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Fueling innovation management research: Future directions and five forward-looking paths

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Abstract

Research about innovation management explores how the future is created—who is creating it (organizations, collaborations, etc.), for what aims (customer satisfaction, market performance, etc.), and with what broader effects (social, environmental, etc.). With this extended essay, we explore the potential futures of innovation management research in three ways. First, we briefly review the history of past research agendas and priorities published in the *Journal of Product Innovation Management* (JPIM), highlighting three broad topic areas (technological, social/environmental, and organizational) that have emerged over time and their potential disruptive implications for innovation management research. Second, we describe the outcome of a gathering of leading scholars in innovation management tasked with the challenge of identifying critical research paths for our field. This collaboration resulted in five "deep dive" essays into areas ripe for innovation management research in the years ahead: liquid innovation, artificial intelligence in innovation, business model innovation, public value innovation, and responsible innovation. Third, we reflect on this expansive effort and offer a discussion of implications (tensions, challenges, and opportunities) for future innovation management scholarship.

KEYWORDS

artificial intelligence in innovation, business model innovation, future of innovation management, liquid innovation, public value innovation, research agenda, research directions, research priorities, responsible innovation

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1 | CHARTING POSSIBLE PATHS FOR INNOVATION MANAGEMENT RESEARCH

The year 2023 marked the fifth year of our (Charles Noble and Jelena Spanjol) *Journal of Product Innovation Management* (*JPIM*) editorship. During those five years we processed thousands of submissions; introduced a new publication format with the *Catalyst*, working closely with authors on crafting thought provoking contributions on design, science fiction, leadership, biocultural innovation, and artificial intelligence (AI), among others, in that format; and shared the vision and mission of *JPIM* with scholars worldwide and across management, marketing, organizational behavior, applied psychology, information systems, and engineering, to name a few. During the typically two-hour long weekly calls we held to manage the journal, two themes kept recurring in our discussions. First, innovation management scholarship has been broadening in thematic scope and disciplinary perspectives, increasingly functioning as a boundary-spanning domain with the potential to integrate different theoretical and methodological traditions and approaches. Second, innovation management problems reflect global concerns (such as environmental sustainability), which must be solved alongside regional legislatures and local market needs and wants (such as functional excellence and customer satisfaction).

The question emerging from our reflections was not surprising: "What might the future hold for *JPIM* and innovation management scholarship and which topics are particularly critical to address in the next years?". Our essay tackles this question and offers readers both big themes and specific research questions we hope will inspire future scholarly works that provide positive impact for individuals, teams, organizations, societies, and the environment.

1.1 | Introduction

As academics, we almost exclusively look in the rearview mirror. We collect quantitative data and model variables and their relationships to explain what has already happened. We construct theoretical narratives based on rich qualitative accounts of what we observed or heard. We assess evidence from other published studies through literature reviews and meta-analyses to solidify our understanding of past events. Across methodological approaches and topics, we look backward to build understanding that can be applied to future thinking. The world in which innovation management is embedded, however, is experiencing major shifts—technological, societal, and environmental—requiring a forward-looking scholarly community engaging with what *might* be as well as what *is* or what is *likely to be*.

While the broader management scholarly community is grappling with how to engage with the future in research (e.g., Gümüsay & Reinecke, 2021), innovation management is (by definition) focused on *creating* the future. Essentially, research about innovation management is research about creating the future—who is creating (organizations, collaborations, etc.), for what aims (customer satisfaction, market performance, etc.), and with what broader effects (social, environmental, etc.). In this essay, we explore the potential futures of innovation management research in three ways.

First, we briefly review past research agendas and priorities published in the *Journal of Product Innovation Management* (*JPIM*), highlighting the three broad topic areas (technology, social/environmental, organizational) that have emerged over time and their potential disruptive implications for innovation management research. Second, we describe a gathering of leading scholars in the innovation management field tasked with the challenge of identifying emerging streams in innovation management research that are critical to explore over the next years. And third, we offer a discussion of implications (tensions, challenges, and opportunities) for future innovation management scholarship and community.

1.2 | Shaping innovation management research through agenda setting: Past trajectories

Future shaping (i.e., innovation) through agenda-setting occurs in industry, policy, and research. Standard-setting organizations and industry associations drive innovation trajectories across firms in a particular market. Regulatory frameworks and policies determine the attractiveness of investment in technological and market development. Strategic priorities in organizations determine resource allocation toward innovation. Research agendas direct a scholarly field's attention toward questions demanding answers. Thus, research agendas play a pivotal role in how scholarship develops.

In innovation management research, a number of past research agendas and priorities (varying in depth and breadth) have been published. In *JPIM* alone, there have been almost 50 articles (including editorials as well as *Perspective* and *Catalyst* articles) that have provided a research agenda and/or listed a set of

research priorities.[1] Cumulatively, these prior efforts at shaping the future of innovation management and new product development scholarship have been cited about 9000 times on Google Scholar, emphasizing the importance of such efforts. Not surprisingly, research agendas and priorities published in *JPIM* have varied widely in terms of their derivation, scope, and focus (Table 1). Some were built on insights from the literature, others gathered experts from academia and/or practice, and several provided more personal perspectives from editors and other thought leaders on selected research priorities. In this regard, research agendas in *JPIM* seem no different from those published in other leading journals.

In reviewing prior *JPIM* articles that laid out priorities and directions for scholars in our community, two general insights emerged. First, among the possible approaches to identifying research priorities, literature reviews have become more frequent in *JPIM* in recent years, suggesting that several areas in the innovation management domain are reaching maturity and/or require consolidation to advance and create new knowledge. Second, most of the research priorities that have been identified seem to converge on three broad themes (technology, organization, and social/environmental concerns). We briefly expand on these two topics next. Table 1 lists the prior research agendas and priorities and summarizes their formats and resulting themes.

1.2.1 | Building research agendas in *JPIM*

The most frequent approach to building research agendas and identifying priorities in *JPIM* has been through a literature review.[2] A dedicated special issue on cumulative knowledge in innovation management (co-edited by Ahmet Kirca, Charles Noble, Gaia Rubera, and Jelena Spanjol) soliciting meta-analyses and literature reviews to consolidate insights and identify research priorities on topics relevant to innovation management is expected to be published early 2025. Literature reviews require a certain maturity level in streams of research and a substantial base of scholarly works within a domain. In contrast, special issue editorials and alternative formats (such as *Catalyst* articles) provide more latitude with evidence used to build a research agenda, ranging from deep experience (e.g., Verganti, 2008; Verganti et al., 2020) and engagement with a particular context (e.g., de Massis et al., 2018), to more exploratory assessments of phenomena and technologies (e.g., Bouschery et al., 2023; Vassallo, Banerjee, & Prabhu, 2023). Finally, special and virtual issue editorials have provided scholars with an opportunity to reflect on the state of a particular domain in innovation management and outline research priorities for the future (e.g., Hopp et al., 2018).

Interestingly, only a handful of research agendas and priorities have been derived in the field, based on expert workshops or surveys/interviews. These typically emerged as part of a conference (e.g., the Utah conference on the intersection of operations and innovation; Karniouchina et al., 2006), *PDMA Research Forum* (Biemans & Langerak, 2015), or *PDMA Doctoral Consortia* (e.g., di Benedetto, 2012; Xiao & Bharadwaj, 2023).

1.2.2 | Substantive themes emerging from research agendas in *JPIM*

A review of the identified prior published research agendas in *JPIM* suggests that three themes have been recurring since the earliest research priorities were published in the 1980s. We use these themes as a loose categorization for purposes of discussion, without claiming a rigorous content analysis.

Organizational issues in innovation management

Not surprisingly, the most frequent and nuanced theme characterizing research agendas in *JPIM* focuses on organizational issues broadly. Priorities for scholars called attention to how to set up processes for and management of (1) certain types of innovation, such as services (e.g., Biemans et al., 2016; Papastathopoulou & Hultink, 2012), highly novel products and technologies (e.g., disruptive innovation, Danneels, 2004); (2) certain types of firms, such as small- and medium-sized companies (de Massis et al., 2018); and (3) certain types of innovation approaches, such as open innovation (West & Bogers, 2014), design-driven innovation (Verganti, 2008), and (4) fundamental concepts to innovation, such as cycle time (Griffin et al., 2019) or customer heterogeneity (Wijekoon et al., 2021). It is clear that organizations are at the heart of most innovation efforts, whether considering "what" issues such as innovation strategy and market analysis, or "how" issues related to innovation process, leadership, team composition, and other factors.

[1]These articles were identified through a search for the words "agenda" and "priorities" and phrases "research agenda" or "research priorities" in the abstract and/or title of JPIM publications. We excluded articles that referred to a research agenda or priorities in the abstract but did not offer a dedicated research agenda or structured set of priorities.
[2]We use this as a catch-all term to include thematic, integrative or systematic literature surveys, bibliometric analyses and other literature-driven approaches.

TABLE 1 Prior research agenda setting articles in the *Journal of Product Innovation Management*.

Author(s)	Year	(Co) authorship by JPIM editor(s)[a]	Approach to research agenda development			Themes covered in research agenda and selected keywords		
			Fieldwork	Literature	Point of view	Technology	Organization	Society/ environment
Little, Albala, Cooper, Crawford, Culwick, Foster, Gold, Paxton, Pessemier, Rothberg & Schmitt	1984	Yes			Invited commentary		Incentives, strategy, cooperation	Role of governments
Little, Holt, Till, Voss & Wind	1984	Yes			Invited commentary	IT, flexible manufacturing	Breakthrough innovation, creativity, user involvement	
Burger	1989	No	PDMA Colloquium				Leadership, forecasting, risk analysis	Role of governments
Mahajan & Wind	1992	No			Invited commentary		Product development models and use	
Albala & Rubenstein	1994	No			Invited commentary	Technology strategy/policy	Role of top vs division management in technology strategy/ policy	
Crawford & Rosenau	1994	No			Invited commentary		Teams, functional roles, metrics, rewards	
Day, Gold, & Kuczmarski	1994	No			Invited commentary		Ideation, strategic planning, leadership	
Devinney	1995	No			Invited commentary		Globalization	
Souder & Thomas	1994	No			Invited commentary		New product forecasting, family business innovation	
Voss	1994	No			Invited commentary	Technology acquisition, total quality	Process and product innovation intersection	
Hult & Scott Swan	2003	Yes			Special issue editorial	Process technology	NPD/supply chain management	
Kahn, Franzak, Griffin, Kohn, & Miller	2003	Yes	PDMA Research Colloquy			Internet integration	Leadership, process, value chains, budgeting	
Danneels	2004	No		Conceptual article		Disruptive technology	Incumbent, customer orientation	

TABLE 1 (Continued)

Author(s)	Year	(Co) authorship by JPIM editor(s)[a]	Approach to research agenda development			Themes covered in research agenda and selected keywords		
			Fieldwork	Literature	Point of view	Technology	Organization	Society/ environment
Lawrence & McAllister	2005	Yes			Special issue editorial		Culture, design	
Karniouchina, Victorino, & Verma	2006	No	Product & Service Innovation Conference			Technological evolution, IT	Marketing-operations interface, collaboration, service innovation	
Verganti	2008	No		Conceptual article			Sociocultural aspects to innovation through design	
Guiltinan	2011	No		Thematic review			Product line pricing	
Noble	2011	No			Invited commentary		Design orientation and strategy	
Barczak	2012	Yes	VCU Innovation Summit / JPIM Thought Leadership Symposium				Talent, idea screening, failure, globalization, collaboration	"Green mandate" in innovation
Di Benedetto	2012	Yes	JPIM Thought Leadership Symposium				Open innovation, failure, customer engagement	Sustainability
Hustad	2012	No	PDMA Research Forum/PDMA membership		Invited commentary	Computer-enabled tools, cloud computing	Portfolio, design, internationalization, launch	
Nakata & Di Benedetto	2012	Yes	JPIM Thought Leadership Symposium/ PDMA Doctoral Consortium		Special issue editorial		Global innovation, open innovation, and innovation function	Sustainability
Papastathopoulou & Hultink	2012	No		Thematic review			Service innovation, market fit, global new services	
Corbett, Covin, O'Connor, & Tucci	2013	Yes			Special issue editorial		Corporate entrepreneurship	
Barczak	2014	Yes			Editorial		Service innovation, global innovation, open innovation	Social innovation

(Continues)

TABLE 1 (Continued)

Author(s)	Year	(Co) authorship by JPIM editor(s)[a]	Approach to research agenda development			Themes covered in research agenda and selected keywords		
			Fieldwork	Literature	Point of view	Technology	Organization	Society/ environment
Chrisman, Chua, De Massis, Frattini, & Wright	2015	Yes			Special issue editorial		Heterogeneity of family firms, time dynamics	
Biemans & Langerak	2015	Yes	PDMA Research Forum			Digital/social/ mobile media	Customer involvement, service innovation, culture	
Lee & Coughlin	2015	No		Thematic review	*Perspective*	Older adults' adoption of technology		
Biemans, Griffin, & Moenaert	2016	Yes		Thematic review/ network analysis	*Perspective*		New service development	
Randhawa, Wilden, & Hohberger	2016	No		Bibliometric review			Open innovation strategy, co-creation, open service innovation	
Colombo, von Krogh, Rossi-Lamastra, & Stephan	2017	Yes			Special issue editorial		Radical innovation processes, collaboration, individuals	
Bstieler, Gruen, Akdeniz, Brick, Du, Guo, Khanlari, McIllroy, O'Hern, & Yalcinkaya	2018	No	PDMA Doctoral Consortium			3D printing, internet of things, big data and analytics	Open innovation, co-creation, and crowdsourcing	Sustainability-focused innovation
De Massis, Audretsch, Uhlaner, & Kammerlander	2018	No			*Perspective*		Innovation in Mittelstand firms	
Hopp, Antons, Kaminski, & Salge	2018	Yes		Topic modeling/ network analysis	Virtual issue editorial		Disruptive innovation	
O'Cass & Wetzels	2018	Yes			Special issue editorial	Online platforms, smart services, IT	Servitization, frontline of service innovation	
Griffin, Langerak, & Eling	2019	Yes			Virtual issue editorial		Cycle time	

TABLE 1 (Continued)

Author(s)	Year	(Co) authorship by JPIM editor(s)[a]	Approach to research agenda development			Themes covered in research agenda and selected keywords		
			Fieldwork	Literature	Point of view	Technology	Organization	Society/ environment
Lee, Spanjol, & Sun	2019	Yes			Special issue editorial	Enabling and legitimating technologies	Front end of innovation, human resource management	Social innovation measurement, governance
Micheli, Wilner, Bhatti, Mura, & Beverland	2019	No		Systematic review/ cluster analysis			Design thinking competence, culture, training	
Appio, Frattini, Petruzzelli, & Neirotti	2021	Yes			Special issue editorial	Digital transformation	Digital innovation process and management	
Wijekoon, Salunke, & Athaide	2021	No		Systematic review			Customer heterogeneity	
Bouschery, Blazevic, & Piller	2023	No			*Catalyst*	Generative AI	AI-augmented teams	Ecological (energy) costs of AI, responsible AI
Mertens, Rennpferdt, Greve, Krause, & Meyer	2023	No		Co-citations analysis		Production system technologies, digitalization	Product modularization, life cycle, platforms	Sustainability
Reynolds, O'Dochartaigh, Secchi, Marshall & Prothero	2023	No		Systematic review			Innovation framing	
Spieth, Breitenoser & Röth[b]	2023	No		Integrative review		Technology for business model innovation	Strategy and decision-making for business model innovation, metrics	
Stanko & Rindfleisch	2023	Yes			Special issue editorial	Digital twin, generative technologies	Digital manufacturing customer experience	Digital manufacturing sustainability
Xiao & Bharadwaj	2023	No	PDMA Doctoral Consortium			AI, extended reality technologies	Business model innovation, open innovation, culture	Sustainability, policies
Gama & Magistretti[b]	2023	No		Systematic review		AI applications in innovation	AI governance, decision-making, competence, ecosystem	

(Continues)

TABLE 1 (Continued)

Author(s)	Year	(Co) authorship by JPIM editor(s)[a]	Approach to research agenda development: Fieldwork	Approach to research agenda development: Literature	Approach to research agenda development: Point of view	Themes covered in research agenda and selected keywords: Technology	Themes covered in research agenda and selected keywords: Organization	Themes covered in research agenda and selected keywords: Society/environment
Ritala	2024	No			*Catalyst*	Platforms	Collective action, ecosystem scalability	Prosocial incentives, social and environmental value
Vassallo, Banerjee, & Prabhu	2023	No			*Catalyst*			Biocultural innovation

[a]Editor(s)-in-chief, special issue guest editor(s), triage editor, or virtual issue guest editor(s).
[b]Part of forthcoming *JPIM* special issue on reviews.

