

# Post-implementation challenges in innovation management: a qualitative case study of a scientific institution in Germany

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## ABSTRACT

While substantial scholarly attention has been devoted to the implementation phase of innovation management, the post-implementation phase—the period in which established innovation processes must be sustained, refined, and scaled—remains comparatively underexplored, particularly for small scientific institutions and resource-constrained organizations. This study investigates the distinct challenges that emerge after the initial deployment of innovation management strategies at a small, industry-focused scientific institution in Germany, with the aim of distinguishing post-implementation barriers from those that characterize earlier stages and providing a structured understanding of their relative severity. A single-case, qualitative methodology was employed, drawing on 17 semi-structured in-depth interviews with three stakeholder groups: department heads within the focal institution, employees who engage indirectly with the innovation process, and external innovation managers from other German organizations with established innovation management implementations. Interview data were analyzed using Qualitative Content Analysis (QCA) via QCAMap software. Findings reveal that post-implementation challenges constitute a distinct and non-trivial category of barriers that differ qualitatively from the foundational challenges of the implementation phase. High-priority barriers include insufficient customer engagement and limited employee time and capacity, each cited across seven interviews. Medium-priority barriers encompass knowledge deficits among employees, absent feedback loops, lack of agility, financial constraints, and an innovation culture insufficiently tolerant of risk and experimentation. Low-priority but structurally significant barriers include incentive scarcity, communication gaps, and the absence of a designated innovation process coordinator. The study's contribution lies in demonstrating that sustaining innovation after implementation demands capabilities—structured feedback architectures, flexible governance, dedicated accountability roles, and culture-level adaptation—that are qualitatively distinct from those required for initial implementation. These findings provide a theoretically grounded and practically oriented framework for small scientific organizations seeking to sustain their innovation capacity under structural and resource constraints.

## 1. Introduction

Innovation is widely recognized as a fundamental driver of economic growth, organizational competitiveness, and societal progress. Derived from the Latin *innovare*—to introduce something new—the concept has evolved over centuries from a description of disruptive change to a purposive organizational capability that institutions actively cultivate and manage (Godin, 2015). In contemporary business and research environments, the capacity to generate, develop, and commercialize novel ideas has become a strategic prerequisite for long-term survival. Organizations that cannot innovate face the prospect of declining relevance in markets characterized by accelerating technological change, intensifying global competition, and increasingly unpredictable consumer demands (Reeves, Levin, & Ueda, 2016). Innovation management—the systematic organizational effort to govern this capacity—has accordingly become a major focus of both managerial practice and scholarly inquiry.

Yet the academic literature on innovation management has developed an asymmetric focus. The bulk of theoretical and empirical attention has been concentrated on the implementation phase—the initial mobilization of resources, organizational structures, and processes to support innovation activity—while the equally critical post-implementation phase remains comparatively underexamined. The post-implementation phase refers to the period following the initial deployment of innovation management strategies and systems, during which the organizational challenge shifts from initiating processes to sustaining, refining, and scaling them toward long-term effectiveness. This distinction matters because the barriers that organizations encounter in each phase are not simply the same obstacles persisting through time; they are qualitatively different challenges that require fundamentally different responses. The operational demands of maintaining innovation momentum, integrating structured feedback mechanisms, preserving stakeholder engagement over extended time horizons, and adapting processes to evolving organizational realities do not simply inherit their character from the implementation challenges that precede them—they constitute a distinct category of management problem that existing frameworks have not adequately theorized.

This gap in the literature is especially consequential for small scientific institutions and medium-sized enterprises (SMEs), which face structural constraints—limited personnel, budgetary pressures, and restricted institutional infrastructure—that amplify the difficulty of sustaining innovation after its initial deployment. Germany provides a particularly instructive contextual lens for this inquiry. As one of the world's most significant industrial research and development (R&D) investors, Germany ranks consistently near the top of global innovation input rankings, yet occupies only ninth position in the Knowledge and Technology Outputs category of the Global Innovation Index 2022 (Dutta, Lanvin, León, & Wunsch-Vincent, 2022). This persistent gap between innovation investment and knowledge output may partly reflect the very post-implementation inefficiencies—the failure to sustain, scale, and realize the full commercial potential of innovation—that this study examines. Smaller organizations operating within this ecosystem are likely to experience these dynamics more intensively than large corporations with dedicated innovation governance structures.

