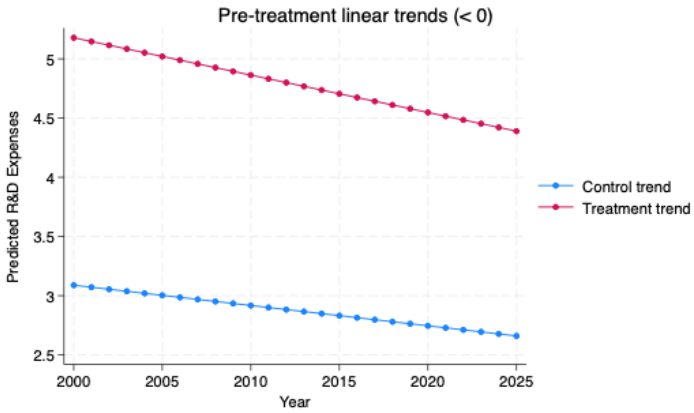
Test	Variable	χ^2(df)	Prob > χ^2	Decision
Breusch-Pagan / Cook-Weisberg	Fitted values of ROA	68.35 (1)	0.000	Reject H_0 (heteroskedasticity present)

Notes: The Breusch-Pagan / Cook-Weisberg test rejects the null hypothesis of constant variance ($p < 0.01$), suggesting that heteroskedasticity is present. To address this issue, robust standard errors clustered at the firm level are applied in all regression estimations.

Q. Parallel Trends Tests for Difference-in-Differences Design

R&D

Specification	Coefficient (Interaction Term)	Std. Error	t-statistic	p-value	95% Confidence Interval	Decision
(B) Linear pre-trend with firm FE (slope equality test)	0.0086	0.0100	0.86	0.392	[−0.0111, 0.0283]	Fail to reject H_0 (parallel trends hold)

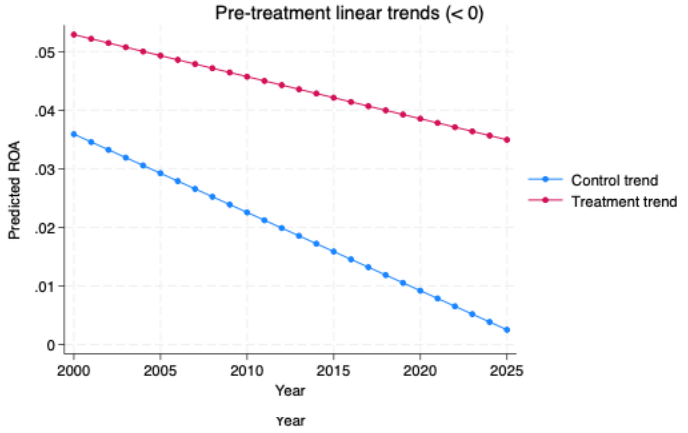


Test of slope equality: F(1, 393) = 0.73, Prob > F = 0.3923

Notes: The regression includes firm fixed effects and clusters standard errors at the firm level.
The interaction term (treat × year trend) is statistically insignificant (p = 0.39), indicating that the pre-treatment trend in R&D intensity does not differ between treated and control firms. This supports the parallel trends assumption required for the Difference-in-Differences framework.

ROA

Specification	Coefficient (Interaction Term)	Std. Error	t-statistic	p-value	95% Confidence Interval	Decision
(B) Linear pre-trend with firm FE (slope equality test)	−0.00089	0.00065	−1.37	0.172	[−0.00216, 0.00039]	Fail to reject H_0 (parallel trends hold)



Test of slope equality: F(1, 546) = 1.87, Prob > F = 0.172

Notes: The regression includes firm fixed effects and clusters standard errors at the firm level.
The interaction term (treat × year trend) is statistically insignificant (p = 0.17), suggesting no significant difference in pre-treatment profitability trends between treated and control firms. This indicates that the parallel trends assumption for the ROA analysis is satisfied.