Technological issues in innovation management

After the organizational theme, a technological perspective is the second most frequently referred to, again varying widely in terms of scope. Danneels (2004) focuses on disruptive technology and outlines key gaps in understanding that scholarship should address, and Lee and Coughlin (2015) provide a discussion of the adoption of technological innovation among older adults. Technological aspects are raised within other topic domains, such as social innovation (Lee et al., 2019) and services innovation (O'Cass & Wetzels, 2018). In a cover essay for an enlightening special issue, Appio et al. (2021) consider the relationship between digital transformation and innovation management, effectively laying out a future research agenda in the area.

Social and environmental issues in innovation management

While social and environmental concerns in innovation management have become increasingly relevant due to pressing climate change and sustainable development concerns, even early *JPIM* research agenda published (e.g., Burger, 1989) included the "social importance" of innovation (e.g., role of governments in innovation processes) on an initial list of topics to be assessed. Although ranking last (out of eight "major issues") in this first *JPIM* research agenda effort conducting a thematic importance ranking in 1989 (Burger, 1989), social and environmental concerns have steadily increased in research prioritization since. The topics covered across research agendas under this theme range from very broad considerations (e.g., noneconomic performance and stakeholders in SMEs; de Massis et al., 2018) to more defined ones (e.g., social innovation; Lee, Spanjol, & Sun, 2019).

Looking forward

While the three broad themes (technology, organization, society/environment) have captured prior visions of innovation management's future, the world in which new solutions are being shaped is experiencing major shifts, ranging from disruptive global health events (such as the Covid-19 pandemic), wars that affect supply and value chains, climate change, and other large-scale societal issues (i.e., grand challenges). As firms grapple with questions regarding their fundamental purpose (Business Roundtable, 2019; World Economic Forum, 2023), innovation managers are also faced with challenges regarding how to assess and make decisions about value created and value destroyed across multiple stakeholders in innovation portfolios. Furthermore, as innovation management is embedded in the reality of increased mandated reporting and governance (e.g., ESG), the question arises

whether the three identified themes capture the future of innovation management adequately and if new perspectives are necessary. To that end, we engaged 21 leading innovation management scholars from various disciplinary and methodological backgrounds (joined by the two editors-in-chief) to uncover key research directions for our field, described next.

1.3 | The *JPIM Innovation Summit*: Co-creating innovation management research priorities

The *JPIM Innovation Summit* ("Summit" hereafter), held over 3 days in January 2023 in Honolulu, Hawaii, was the crystallizing event for the development of the insights presented here. At this event, 21 leading innovation scholars and the two *JPIM* editors-in-chief gathered together to form teams around central themes to be discussed below. Many of the attendees were Associate Editors with *JPIM*, supplemented by select others to round out the portfolio of research interests we wanted across the spectrum of innovation research. Importantly, the participants represent a variety of disciplinary perspectives within innovation management (including marketing, management, design, organizational behavior, leadership, and strategy, among others), with a combined Google Scholar citation count of over 250,000, and numerous editor roles across journals, demonstrating the collective thought-leadership gathered at the Summit.

The *JPIM Innovation Summit* was thus fairly unique in the sense that it is rare to have such a large group of leading scholars work on critical research directions for the field. Typically, such efforts are constrained to a session or two (e.g., at a doctoral consortium or conference), rather than a full 2.5 days of intensive discussing, writing, debating, and so forth. Even more unusual is the fact that most of these scholars had not co-authored together before, creating a rich cross-fertilization of expertise domains.

1.3.1 | *JPIM Innovation Summit*: Objectives and activities

To maximize the potential for insight from the assembled scholars, the Summit was designed to contain different activities, varying in terms of focus (i.e., generative ideation, selection, focused elaboration) and mode (i.e., individual work, plenum discussion, group work). The activities were sequenced to generate sufficient depth in identified research priorities, while also allowing for critical discussion between the activities regarding the domains identified and ultimately selected. Importantly, the Summit did not aim for a comprehensive and exhaustive research agenda, but rather an exemplary selection of important domains which scholars in the field of innovation management should investigate. Work on the five research priorities continued after the Summit over several months, with two rounds of detailed feedback provided to participants by the *JPIM* editors-in-chief. Table 2 provides an overview of the activities and formats.

The idea generation process at the Summit started out in an informal way, where participants exchanged with each other around three major questions (Table 2) as a way to get to know each other as well as prime their thoughts for the actual workshop. While these questions didn't directly relate to the ultimate goals of the Summit they did serve as broad-thinking thought-starters. The second day was the most rigorous workday of the Summit. We began with opening comments from the two *JPIM* editors-in-chief on the purpose, goals, and specific deliverables expected from the Summit. Rather than focusing on past efforts of "future of innovation research" (see Table 1), the presentation framed the major goals for the Summit:

- Mapping out the next 5–7 years of broad innovation management research priorities;
- Laying out a clear roadmap for the field with implications for research, policy, and practice; and
- Confirming and extending the thought leadership of *JPIM* in the area of innovation management.

Compared to prior "future research" efforts, the Summit was intended to have a much broader and richer base of insights (e.g., 23 scholars including the two EICs versus as few as one in some prior efforts), a more ambitious scope (e.g., putting more emphasis on societal implications than prior efforts), and a "deeper dive" into select future research areas than previous comparable efforts. This was achieved by sequencing a set of activities focused on ideation, selection (discussion and voting), and elaboration of research priorities (see Table 2 for details). The structured process resulted in the editors-in-chief identifying five teams of researchers who were then tasked with organizing themselves around five research priorities that emerged from the ideation and selection activities. Detailed exposition of the five research priorities are presented in Sections 2–6, with Table 3 providing an overview of the topics and contributors. There were three rounds of development over the next months by the teams to arrive at the final agendas as presented below. Additionally, three of the topics were discussed with practitioners on a panel at the *2023 JPIM Research Forum* (September 2023), and input was considered in the final

TABLE 2 Overview of JPIM innovation summit activities.

Day	Session	Format	Aim and Format	Questions/tasks
Day 1 (Evening)	Introduction	Individual work & dyadic exchanges	Participants are getting to know each other, first reflection and discussion around questions, "snowball fight"	Objective: Warm up and get to know each other 1. What was the most memorable/surprising finding you had in a research project on innovation management? (Biggest aha!) 2. If you were to advise a large corporate or country on THE most important thing they needed to focus on for innovation in the next 5 years, what would it be and to which corporate/country would you make that recommendation? 3. What do you think will be the biggest innovation failure in the next 5 years?
Day 2 (All Day)	Welcome and Lightning Round	Individual work and presentation in plenum	Aims of Summit presented, initial priorities elicited in plenum and voted on during break	Objective: Identify and pitch pressing research questions (RQ) Draft 1–2 research questions that are critical to answer. 30 seconds to present, voting in plenum
	Working Session #1	Group work	Generation of important research questions	Objective: Build on initial RQs and expand towards a topic domain. Poster 1: Original RQ + 3 additional related RQs Poster 2: One figure that summarizes all 4 RQs into a cohesive conceptual framework/model Title of a hypothetical JPIM special issue based on the ideas in the conceptual framework
	Working Session #2	Group work and presentation to plenum	Methodological implications from research questions identified	Objective: Examine RQs from a methodological perspective. Poster: What is the ideal data for answering RQs specified in WS1? Specific level, source, and so forth. What would be needed to get access to such data? Identify methods needed to analyze the data properly. Are there methods or disciplines that would need to be engaged for expertise or borrowed from other fields? Title of a hypothetical JPIM special issue if one were to be hosted based on the method and data needs.
	Working Session #3	Group work and discussion in plenum	Identification of what is missing from sets of research priorities and questions, in group and plenum	Objective: Identify what might be missing Group discussion—identification of what needs to be added to the comprehensive research agenda but is not yet represented on the posters. Open discussion
	Reflection and Wrap Up	In plenum	Open critical discussion	Objective: Critical avenues for inquiry in innovation management research wrap up
Day 3 (Morning)	Working Session #4	Group work	Translating ideas into structured outlines	Objective: Craft outlines of research agenda contributions Groups construct an outline and structure + initial figures, tables, and references In addition to incorporating key references, look outside of established literature and speak to your phenomena (e.g., developments in practices, societal and technological trends, etc.)

TABLE 2 (Continued)

Day	Session	Format	Aim and Format	Questions/tasks
	Working Session #5	Group work and discussion in plenum	Further development of structured outlines to serve as a basis for post-Summit work	Objective: Finalize outlines of research agenda contributions Full outline based on RQ work and identifciation of how group is going to collaborate after the Summit

write-up. Before presenting these five research priorities, we next discuss a set of broader implications for future innovation management research arising from the Summit and insights from prior research agendas in *JPIM*.

1.4 | Future research implications and discussion

We started out by looking back to discover how prior *JPIM* efforts towards identifying critical research directions were shaped and identified a variety of processes to arrive at the priorities and three major themes (organization, technology, and society/environment) across past research agendas. Through an interactive, in-depth workshop over 2.5 days with a group of leading innovation management scholars, we see some continuity with these themes, yet also a shift towards more "big picture" thinking in our field. Specifically, our participants identified research directions that recognize a fundamental shift in how the environment and our world work (i.e., liquid innovation), stakeholders that are moving into focus (i.e., public innovation), governance processes that require a broader view (i.e., responsible innovation), and technologies that are disruptive or changing the nature of innovation and its processes (i.e., AI), having to consider a broader view of value creation and capture in innovation management (i.e., business model innovation). Each of these themes is described in more detail in Sections 2–6 (see Table 3 for an overview) by our participant teams.

While our general analysis of prior research agendas uncovered a few broad themes (i.e., technology, organization, and social/environmental concerns) that continue to be reflected in the five research directions, the Summit represented a more intense scholarly dive into not just specific topics but broader forces and trends which will need to influence future innovation management research to produce impactful findings. Reflecting upon the debates at the *JPIM Innovation Summit*, the resulting research directions, and the turbulent world around us, we highlight three facets of the underlying logic of innovation management as a research domain that appear to be at the minimum in question or even already in flux, and which we encourage innovation management scholars to actively reflect upon in their research projects.

1.4.1 | The logic of formality and stability

Much of the cumulative evidence in innovation management points to the benefits of having formal, streamlined processes to ensure activities and decisions are comprehensive and decision-making reflects functionalities and relevant stakeholders. Yet, innovation and new product development (NPD) have also, and notoriously so, struggled with the tension between rigidity and adaptability. Firms strive for a formally structured approach to NPD (e.g., stage gate, six sigma) though more nimble approaches (e.g., design thinking, lean innovation) are gaining momentum. This shift is likely spurred by the wide-ranging shocks facing the world in recent years, including a pandemic, a multitude of regional military conflicts, seismic political upheaval in many countries, and the emergence of perhaps the most profoundly disruptive technology in the last century (i.e., artificial intelligence). As the authors of the liquid innovation essay highlight, management must accept a different set of guiding principles in this turbulent environment such as the "new normal" of near chaotic turbulence in markets and organizational environments. In a sense, this changes the typical logic of formality and stability in innovation management, which suggests that learning more about the market, customers, and technology will whittle down uncertainties, so that robust and reliable information is available by the time a new product approaches the launch stage. Under the "liquid innovation" logic, however, this might not be the case anymore.

Accepting this new paradigm of liquid innovation requires a fundamental rethinking of not just what we study, but of how we study. As mentioned in the introduction of this essay, research techniques such as the use of managerial surveys and the analysis of secondary data are inherently rear-view approaches. It is not a large stretch to suggest that both of these approaches are fundamentally flawed in a world of liquid innovation. While

TABLE 3 Overview of *JPIM* innovation summit future research directions.

Section	Title	Contributors	Key ideas
2	The Logic of Liquid Innovation	Ricarda B. Bouncken, Sabine Kuester, Aric Rindfleisch, Roberto Verganti, Martin Wetzels	• Shift in Innovation Paradigm: The essay highlights a fundamental shift in the underlying logic of innovation, transitioning from solid to liquid forms, influenced by global crises, economic changes, and the digital revolution. A new taxonomy outlines how liquid innovation practices differ from solid innovation practices concerning targets, processes, instruments, structures, relations between actors, consumer behavior, and offerings. • Characteristics of Liquid Innovation: The liquid innovation logic captures the transient (rather than discrete), incomplete (rather than complete), and plural identities (rather than singular) of liquid innovation. • Future Research Directions: The essay proposes intriguing research questions across innovation, innovator, and offering domains, encouraging exploration of managing liquid innovation, understanding consumer roles, and navigating the digital-physical landscape amid fluid identities and needs.
3	Implications of (Generative) Artificial Intelligence for Research on the Management of Innovation	Markus Baer, Gerda Gemser, Dhruv Grewal, Martin Hoegl, Andrea Ordanini	• This section describes the evolution of the role of AI in the innovation process across four stages (tool, interactive support agent, fully equivalent team member, autonomous leader of innovation initiatives). • The new product development process is used as a scaffolding to highlight a set of research questions regarding AI-enhanced innovation. • The need for conceptual and theoretical development in two areas to support these future research efforts is highlighted.
4	Business Model Innovation: An Understudied but Prevalent Form of Innovation	Marcel L. A. M. Bogers, Minu Kumar, Alina Sorescu	• Business model innovation is described as a change in the value creation, value appropriation, or value delivery function of a firm that results in a significant change to the firm's value proposition. • The drivers of business model innovation are more likely to be market factors, rather than the technological knowledge and capabilities that have been highlighted as drivers of product innovation. • Business model innovations can have significant positive financial consequences for firms, but they can also transform industries and even have profound socio-ecological consequences such as, for instance, business models leveraging peer-to-peer platforms have had on the ecosystems in which they operate.
5	Public Value Innovation: Key Features and Research Directions	Jonathan Bohlmann, Luigi M. De Luca, Ruby Lee, Dominik Mahr	• Public Value Innovation (PVI) is the development and implementation of new products, services, processes, and ideas that

TABLE 3 (Continued)

Section	Title	Contributors	Key ideas
			create value for society by addressing grand challenges. • PVI emerges from an ecosystem of private actors, public actors, and citizens who co-create innovative, challenge-led, and context-specific solutions. • PVI redefines the concept of innovation value, and requires new and specific capabilities, culture, work processes, business models, and innovation success metrics.
6	Re-Envisioning the Innovation Process in Business: A Research Agenda for Responsive and Responsible Innovation	Ludwig Bstieler, Rosanna Garcia, Cheryl Nakata, Victor Seidel	• Research on responsible innovation (RI) lends itself to considering broader societal issues such as environmental issues, social changes, governance, and sources of value generation. • Research on RI can include a focus across four key topic areas: Awareness, adoption, positive societal impacts, and foresight. • Tensions that may be explored in RI research will include stakeholder, motivational, time-horizon, standards, outcome, and agency tensions.

managerial surveys may be gathered in the present, they are based on the reflections of respondents on events that may be years in the past. Secondary data may create even more dramatic concerns, given that we draw insights from events that may have happened decades earlier to shape thinking in the present. The principles of liquid innovation suggest that this may not be a fair extrapolation to introduce these generalizations into a significantly changed world. These problems are only exacerbated by our modern academic publishing process where top journals may take multiple years to bring research insights into the public view.