This study addresses this gap by investigating the post-implementation challenges of innovation management at a small, industry-focused scientific institution in Germany, using a qualitative case study methodology built on 17 in-depth interviews with managers, employees, and external experts. The study builds on Schuhmacher et al.'s

(2018) analysis of barriers to radical innovation implementation, extending their framework to examine what happens after implementation—how barriers evolve, which new challenges emerge, and what organizational capabilities are required to sustain innovation processes over time. By providing empirically grounded evidence on the specific and distinct character of post-implementation barriers, the study aims to contribute to the innovation management literature a more complete account of the innovation lifecycle, and to provide actionable guidance for resource-constrained organizations navigating this underexplored and operationally demanding phase.

## **2. Literature Review**

Innovation management research has generated a substantial body of knowledge about the challenges organizations face throughout the innovation lifecycle. This literature review is organized across five thematic domains that are directly germane to the present study: the general landscape of innovation management challenges; resource and structural constraints; stakeholder engagement and market orientation; organizational culture and leadership; and the specific, underexplored territory of the post-implementation phase.

### ***2.1 The Landscape of Innovation Management Challenges***

Innovation management challenges span the full arc of the innovation process, from the identification of opportunities and the generation of ideas through to their development, implementation, and eventual scaling. D'Este, Iammario, Savona, and Tunzelmann (2012) draw a theoretically important distinction between 'revealed' barriers—those that actively obstruct ongoing innovation activity—and 'detering' barriers—those that discourage organizations from initiating innovation in the first place. This distinction anticipates the conceptual argument of the present study: that different phases of the innovation lifecycle surface qualitatively different barrier configurations, and that managerial strategies must be phase-sensitive rather than phase-agnostic. Bessant (2003), in his comprehensive account of innovation management challenges, identifies communication deficits and resource constraints as particularly pervasive across the innovation lifecycle, while also noting that the manifestation of these barriers varies with organizational context, size, and strategic orientation. Sandberg and Aarikka-Stenroos (2014), in their systematic review of barriers to radical innovation, identify stakeholder engagement, cultural resistance, and knowledge gaps as recurring impediments that extend well beyond the early stages of implementation—an observation that directly informs the present study's investigation of post-implementation dynamics.

The temporal dimension of innovation management challenges deserves particular theoretical attention. Zaltman, Duncan, and Holbek (1973), in one of the foundational contributions to the innovation management literature, recognize that maintaining and scaling innovation over time involves demands that are qualitatively distinct from those of initial implementation—a proposition that has been largely reconfirmed by subsequent research but has not generated the systematic empirical focus it warrants. Young (1985) and Tidd and Bessant (2018) similarly acknowledge the temporal complexity of innovation processes, noting that the transition from implementation to sustained operation introduces new governance, cultural, and resource allocation challenges that organizations are frequently unprepared to address. Muralidharan (2020) provides contemporary practical grounding for these theoretical

propositions, arguing that structured innovation strategy—encompassing not only the design of innovation processes but their ongoing governance and adaptation—is essential for organizations seeking to translate creative capacity into sustained commercial outcomes.

### ***2.2 Resource and Financial Constraints***

Resource constraints constitute one of the most consistently identified barriers across the innovation management literature, and their effects are particularly pronounced in the post-implementation phase, where the initial capital expenditure of implementation must be sustained through ongoing investment in personnel, tools, and process refinement. Hahn, Minola, Vismara, and Stasio (2019) provide a comprehensive account of the financing challenges associated with innovation, demonstrating that resource limitations not only restrict the scale of innovation investment but shape the risk-taking propensity and strategic horizon of the organizations that face them. For smaller firms and scientific institutions, the cumulative costs of R&D, prototyping, market entry, and process maintenance often strain budgetary capacity to the point of operational paralysis, forcing organizations to make sequential trade-offs between innovation investment and operational continuity.

Employee time and capacity represent a dimension of resource constraint that is structurally distinct from financial limitation but equally consequential. The challenge of allocating sufficient human attention to innovation activities alongside existing operational demands is a recognized tension in the innovation management literature: Tidd and Bessant (2018) identify this dual-burden problem as one of the most practically significant barriers to sustaining innovation, noting that even when strategic intent to innovate is strong, the operational pressures on front-line and mid-level employees frequently erode the time and energy available for innovation tasks. This constraint is especially severe in small organizations, where the ratio of innovation-required activities to innovation-capable personnel is structurally unfavorable. Without mechanisms for protecting innovation time—dedicated roles, explicit time allocation policies, or phased workload management—innovation activities are progressively displaced by operational urgencies.

### ***2.3 Stakeholder Engagement and Market Orientation***

The challenge of maintaining meaningful stakeholder engagement—with customers, suppliers, partners, and regulators—across the full duration of an innovation initiative represents one of the most operationally demanding aspects of innovation management, and one whose difficulty intensifies in the post-implementation phase as the novelty of the initiative fades and the costs of sustained engagement become more salient. Tidd and Bessant (2018) argue that a persistent failure of innovation management practice is the tendency to concentrate stakeholder engagement at the front end of innovation projects—during ideation and market research—while allowing engagement to atrophy once implementation is underway. The consequence is a growing misalignment between the organization's innovation activities and the evolving needs and expectations of its market, which ultimately threatens the commercial viability of innovation investments.