R. Descriptive Statistics by Sector and Acquisition Status

	Control firms (Acq=0)					Treated firms (Acq=1)				
	Mean	**Standard deviation**	**Minimum**	**Maximum**	**Count**	**Mean**	**Standard deviation**	**Minimum**	**Maximum**	**Count**
Return on assets	0.016	0.117	-0.548	0.265	6,441	**0.043**	0.055	-0.227	0.265	1,196
Return on sales	0.010	0.398	-2.351	0.553	6,429	**0.101**	0.114	-2.351	0.553	1,421
Asset turnover	0.863	0.701	0.002	28.248	6,441	0.893	0.519	0.000	4.077	1,425
Firm size	6.658	1.940	3.930	12.764	6,441	9.148	2.125	2.158	18.424	1,425
Leverage	0.228	0.174	0.000	0.704	6,441	0.239	0.124	0.000	0.704	1,425
R&D expenses (ln)	2.814	1.796	0.048	8.530	3,555	**4.934**	2.102	0.048	8.530	1,054
R&D intensity	0.092	0.386	-0.262	14.331	3,559	0.032	0.040	-0.001	0.235	1,054
Cumulative number of acquisitions						0.485	0.859	0.000	7.000	1,425

	Non-energy firms					Energy firms				
	Mean	**Standard deviation**	**Minimum**	**Maximum**	**Count**	**Mean**	**Standard deviation**	**Minimum**	**Maximum**	**Count**
Return on assets	0.019	0.114	-0.548	0.265	6,049	0.024	0.090	-0.548	0.265	1,588
Return on sales	0.014	0.357	-2.351	0.553	6,151	0.072	0.390	-2.351	0.553	1,699
Asset turnover	0.930	0.668	0.000	28.248	6,161	0.650	0.639	0.000	5.550	1,705
Firm size	6.688	1.974	2.158	13.504	6,161	8.632	2.277	3.402	18.424	1,705
Leverage	0.221	0.164	0.000	0.702	6,161	0.261	0.168	0.000	0.702	1,705
R&D expenses (ln)	3.204	2.060	0.048	8.530	3,876	**3.797**	2.063	0.047	8.530	733
Cumulative number of acquisitions	0.047	0.262	0.000	3.000	6,161	0.236	0.709	0.000	7.000	1,705

Mean Difference Tests between Treated and Control Firms

	Obs (Control)	Obs (Treated)	Mean (Control)	Mean (Treated)	Diff	Std. Error	t-stat	p-value
Return on assets	6,468	1,169	0.016	0.042	-0.026	0.003	-7.46	0.000
R&D expenditure (ln)	3,558	1,051	2.812	4.945	-2.132	0.066	-32.51	0.000

S. Correlation Matrix of Key Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Return on assets	1.000								
(2) Return on sales	0.652***	1.000							
(3) Asset turnover	0.177***	0.118***	1.000						
(4) R&D expenses (ln)	0.120***	0.130***	-0.042***	1.000					
(5) R&D Intensity	-0.290***	-0.462***	-0.116***	0.049***	1.000				
(6) Firm size	0.155***	0.204***	-0.128***	0.724***	-0.136***	1.000			
(7) Leverage	-0.124***	0.115***	-0.188***	-0.016	-0.067***	0.193*	1.000		
(8) Acquirer (ever_acq)	**0.085*** **	**0.093*** **	0.020*	**0.432*** **	**-0.074*** **	**0.441*** **	0.017	1.000	
(9) Cumulative number of acquisitions	**0.029** **	**0.046*** **	-0.019*	**0.288*** **	**-0.033** **	**0.286*** **	0.012	0.462***	1.000

Notes: Significance levels are denoted as follows: *** *p<0.01, ** p<0.05, * p<0.1*