The need for nimbleness in the practice of innovation management mirrors the need for nimbleness in our research methods and publishing process. We expect that the years ahead will see an even greater emphasis on behavioral data and real-time data collection such as the gathering of biometrics. The proliferation of tools for the collection of digital data helps achieve these goals as even something as ubiquitous as a smartphone has become a powerful data collection device. At the same time, it is unclear how generative such insights would be through observing what is being done (i.e., behavioral data), as opposed to imagining behaviors that might be entirely different from what is being observed (e.g., through science fiction; Michaud & Appio, 2022). For example, while highly effective, the "never ending scroll" arose from behavioral data analysis and has led to the overuse of social media.

In general, however, academic research has probably been less successful in understanding the inner workings of organizations in this liquid environment in such a real-time way; however, there do seem to be emerging, interesting opportunities for the fluid interaction with personal technology in the workplace. For example, the breakthru app for Microsoft Teams encourages moments of personal reflection, meditation, and other forms of mental wellness in the midst of a busy workday (Raghavan, 2023). The use of this kind of technology also suggests real-time data collection opportunities. This is just one example of how we may strive to close the gap between data and insights.

Closing the gap between insights and publication may be even more challenging as the academy seems fixed on the notion that rigor is paramount in our publishing and only comes with a lengthy review process. There are many merits to this research approach as there are merits to our traditional research methods. However, the authors of the Liquid Innovation essay suggest that the incentives to create true value in our research by understanding the changing world in which we live and work will require some fundamental rethinking in these areas.

1.4.2 | The logic of markets

The range of perspectives on innovation management phenomena (in *JPIM* and other journals) has grown over

the decades as a result of changing organizational practices, governance models, and technologies. Yet, the market logic informing innovation management practice and scholarship has remained remarkably stable. Despite considering additional functions (e.g., design, data analytics), collaboration modes (e.g., open innovation), stakeholders (e.g., industry ecosystems), and types of innovation (e.g., social and environmental innovation), our field has largely retained a focus on measuring performance in terms of market success (customer and other metrics) and financial returns (profit, revenues, and stock returns). This is being challenged by the concept of public value innovation, which offers a new way of thinking about innovation and its potential to improve the well-being of our society. Under such a nonmarket logic, a disconnect emerges between what is taught in innovation management courses across levels and the necessary capabilities underpinning innovation that serves society, rather than particular markets. While interdisciplinary teaching and research is generally accepted and recognized as beneficial in our domain, we think of interdisciplinarity predominantly within business schools and across its departments, and possibly with engineering management and design colleagues. Rarely do scholars in our field collaborate with political science, public policy, or public administration colleagues, for teaching likely even less than for research. Thus, questioning the market logic prevalent in our field also means questioning the (natural) boundaries associated with its scope.

Apart from reconsidering the theories and sets of assumptions when questioning the market logic, there are also implications for methodological choices. The success of a public value innovation would need to be assessed substantially differently. Rather than customers and producers capturing the majority of the value created by innovation, researchers would need to assess benefits accruing to public entities, citizens, and society at large. In addition, how to trace the impact of an innovation (both positive and negative, as suggested by the responsible innovation essay) on a city or society is currently largely outside of the methodological toolbox of innovation management researchers. Finally, who is "managing" such public value innovation, and is the term "management" then still at the core of our domain? We would argue that it still is, as management is essentially a matter of responsibility (for employees, for customers, for the environment).

Of course, the question that naturally arises is whether innovation management publication outlets (including *JPIM*) will need to redefine their target audiences. Already we see authors discussing policy implications from their theorizing and findings in *JPIM*, yet we know that policy makers and public administration researchers rarely (if ever) consider *JPIM* as a source of important insights to track. One possibility is for our community to seek out joint workshops or conferences, bringing together our scholarly domains at a defined intersection (such as public value innovation). Another important question is whether such a (partial) shift to a different, nonmarket logic in some of the research conducted and published in our field is "in step" with the shift occurring in the business landscape, with organizational purpose coming into the foreground and firms attempting to measure their societal impact, such as some pharmaceutical firms do in terms of employment created in specific locations where they operate and quality-adjusted life years of communities due to the introduction of certain medications.

1.4.3 | The logic of bounded time

Collectively, the research directions presented in the next section imply changes to how we view time in our research projects. That is, we consider it appropriate to measure the speed of innovation (e.g., NPD cycle time, sequential introductions of new products), the span of innovation management (e.g., innovation horizons, radical innovation projects, product line extensions), or the window of returns to innovation (e.g., stock market event studies, annual financial performance). Several of the research directions emerging from the *JPIM Innovation Summit* (including liquid innovation, the deployment of AI technologies, public value, and responsible innovation) suggest time in innovation management must be reconceptualized. With organizational structures and processes in constant flux (liquid innovation) and continuous behavioral data as the foundation of innovation decisions (AI-enabled innovation), the implication seems to be an ever-decreasing window of time to consider for (re)assessment and (re)evaluation. Yet, with public value innovation tackling large-scale societal problems and business model innovation encompassing broader initiatives than project-level NPD, time windows for ideation, initiation, and implementation of innovation expand. How to reconcile these opposing forces presents a formidable challenge for our domain.

On the one hand, we see the need to expand the type of data we utilize in innovation management research at both ends of the spectrum. To capture the liquidity and generative AI aspects of innovation, we require continuous data that reflects micro, real-time observations. To enable research on public value and responsible innovation, we require long-term, macro data. Neither of these are typically in our field's repertoire. To effectively study business model innovation, one often needs multi-level data at the

organizational, unit, and product levels. Again, an implication is that more (and perhaps different) collaboration with other disciplines is needed (data scientists, public administration scholars, etc.) as well as an expansion of the methodological training we provide to doctoral students.

Another aspect of time that must be considered is the acceptability of the lengthy time frames inherent in review and publication processes in business journals specifically and social sciences generally. If we think the research we publish is truly important, timely, and needed to solve pressing problems (as argued especially by the public value innovation, responsible innovation, and AI essays), is it appropriate to allow 3–5 or more years to pass from the start of a project to its publication? Other disciplines may be thinking differently about the cost of time, with estimates of submission-to-publication time for successful papers about 3–6 months[3] at *Nature*, a similar time frame at *Science*,[4] and as quickly as 2 weeks at the *New England Journal of Medicine*.[5] Why do our business journals take so much longer to bring important insights to light? It is unlikely that "higher standards of rigor" are the answer when compared with journals publishing critical medical about pandemics, for example.

There are, of course, substantial differences in how research is conducted and published in health and natural sciences, when compared to social sciences, including innovation management. For one, published research articles are much shorter. The maximum length of original research submissions to the *New England Journal of Medicine* (*NEJM*) is 2700 words with a maximum of 40 references, evidence-based review articles may run up to 3000 words and 75 references,[6] and *Perspective* articles (covering timely, relevant topics "in an accessible style") may be up to 1200 words (i.e., about 45% of an original research article) and five references. At *JPIM* and most business journals, articles are typically between 9000 and 10,000 words and include over 100 references. In that sense, the *JPIM Catalyst*, with about half the length of a regular article, is comparable in format to a *NEJM Perspective* and also faster in dissemination. Yet, there may be opportunities at *JPIM* for additional formats, such as letters to the editor, commentaries, brief reports, viewpoints, and others, which are faster to process and evaluate according to different criteria than original research articles. In a sense, such formats may also complement conference proceedings, ensuring a continuous dialogue in our scholarly community. To enable these different formats and processes, the editorial roles might need to be reimagined and expanded. During our tenure as editors-in-chief, for example, we created a dedicated associate editor role in charge of developing early career scholars' reviewing capabilities, with Minu Kumar taking on that role. We believe much more is possible in terms of formats that enhance the timely dissemination of key insights.

A second key difference between business and health and natural sciences research is the collaborative nature (i.e., larger teams) and specialization in author teams. Original research articles published in recent *NEJM* or *Nature* issues, for example, were regularly authored by over 20 researchers. With larger teams and dedicated roles, author contribution statements are often mandatory in natural science and health journals, providing not only transparency but also an acknowledgment that science is a "team sport". Yet, in business journals smaller teams might not only take longer to complete and publish research studies, but also convey the (implicit) expectation that researchers are excellent data collectors, statisticians, writers, project managers, and so on. Of course, changes in collaboration and specialization would require a rethinking of doctoral training formats and expectations, along with (again) increased engagement with other disciplines that bring their own skill set (see preceding sections on changing logics). Again, JPIM may have an opportunity to take on leadership in this realm and create sessions at the *PDMA Doctoral Consortia* and *JPIM Research Forum*, with special contributions in the journal reflecting those activities.

In sum, it seems clear that if we want to truly contribute to solutions targeting the global challenges in human, planetary, and societal health, we need to find ways to get important insights emerging from our research projects completed and published more quickly and in a variety of formats. Perhaps the perspective that needs to be adopted is that all research has a "half-life", that is, from the moment a valuable insight is gained it immediately begins to degrade in the face of changing environmental factors, competitive action, and other factors. We need to push back against this degradation, finding ways to get quality research more efficiently into the hands of those who can use it.

As you read on and reflect upon the five research priorities emerging from the *JPIM* Innovation Summit presented in Sections 2–6 (Table 3 provides an overview of the authors and key ideas of these research directions), we hope you feel energized and inspired by the possibilities of our field, as well as committed to ensure our *JPIM* community stays at the forefront of impactful innovation management research.

[3]https://support.nature.com/en/support/solutions/articles/6000131708-timescale-to-publish-an-article-for-a-springer-nature-journal.
[4]https://www.science.org/content/page/journal-metrics.
[5]https://www.nejm.org/about-nejm/editorial-policies.
[6]Similar length restrictions exist for submissions to *Science* and *Nature*.

2 | THE LOGIC OF LIQUID INNOVATION

Ricarda B. Bouncken, Sabine Kuester, Aric Rindfleisch, Roberto Verganti, Martin Wetzels

The innovation management domain is currently being transformed by a variety of forces including global crises, economic challenges, and the digital revolution (Rindfleisch, 2019; Wetzels, 2021). We propose that one important (but under-recognized) manifestation of this transformation is the emergence of a fundamental change in the underlying logic of innovation itself. Specifically, we propose that the domain of innovation is shifting from an institutional logic that has been largely solid in nature to one that is increasingly liquid.

2.1 | Institutional logic

The concept of institutional logic has captured the attention of both strategy (Greenwood et al., 2010) and marketing (Moorman & Harland, 2002) scholars but has remained conspicuously absent within the innovation domain (Lyytinen, 2022). In brief, institutional logic refers to the mindset and worldview underpinning a set of beliefs and practices (Thornton & Ocasio, 2008). Specifically, Thornton et al. (2012, p. 2) define institutional logic as *the socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values and beliefs, by which individuals and organizations provide meaning to their daily activity, organize time and space, and reproduce their lives and experiences.*

In essence, institutional logic provides participants in a particular domain with a shared framework upon which to structure their thoughts and actions (Lee & Lounsbury, 2015). According to a growing number of scholars, rapid changes in technology, society, and culture are currently shifting the logic that underlies a wide swath of institutions (e.g., Vaskelainen & Münzel, 2018). One essential cause of this shift is the emergence of liquid modernity.

Although there is just scant research on connecting institutional logics and innovation (Lyytinen, 2022; Pahnke et al., 2015), the institutional logic perspective offers us a powerful frame of interpretation to make sense of how innovation is affected by profound changes in society, and in particular of the emergence of fluidity in modern life (Bardhi & Eckhardt, 2017). For example, due to the globalization and emergence of powerful digital technology, many professionals are becoming global nomads who frequently relocate across the world and adopt constantly changing identities (Bardhi et al., 2012). This development has been coined "liquid modernity" and is characterized by "fragility, temporariness, vulnerability, and inclination to constant change" (Bauman, 2013, p. 8). According to this perspective, individuals but also ideas and offerings often take on a fluid quality and may express a "multiplicity" of identities in a relatively seamless manner.

Although the concept of liquid modernity has received little attention within the innovation domain, it has attracted recent interest among scholars in the related domain of consumer behavior (e.g., Bardhi & Eckhardt, 2017; Villaespesa & Wowkowych, 2020). For example, Bardhi and Eckhardt (2017) propose that solid (i.e., materialized) activities such as collecting physical memorabilia are increasingly being replaced by liquid (i.e., dematerialized) activities such as consuming digital entertainment. In addition to altering an offering's material form, liquid consumption's ephemeral nature and access orientation also allows consumers to play a more central role in the value-creation process compared to their solid counterparts (Bardhi & Eckhardt, 2017).

2.2 | Conceptualizing liquid innovation logic

In accord with these prior conceptualizations, we define the logic of liquid innovation as innovation-related beliefs and practices that are (1) transient (rather than discrete), (2) incomplete (rather than complete), and (3) displaying plural (rather than singular) identities.

The transient nature of liquid innovation is manifest in the transformation that characterizes many contemporary offerings, to the point that some products live "in the moment". This characteristic is evident in Netflix, which employs sophisticated AI algorithms to instantaneously create a unique interface for a specific user at a specific moment in time (Verganti et al., 2020). The incomplete nature of liquid innovation can be seen in offerings taking the shape of platforms that can be easily modified by their creators and users both before and after release. For example, Tesla employs IoT technology to liquify innovation in automobiles via downloadable software updates that provide added functionality over time. As a case in point, Tesla Model 3 automobiles have been equipped with internal cameras since 2017 but were only made functional in 2020 (Verganti et al., 2020). Finally, the plural identity of liquid innovation recognizes the fact that both products and the people who develop them may assume multiple identities simultaneously. For example, AI avatars and other forms of digital twins provide offerings with both a physical as well as a digital form

(Fukawa & Rindfleisch, 2023). AI is in this sense offering opportunities to significantly rethink the role of humans in innovation projects (Section 3). In addition, people engaged in innovation processes increasingly adopt multiple identities in response to societal changes and technological advancements. For example, co-creation platforms such as Thingiverse.com allow individuals to be both designers and consumers (Ohern & Rindfleisch, 2010; Schuhmacher & Kuester, 2012).

In a sense, the nature of innovation itself is inherently transient, incomplete, and plural. For example, needs and technologies continuously evolve, and customers are diverse individuals who play multiple roles and lead lives that keep changing. However, these liquid aspects were often underappreciated and underserved due to the limitations of prior technological regimes such as the industrial revolution and mass manufacturing, which made it practically impossible and economically irrational to design and develop large-scale customized solutions. Instead, offerings were typically designed for segments of users and then manufactured at scale while undergoing little more than minor tweaks during their lifecycle. In essence, until recently innovation was largely solid in nature and frequently occurred in a highly modular fashion that often required a sizeable degree of investment (Benkler, 2006).

The key differences between traditional (i.e., solid) innovation logic versus liquid innovation logic are summarized in Table 4 where we contrast the solid with the liquid innovation logic along several dimensions that are relevant to bring about innovations under these two opposing logics. While organizations have partially embraced elements of the liquid innovation logic, they will need a fuller immersion into this logic to account for the various technological and societal developments already well on the way.

The emergence of liquid innovation logic has been facilitated by the development of new digital technologies (e.g., artificial intelligence, 3D printing, and networked communications). These technologies dramatically reduce the cost and time of designing, manufacturing, and delivering products and allow complex tasks to become more and more scalable, modular, and granular (Benkler, 2006). As a result, activities that used to be static in nature and conducted by a few individuals within a firm are increasingly dynamic in nature and capable of being conducted by thousands of individuals across the world. For example, the development of the desktop computer and the Internet dramatically transformed more solid forms of knowledge such as the Encyclopedia Britannica into more liquid forms of knowledge such as Wikipedia (Benkler, 2006).