Saatçioğlu and Özmen (2010) provide empirical grounding for this concern, demonstrating through their interpretive structural modelling analysis of Turkish firms that insufficient customer insight is a primary structural barrier to effective innovation—

one that generates downstream barriers including resource misallocation and missed market opportunities. D'Este et al. (2012) corroborate this finding in their analysis of UK firms, identifying inadequate customer understanding as a deterring barrier that influences not only whether organizations innovate but the directions in which they innovate. Bessant and Young's (2003; 1985) earlier arguments that the value of innovation depends critically on whether it addresses actual customer needs—rather than the organization's internal perception of those needs—remain foundational to understanding why sustained customer engagement is not merely a marketing function but a strategic necessity for post-implementation innovation management.

Building and maintaining inter-organizational networks constitutes a related and equally significant stakeholder management challenge. Gardocka-Jałowiec and Wierzbicka (2019) document the critical importance of inter-organizational collaboration for resource access and joint innovation in the Polish innovation ecosystem, while noting that the transition from transactional to cooperative, trust-based relationships is both necessary and structurally difficult to achieve. Bondeson and Grönlund (2016) examine this challenge in the specific context of innovation laboratory management, finding that sustaining collaborative relationships with external partners requires dedicated governance mechanisms that are frequently absent from the institutional design of small scientific organizations.

#### ***2.4 Organizational Culture, Leadership, and the Innovation Mindset***

Organizational culture and leadership constitute what might be described as the soft infrastructure of innovation management—the values, norms, and behavioral orientations that determine whether innovative ideas are encouraged, developed, or suppressed. The innovation management literature consistently identifies risk-averse cultures and inadequate leadership as among the most consequential barriers to both implementing and sustaining innovation (Muralidharan, 2020; Sandberg & Aarikka-Stenroos, 2014). Khallouk and Robert (2018), examining management innovation in non-profit organizations, demonstrate that cultural resistance and leadership orientation are particularly powerful determinants of innovation outcomes in smaller, non-commercial institutions—a finding directly applicable to the scientific institution context examined in the present study.

Lindsay, Perkins, and Karanjika (2010) identify the 'Not Invented Here' (NIH) syndrome—the tendency of organizational members to discount or resist ideas that originate outside their immediate group—as a particularly insidious cultural barrier that can persist through and intensify after implementation, as the organizational investment in existing approaches creates a vested interest in their perpetuation. Khan and Khan (2016) establish the complementary point that leadership quality and strategic vision are critical enabling conditions for innovation sustainability: without leaders who can articulate a compelling innovation direction, manage the tensions between short-term operational demands and long-term innovation investment, and model the experimental mindset that innovation requires, organizations tend to default to risk-avoidance and process rigidity precisely at the post-implementation moment when adaptive flexibility is most needed.

The skills and knowledge dimensions of the post-implementation challenge deserve separate consideration. Sandberg and Aarikka-Stenroos (2014) and D'Este et al. (2012) both identify knowledge gaps—encompassing technical expertise in new

technologies and processes, understanding of innovation management methodologies, and clarity about individual roles within the innovation system—as barriers that compound other structural challenges. In the post-implementation phase, knowledge gaps take on a distinctive character: they concern not the knowledge required to design and launch an innovation management system but the understanding required to operate, adapt, and improve it over time. This operational knowledge is more distributed, more tacit, and more context-dependent than the strategic knowledge that guides implementation, making it correspondingly more difficult to develop through formal training programs alone.

### ***2.5 The Post-Implementation Gap in Innovation Management Research***

Despite the theoretical and practical importance of the post-implementation phase, it has attracted only fragmentary attention in the innovation management literature. Most existing frameworks—including Cooper's (2008) Stage-Gate model and Xu et al.'s (2007) Total Innovation Management framework—are primarily organized around the stages of innovation development and implementation, treating the period following deployment as a continuation of earlier processes rather than as a qualitatively distinct management phase with its own characteristic challenges and capability requirements. This framework orientation reflects a broader bias in the field toward studying innovation as an event—the successful launch of a new product, process, or organizational system—rather than as an ongoing practice that demands sustained management attention over time.