T. Long-Term Effects of Startup Acquisitions (OLS Models)

Long-term effects	**Model 1**: Long-term R&D Effects	**Model 2**: Long-term ROA Effects
Post Long	-0.066	-0.014**
	(0.091)	(0.006)
Firm size	0.855***	0.007
	(0.122)	(0.005)
Leverage	-0.124	-0.176***
	(0.513)	(0.034)
Cash ratio (lagged)	-0.441	0.118***
	(0.405)	(0.036)
CapEx intensity (lagged)	2.705*	0.033
	(1.353)	(0.074)
SG&A ratio (lagged)	0.714*	-0.071***
	(0.380)	(0.022)
Constant	-3.335***	0.022
	(1.191)	(0.049)
Number of obs	1,015	1,126
F-statistic	8.88	8.16
Prob > chi^2	0.000	0.000
R^2	0.9514	0.6245
Adjusted R^2	0.9472	0.5934
Within R^2	0.1952	0.1481
Firm FE	Yes	Yes
Year FE	Yes	Yes
Clustered SE	Firm	Firm

Notes: Significance levels are denoted as follows: **** p<0.01, ** p<0.05, * p<0.1*
Results from two-way fixed effects (TWFE) OLS regressions estimating the long-term impact of startup acquisitions on firms' innovation investment (Model 1) and profitability (Model 2). The dependent variables are the natural logarithm of R&D expenditures and return on assets (ROA), respectively.

U. Long-Term Effects on Innovation (DiD Models)

Long-term R&D effects	**Model 1**: Baseline	**Model 2**: Energy-sector heterogeneity	**Model 3:** Dynamic DiD
DiD	-0.038	-0.026	-
	(0.083)	(0.109)	
Energy	-	0.075	-
		(0.206)	
Energy x DiD	-	-0.029	-
		(0.158)	
Short-term (0-1 years)	-	-	-0.028
			(0.070)
Medium-term (2-4 years)	-	-	-0.051
			(0.102)
Long-term (5+ years)	-	-	-0.033
			(0.110)
Firm size	0.618***	0.617***	0.618***
	(0.055)	(0.055)	(0.055)
Leverage	0.003	0.002	0.003
	(0.204)	(0.202)	(0.203)
Cash ratio (lagged)	-0.177	-0.177	-0.178
	(0.156)	(0.156)	(0.156)
CapEx intensity (lagged)	0.580	0.579	0.581
	(0.480)	(0.480)	(0.481)
SG&A ratio (lagged)	0.064	0.064	0.064
	(0.058)	(0.058)	(0.058)
Constant	-1.229***	-1.239***	-1.229***
	(0.409)	(0.404)	(0.409)
Number of obs	4,201	4,201	4,201
F-statistic	23.58	18.64	17.79
Prob > chi^2	0.0000	0.0000	0.0000
R^2	0.9564	0.9564	0.9564
Adjusted R^2	0.9519	0.9519	0.9519
Within R^2	0.1782	0.1783	0.1782
Bootstrap p-value (DiD)	0.6594	0.8303	
95% CI (DiD)	[-0.2061, 0.1284]	[-0.2533, 0.1972]	
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Clustered SE	Firm	Firm	Firm

Notes: Significance levels are denoted as follows: **** p<0.01, ** p<0.05, * p<0.1*

Bootstrap Results Short-, Medium-, Long-Term Treatment Dummies

Hypothesis	t-statistic	Prob |t|	95% Confidence Interval	Decision
H_0: st_treat = 0	-0.3961	0.7024	[-0.1702,0.1124]	Fail to reject H_0
H_0: mt_treat = 0	-0.5032	0.6247	[-0.2580, 0.1524]	Fail to reject H_0
H_0: lt_treat = 0	-0.2966	0.7769	[-0.2582, 0.1834]	Fail to reject H_0
H_0: st_treat = mt_treat = lt_treat = 0 (joint)	F(3, 364) = 0.0928	Prob > F = 0.9676	—	Fail to reject H_0
H_0: lt_treat = st_treat	-0.0568	0.9572	[-0.1798,0.1665]	Fail to reject H_0

Notes: Wild cluster bootstrap-t with 9,999 replications (Rademacher weights) and clustering by firm identifier (gvkey_num). All bootstrap p-values exceed 0.10, confirming that none of the short-, medium-, or long-term treatment effects are statistically significant.