The concept of liquid innovation also enriches and extends prior research in the innovation domain. For example, the co-creation literature recognizes that the boundaries of the firm have become blurred and that innovation activities can benefit from input from a variety of external stakeholders (Kuester et al., 2017; Menz et al., 2021; Ohern & Rindfleisch, 2010). For example, Wikipedia engages in liquid innovation by employing a loosely connected coalition of individual contributors that perpetually update entries across a wide variety of topics (Jemielniak & Raburski, 2014). Moreover, contributions to Wikipedia are emergent rather than planned and contributors can be located anywhere across the planet.

In addition to its links to co-creation, the concept of liquid innovation also connects with research on the impact of new organizational forms on innovation management (Mousavi Baygi et al., 2021) and value creation via business model innovation (see "Business model innovation—an understudied but prevalent form of innovation," Section 4). Prior research in this domain suggests that decentralized and organic (i.e., fluid) organizational forms enable companies to remain innovative when operating in high velocity environments (Cooper, 2021). These types of fluid organizational forms often employ flexible control mechanisms, virtual operations, and diverse contributors who are typically located in a variety of spatial contexts (e.g., traditional office, coworking-space, home-office) (Bouncken & Tiberius, 2023). For example, PricewaterhouseCoopers recently established Experience Centers in which its employees, clients, and external experts generate creative solutions in flexible working spaces equipped with the latest digital technologies.

In sum, although the logic of liquid innovation may be an emergent concept, it is closely connected to both the theory of liquid modernity as well as several recent developments in innovation thought and practice.

2.3 | Key principles of liquid innovation

The transition towards an institutional logic imprinted by liquidity has profound implications for both innovation scholars and managers. For managers, it implies a substantial change of mindset in the way innovation is practiced. For scholars, it implies a need to rethink the very nature of innovation. To assist with both managers' and scholars' transition to this new perspective, we propose a new ontology for innovation based on three key principles. These principles are discussed below and summarized in Table 5.

TABLE 4 Differences between solid and liquid innovation management practice.

	Solid innovation logic	Liquid innovation logic
Targets and planning	• Specified targets and nested sub-targets • Formalized top-down planning, hierarchy, defined roles • Following the trajectories of paths	• Adaptable, moving and updating targets, and slack • Circular planning, meshwork, supporting reinventing of the firm • Experimentation with novel pathways, grass-roots processes
Processes	• Chronologically moving forward by discrete instances, "chronos" • Episodic: Clear beginning, clear end • Actor-centricity innovation	• Finding the "Kairos" and temporal flows of action in complex systems • Continuous: No beginning, no end • Distributed innovation, serendipity
Instruments	• Formal innovation management and controls, bureaucracy • Functional focus of tasks and skills, skill training • Single-team systems, siloed knowledge	• Informal innovation management, monitoring of mutuality, adhocracy • Job crafting, reskilling, co-creation • Multi-dynamic teams in open workspaces and virtual work
Structures & Forms	• Establishing and preserving norms • Defining and maintaining clear boundaries • Rather centralized	• Evolving new norms • Blurred boundaries and boundary spanning • Decentralized and organic
Relations between Actors	• Long-term commitments, permanent with sense of continuity • Forces towards uniting and singular identities • Forces towards coherence, speaking with one voice	• Long-term commitments as liability, fleeting, and discontinuous • Dual and plural identities • Allowing for polyphony, encouragement, and attention to different voices
Consumer Behavior	• Ownership-based, possession-dominated • Enduring and persistent • Clear holistic, unified, or dual identities easy to assess	• Subscription-based, use-focus • Access-based, on-demand • Ephemeral and transient identities difficult to assess
Offerings	• Complete, fully developed for set of use cases • Designed once and permanently fixed • Materialized, physical offerings	• Incomplete "envelopes of possibilities", easy to modify and remix • Designed "in the moment" and open-ended • Materialized and dematerialized, digital offerings

2.3.1 | Principle 1: Change is the norm, stability the exception—A new ontology of "innovation"

As noted earlier, one of the defining characteristics of liquid innovation is continuous transition. Thus, under the logic of liquid innovation, the boundaries of design, manufacture, and consumption become quite blurred (Verganti et al., 2020). As a result, firms need to manage an innovation process that lacks both a distinct beginning and a clear end. As noted by Bardhi & Eckhardt (2017, p. 584), "Mobility, flexibility, and openness to change are currencies of liquid modernity." For innovation managers, these characteristics suggest the need to transform the innovation function from a discrete to a continuous process that entails closely monitoring environmental changes, shifts in stakeholder needs, and rapidly emerging technological opportunities. In addition, managers will need to acquire resources and develop capabilities that allow them to design and deliver products "in the moment" in concert with a variety of stakeholders both within and outside their organization.

Managing this type of continuous innovation process is likely to be a very challenging task, as a number of stakeholders may exhibit inertia and reactance towards these changes. Indeed, Bauman (2007, p. 31) observes that "the desire for durability, stability, and security can potentially be a liability in liquid modernity." For scholars, the fact that products are subject to continuous change and transition complicates the task of identifying what a "new" product is and how it begins. From the perspective of liquid innovation logic, when does an innovation project start and end, if ever? Likewise, a liquid perspective challenges the very notion of what an "innovation" is and who creates it. In order to address these ontological dilemmas, innovation scholars will likely need to adopt a more relativistic perspective toward the innovation process and become comfortable with the notion that innovation may not have a natural beginning or ending.

TABLE 5 The transition from solid to liquid innovation logic.

Solid innovation logic	Liquid innovation logic	Key principle	Ontological focus	Research questions
Discrete	Transient	Change is the norm, stability the exception	Innovation	*RQ1*: *How can firms best manage liquid innovation? In particular, what is the impact of dual or rotating leadership structures upon liquid innovation?* *RQ2*: *How does the innovation process differ when an offering is accessed rather than owned?*
Complete	Incomplete	Incompletion is a feature rather than a bug	Innovator	*RQ3*: *To what degree should an offering's characteristics and features be fixed prior to its launch* versus *being adaptable to changing conditions?* *RQ4*: *What roles* (e.g., *contribution*, *testing*, *selection*, *production*) *should consumers play in the creation and production of new product offerings?*
Singular	Plural	Innovation has multiple rather than single instances	Product	*RQ5*: *When should a new offering be digital*, *physical*, *and/or dual in nature?* *RQ6*: *How should customer needs and desires be assessed and incorporated when identities are increasingly fluid in nature?*

2.3.2 | Principle 2: Incompletion is a feature rather than a bug—A new ontology of "innovator"

In the context of liquid innovation, products are no longer rigid and fixed. Instead, they are fluid in nature and represent an "envelope of possibilities," and allow customers to participate in their development (Francis & Bessant, 2005). For example, new flexible techniques such as mass individualization allow customers to select product variants to generate personalized product versions (Qin & Lu, 2021). These techniques are facilitated by new digital tools (such as 3D printing) that allow individuals to remix existing offerings in new combinations or develop their own creations (Rindfleisch & O'Hern, 2015). For example, the music file-sharing platform, CCMixter enables creators to post snippets of music that can be remixed by others. As new technologies (such as generative AI) emerge as relevant to the management of innovation (Section 3), remixing will increasingly become part of the design and manufacture of not only intangible offerings but also physical goods (Rindfleisch & O'Hern, 2015). According to Hill and Monroy-Hernández (2013), remixing is more likely to be facilitated when a product is at least somewhat incomplete in nature. As a result, under a logic of liquid innovation, firms may no longer wish to design and develop fully functional offerings.

The notion of incompleteness raises several interesting dilemmas for innovation practice. For example, how to control the identity of a product that may be largely unfinished in nature, who is responsible for quality and failures, or how to handle ownership of future adaptations? Likewise, product incompleteness offers some intriguing challenges for innovation scholars in terms of understanding the role of the "innovator" and conceptualizing the journey that a product may endure as it evolves through cycles of creation and remixing. This fluid nature of product development also complicates the notion of causality and demand estimation. In response, innovation researchers may need to embrace methods such as theories-in-use that develop inferences based on the actions of individuals to be able to explore how innovation evolves in natural habitats (Zeithaml et al., 2020). The theories-in-use approach can help to unearth the tacit and nontacit knowledge of consumers, managers (or whoever the innovator is), and other relevant stakeholders capturing their everyday decisions and actions as they unfold. This sensitivity to (the liquid) context brings consideration of the diverse voices and power dynamics among stakeholders involved (Reed & Rudman, 2022).

2.3.3 | Principle 3: Innovation has multiple (rather than single) instances—A new ontology of "product"

According to the logic of liquid innovation, a product may take on different instances and may exist in a plurality of dimensions. For instance, a digital design that may be easily remixed may not only differ across various users but may also differ within a given individual over time. A good example of this dynamic quality is the Thingiverse Customizer, which allows 3D printing enthusiasts to easily adapt a digital template into various manifestations across a set of design parameters (Wittbrodt et al., 2013). As a result, offerings are *not something fixed once and for*

all, but something that can exist in different, potentially infinite versions (Manovich, 2002, p. 36).

The idea that an offering may have multiple instances has important implications for both innovation thought and practice. In terms of innovation management, these multiple instances can be numerically represented and easily altered via algorithms. The ability to offer multiple instances within a single offering should also enhance a product's value proposition and bolster firm performance due to enhanced personalization, an ability to constantly update product features, and the ability to experience an offering in both digital and physical form (Fukawa & Rindfleisch, 2023). The multiplicity of product instances also raises some intriguing opportunities for innovation scholars in terms of redefining the notion of a "product" and conceptualizing all of the possible instances that an offering may manifest throughout its life cycle.

Organizations that purposely leverage digital opportunities to expand the learning capabilities of products will enjoy significant benefits in terms of value creation at the firm but also ecosystem levels (Section 4). This implies the need to embed into a product a learning system (e.g., machine learning), sensing capabilities (thanks to the diffusion of the Internet of Things), and continuous connection with data lakes. Value creation comes not only from the possibility that every user always interacts with the most updated and personal product. It also comes from the possibility for individuals to experiment with product usage through different versions of the product, and to simultaneously enjoy different product identities, as they entertain different personal identities. This liquid mirroring of plural identities, at the personal and product levels, and therefore the emergence of multiple person-product dyads is one of the most fascinating and unexplored paths ahead of us.

2.4 | Research questions

Due to its emerging nature, the concept of liquid innovation provides ample opportunities to investigate a wide array of interesting and important innovation-related questions. As a starting point, we offer a set of six future research questions in this domain. These questions, which are organized across the three ontological foci (i.e., innovation, innovator, and offering), are detailed below and summarized in Table 5.

2.4.1 | Research questions related to the innovation

The transient nature of liquid innovation demands a continuous integration of knowledge and solutions across diverse stakeholders within a firm as well as outside its boundaries. This type of continuous flow of information and actions is often complex and difficult to control. The challenge is further exacerbated by the plurality of people engaged in the innovation process, who constantly move between different identities (e.g., innovators, producers, entrepreneurs, users). The fluid nature of people and processes poses significant challenges for innovation managers (Pesch et al., 2021). For example, managers face the difficulty of trying to facilitate openness and listen to diverse voices, and promote grassroot processes while avoiding the risks of devolving the innovation process into a chaotic mix of adhocracy and polyphony. One possible solution to this dilemma might be dual leadership structures, which allows a firm to bounce back-and forth between two different leaders. Alternatively, firms may try to rotate leadership by revolving decision control across different stages of the innovation process. Although rotating leadership is not completely fluid, as it defines some roles and responsibilities, it reduces the type of solidification of beliefs and practices that often are seen when a leader is fixed in a role for a long period of time. Rotating leadership might also inject a new and diverse set of network relationships that can help ensure that an innovation process remains liquid in nature and in a state of flow.

> **RQ1.** *How can firms best manage liquid innovation? In particular, what is the impact of dual or rotating leadership structures upon liquid innovation?*

The rise of the digital revolution has altered the way product offerings are delivered. Traditionally, most new offerings are purchased and owned by end users. However, the recent rise of the sharing economy (empowered by digital platforms) allows users to access (rather than own) a wide variety of offerings, ranging from accessories to automobiles (Eckhardt et al., 2019). This shift from ownership to access has the potential to disrupt a wide variety of traditional beliefs and practices. For example, branding appears to have less influence when offerings are accessed rather than owned (Eckhardt et al., 2019). Although access-based consumption is attracting growing attention, little is known about the impact of this shift from ownership to access upon the way innovation is created. It would be fruitful to learn how customer needs and desires differ under access versus ownership. Does access-orientation imply more transient manifestations of needs, that become more temporary and in continuous evolution? If the answer is yes, how does this shift impact the innovation process? For example, startup Collaborative Housing Group LCC, conceives their apartments, which are aimed to be shortly rented, with smaller

private residences and conversely larger share spaces (e.g. workspaces).

> **RQ2.** *How does the innovation process differ when an offering is accessed rather than owned?*

2.4.2 | Research questions related to the innovator

In times of accelerated social and technological turmoil, existing beliefs and practices are often challenged by new realities. For example, the recent emergence of generative AI systems such as ChatGPT is rapidly changing the way in which many forms of content are being produced. Under these types of liquid conditions, offerings that are fully developed for application to a specific set of use cases may face premature obsolescence. Instead, as shown earlier in the case of Tesla, organizations may opt to design products that are initially incomplete and then update them as new opportunities emerge and specific needs arise. This approach is possible only if products are originally designed as open ended in nature, and hence, easy to modify and remix. Thus, a key strategic decision in defining a liquid product offering will be the extent to which its key characteristics and features will be able to adapt to changing conditions and emerging realities. At present, these turbulent characteristics seem to be highly apparent in new technological offerings such as generative AI bots, smartphone apps, and electric vehicles. Thus, these types of offerings are likely to provide an opportune context for investigating this research question.

> **RQ3.** *To what degree should an offering's characteristics and features be fixed prior to its launch versus being adaptable to changing conditions?*

According to many social commentators, we are living in a consumer-oriented society that places priority upon consumption (rather than production) (Burroughs & Rindfleisch, 2002). As noted by Bardhi and Eckhardt (2017), this emphasis on consumption is also a hallmark characteristic of liquid modernity. In fact, they suggest that the act of production itself is becoming liquified, as consumers are increasingly taking on a larger role in the production process. For example, consumers routinely provide firms with ideas for new products via co-creation platforms, or design themselves context-specific features of the product and may actually engage in production activity in lateral exchange markets (Allen et al., 2018; Perren & Kozinets, 2018). Although prior research suggests that these types of platforms may lead to positive outcomes, questions remain regarding the long-term effectiveness of these types of prosumer initiatives, as many of the most renowned examples appear to be less successful than commonly believed. For example, many heralded co-creation efforts such as Dell IdeaStorm and MyStarbucksidea are no longer in operation (Fisher & Rindfleisch, 2023). As a starting point, this question could be examined via case studies that examine the effectiveness, risks, and benefits of various types of co-creation initiatives.

> **RQ4.** *What roles* (e.g., *contribution*, *testing*, *selection*, *production*) *should consumers play in the creation and production of new product offerings?*

2.4.3 | Research questions related to offerings

The recent emergence of digital manufacturing technologies such as 3D printing is also increasingly blurring the line between the physical and the digital (Bouncken & Barwinski, 2021). For example, digital design-sharing websites such as Thingiverse contain millions of digital files that can be downloaded and 3D printed. The ability to produce either materialized or dematerialized product offerings is a hallmark of liquid modernity and a feature that appears to offer substantial benefits to both producers and users alike (Bardhi & Eckhardt, 2017; Fukawa & Rindfleisch, 2023). Atasoy and Morewedge (2018) suggest that while digital goods offer the benefit of convenience, in some cases physical goods may be more highly valued due to their ability to instill a sense of psychological ownership. However, research on the relationship between digital and physical product offerings and their relative value to both creators and users is still in its early stages and presents an intriguing opportunity for future inquiry. One way to investigate this question would be to conduct a field experiment in which consumers are presented with either a digital or a physical offering and then to track their usage and satisfaction with a digital versus a physical offering.