Zaltman et al.'s (1973) early recognition that scaling and maintaining innovation involves demands not present in implementation, and Young's (1985) related argument about the temporal complexity of creative organizational processes, established the theoretical foundation for a more phase-differentiated understanding of innovation management. However, this foundation has not been systematically built upon. Sandberg and Aarikka-Stenroos (2014) note in their review that post-launch challenges are consistently underrepresented in the barriers-to-innovation literature, while Schuhmacher et al.'s (2018) qualitative study of pharmaceutical innovation barriers focuses primarily on the pre-launch phase despite acknowledging that post-implementation challenges exist and may differ. For small, resource-constrained organizations, this gap in the research base is particularly consequential: the institutional infrastructure and financial resilience that allow larger organizations to navigate post-implementation challenges through trial and error are not available to them, making empirically grounded guidance for this phase a practical necessity.

This study directly addresses this gap. By focusing specifically on the post-implementation phase—identifying which challenges emerge or intensify after implementation, which persist from earlier stages, and which represent genuinely novel barriers—it aims to provide the systematic, empirically grounded account of post-implementation innovation management that the existing literature has not yet produced for small scientific institutions in the German context.

## **3. Methodology**

This study employs a qualitative, exploratory research design to examine the post-implementation phase of innovation management at a small scientific institution in Germany. The qualitative approach was selected because the study's primary objective—understanding the lived organizational experiences, perceptions, and interpretations of

individuals navigating post-implementation challenges—requires the depth of engagement that quantitative instruments cannot provide (Sandberg & Aarikka-Stenroos, 2014; Schuhmacher et al., 2018). Given the nascent state of research on this specific phase and organizational context, an exploratory orientation was appropriate; the goal was to generate theoretically grounded insights and a conceptual framework from empirical material rather than to test pre-specified hypotheses against existing theory.

### ***3.1 Case Design and Study Setting***

A single-case study design was adopted, centered on a small, industry-focused scientific institution in Germany that had implemented a formal innovation management system. Single-case studies are methodologically appropriate when the case is theoretically distinctive, the research questions are exploratory, and the aim is to generate rich contextual understanding rather than statistical generalizability (Yin, 2018). The focal institution's position as a small scientific organization in the German innovation system—navigating the country's significant R&D investment infrastructure while lacking the resources of larger commercial enterprises—makes it a theoretically representative case for the population of interest.

### ***3.2 Participants and Data Collection***

Data were collected through two complementary methods: a structured literature review to establish the theoretical grounding for the interview protocol and interpretive framework, and 17 semi-structured expert interviews constituting the primary empirical data source. Participants were drawn from three groups to ensure diversity of perspective and to capture the multi-level character of post-implementation challenges. The first group comprised department heads at the focal institution who provided strategic and managerial perspectives on innovation governance. The second group consisted of employees who experience the innovation management process operationally and could speak to its practical integration with their everyday work. The third group included external innovation managers from other German organizations with established innovation management implementations, whose comparative experience provided a benchmarking function and allowed the identification of challenges specific to the focal institution's context versus those more broadly generalizable across small organizations.

All interviews followed a semi-structured format, using a guide developed from themes identified in the preliminary literature review and refined through pilot testing. The semi-structured approach allowed the research team to maintain consistent coverage of core topics while preserving the flexibility for participants to introduce themes and experiences not anticipated by the protocol. Interviews were conducted face-to-face or via video conference, audio-recorded with participant consent, and transcribed verbatim to ensure fidelity to participants' expressed perspectives. Interview duration ranged from approximately 45 to 90 minutes.

### ***3.3 Data Analysis***

Transcribed interviews were analyzed using Qualitative Content Analysis (QCA), a systematic, rule-governed procedure for the structured interpretation of textual data (Mayring, 2015). Analysis was conducted using QCAnap software, which provides

a digital environment for category-based coding and retrieval (Fenzl & Mayring, 2017). The analytic process proceeded in three stages. In the first stage, an initial deductive category system was developed from the literature review, providing a theoretical scaffold for coding while explicitly remaining open to inductive refinement based on empirical material. In the second stage, interview transcripts were coded against this category system, with new categories created inductively where participant responses introduced themes not anticipated by the deductive framework. In the third stage, coded material was reviewed for internal consistency, inter-category distinctiveness, and alignment with the study's research questions, resulting in the final thematic structure presented in the findings. To support credibility and trustworthiness, coding decisions were reviewed iteratively by the research team, with disagreements resolved through discussion and documented revision of category definitions.

#### **4. Results and Discussion**

The analysis proceeds in three stages. First, it maps the full landscape of challenges identified across the innovation management lifecycle, distinguishing between those that characterize the pre-implementation phase, those that emerge specifically in the post-implementation phase, and those that persist across both. Second, it provides a structured prioritization of post-implementation challenges based on their frequency of citation and perceived urgency, as reflected in the interview data. Third, it offers an interpretive discussion of the most significant post-implementation barriers, situating the empirical findings within the existing theoretical framework and drawing out their implications for innovation management practice in resource-constrained scientific organizations.