V. Long-Term Effects on Profitability (DiD Models)

Long-term ROA effects	**Model 1**: Baseline	**Model 2**: Energy-sector heterogeneity	**Model 3:** Dynamic DiD
DiD	-0.015***	-0.017**	-
	(0.006)	(0.008)	
Energy sector firm (dummy)	-	-0.012	-
		(0.011)	
Energy x DiD	-	0.005	-
		(0.009)	
Short-term (0-1 years)	-	-	-0.004
			(0.005)
Medium-term (2-4 years)	-	-	-0.013**
			(0.006)
Long-term (5+ years)	-	-	-0.026***
			(0.008)
Firm size	0.015***	0.016***	0.016***
	(0.004)	(0.004)	(0.004)
Leverage	-0.210***	-0.210***	-0.210***
	(0.022)	(0.022)	(0.022)
Cash ratio (lagged)	0.067**	0.067**	0.067**
	(0.026)	(0.026)	(0.026)
CapEx intensity (lagged)	0.026	0.026	0.026
	(0.040)	(0.039)	(0.040)
SG&A ratio (lagged)	-0.049**	-0.048**	-0.049**
	(0.022)	(0.022)	(0.022)
Constant	-0.037	-0.035	-0.036
	(0.031)	(0.031)	(0.031)
Number of obs	6,768	6,768	6,768
F-statistic	18.05	13.78	14.89
Prob > chi^2	0.0000	0.0000	0.0000
R^2	0.5514	0.5514	0.5519
Adjusted R^2	0.5129	0.5129	0.5133
Within R^2	0.0921	0.0923	0.0931
Bootstrap p-value (Main DiD effect)	0.011	-	-
95% CI (DiD)	[−0.026, −0.004]	-	-
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Clustered SE	Firm	Firm	Firm

Notes: Significance levels are denoted as follows: **** p<0.01, ** p<0.05, * p<0.1*

Bootstrap Results Energy-sector Dummy

Hypothesis	t-statistic	Prob |t|	95 % Confidence Interval	Decision
H_0: DiD = 0 (non-energy firms)	−2.09	0.051	[−0.033, −0.000]	Significant negative effect
H_0: Energy × DiD = 0 (difference)	0.47	0.651	[−0.015, 0.025]	No significant difference
H_0: DiD + Energy × DiD = 0 (energy firms total effect)	−1.84	0.088	[−0.025, 0.002]	Negative, similar to non-energy firms

Notes: Wild cluster bootstrap-t with 9,999 replications (Rademacher weights), clustered by firm identifier (gvkey_num). The bootstrap results show that both energy and non-energy firms experience a comparable decline in profitability after acquisitions. The insignificant interaction term confirms that the difference in treatment effects across sectors is statistically negligible.

Bootstrap Results Short-, Medium-, Long-Term Treatment Dummies

Hypothesis	t-statistic	Prob |t|	95% Confidence Interval	Decision
H_0: st_treat = 0	-0.6906	0.4985	[-0.0136, 0.0066]	Fail to reject H_0
H_0: mt_treat = 0	-2.2559	0.0267	[-0.0245, -0.0017]	Reject H_0
H_0: lt_treat = 0	-3.3521	0.0006	[-0.0421, -0.0098]	Reject H_0
H_0: st_treat = mt_treat = lt_treat = 0 (joint)	F(3, 504) = 5.0403	Prob > F = 0.0036	—	Reject H_0
H_0: lt_treat = st_treat	−3.6665	0.0003	[-0.0344, -0.0104]	Reject H_0

Notes: Wild cluster bootstrap-t with 9,999 replications (Rademacher weights) and clustering by firm identifier (gvkey_num). Bootstrap p-values are all below conventional significance thresholds, confirming that the medium- and long-term treatment effects on ROA are statistically significant, while the short-term effect is not.
Overall, the results indicate that startup acquisitions are associated with a sustained decline in profitability that becomes more pronounced over time.