> **RQ5.** *When should a new offering be digital, physical, and/or dual in nature?*

In order to develop successful new offerings, it is imperative to sense and understand customer needs and desires. This sensing process is inherently challenging and has been the subject of considerable scholarly interest across many decades (Cooper & Kleinschmidt, 1987). Although they differ in terms of their specific techniques,

these various approaches are based on the assumption that customer needs are relatively stable and can be reliably assessed. However, as noted earlier, liquid modernity is characterized by the ephemeral over the enduring. This ephemeral quality plays an important role in terms of understanding customer needs since the very identity of a customer may substantially shift over time. For example, a growing number of young consumers have recently begun to question their gender identity and are forming new identities that transcend the traditional categories of male and female. This identity shift poses a tremendous challenge, as these traditional gender roles have defined many product categories (e.g., beer, cosmetics, clothing) and have played an important role in understanding customer needs and desires. Similarly, the emergence of social media, of virtual (gaming) platforms, and the expected future diffusion of the metaverse suggest that the same person will increasingly entertain plural identities in different spaces. As a result, the way these needs and desires are assessed and incorporated into offerings may have to be rethought under conditions of liquid innovation.

> **RQ6.** *How should customer needs and desires be assessed and incorporated into offerings when identities are increasingly fluid in nature?*

2.5 | Conclusion

In conclusion, the logic of liquid innovation offers a new perspective on the core elements of innovation: products, processes, and people. Specifically, under a logic of liquid innovation, these elements are viewed as transient, incomplete, and plural in nature. As discussed earlier, these characteristics stand in stark contrast to the traditional innovation logic, which has largely focused on fixed and solid products, processes, and people. We hope that our explication of liquid innovation, set of key principles, and research questions assist innovation scholars and managers to better understand and engage with this intriguing new form of institutional logic.

3 | IMPLICATIONS OF (GENERATIVE) ARTIFICIAL INTELLIGENCE FOR RESEARCH ON THE MANAGEMENT OF INNOVATION

Markus Baer, Gerda Gemser, Dhruv Grewal, Martin Hoegl, Andrea Ordanini

Predicting the future is exceedingly difficult—and predicting the future of artificial intelligence (AI) and its role in the innovation process is no exception. Yet, we believe that it is critical to sketch out at least a rough draft of what the future of AI-enhanced innovation may look like to provoke some much-needed theoretical and empirical exploration of the topic. Our ideas are explicitly speculative; they do not constitute a precise road map for scholars to follow. The time horizon over which these changes may occur simply is too long, and the technological developments too fast-paced, to map a precise route. Nor are we suggesting that the developments outlined here are inevitable or predetermined; human agency can and will shape developmental trajectories in any number of ways.

The effects of AI span nearly every sphere of life, even when people are not fully aware of their pervasiveness (Davenport et al., 2021). The rise of AI is particularly relevant to the management of innovation, considering how widely this technology has been integrated into aspects of the innovation process. Furthermore, AI is fundamental to recent innovations involving robots, chatbots, voice assistants, recommendation systems, and so forth. That is, AI both represents an innovation itself—the potential of which is still being discovered—and offers meaningful implications for enhancing innovation related to products, services, processes, and procedures, and, consequently, for how these efforts are managed.

Broadly, AI can be defined as machines that can perform human-like cognitive tasks that previously required human contribution to be completed (Grewal et al., 2021). Generative AI goes beyond this broad notion to refer to AI that creates novel content using existing material, from which AI (and its algorithms) have learned. Such content can take on various forms. For example, ChatGTP, Bard, DramaTron, and Galactica produce textual content, engage in conversations with users, summarize academic and scientific literature, and solve mathematical problems. Other generative AI creates image, video, audio (e.g., musical), and coding content, based on both textual and visual input. Recent work in *Journal of Product Innovation Management* (Bouschery et al., 2023) outlines some current use cases for AI-enhanced innovation, but we anticipate that the application of AI will proliferate and deepen, evolving from AI as a sophisticated tool to AI functioning as autonomous, nonhuman actors in innovation processes.

Many AI tools are relatively new, such that firms are only starting to realize and appreciate their enormous potential, while also identifying some shortcomings that will need to be addressed before firms can adopt them fully and integrate them into their new product development and innovation processes (Grewal et al., 2021). Therefore, we provide an initial assessment of how AI in general, and generative AI in particular, is likely to transform innovation processes. We do so by leveraging

insights from initial research that has started to explore AI-enhanced innovation and that has described how sentiment and text analysis capabilities can facilitate the ideation process (Bouschery et al., 2023).

3.1 | Evolving role of AI in innovation management

We suggest that the role of AI in innovation management may evolve in four stages: (1) AI as a tool; (2) AI as an interactive support agent; (3) AI as a fully equivalent member of an innovation team; and (4) AI as an independent orchestrator of innovation efforts and teams. Figure 1 summarizes the potential evolution of AI, from current AI-based technologies used as tools by (human) actors to fully-fledged AI-driven innovation in the future.[7]

3.1.1 | AI as innovation tool

As is currently the case for a wide range of uses, AI increases the efficiency of the innovation processes that it facilitates. In many ways, it functions akin to an enhanced database, able to gather and assess vastly more information than the human mind can handle and to perform tasks efficiently because of this capability. *FarmWise Labs*, *Inc*. is an agricultural technology and robotics company, based in California. The company's latest model, the Titan FT-35 is an automated mechanical weeder that relies on AI, computer vision, and robotics to remove weeds in fields without the use of chemicals. The company trained machine learning algorithms on millions of crop images to create a system that successfully can distinguish between crops and weeds, capturing the 3D geometry of each plant it encounters. By leveraging artificial intelligence and robotics, FarmWise Labs is driving innovation in sustainable farming and helping farmers optimize their operations while reducing environmental impact (Davenport & Miller, 2022).

[7]We do not consider this trajectory as preordained. The question of whether technological change is "deterministic" has been posed and analyzed, particularly by sociologists and historians of technology (Barley, 1988; Dafoe, 2015). Recent theorizing on AI and its integration in organizations adopts the view that both AI and humans have agency, which is in line with the so-called constructivist approach to technological change (Dafoe, 2015). Nonetheless, for human agency to effectuate, we need to reflect, deeply, on what type of society we are or should be constructing, together with AI.

3.1.2 | AI as interactive support agent

As AI evolves to become more generative, it contributes ideas and insights that human innovators can leverage and apply in their own productive efforts. In other words, AI is augmenting human capabilities in the innovation process. In this way, AI-powered recommendation systems may assist teams in generating new insights, analyzing large amounts of data, and providing new ideas and suggestions based on emerging patterns and trends. To establish an innovative offer of personalized coffee flavors for retail and wholesale buyers, for instance, coffee farmers can use an AI-enabled monitoring system to detect the "sensory digital footprint" of green (i.e., raw) coffee beans, according to their organic compounds. Based on these data, growers, and roasters can then determine whether the sweetness that can be found in a particular batch of beans comes from a chocolate flavor or a caramel one. This insight, in turn, allows rosters to match their products more effectively to customer demand (Kite-Powell, 2021). In addition, AI can be expected to play a more active role in the management of innovation, by automating certain aspects of the innovation process. One example might be AI-driven project management systems that can autonomously allocate resources, monitor progress, and identify potential bottlenecks or risks in innovation projects. Such systems would optimize efficiency and enhance coordination among teams.

3.1.3 | AI as independent member of innovation team

Assuming AI continues to evolve, and gains expanded capabilities, it ultimately may be able to replace members of new product innovation teams, interacting with relevant internal and external stakeholders, such as members of other teams or customers. For instance, AI algorithms could analyze vast amounts of scientific research, market trends, and user feedback to propose novel ideas and concepts that humans may not have considered. In the artistic domain, the continually updating humanoid robot *AI-Da* already can create original artwork largely independently, some of which have been displayed at Oxford University (Block, 2019). Another example comes from *AlphaCode*—an AI-powered coding engine that can create new code autonomously. Similar to a human programmer, AlphaCode produces a larger number of possible answers and then narrows these down by running the code and checking the output. The entire process is automated, without any human assistance during the selection of the best solution. This AI represents the first

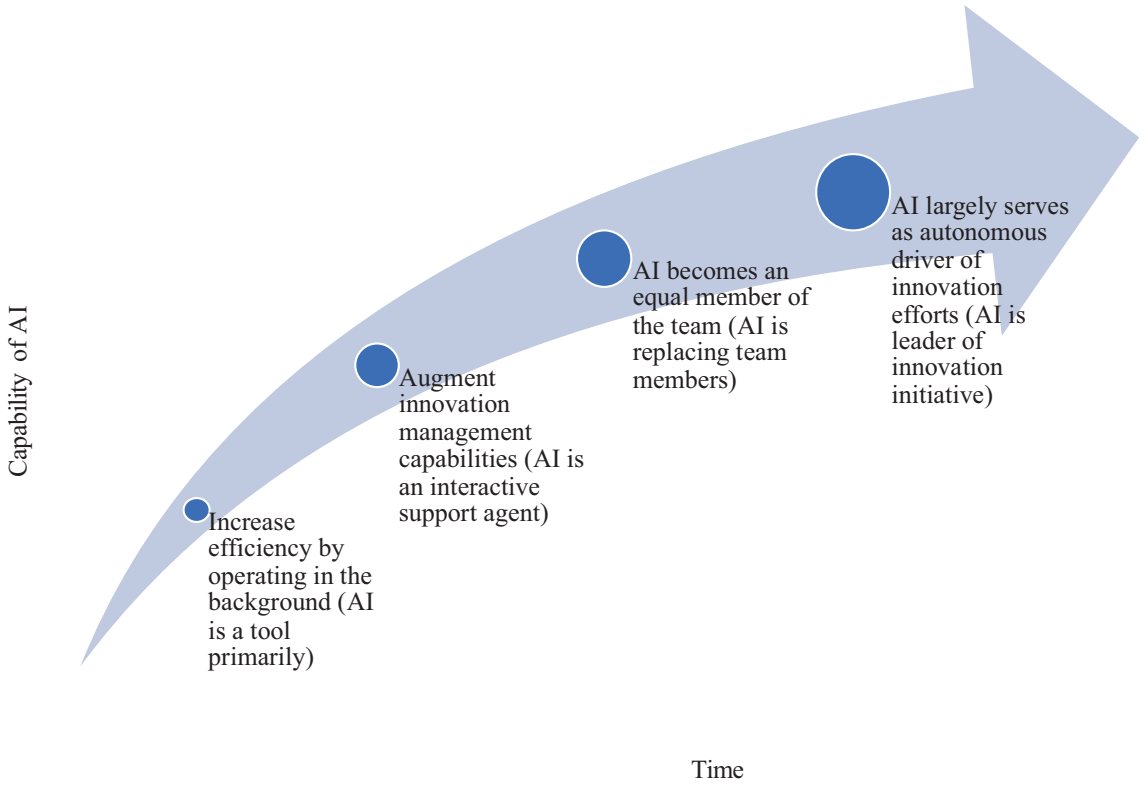

FIGURE 1 Evolution of role of AI in innovation process. The developmental trajectory outlined here constitutes but one of a possible set of futures. While there are any number of divergent pathways, we maintain that the one sketched out here is one that is plausible and likely.

significant step towards the creation of a flexible problem-solving AI—a program that can autonomously tackle coding challenges that are currently the domain of humans only. Overall, then, at this stage of development, AI will be able to conduct a variety of analytical and creative tasks autonomously and without input from human actors.

3.1.4 | AI as leader of innovation initiative

In the more distant future, AI may have evolved to a level at which it can autonomously manage and execute innovation projects without significant human input and oversight. For instance, AI-driven innovation systems could continuously scan the external environment, identify emerging technologies, or market opportunities, devise strategies, and implement innovation initiatives. These systems would act as self-learning, adaptive entities capable of driving innovation at an unprecedented scale. *Insilico Medicine*—a biotechnology company based in Hong Kong and New York—exemplifies an early application of how AI can autonomously lead innovation projects in drug discovery. The company combines genomics, big data analysis, and deep learning to identify novel drugs for untreated diseases. Insilico Medicine's technology allows the company to evaluate gene targets based on a disease of interest using AI-driven hypothesis generation, to deliver new, promising chemical compounds in days using a fully automated machine learning platform, and to *forecast a clinical trial's probability of success* using a data-driven multimodal approach. In the future, AI systems may autonomously manage much of the drug discovery process driving innovation in the pharmaceutical industry.

Next, we pose some key questions for scholars to consider when examining the implications of the changing role of AI for the management of innovation. Recent articles (e.g., Bailey et al., 2022; von Krogh, 2018) and journal special issue calls (e.g., Chalmers et al., 2023) in the wider management field have raised some interesting research questions. However, we encourage scholars to focus their efforts on the process of innovation specifically and to engage in the necessary theory development to explain *how* AI is likely to shape the management of innovation as it evolves. Research in adjacent fields, such as creativity (Amabile, 2020; Jia et al., 2024), knowledge networks (Waardenburg et al., 2022), and entrepreneurship (Chalmers et al., 2021) has started to document the challenges associated with AI and offers some valuable insights for innovation management scholars as well.

3.2 | Research agenda: Implications of AI for the management of innovation

Two overarching goals may guide continued research efforts at the nexus of innovation management and AI. First, we need to develop new theory to elucidate the evolution of AI towards an autonomous, nonhuman innovator (Figure 1). To this end, we likely need a new conceptualization of the nature of innovation and its defining features. For example, in cultural industries, vigorous debate continues regarding whether AI-generated artifacts should be defined and valued as art and, if so, what their worth is (Harris, 2023). A potentially relevant theoretical framework for assessing value and how it shifts over time can be found in *selection system theory* (Priem, 2007; Wijnberg & Gemser, 2000). The theory describes how to distinguish "winners" from "losers," based on three selection methods: market (consumers are the selectors), peer (the selected and selectors represent the same group), or expert (selectors do not produce or consume but select based on their expertise). These selection systems are not static. In the visual arts industry for example, the selection system shifted, from being dominated by peers to being defined by experts, following the emergence of a new group of artists (i.e., French Impressionists). This change resulted in a substantial increase in the value of "novelty" (Wijnberg & Gemser, 2000). The emergence of generative AI could induce a similar shift in the selection system, such as to an (expanded) peer selection system in which AI evaluates (the novelty of) art generated by or with AI. More radically, conceptualizations that determine value predominantly based on novelty might be abandoned, in both cultural and noncultural industries, and replaced with other criteria, more fitting for an AI era (e.g., transparency of source material, clarity of attribution of credit).

Second, new theory likely is required to explain the key drivers and inhibitors of the performance of AI-enhanced innovation processes, at every stage of this evolutionary path. An important research question pertains to the success factors and potential pitfalls of integrating distinctive efforts by both human and AI actors at different stages of innovation processes. To examine how AI can be embedded into organizational life, we propose using a *sociomaterial approach* (Orlikowski & Scott, 2008), which conceives of technology as active, equal counterparts in a system of organizational interactions and regards technologies and humans (or organizations) as mutually constitutive. For sociomateriality scholars (e.g., Anthony et al., 2023; Bailey et al., 2022), the boundaries between humans and technology are not given but rather are enacted in practice and relations. Studying how humans and technology function as interdependent systems that shape one another, seems particularly promising in the age of AI, as the lines between object (technology) and subject (humans or organizations) can become increasingly blurred.