##### ***4.1. Mapping Innovation Management Challenges Across the Lifecycle***

Table 1 presents a structured overview of the challenges identified through the combined analysis of the literature and the interview data, classified by the phase or phases in which they predominantly manifest. This classification framework is this study's first principal contribution: it provides empirically grounded evidence for the claim that implementation and post-implementation challenges are not merely the same barriers persisting over time, but that the post-implementation phase introduces a distinct set of barriers—including lack of communication, process rigidity, insufficient agility, complexity overload, incentive scarcity, absent point-of-contact accountability, limited feedback loops, and stakeholder mismanagement—that have no counterpart in the pre-implementation phase and that cannot be addressed by the strategies developed for earlier stages.

The distribution of challenges across phases confirms the study's central thesis. Nine challenges span both phases, reflecting persistent organizational constraints that accompany innovation management from inception through sustained operation—resource limitations, cultural barriers, leadership misalignment, and skills gaps among them. Four challenges are specific to the pre-implementation phase, primarily concerned with the foundational tasks of opportunity identification, technological readiness, and environmental scanning. Ten challenges are specific to the post-implementation phase, confirming that this stage generates a distinct and substantial barrier landscape.

Table 1. *Categorization of innovation management challenges by lifecycle phase*

Challenge	Pre-Implementation	Post-Implementation
<b>Challenges Persistent Across Both Phases</b>		
Integration with existing organizational structures	✓	✓
Customer and market understanding	✓	✓
Skills and knowledge gaps	✓	✓
Resources: employee time and capacity	✓	✓
Financial resources	✓	✓
Leadership and strategic vision	✓	✓
Organizational culture	✓	✓
Negative internal perception of the process	✓	✓
Cultivating an innovative employee mindset	✓	✓
<b>Challenges Specific to the Pre-Implementation Phase</b>		
Challenges with identifying opportunities	✓	—
Technological challenges	✓	—
External environmental factors	✓	—
Managing inter-organizational connections	✓	—
<b>Challenges Specific to the Post-Implementation Phase</b>		
Lack of communication	—	✓
Lack of structure in the innovation process	—	✓
Lack of agility	—	✓
Process complexity and overload	—	✓
Lack of incentives for participation	—	✓
Absence of a designated process coordinator	—	✓
Absence of feedback loops	—	✓
Stakeholder management	—	✓
Misapplication of innovation processes	—	✓
Insufficient responsiveness (process too slow)	—	✓

*Note.* ✓ = challenge identified in this phase; — = challenge not identified in this phase.

The persistent challenges are consistent with the synthesis of D'Este et al. (2012), Sandberg and Aarikka-Stenroos (2014), and Tidd and Bessant (2018), who collectively identify resource constraints, knowledge gaps, cultural barriers, and leadership limitations as structural features of innovation management across organizational types and stages. However, interview data provide important nuance: while the challenges persist, their character evolves. As one department head observed, 'Leadership's strategic vision and how it aligns with operational realities often dictates whether innovation efforts are sustained over time.' This statement captures the distinctive post-implementation manifestation of the leadership challenge—not the initial absence of strategic vision but the growing misalignment between top management's strategic aspirations and the operational complexity that employees navigate daily, a tension that intensifies as implementation recedes and the everyday frictions of sustaining innovation accumulate.

The pre-implementation-specific challenges—opportunity identification, technological constraints, external environmental factors, and inter-organizational network management—are well-theorized in the existing literature and require no

distinctive post-implementation treatment. Their absence from the post-implementation challenge set is theoretically interpretable: once the foundational decisions about which innovation directions to pursue, which technologies to adopt, and which partnerships to establish have been made, the relevant challenge frontier shifts from establishing the direction of innovation to sustaining and improving its execution. As one participant put it: 'The biggest challenge is ensuring that we identify opportunities that truly align with market needs. Without this, we're building on unstable ground.' This characterizes a pre-implementation orientation that, once addressed, gives way to the operational management challenges that dominate the post-implementation phase.

#### 4.2. *Prioritization of Post-Implementation Challenges*

Table 2 presents the post-implementation challenges ranked by their level of priority, operationalized as the frequency with which they were explicitly and substantively cited across the 17 interviews. This prioritization serves two analytical purposes: it reflects the relative urgency of each challenge as experienced by participants, and it provides a practical triage framework for resource-constrained organizations seeking to allocate limited management attention to the most consequential barriers.