W. Event-Study Estimates and Pre-Trend Validation (ROA)

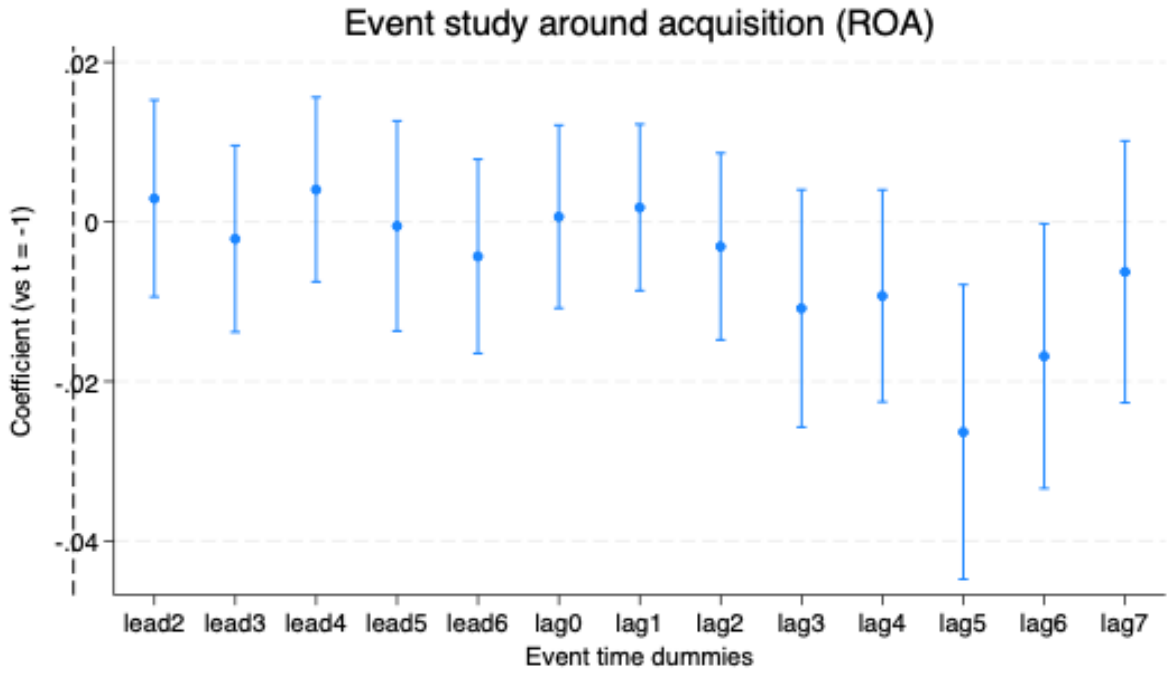
	Robustness Check: ROA Effects
Lead 2	0.003
	(0.006)
Lead 3	-0.002
	(0.006)
Lead 4	0.004
	(0.006)
Lead 5	-0.001
	(0.007)
Lead 6	-0.004
	(0.006)
Lag 0	0.001
	(0.006)
Lag 1	0.002
	(0.005)
Lag 2	-0.003
	(0.006)
Lag 3	-0.011
	(0.008)
Lag 4	-0.009
	(0.007)
Lag 5	-0.026***
	(0.009)
Lag 6	-0.017**
	(0.008)
Firm size	0.016***
	(0.004)
Leverage	-0.210***
	(0.022)
Cash ratio (lagged)	0.067**
	(0.026)
CapEx intensity (lagged)	0.025
	(0.040)
SG&A ratio (lagged)	-0.048**
	(0.022)
Constant	-0.037
	(0.031)
Number of obs	6,768
F-statistic	7.28
Prob > chi^2	0.0000
R^2	0.5513
Adjusted R^2	0.5120
Within R^2	0.0921
Firm FE	Yes
Year FE	Yes
Clustered SE	Firm

Notes: Significance levels are denoted as follows: **** p<0.01, ** p<0.05, * p<0.1*

Joint Pre-Trend Test for Event-Study (ROA)

Test	Null Hypothesis	F-Statistic	Degrees of Freedom	Prob > F	Interpretation
Pre-Trend Joint Test	lead 2 = lead 3 = lead 4 = lead 5 = lead 6 = 0	0.72	(5, 504)	0.6126	Fail to reject H_0; no significant pre-trend differences

Notes: This table reports the joint F-test for the null hypothesis that all pre-treatment coefficients (lead2-lead6) are jointly equal to zero in the event-study regression for ROA. The insignificant p-value (0.610) indicates that treated and control firms followed parallel profitability trends before the acquisition event.