In addition to these broad goals for new theory development (or applications of existing theory to new questions), a more concrete set of questions can guide research efforts; we derive such a set by speculating about how AI is likely to shape various stages of a core innovation process, namely, the process of new product development (NPD; Table 6).

The rise and evolution of AI seems likely to trigger and necessitate revisions and/or extensions to existing constructs that have been integral to understanding how the NPD process unfolds (i.e., opportunity identification, concept generation, project evaluation, development, and launch) and which key factors might accelerate or derail this process. This exercise is not designed to provide an exhaustive list of research questions associated with the role of AI in innovation. Rather, we seek to offer a primer on how to approach and explore the novel nexus between innovation management and AI. Moreover, by focusing on a single critical process and its stages, this exercise can serve as an example of how to generate research questions using a problematization approach rather than a simple gap-spotting approach.[8]

The first stage of new product development is *opportunity identification*, which entails spotting openings in the market that could be exploited with an extension of current product offerings or new offerings. One of the key capabilities needed to execute this stage is vigilant market learning. For this stage, a promising research avenue might be to explore how generative AI can help companies strengthen this fundamental capability, as well as to determine how they can best integrate AI with the efforts of humans who have developed an intuitive understanding of the market and its associated opportunities. The increasing reliance of AI during this stage may have some unintended side effects, however, such as the degradation of the intuitive understanding of market patterns and the reasons behind those patterns—a question that is well worth considering. As future research pursues these questions, data will be needed on which ideas or opportunities were identified by AI, humans, or by both jointly. The research will likely benefit from using advancements in natural language processing and

[8]In addition to the NPD process, for instance, research could examine more in-depth the role of AI in firms' efforts to innovate their business models (Kanbach et al., 2023).

TABLE 6 The role of AI in new product development—research questions.

NPD stage	Research questions
1. Opportunity identification	• How can the adoption of generative AI assist the process of opportunity identification? Does the lack of empathy that characterizes AI necessitate the integration of insights generated by "cold" analysis with insights generated by the intuition of human actors?
2. Concept generation	• How does the adoption of generative AI affect humans' creative production? Does generative AI enable humans to produce more ideas, irrespective of the creativity of the ideas, or also ideas that are more creative and vary in their creativity? • How does the adoption of generative AI affect the two aspects of creativity (i.e., novelty and value) and can AI be utilized to reduce the trade-off between the two aspects? How can prompts be designed in such a manner that AI-generated content maximizes novelty versus value?
3. Project evaluation	• How can AI-driven perceptual mapping techniques be further developed and refined to incorporate a wider range of complex consumer attributes and preferences, enabling more accurate and comprehensive evaluation of concepts?
4. Product development	• How will AI-enabled prototyping and virtual testing impact the new product development process in terms of speed, accuracy, and cost-effectiveness? To what extent can AI-enabled virtual testing simulate human responses to new product ideas and offerings and which aspects of the human response will remain uniquely "human."
5. Market launch	• How can AI optimize distribution channels by analyzing data on customer preferences, demographics, and geographical locations, predicting demand in specific regions, and optimizing logistics for efficient product availability?

machine learning to better understand the nuances of each mode of generation and how they are related to the success and failure of new product development initiatives.

The second stage of NPD is *concept generation*, during which the organization defines a possible product configuration (need, form, and technology), based on an idea. Creativity plays a central role at this stage, which in the NPD realm tends to manifest as a composite of novelty and value. Various forms of generative AI already have been applied to support the production of creative ideas, so this stage might be a particularly fertile area in which to explore further the possibilities that AI can afford. Recent research indicates, for instance, that ChatGPT outperforms MBA students in generating new product ideas (Girotra et al., 2023). Overall, it would be helpful to understand which forms of generative AI are particularly well-suited to support the production of novelty versus value and the extent to which these tools can optimize both dimensions, thereby reducing the trade-off that often appears necessary across them. In addition, as the production of novelty might be supported by both textual and visual inputs, it will be important to understand when (and when not) to use both text and image inputs synergistically when evaluating prompt design for creativity.

In the third stage, *project evaluation* involves the selection of concepts to be refined and concretely developed. Perceptual mapping is traditionally a key tool used at this stage; it functions to identify relevant, discriminant set of attributes important to consumers' choice. The potential of AI for perceptual mapping has been demonstrated clearly in marketing literature (Yang et al., 2022). Extending such analyses to the NPD context specifically would be an interesting and fruitful avenue for further research. While we envision that AI can and likely will play a more prominent role in the evaluation of new projects, the assessment of the extent to which these projects fit with a firm's overarching strategy/portfolio likely will continue to benefit from significant human involvement, at least in the foreseeable future.

Product development, the fourth step in the innovation process, pertains to the set of activities required to arrive at a prototype, typically involving different functions, such as marketing, R&D, and manufacturing, among others. Design and teamwork are key to the proper execution of this step. It would be interesting to examine how AI can help designers simulate and optimize their products according to certain criteria, such as cost, weight, or performance (MIT, 2021). At this stage, AI is likely to afford firms to develop new ways of simulating product development and performance, and research will be needed to better understand the effectiveness of these approaches. Alternatively, examining the various opportunities and challenges associated with the use of generative AI in innovation teamwork activities could prove insightful (Zhang et al., 2021).

Finally, for the *market launch* stage, it would be interesting to determine if and to what extent AI also can

facilitate commercialization and market diffusion. For example, AI might conduct simulated market tests, which would help optimize new product rollout plans or determine the best locations for pilot launches.

When examining the current state of AI and its integration in NPD, there are particularly promising developments regarding early-stage activities, such as opportunity identification, concept generation, and project evaluation. However, time will tell how and when AI will drive the entire NPD process. This may also be dependent on the type of products involved—in the case of digital products, for instance, AI is likely to drive the whole NPD process sooner as compared to products that are not digital in nature.

As innovation scholars address these research questions, they are likely to apply a wide range of approaches—from phenomenon-based to theory-driven—and methodologies—from qualitative and exploratory to quantitative and hypothetico-deductive. Given that the introduction of AI to the innovation process necessitates interconnections between various stakeholders, including employees, customers, and AI systems, network analysis techniques may be particularly useful in mapping the relationships among these actors. For the more distant applications of AI (AI as member of innovation team or AI leading innovation efforts), ethnographic studies that involve immersing researchers in the organizational context may provide an in-depth understanding of how AI is integrated more holistically in the innovation process. Due to the interdisciplinary nature of the research questions at the nexus of innovation management and AI, innovation scholars may benefit from joining forces with scholars from relevant fields, such as management information systems (MIS) or computer science.

More fundamentally, however, AI will likely revolutionize the process of innovation research itself. As such, it seems likely that research on innovation management as a process of producing output of novelty and value will equally be impacted by new possibilities through involving AI. This may include identification of new research questions based on the analysis of vast amounts of scientific and nonscientific literature to sentiment analysis and coding of qualitative data, among others. These developments will likely raise ethical questions regarding intellectual ownership and authorship credit along the various stages of the research process that our community will have to wrestle with.

3.3 | Conclusions

In this section, we offer a speculative exploration of the implications of the rise of artificial intelligence (AI) for research on the management of innovation. We present a novel framework that describes the evolving role of AI in innovation management, progressing from a mere tool to an interactive support agent, a fully equivalent team member, and ultimately, an independent orchestrator of innovation efforts. In addition, we highlight the potential transformative power of AI in enhancing efficiency, generating new ideas, automating aspects of the innovation process, and even leading innovation teams. Importantly, we call for the development of new theories to understand the evolving nature of AI-driven innovation and its impact on the management of innovation processes. Finally, we highlight how AI might influence the research process used by innovation scholars and the need for the development of new methodological approaches to examine the interaction between humans and AI. While the potential for AI to fundamentally reshape the process of the management of innovation is profound, as innovations scholars and industry practitioners we need to be mindful of the kind of organizational reality we are or should be constructing, together with AI. Whether AI should be allowed to replace members of innovation teams or to independently formulate, orchestrate, and execute innovation strategies are important questions for our community to consider.

4 | BUSINESS MODEL INNOVATION: AN UNDERSTUDIED BUT PREVALENT FORM OF INNOVATION

Marcel L. A. M. Bogers, Minu Kumar, Alina Sorescu

4.1 | Business model innovation: A growing form of innovation in the marketplace

Ever since Joseph Schumpeter coined the term "creative destruction"—the idea that in capitalism firms are constantly replacing the old way of doing things with a newer and better alternative—scholars have been studying the sources and consequences of innovation. Empirical innovation research, which spans economics and most business disciplines, is primarily focused on product innovation, operationalized with measures ranging from R&D expenditures, to patents, to new product introductions. Other forms of innovation have been studied mostly through the lenses of case studies.

Among the types of innovation that have been the subject of limited empirical research is business model innovation. Business model innovation has been defined as a "process that deliberately changes the core elements

of a firm and its business logic" (Bucherer et al., 2012, p. 184), "the introduction of a new business model aimed to create commercial value" (Berglund & Sandström, 2013, p. 276), "the search for new logics of the firm and new ways to create and capture value for its stakeholders; it focuses primarily on finding new ways to generate revenues and define value propositions for customers, suppliers, and partners" (Casadesus-Masanell & Zhu, 2013, p. 464), or "a change in the value creation, value appropriation, or value delivery function of a firm that results in a significant change to the firm's value proposition" (Sorescu, 2017, p. 692). Since a business model is defined as the combination and interplay of value creation (i.e., the component that houses the processes, actors, networks, and resources that organizations utilize to design and produce the product (good or service) that they sell), value appropriation (i.e., the cost structure and revenue model that organizations leverage to appropriate profits from its operations), and value delivery (i.e., the interface comprised of the product sold, setting off the transaction and customer support associated with it, all of which combine into the customer experience), a business model innovation can arise from a change in any or all of these components.

Business model innovation is distinct from other types of innovation, such as product innovation (i.e., "new products [...] introduced to meet an external user or market need" (Damanpour, 1991)), or process innovation (i.e., "new elements introduced into an organization's production or service operations-input materials, task specifications, work and information flow mechanisms, and equipment used to produce a product or render a service" (Damanpour, 1991)). While product innovation is designed in the value creation component of the business model and made available in the value delivery component, process innovation is typically deployed only in the value creation component, and occasionally in the value delivery component, to the extent to which it involves suppliers or other partners. In terms of similarities, all three types of innovation can help the firm enact its value proposition and can contribute to the value that customers—both individual consumers and firms—derive from what firms offer. Moreover, all types can vary in their degree of innovativeness (incremental versus radical), or in the extent to which they are new to the firm or the industry. We provide an illustration of these three types of innovation and the value they provide in Figure 2.

As the above-mentioned definitions suggest, business model innovation is a more complex construct than product innovation, as it encompasses a broader part of the architecture that describes how firms conduct business. This makes it more difficult to quantify. Product innovation often involves counts: for instance, a pharmaceutical firm introduces three new drugs. In turn, it is not as easy to define the threshold of newness for a business model relative to existing alternatives. Perhaps because of these characteristics, there are no databases that we are aware

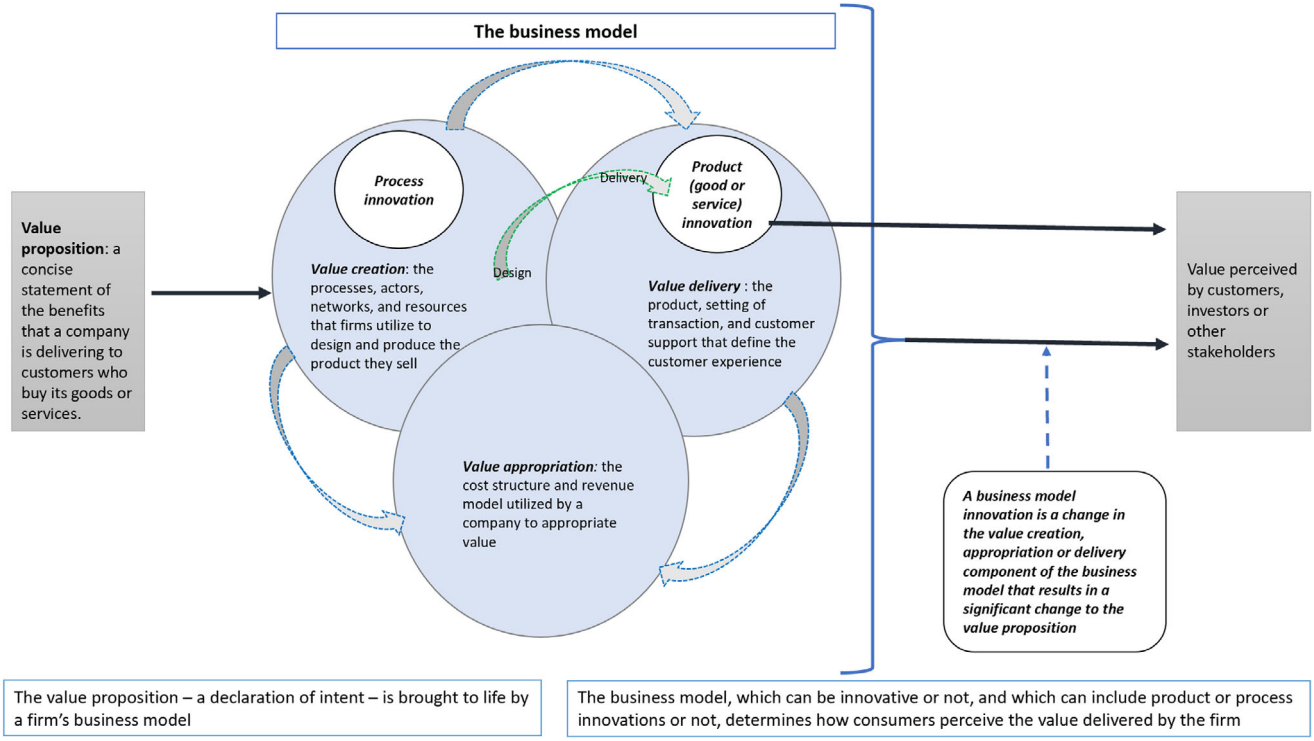

FIGURE 2 Product, process, and business model innovation and their relationship to firms' value proposition.

of that "count" or document business model innovations. The difficulty in measuring business model innovation and the lack of readily available relevant secondary data have impeded the emergence of empirical research that would document how firms can design and implement this type of innovation, as well as understand its consequences. While conceptual research in this area is sufficiently advanced to have resulted in a few review papers (Foss & Saebi, 2017; Kraus et al., 2020), there is still a dearth of large scale, multi-industry empirical research, with most current work being based on case studies or surveys conducted in a single industry. In Table 7 we outline some of the challenges that impede empirical research on business model innovation and we propose a few solutions to these challenges.

This lack of scholarly insights stands in contrast to the prevalence of this type of innovation in the marketplace. A 2018 McKinsey study found that 80% of executives believe that their companies are under pressure to innovate their business models (Nieminen, 2018). And, according to the Boston Consulting Group, the average business model lifespan has fallen from about 15 years to less than 5 in the past 50 years (BCG, 2023). To catch up with practice, academics need to build, operationalize, and test a theory of business model innovation (Foss & Saebi, 2017). Such a theory may encompass three primary areas of inquiry, which we describe below, along with examples of research questions that can advance knowledge in each area.

4.2 | Drivers of business model innovation

Researchers focused on product innovation have documented a broad set of organizational, contextual, and environmental factors that foster this type of innovation. In a similar vein, business model innovation can be spurred by external factors, such as technological advances, or internal factors, such as organizational mindsets of resources. Technological change is perhaps the best understood and most frequently referenced driver of business model innovation. The advent of the Internet led to e-commerce, platform technologies led to peer-to-peer business models that underlie the sharing economy, and social networks are spurring new business models that form the basis of the creator economy. These technologies have provided opportunities for new entrants but have also threatened the value logic of incumbents and have rendered many of their business models obsolete.