Table 2. *Post-implementation challenges ranked by priority and interview frequency*

Post-Implementation Challenge	Priority Level	No. of Interviews Citing
<b>High Priority</b>		
Insufficient customer involvement and engagement	High	7
Limited employee time and capacity for innovation	High	7
<b>Medium Priority</b>		
Knowledge deficits among employees	Medium	4
Absence of formal feedback loops	Medium	4
Lack of agility and process rigidity	Medium	4
Financial resource constraints	Medium	4
Insufficient culture of risk-taking and experimentation	Medium	4
Misapplication of innovation processes	Medium	4
<b>Low Priority</b>		
Absence of participation incentives	Low	3
Communication gaps and misalignment	Low	3
Absence of a designated innovation process coordinator	Low	3

*Note.* Priority levels are derived from frequency of citation across 17 interviews; higher citation frequency indicates greater perceived urgency and prevalence.

#### 4.3. *High-Priority Post-Implementation Challenges*

##### 4.3.1. *Insufficient Customer Involvement and Engagement*

Customer engagement emerged as the most urgently felt challenge in the post-implementation phase, cited in seven of the seventeen interviews. The challenge is not simply the familiar one of understanding customer needs during market research—a pre-implementation concern—but the operational difficulty of sustaining meaningful, structured interaction with customers over time once the innovation management system is in place and operational priorities crowd out deliberate engagement activities. Organizations reported a gradual erosion of the connection between their innovation

processes and the evolving preferences of the users they were designed to serve, precisely because the feedback mechanisms that would maintain this connection were not formally embedded in the operational architecture of their innovation management system.

One external participant articulated this challenge directly: 'Customer feedback is essential for adapting and improving our processes, but we often lack structured ways to collect it.' The significance of this observation lies in what it reveals about the design failure of many innovation management implementations: the system was built to launch the organization into innovation activity without building the ongoing customer intelligence infrastructure necessary to ensure that innovation activity remains directionally aligned with market reality. Zaltman et al.'s (1973) foundational argument that iterative feedback loops are necessary for sustaining innovation management processes is directly confirmed by this finding—and the interview data reveal that the failure to build such loops into the post-implementation system is common even among organizations that understand their value in principle. The practical implication is that customer engagement mechanisms—structured feedback collection processes, regular market scanning activities, and formalized mechanisms for translating customer input into process adaptation—must be designed into innovation governance from the outset, not added retrospectively when disconnection has already become apparent.

#### ***4.3.2. Limited Employee Time and Capacity***

Resource constraints in the form of limited employee time and capacity were cited with equal frequency to customer engagement challenges, appearing in seven interviews and consistently described as among the most operationally debilitating barriers to sustaining innovation. The challenge is structural and systemic: innovation management activities require dedicated time and cognitive bandwidth, but in small organizations the same employees who are expected to contribute to innovation are simultaneously responsible for delivering the core operational outputs of the institution. Without explicit mechanisms for protecting innovation time—dedicated allocations, ring-fenced project budgets, or role separation—innovation activities are progressively displaced by operational urgencies as the novelty of the innovation initiative fades and management attention returns to daily operational demands.

The emotional and behavioral consequences of this structural conflict are significant. Multiple respondents described the dual-burden of operational and innovation responsibilities as a source of chronic overload: 'It's difficult to allocate time for innovation when regular duties already consume so much capacity.' This observation corroborates Tidd and Bessant's (2018) characterization of resource limitations as a key barrier to sustaining innovation, and extends it by specifying the mechanism: the competition is not primarily financial—small organizations in this study generally understood the need for innovation investment—but temporal. The scarcest resource in post-implementation innovation management is not money but the focused attention of employees who are genuinely engaged with both the operational and the innovation dimensions of their roles. The implication for organizational design is that sustainable innovation management in small institutions requires explicit role architecture decisions: who bears primary innovation responsibility, what proportion of their working time is

explicitly designated for innovation activities, and what operational tasks are re-assigned or eliminated to create this capacity.

#### ***4.4. Medium-Priority Post-Implementation Challenges***

##### ***4.4.1. Knowledge Deficits and Training Gaps***

The absence of sufficient knowledge among employees about the innovation management process and their individual roles within it was cited in four interviews and reflects a challenge that is analytically distinct from the skills and knowledge gaps characteristic of the pre-implementation phase. Before implementation, knowledge gaps concern the understanding required to design and launch the innovation system. After implementation, they concern the understanding required to operate, contribute to, and improve a system that already exists but whose operational logic is not fully transparent to its participants. Employees who understand in principle that their organization has an innovation management process but lack clarity about what is expected of them, how their contributions are evaluated, or how the process connects their daily work to strategic outcomes cannot contribute effectively, regardless of their general capability and motivation.