Notes: Overall, the event-study estimates reveal no significant pre-treatment differences, supporting the parallel trends assumption. Post-treatment coefficients turn negative only gradually, with economically meaningful effects emerging after five years. This pattern aligns with the main DiD results and suggests that profitability declines materialise slowly rather than immediately after acquisitions.

X. Placebo Difference-in-Differences Test (ROA)

	Robustness Check: ROA Effects
Placebo Post	-0.007
	(0.010)
Treat # Placebo Post	0.003
	(0.006)
Firm size	0.026**
	(0.014)
Leverage	-0.332***
	(0.048)
Cash ratio (lagged)	0.119**
	(0.048)
CapEx intensity (lagged)	-0.173
	(0.044)
SG&A ratio (lagged)	0.043
	(0.034)
Number of obs	1,757
F-statistic	12.01
Prob > chi^2	0.0000
R^2	0.6358
Adjusted R^2	0.5643
Within R^2	0.1618
Firm FE	Yes
Year FE	Yes
Clustered SE	Firm

Notes: Significance levels are denoted as follows: **** p<0.01, ** p<0.05, * p<0.1*

Additional Inference Tests

Test	**Statistic**	**df**	**p-value**	**Confidence Interval**
Joint F-test: H_0: Treat × Placebo Post = 0	F(1, 276) = 0.24	276	0.6216	—
Wild Cluster Bootstrap (9,999 reps)	t = 0.4941	276	0.6204	[−0.0082, 0.0138]

Note: The placebo DiD model produces no statistically significant effects, and all interaction estimates remain close to zero across inference methods. This confirms that the main DiD findings are unlikely to be driven by time trends or spurious correlations.

Y. R&D Intensity as Outcome Variable

	Robustness Check: R&D Effects (OLS)	**Robustness Check**: R&D Effects (DiD)
Post Long (OLS)	0.003	-
	(0.003)	
DiD	-	0.007
		(0.007)
Firm size	-0.003	-0.035**
	(0.004)	(0.018)
Leverage	0.021	0.088
	(0.013)	(0.075)
Cash ratio (lagged)	-0.000	0.060
	(0.027)	(0.050)
CapEx intensity (lagged)	0.026	-0.007
	(0.039)	(0.110)
SG&A ratio (lagged)	0.034**	0.102***
	(0.014)	(0.034)
Constant	0.044	0.271**
	(0.041)	(0.125)
Number of obs	1,014	4,200
F-statistic	2.09	4.55
Prob > chi^2	0.0698	0.0002
R^2	0.9080	0.7614
Adjusted R^2	0.9000	0.7367
Within R^2	0.0443	0.0359
Firm FE	Yes	Yes
Year FE	Yes	Yes
Clustered SE	Firm	Firm

Notes: Significance levels are denoted as follows: *** *p<0.01, ** p<0.05, * p<0.1*
Across OLS and DiD specifications, startup acquisitions do not influence R&D intensity, regardless of sample restrictions or transformations. These robustness checks confirm that the null result for innovation input is not sensitive to measurement choices.