TABLE 7 Challenges and opportunities associated with advancing research on business model innovation.

	Challenges	Opportunities
Conceptual	1. Lack of definitional consistency 2. The construct of business model innovation draws from various sub-domains within the larger domain of business and its boundaries are not consistently represented 3. The construct lacks a dedicated theory that can articulate its drivers and consequences	1. Arrive at a commonly accepted definition through a meta-review process of existing definitions and by obtaining validation from industry participants 2. Revise theories of competitive advantage to include business model innovation, their drivers and consequences
Data	Not available or easily retrievable or constructed, because: 1. Lack of agreement on the definition of business model innovation 2. Difficult to measure business model innovation. For instance, patents have been used to measure innovation but few, if any business models are patented 3. Not an output typically reported in any industry, or regulated in any way as, for instance, new introductions in the pharmaceutical industry are regulated by the FDA	Data on business model innovation could be collected through: 1. Interviews and more comprehensive qualitative analysis 2. A text analysis of firm communications and determining to what extent firms emphasize this type of innovation. 3. Questionnaires were administered to TMT members across industries.
Methodology	Methodological difficulties arise in: Measurement of: (1) the construct of business model innovation; (2) the right time frame over which it is instituted Choice of: (1) dependent variables that can accurately capture the impact of business model innovation; (2) time frame over which this impact can be measured Discriminant validity between business model innovation and other types of innovation such as process and service innovation	The performance of business model innovation can be assessed by using survival analysis or by examining the long-term (stock market) performance (both returns and risk), while controlling for other types of innovation that the firm focuses on The process of business model innovation can be addressed through in-depth ethnographies or micro-level data that enables longitudinal analysis

Opportunities also reside in changing consumer worldviews and perceptions of incumbent value propositions. A 2020 Gartner study ranked meeting customer demands and expectations as the top external driver of business model innovation (Gartner, 2020). Changing consumer perspectives on ownership, sustainability, and consumption have led to new business models that address these consumer priorities. For instance, consumers' desire to not own products that they rarely use has led to rent-based business models, such as Zipcar's car sharing business model that provides a short-term car rental option to car ownership, or WeWork and Regus's co-working business models that offer office space to businesses on a rental basis, rather than requiring them to purchase or lease their own space. Increased awareness of sustainability imperatives resulted in the emergence of circular economy models that aim to reduce waste and environmental impact by keeping products in use for as long as possible, through initiatives like repair, refurbishment, and recycling (e.g., Patagonia) or low-waste business models that seek to reduce the amount of packaging and waste associated with consumer products, by offering refillable or reusable products (e.g., Loop).

While companies need to monitor and assess the impact that external factors have on the viability of their current business model, business model innovations can only be effectively implemented if companies have the right organizational mindsets, processes, and capabilities and if they deploy appropriate resources. For instance, external knowledge management capabilities stimulate business model innovation, particularly for firms with a high-risk tolerance, whereas internal knowledge is only effective for firms with a low risk-taking tolerance (Hock-Doepgen et al., 2021). Managerial cognition matters as well: differences in how strategic issues are identified and interpretated can help explain the cognitive barriers that emerge when incumbent firms try to engage with radical business model innovation (Egfjord & Sund, 2020).

Much ground remains to be covered to fully understand what drives and impedes business model innovation. In Table 8, we propose some additional research areas and questions that can shed light on this important topic, particularly since business model innovation has been deemed to constitute a strong source of competitive advantage (Amit & Zott, 2012).

4.3 | The process for business model innovation

While the business model concept has often been described in relatively static terms—such as representing the architecture of firms' value creation, appropriation, and delivery—business model innovation is a dynamic concept that encompasses changes to the business model components but also changes to the interdependencies across these components (Amit & Zott, 2012) with implications across multiple levels of analysis (Zott & Amit, 2015). Following Foss and Saebi (2017), business model innovation defined as a process can be identified as one of several research foci within this domain.

One of the early efforts to explicate the process of business model innovation can be found in Osterwalder and Pigneur (2010), who describe the steps involved in the design of this type of innovation. They discuss how customer insights can be a good starting point in the design process, how ideation should be followed by visual thinking and prototyping, and how scenario planning can be a valuable tool in refining a plan for a new business model. However, while these steps may on the surface appear to mirror a general innovation process that can be applied to product innovation, they need to be deployed on multiple levels, and in a configurational manner, in the case of business model innovation. These ideas preface other work that has taken an experimental perspective on business model innovation, both within firms and across industries (McGrath, 2010). Specifically, firms find themselves in situations "when it is clear that the 'old' business model is no longer working [...] but it is not at all clear what the eventual 'new' business model will turn out to be." (Chesbrough, 2010, p. 357). In such a context, experimentation is key. To help advance research in this area, a focus on business model exploration versus exploitation may be useful (Sund et al., 2016), possibly combined with a focus on search, experimentation, and/or transformation (Foss & Saebi, 2017).

Other research has specifically focused on the phases through which the business model innovation process goes through. For example, Massa and Tucci (2013) describe creating, implementing, and validating as generic phases of the business model innovation design process, while Christensen et al. (2016) refer to the business model's journey as comprising creating the new business model, sustaining the related innovation, and finally focusing on efficiency. In contrast, Sjödin et al. (2020) focus more on the effectiveness of business model innovation in regard to how it effectively engages with customers, namely value proposition definition, value provision design, and value-in-use delivery. While these papers examined specific aspects of the business model innovation process, research that provides a clear perspective on the overall process of business model innovation in general and the design process, in particular, would be valuable.

In general, there may be several contingencies that still need to be uncovered in terms of what would

TABLE 8 Research directions and questions within the three main areas of inquiry of business model innovation.

		Drivers	Process	Consequences
External forces	Technological change	What type of technologies are most likely to fuel business model innovation, and in particular radical business model innovation, and when should firms update their business model in the face of technological change?	How early should firms adopt and incorporate new technology-enabled process changes and should they attempt to use multiple business models until the new technology matures?	Can firms use new technologies to increase the positive and reduce the negative externalities of their business models and operations?
	Competitive pressure	Should firms attempt to be early entrants in an industry with a business model innovation or be a follower and what contingencies impact this decision? Are there industry factors (e.g., turbulence, dynamism, etc.) that are more conducive to product versus business model innovation?	Which industry factors impact the design of business model innovation, particularly relative to other types of innovation? How does the design of business model innovation depend on the stages of market development and industry evolution?	Is there a first-mover advantage in business model innovation and if so, how sustainable it is? How do disruptive business models transform industries and what is their impact on life cycles of both product and business model innovations? Do consumers perceive innovation in business models in a similar way in which they assess product innovation and if so, are they aware of business model innovation leadership in the industry and of the position of each firm relative to this leadership?
	Consumer trends	Which consumer preferences and trends are sustainable and would lead them to embrace a business model innovation for the foreseeable future?	Is there potential to cocreate the business model design or update to the design with consumers and if so, how? Can and should societal pressures (e.g., sustainability and social responsibility imperatives) be addressed through business model innovation? For instance, if consumers value sustainability, are they likely to respond better to sustainable product or business model innovations, and do they expect both?	Does the Bass model for product diffusion apply to diffusion of business model innovation? What are the characteristics of business model innovation that determine their diffusion rate? Do consumers form associations about business models in the same way in which they form associations about brands or products? For instance, do consumers gauge business models based on the ethicality and sustainability of their outcomes? Can business model design help consumer perceptions or are these driven only by the customer experience?
	Regulatory inefficiencies or pressures	How do cost or cumbersomeness of regulation drive innovation?	How can the business models processes be designed in areas restricted by government regulation without violating any laws?	What types of regulatory response can firms anticipate when they legally disrupt an area governed by existing regulation and yet create value for their customer?
Internal forces	Organizational structure and existing architecture of	Are firms with certain characteristics more likely to pursue business model innovation? For instance, are younger and larger firms in a	What characteristics of a business model allow it to be more easily updated? Is there a particular architecture that allows changes to a current	What type of business model architecture leads to the best financial outcomes for the firm? Should firms put particular emphasis into one component or

(Continues)

TABLE 8 (Continued)

	Drivers	Process	Consequences
the business model	better position to update their business model than older or smaller ones?	business model while minimizing disruptions to firms/operations and output? Which components of the business model, if updated, would lead to the highest value delivered for customers or appropriated by the firm? When firms aim to pursue a new business model, should they design a new unit that is powered by that business model innovation or seek to update their current business model, and if so, under which circumstances? If multiple business model innovations are warranted, how do optimal portfolios of business models look like?	dedicate resources equally across value creation, appropriation, and delivery? What is the role of the connections between these components in helping firms appropriate value?
Organizational mindset, cognition, and governance	What type of knowledge and functional expertise are needed to decide that the firm needs to innovate its business model and find the best way to do it? Does technological know-how lead to a higher focus on product innovation and therefore to a lesser focus on business model innovation? How does organizational culture affect the likelihood of business model innovation, and how does it differ from other types of innovation?	What are the microfoundations of the business model innovation design process and how do they relate to the governance system of the firm, or to characteristics of the top management team? What role does creativity plays in the design of business model innovation? Is it a top-down design process that is initiated by a strategic imperative or a bottom-up process driven by process innovation or external factors that lead to changes in value creation, appropriation, or delivery? Which one is easier to implement?	Beyond financial performance, can business model innovation improve governance structures and employee outcomes? How can firms be "ambidextrous" with respect to business model exploration and exploitation?
Resources	What resources and configuration of resources are necessary to foster business model innovation?	What investments can reduce the likelihood that companies would abandon an existing business model that no longer provides a sufficient competitive advantage?	Do resources invested in business model innovation detract from other types of innovation? Is a product innovation more successful in a marketplace if it is housed in a more appropriate business model and is investing in both product and business model innovation efficient?

facilitate or hamper the process of business model innovation. This process will likely differ depending on whether or not there already exists a business model (Massa & Tucci, 2013). Another difference may lie in whether the logic underpinning value creation and capture involves a closed or open innovation process (Chesbrough & Bogers, 2014; Schäper et al., 2023). Along these lines, Chesbrough and Tucci (2020) also emphasize the large differences between incumbents and startups, which has major implications for how different types of organizations design and implement business model innovations. More generally, a better understanding of

this process will also require research that considers different aspects across a number of "layers" that need to be concurrently theorized and analyzed (cf. Zott & Amit, 2015). For example, while both individual and collective levels have been recognized as relevant in business model research (Massa et al., 2017), the recent interest in "ecosystems" moves the level of (surplus) value creation and capture to the network level (Baldwin et al., 2024). Addressing some of these questions will require relying on a diverse set of theories, ranging from evolutionary theory and industry evolution to network and innovation system studies, and from open innovation and innovation ecosystems to cognition and socio-psychology studies.

4.4 | Consequences of business model innovation

4.4.1 | Firm level consequences of business model innovation

Researchers have been advocating that complementing product innovation with business model innovation can create better financial and strategic outcomes for the firm (Massa & Tucci, 2013), but empirical research in this domain is still limited in scope. The positive outcomes of business model innovation that have been studied so far are (a) financial, such as higher revenues and cost reduction (Kim & Min, 2015) and stock performance (Amit & Zott, 2012), (b) strategic competitive strengths, such as first mover and other positional advantages that are difficult to imitate (Bock et al., 2012) and (c) long-term competitive advantages (Desyllas & Sako, 2013), including both value directly created for the organization, or broader value, such as socio-ecologically sustainable outcomes (Bocken et al., 2014). Except for a few examples that span multiple industries (e.g., Amit & Zott, 2012), the empirical investigations exploring the connection between business model innovation and firm-level outcomes have been narrowly focused on certain industries (e.g., open-source software industry; Bonaccorsi et al., 2006) or very specific business model types (e.g., freemium business model; Gu et al., 2018). Scholars have an opportunity to study the effects of business model innovation on firm-level outcomes in a more generalizable manner using survey instruments and scales for the construct (e.g., Clauss, 2017).

4.4.2 | Industry-level consequences of business model innovation

Changes in the business model of incumbent firms can trigger a response from others in the industry. Casadesus-Masanell and Zhu (2013) propose a game theoretical model that explores the strategic dynamics of incumbents imitating the business model innovation of a new entrant. Their model highlights the upsides and downsides of "showing your hand" or concealing it for a new entrant with a new business model. Their models also suggest that an incumbent may prefer to compete in a duopoly relative to being a monopolist. In reality, monopolies and duopolies are rare except in a few industries and business models can diffuse both within and outside the industry. Analogous to product innovation, the diffusion of innovative business models can transform industries, as was the case of the effect of the iPod and iTunes on music labels. Moreover, it has been proposed, although not empirically tested, that business model innovations experience faster diffusions than goods or services innovations Massa and Tucci (2013). A faster diffusion rate is perhaps caused by the difficulties associated with protecting the intellectual property associated with business model designs (Desyllas & Sako, 2013). Given these challenges, a major emphasis in business model innovation research has been about creating unique "sticky" couplings of value creation, value delivery, and value capture processes that are less easy to replicate (Sjödin et al., 2020). More broadly, meso-level and multi-industry empirical investigations of diffusion of business model innovations have not been undertaken. These topics, along with other research questions highlighted in Table 8 are all research topics ripe for scholarly investigation.

4.4.3 | Socio-ecological consequences of business model innovation

Once an innovative change from a dominant business model diffuses widely into the market, it has the potential to have economic, social, and environmental consequences (Cairncross, 1992; Foss & Saebi, 2017). For instance, service-providing marketplace platforms for taxi rides (e.g., Uber) and travel accommodations (e.g., Airbnb) have now permeated many industries and has become widely accepted by consumers, while in many industries the once popular "razor + razor blade model" that defined how consumers bought many things such as razor and printing equipment (inexpensive Razor handles and printers + expensive razors and toner cartridges) are seeing major shifts in consumer preferences, such as finding more value in subscription services (e.g. subscriptions for Harry's Razors and large ink tank Epson Printers). Business model innovation may have arisen in response to consumers increasingly preferring more liquid consumption experiences (Bardhi & Eckhardt, 2017) or the development of continuous

improvement products (Ho-Dac et al., 2020), in turn leading to an expansion in demand and new opportunities for entrants developing business models using institutional logics that are more liquid.

However, there are macro-level economic, social, and environmental consequences of business model innovations that have been seldom investigated empirically by innovation scholars (Bocken et al., 2014). Often these consequences are considered positive or negative "externalities". It could be argued that in the razor + razor blade model, building modularity into the expendable parts of the product, and building a value delivery channel changed consumer habits along with reducing the carbon footprint of the sponsor firms. On the other hand, the negative effects of Airbnb on small hotels, housing and renting prices, gentrification, breaking down of communities are all well documented (Benítez-Aurioles & Tussyadiah, 2021; Nieuwland & van Melik, 2020). Research on the externalities of business model innovations is absent in top-tier business and innovation journals. Therefore, scholars investigating externalities resulting from business model innovation can generate unique insights which could, among others, inform how subsidies, tax breaks, tariffs, and fines can be determined by policy makers interested in supporting positive externalities and reducing the negative ones.

As scholars consider these externalities, they should also revisit and broaden the notion of value generated by firms and their business models. In this realm, researchers have started examining sustainable business model innovations (Bocken et al., 2014), which offer the potential for re-conceptualizing the purpose of value creation, delivery, and capture for different stakeholders at three different levels (Freudenreich et al., 2020); for the customer (at the micro-level), for the firm (at the meso-level), and for society (namely the public value that accrues at the macro-level, which has been discussed elsewhere in this article). The hope is that these models provide the fundamental business logic needed to change business practices into a direction that not only helps firms make a profit but also meets the grand socio-ecological challenges of our time.