One participant articulated this operational knowledge gap precisely: 'We need more training to understand not just the process but also our specific tasks within it.' This observation resonates with Rese and Baier (2011), who argue that capability-building—encompassing not only technical knowledge but organizational understanding and role clarity—is essential for bridging the gap between innovation system design and effective participation. The practical response to this challenge is not generic innovation training but contextualized operational education that clarifies the specific ways individual roles connect to the innovation management system and the specific behaviors that are expected and valued.

##### ***4.4.2. Absence of Formal Feedback Loops***

Formal feedback mechanisms—systematic processes for collecting, synthesizing, and acting on information about the performance of the innovation management system—were identified as absent or inadequate by four interview participants. The consequences of this absence are both diagnostic and motivational: without feedback loops, the organization loses its capacity to learn from experience and improve iteratively, and individual contributors lose the sense that their efforts are producing visible effects. An external expert captured both dimensions: 'Without proper feedback, we don't learn from our mistakes, and the process stagnates.' Sandberg and Aarikka-Stenroos (2014) identify feedback loops as essential for iterative improvement in innovation management, and the interview data confirm that their absence produces exactly the stagnation they predict—an innovation management system that maintains its structural form while losing its adaptive capacity and its capacity to generate sustained engagement.

The design implication is that feedback loop architecture must be a first-order concern in innovation management governance design, not an afterthought. Effective feedback loops require clarity about what information will be collected, by whom,

through what mechanisms, and with what authority to act on what is learned. In the absence of this architectural specificity, feedback becomes episodic and informal—dependent on individual initiative rather than systematic process—and loses its function as a learning and adaptation mechanism.

#### ***4.4.3. Process Rigidity and Insufficient Agility***

Rigid processes and the absence of adaptive capacity were highlighted by four participants as medium-priority post-implementation barriers, reflecting a tension between the need for process standardization—which creates the operational consistency necessary for coordinated innovation activity—and the need for flexibility to respond to changing market conditions, technological developments, and internal learning. One department head articulated this tension with particular clarity: 'Innovation doesn't happen in a straight line—it requires iterative loops and flexibility. Rigid processes don't allow for that.' This observation is consistent with Sandberg and Aarikka-Stenroos's (2014) advocacy for adaptive strategies in innovation processes and anticipates the central argument of agile innovation management frameworks, which have gained practical currency precisely because they address the rigidity-flexibility tension that traditional stage-gate processes resolve in favor of predictability at the expense of adaptability.

For small scientific institutions, process rigidity often reflects an overcompensation for the governance uncertainty of early implementation—organizations design detailed processes to ensure consistent execution and then find that those processes cannot accommodate the unanticipated situations and evolving priorities that real-world innovation management inevitably generates. The solution is not to eliminate process structure but to design structural flexibility explicitly into the innovation governance architecture, creating clear decision rights for adapting processes in response to experience while maintaining the accountability mechanisms that protect against process fragmentation.

#### ***4.4.4. Financial Constraints, Risk Culture, and Process Misapplication***

Financial resource constraints were cited in four interviews, reflecting a familiar but context-specific barrier: small scientific institutions in Germany operate with sufficient baseline funding to maintain research activities but frequently lack the additional financial capacity to invest in the tools, technologies, and dedicated personnel that sustaining and scaling innovation management requires. As one external expert observed: 'We need more financial support to scale our innovations effectively.' This finding is consistent with Hahn et al.'s (2019) analysis of innovation financing constraints, though the interview data suggest that the binding constraint for small scientific institutions may be less the absolute level of financial resources than their allocation flexibility: institutions that have committed resources to ongoing operations may lack the discretionary capacity to redirect investment toward innovation infrastructure as needs evolve.

The insufficient culture of risk-taking and experimentation, similarly cited four times, reflects a challenge that is particularly pronounced in scientific institutions where methodological rigor and established disciplinary practice create strong norms of

procedural conservatism that can conflict with the experimental orientation that innovation management requires. Multiple respondents noted that organizational culture did not provide adequate psychological safety for experimentation or sufficient tolerance for the failure that genuine innovation entails: 'Innovation often requires you to fail first, but our current system doesn't incentivize that.' Lindsay et al. (2010) characterize this culture-level barrier as among the most difficult to address because it requires not merely procedural changes but value-level reorientation—a qualitatively different kind of organizational change from structural or process modification.

#### ***4.5. Low-Priority Challenges: Structurally Significant but Less Pervasive***

Three post-implementation challenges were identified as low-priority by virtue of their lower citation frequency—appearing in three interviews each—yet each carries structural significance that warrants attention beyond their frequency ranking. The absence of clear participation incentives for employees to engage with innovation activities was consistently described as a demotivating factor whose effects accumulate over time: 'People don't feel motivated to contribute if there's no tangible reward for their efforts.' Lindsay et al. (2010) emphasize the role of incentives in sustaining employee engagement with innovation processes, and the finding that incentive design is neglected in post-implementation governance reflects a broader pattern of underinvestment in the behavioral architecture of innovation management.