Z. Overview of Empirical Models and Key Findings

	Model	Outcome Variable	Identification Strategy	Key Coefficient	Sign & Significance	Interpretation
			ORDINARY LEAST SQUARES			
H1	*Treated-Only*	R&D	Within-firm FE (treated firms only), long-run (≥5 years)	β = -0.066 (p = 0.47)	**Not significant**	No long-term change in internal R&D after acquisitions.
H2	*Treated-Only*	ROA	Within-firm FE (treated firms only), long-run (≥5 years)	β = -0.014 (p < 0.05)	**Negative, significant**	Profitability declines in the years after the acquisition.
			DIFFERENCE-IN-DIFFERENCES			
H1	*Baseline*	R&D	TWFE DiD with firm + year FE	β = -0.038 (p = 0.65)	**Not significant**	Acquisitions do not affect R&D investment relative to controls.
	Dynamic	R&D	Event-time categories (0-1, 2-4, 5+ years)	ST = -0.028; MT = -0.051; LT = -0.033 (all p > 0.60)	**Not significant**	No short-, medium-, or long-term R&D effects.
	Sectoral	R&D	DiD with Energy × Treatment interaction	Interaction β = -0.029 (p = 0.85)	**Not significant**	Energy firms do not differ from non-energy firms.
H2	*Baseline*	ROA	TWFE DiD with firm + year FE	β = -0.015 (p < 0.01)	**Negative, significant**	Profits drop by ~1.50% relative to controls after acquisition.
	Dynamic	ROA	Event-time categories (0-1, 2-4, 5+ years)	ST = -0.004 (p = 0.49); MT = -0.013 (p < 0.05); LT = -0.026 (p < 0.01)	**Medium & long-term significant**	Profitability declines gradually and becomes strongly negative after 5+ years.
	Sectoral	ROA	DiD with Energy × Treatment interaction	Interaction β = 0.005 (p = 0.64)	**Not significant**	Energy firms experience similar profitability declines as others.

Notes: R&D expenditure is measured as ln(1 + R&D) to account for right-skewness and the presence of zero observations.

AA. Case Overview – EnBW × SENEC

This appendix provides background information on the SENEC acquisition to contextualize the quantitative finding that startup acquisitions in the energy sector show no effect on R&D spending but a persistent negative association with ROA.

Background and Onset of Problems

EnBW acquired SENEC in 2018 to strengthen its decentralised energy solutions portfolio. From 2023 onwards, extensive technical defects in SENEC's home-storage systems led to battery shutdowns, customer complaints, operational disruptions, and an almost year-long halt in sales. The repercussions extended into SENEC's ecosystem: Sungrade Photovoltaik, a SENEC partner in which SENEC holds a 30% stake, filed for insolvency in 2025. The insolvency administrator cited the commercial strain resulting from SENEC's product failures and the associated need for transaction reversals and customer compensation (Buissinne 2025; Meyer-Tien 2025).

Financial Impact on EnBW

SENEC's operational issues translated into substantial financial burdens for EnBW. SENEC recorded a €663 million loss in 2023, consisting of €296 million in future replacement provisions, write-downs, compensation measures, and liquidity support provided by EnBW through loans and cash-pool adjustments (Meyer-Tien 2025). The Smart Infrastructure for Customers (SIC) segment reported declining earnings in 2024, with impairments and negative effects attributed to SENEC's challenges. By Q3 2025, SIC showed partial recovery due to "lower negative effects at SENEC compared to previous year" (EnBW Energie Baden-Württemberg AG 2025).

Selected Financial Indicators (2023, five years post-acquisition)

- Annual net loss: - € 663m
- Replacement provisions: € 296m
- Operating cash flow: - € 248m
- EnBW liquidity measures: € 300m loan, € 100m cash pool, € 453m loans restructured

Mechanisms Reflected in the Case

Mechanism	SENEC Evidence
High integration costs	Multi-year losses, recalls, restructuring expenses (Buissinne 2025; Meyer-Tien 2025)
Sectoral rigidity	Safety-critical technologies; grid-system interdependence
Limited absorptive capacity	Slow remediation, management turnover (Heinen 2025)
Ecosystem dependencies	Insolvency of affiliated installer Sungrade (Buissinne 2025)

Relevance for Quantitative Findings

The SENEC case empirically illustrates the pattern found in the DiD analysis: acquisitions do not increase internal R&D efforts, but profitability declines persistently due to integration burdens. SENEC thus serves as a concrete example of how acquired startups in capital-intensive, safety-regulated energy systems may contribute to long-term ROA deterioration, consistent with the mechanisms highlighted in the literature.