Communication gaps—insufficient clarity and consistency in information flows within and between teams engaged in the innovation management process—were described as creating misalignment and coordination failures whose effects are felt most acutely in post-implementation, when the shared context established during implementation begins to erode and must be actively maintained. One department head remarked: 'We often struggle to align our teams because the communication channels aren't well-defined.' This observation points to a governance design gap: the communication infrastructure designed for implementation may not be adequate for the distributed, ongoing coordination that sustaining innovation requires.

The absence of a designated innovation process coordinator—a role with explicit responsibility for overseeing the innovation management process, ensuring accountability, and serving as a point of contact for participants—was described as a structural gap that allows accountability to diffuse and innovation efforts to lose coherence over time: 'Without a clear point of contact, accountability becomes an issue.' While this challenge was among the least frequently cited, its structural implications are significant: without clear role assignment, the coordination and accountability functions that support post-implementation innovation management depend on informal norms and individual initiative rather than formal role architecture—a governance design that is fragile precisely in the resource-constrained environments where it is most common.

### **5. Conclusion**

This study has examined the post-implementation phase of innovation management at a small scientific institution in Germany, using qualitative evidence from 17 expert interviews to identify, categorize, and prioritize the challenges that organizations encounter after the initial deployment of innovation management strategies

and systems. The central contribution of the study is empirical and conceptual: it provides systematic evidence that post-implementation challenges constitute a distinct and substantial barrier landscape that is qualitatively different from the foundational challenges of the implementation phase, and that cannot be addressed by extending or adapting the strategies developed for earlier stages. Ten challenges were identified as specific to the post-implementation phase, with a further nine persistent challenges evolving in their character and operational demands as organizations transition from implementation to sustained operation.

The prioritization of post-implementation challenges generates three levels of practical implication. At the strategic level, the high-priority findings—insufficient customer engagement and limited employee time and capacity—point to two governance design imperatives that organizations must address before the post-implementation phase begins: building structured customer feedback mechanisms into the operational architecture of the innovation management system, and designing explicit role and time allocation frameworks that protect innovation capacity from displacement by operational urgencies. These are not challenges that can be managed reactively once they manifest; their structural roots in organizational design decisions made during implementation mean that the opportunity for prevention is during the implementation phase itself.

At the operational level, the medium-priority findings—knowledge deficits, absent feedback loops, process rigidity, financial constraints, cultural barriers to risk-taking, and process misapplication—describe a pattern of accumulated friction in which individual management deficits compound each other. An organization without adequate knowledge dissemination, formal feedback mechanisms, and cultural tolerance for experimentation will find that each of these deficits makes the others more severe: employees who lack role clarity cannot contribute to feedback loops; feedback loops that fail to produce visible responses to input undermine the motivation to engage; and a culture unreceptive to failure discourages the experimentation that might generate the learning that feedback loops are designed to capture. Addressing these challenges requires not sequential, individual interventions but an integrated governance design that treats the behavioral, structural, and cultural dimensions of post-implementation innovation management as mutually conditioning.

## **6. Limitations**

The present study has several limitations that should be acknowledged and that delineate opportunities for future research. The single-case design, while well-suited to exploratory inquiry, limits the external generalizability of the findings; the challenges identified are specific to a particular institutional context, and while they are theoretically interpretable in terms of broader innovation management principles, their relative significance may vary across organizational types, sectors, and national contexts. The exclusively qualitative methodology, while appropriate for the study's exploratory objectives, introduces interpretive subjectivity that quantitative instruments could partially address in follow-up investigations. The study's focus on a single phase of the innovation lifecycle does not fully account for how earlier challenges may shape or constrain the post-implementation challenge landscape. Future research should extend

the comparative scope of this inquiry to encompass diverse organizational contexts—including larger research organizations, SMEs in commercial sectors, and innovation-active institutions in other national contexts—and should integrate longitudinal designs that can trace how post-implementation challenges evolve as organizations develop experience and capability in managing their innovation systems. Mixed-method approaches that quantify the relative impact of post-implementation barriers on innovation outcomes would strengthen the evidentiary basis for the priority framework presented here. Despite these limitations, this study makes a meaningful contribution to innovation management research by providing the first systematic, empirically grounded account of post-implementation challenges in the context of a small German scientific institution—advancing the theoretical differentiation of innovation management phases and offering actionable guidance for the resource-constrained organizations for which sustained innovation management is both most difficult and most consequential.

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### NO CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

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