4.5 | Articulating the cyclical nature of business model innovation

While we discussed the drivers, process, and consequences of business model innovation at various level of aggregation and from the perspective of various stakeholders, we conclude this discussion by highlighting that the complex and dynamic nature of business model innovation also implies a larger framework in which all these elements are linked together. Indeed, as we also tried to indicate in some of our suggestions, it is in fact the interdependencies and contingencies connected to the business model innovation construct that we need to understand better. In our view, this also calls for a need to better articulate the cyclical nature of business model innovation. Based on our discussion above, Figure 3 provides a first attempt to describe the business model innovation cycle in which external and internal drivers affect the process of business model innovation. These then lead to firm-level, industry-level, and socio-ecological consequences, which ultimately feed back to the original drivers. We hope that scholars will further develop and

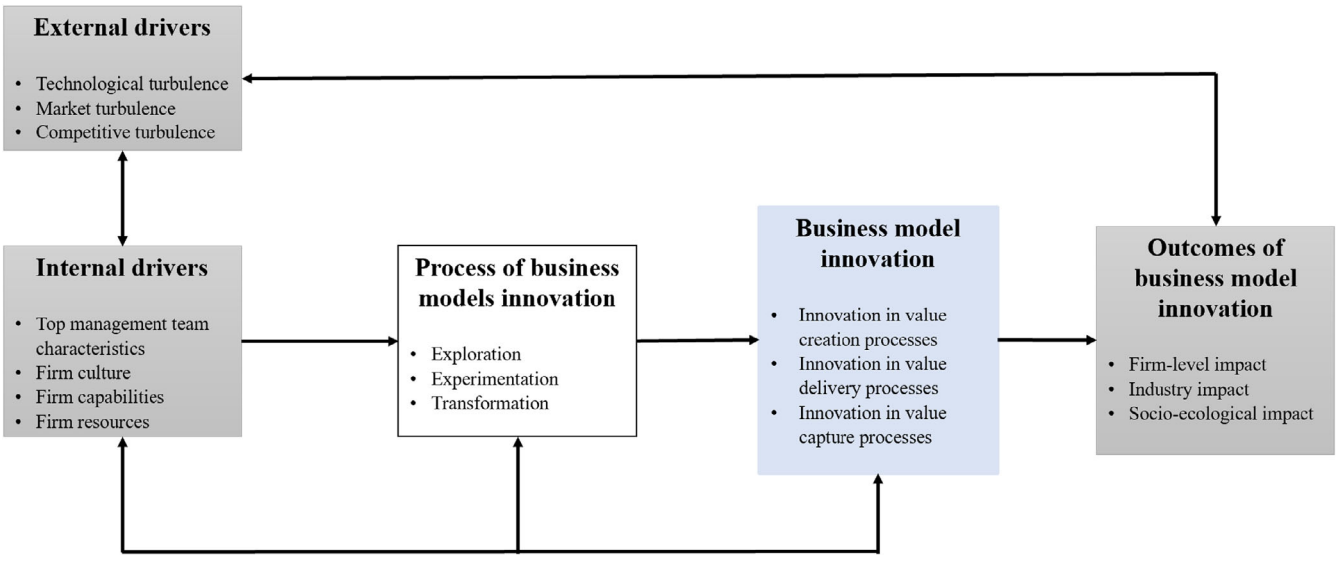

FIGURE 3 The business model innovation cycle.

embed this initial framework into a broader perspective that is emerging in strategy and management, namely, a dynamic view of institutions as ongoing processes (Reinecke & Lawrence, 2023), and bring business model innovation to the forefront as a potentially important source of competitive advantage for firms.

5 | PUBLIC VALUE INNOVATION: KEY FEATURES AND RESEARCH DIRECTIONS

Jonathan Bohlmann, *Luigi M. De Luca*, *Ruby Lee*, *Dominik Mahr*

5.1 | Introduction

Today's world is besieged by the grand challenges that threaten society's future (George et al., 2016). Addressing these grand challenges calls for the concerted efforts of civil society as well as public and private institutions towards innovative ways to create public value and achieve societal goals (Moore, 2013). Public value describes the benefits and outcomes that accrue to society as a whole rather than just shareholders, consumers, the state, and other stakeholders in isolation (Crosby et al., 2017). The emerging public value perspective is founded on a collective understanding of value as co-created by the private and public sectors, rather than created by the former and "fixed" by the latter (Mazzucato & Ryan-Collins, 2022).

Innovation has traditionally been considered a driving force behind progress and economic growth, and effective innovation is a necessary condition for solving societal challenges. For example, achieving ambitious decarbonization targets agreed upon by successive climate change conferences requires innovation in technologies, products, services, business models, and distribution systems that can transform mainstream markets, supply chains, and consumption patterns. In line with this view, we define public value innovation (PVI) as the *development and implementation of new products, services, processes or ideas primarily concerned with value creation for the society as a whole*. Following the existing conceptualization of public value, PVI is collectively developed by the public sector bodies, private market actors, and civil society of a defined scale (e.g., local, regional, national, or global) and prioritizes public value over market value.

Table 9 outlines the key differences between public value innovation and what we label, in contrast, as the "market value" perspective, which is predominant among innovation scholars and practitioners. Public value innovation rests on a shared enterprise and aims to achieve collective goals beyond the values accrued to specific individual actors. In contrast, market-value innovation implies that private actors, public actors, and civil society derive different (and often idiosyncratic) benefits and sacrifices from innovation (Hartley et al., 2013). For example, the accelerated development of innovations based on artificial intelligence (AI) is predominantly driven by a market-value logic that offers the prospect of profitable new markets for technology companies. However, the contribution of AI to public value creation remains

TABLE 9 How innovation creates value under the "market value" and "public value" paradigms.

	Market value innovation	Public value innovation
Innovation objective for private sector	Achieving a competitive advantage, superior market and financial performance driven by new products and services that address market opportunities, net of R&D and marketing investments	Achieving a competitive advantage, superior market, and financial performance driven by new markets for products and services that address societal grand challenges
Innovation objective for public sector	Economic growth and productivity, net of innovation externalities	A greener and more sustainable economy and more equitable society
Innovation objective for society	Better satisfaction with customer needs and wants, net of the unintended consequences of innovation	Increased well-being and better quality of life for citizens and communities, of current and future generations
Extent to which diverse actors jointly define and create value	Low	High
Role of public sector	Enabler of private value creation, regulator, and redistributor of value	Key player within innovation ecosystems for the creation of public value
Role of public sector manager	Independent provider of regulations and policies	Convenor and orchestrator among stakeholders aiming at developing public value innovation

unclear, and many experts (including leading AI developers) invoke a "responsible" approach to avoid dramatically negative consequences of AI for the future of humanity. Against these rapid developments, the public sector is struggling to provide a viable regulatory framework, while individuals and communities are watching from the sideline. Public value innovation goes beyond mitigating the unintended consequences of innovation on society (i.e., PVI is not a new term for responsible innovation); instead, it is a new paradigm of value co-creation through innovation, with the primary purpose of helping civil society address its grand challenges and their manifestations, from local communities to the global scale.

The differences between the paradigms emphasize our key argument that innovation framed within a market-value logic is not fit for the purpose of addressing societal challenges; thus, the strategic importance of PVI will grow over time as the gravity of societal challenges and the urgency to address them increases. Our goal is to examine several key areas of future research opportunities on PVI, offering specific research questions and associated methodological implications. The proposed research agenda can lead to important developments in the theory and practice of innovating for public value. We begin with the distinctive nature of PVI as a key research area.

5.2 | Distinctive nature of public value innovation

The notion of public value encompasses the dimensions of economic, environmental, and social value, which echo the three pillars of corporate social responsibility (CSR). Yet, in contrast to CSR, public value should be defined and determined by the collective needs and priorities of society, as expressed by various stakeholders, such as government agencies, nonprofit organizations, and communities (Crosby et al., 2017). These stakeholders play a crucial role in identifying and prioritizing public goods and services that are necessary for creating and sustaining a healthy, prosperous, and equitable society. These stakeholders, however, often have distinct motivations and resources; thus, research into their distinctive roles in PVI is needed.

In addition, PVI is different from responsible innovation, as the latter responds to ethical concerns related to the governance of science and technology through the dimensions of anticipation, reflexivity, inclusion, and responsiveness (Stilgoe et al., 2013). The accompanying essay on a Responsible Innovation (Section 6) process stresses an ethically based viewpoint to achieve sustainable development goals. This viewpoint follows a market-value logic, centered around the innovation process defined from the firm/corporate perspective. Thus, while responsible innovation is a safeguard against the potential "irresponsibility" and unintended consequences of the innovation process, it does not propose an alternative conceptualization of innovation value. In fact, responsible innovation has been actively embraced as an "add-on policy" by corporate giants and social media players as a way to reassure the public on privacy concerns, data exploitation, and the dark side of their products for people's wellbeing. However, this attention to responsibility is still strongly rooted in the traditional market-value approach. It follows that innovation can be (claimed as) responsible without necessarily producing public value.

PVI has a strong affinity with the concept of social innovation, defined as a way to offer novel solutions that can more effectively and efficiently solve social problems and needs, and ensure social progress (Lee et al., 2019). One key difference is that social innovation focuses on the entrepreneurial initiative of private and third-sector organizations as the main driving force. More broadly, the antecedents, consequences, and processes of PVI can differ from those of other types of social innovation; however, research is needed to disentangle these differences. Also, social innovation may include attempts to "rebrand" traditional innovation to appeal to socially-sensitive stakeholders (Marques et al., 2018). The field will benefit from integrative frameworks that connect the currently fragmented streams of research that focus on innovation as a solution to societal grand challenges. This can also lead to more research on the nomological network of the antecedents and consequences of PVI.

5.3 | Public value innovation ecosystem

Innovation ecosystems have traditionally been studied from a market-value perspective based on the business and innovation objectives of one or more focal enterprises. Innovation ecosystems are defined as "collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution" (Adner, 2006, p. 2). Thus, innovation ecosystems connect suppliers, distributors, and other organizations that affect and are affected by the creation and delivery of value by a focal company. By its own nature, PVI also emerges from ecosystems of actors (including companies, public sector, state, and universities) who are often brought to collaborate with each other for the first time, with limited or no previous knowledge and experience of their partners. In contrast to market-value-oriented innovation ecosystems, PVI ecosystems establish dependencies, common goals, and complementary knowledge and capabilities around the creation of public value, as opposed to financial profits. PVI ecosystems are anchored to specific missions (e.g., implementing net zero) and are often highly

contextualized. Therefore, the question of how these ecosystems can be created and organized is central to PVI.

Furthermore, the grand challenges landscape is dynamic (e.g., Seelos et al., 2022), as their importance varies when problems are solved, get worse, or new problems take priority over old ones. Therefore, a related question is how PVI ecosystems evolve, dissolve, and are reconfigured over time. Innovation research will benefit from new models that account for the complex and nonlinear innovation work performed within the PVI ecosystem. For example, the Quintuple Helix is a model of innovation that can tackle existing challenges (e.g., global warming) through the application, exchange, and transfer of knowledge within five subsystems: academia, the public sector, the private economy, media institutions, and the natural environment (Carayannis et al., 2012). Future research can focus on specific roles (e.g., convenors and orchestrators) and how effectively these roles are interpreted by various actors. For instance, universities often act as aggregators of PVI ecosystems because research grant conditions include the creation of industrial links. However, there is limited knowledge of the effectiveness of this mechanism, as opposed to alternative types of PVI networks.

Beyond knowledge application and exchange, PVI ecosystems also need trust, cooperation, and mutual goals among heterogeneous actors that pursue individual yet collectively aligned objectives. We believe that academics, in particular, could serve as knowledge brokers and independent orchestrators of value co-creation. This might include the dissemination and sharing of knowledge with various stakeholders through conferences, forums, and industrial partnerships. Bringing together public sector and industry professionals, investors, policymakers, and researchers would foster the exchange of ideas and enhance potential collaborations for developing PVI. For example, in the UK, the Cardiff Capital Region Challenge Fund mobilized £10 m of public funding with the aim of re-building local wealth through bringing innovative solutions to urgent societal problems (i.e., accelerating decarbonization, health and wellbeing, and transforming communities). This PVI initiative was built on a partnership among Cardiff University, public sector bodies, and private sector organizations to deliver novel solutions, where no commercial solution existed, and to identify a route to market for these innovations (Henderson et al., 2024).

5.4 | Resources and capabilities for public value innovation

To generate public value, it is necessary to combine resources, expertise, and collaborative efforts to design, implement, and evaluate policies and programs that cater to public needs (Hartley et al., 2017). However, the traditional perspective on collaboration with other actors in public service domains considers innovation as a top-down approach that neglects the requirements of users, cross-disciplinary solutions, and contributions from the private sector. In the strategic alliance literature, research has shown that strategic collaboration, inter-firm responsiveness, and strategic integration are crucial elements for successful collaboration. By integrating insights from the strategic alliances and public services literature (Skålén et al., 2018), we emphasize the importance of the following resources and capabilities: (1) identifying the needs and preferences of the public; (2) collaborating with various stakeholders, such as government agencies, nonprofit organizations, and community groups, to ensure alignment between policies and programs with the public's needs and interests; (3) utilizing advanced technologies (e.g., AI, data analytics, and digital platforms) to develop novel solutions that optimize public value; (4) obtaining both financial and human resources, such as a diverse and skilled workforce, to implement policies and programs that create public value; and (5) monitoring the effectiveness of PVI (e.g., new policies and programs) and adjusting as necessary to sustain public value. In sum, similar to private sectors that aim at producing economic benefits, for organizations to create PVI, more research is needed to understand how different parties and stakeholders integrate resources, expertise, and collaborative efforts to design, implement, and evaluate innovative policies and programs with the goal to meet the public's needs and preferences (e.g., Gutierrez et al., 2022).

5.5 | Culture and work processes for public value innovation

As in other organizational configurations of innovation, shared culture, and work processes hold the structure for PVI together and enable value creation. While culture (i.e., beliefs and norms) and work processes (i.e., activities of value creation) are conceptually distinct, both concepts determine the behavior of stakeholders involved. Culture and work processes are intertwined and emerge in three key features of collaborations for PVI: (1) stakeholder co-creation, (2) openness and learning, and (3) goal alignment and leadership.

5.5.1 | Stakeholder co-creation

Theories on innovation have evolved from a traditional focus on individual actors to acknowledge the critical role

of innovation networks and open innovation (Kazadi et al., 2016). To address grand challenges, such as sustainability and climate change, innovation must involve highly diverse stakeholders with varying levels of willingness and ability to participate in collaborations. While co-creation, or the active participation of stakeholders through shared processes and culture, has not been the focus of stakeholder-related theories, it is crucial to understanding PVI. Adding complexity is the fact that co-creation processes differ in the level of cooperation among actors. On a micro-level, individual or team motivations may play a role, while organizational value-sharing practices and formal management agreements might be decisive at the meso- and macro-levels. To fully understand how culture, processes, and work practices are learned, transferred, and shared within PVI ecosystems, future research should investigate these factors and their levels.

5.5.2 | Openness and learning

Trust plays a significant role in creating innovation ecosystems. While trust helps to increase information sharing, develop mutual understanding, and identify shared goals among PVI partners (Alam et al., 2022), the role of transparency as a common antecedent to interfirm trust and cooperation is more complex; transparency of information and processes may increase cooperation in some cases, while also creating tensions or conflicts in others. Both trust and transparency can foster learning among PVI stakeholders. Developing the culture and processes to learn from these differences and using them to reframe problems fosters the identification of learning opportunities from external partners.

5.5.3 | Goal alignment and leadership

The diversity of stakeholders in PVI determines the diversity of their goals. Triple, quadruple, or quintuple helix models applicable to PVI demand the identification of common goals and alignment of each partner's goal. Goal multiplicity (i.e., the endorsement of both social and economic goals) supports openness to an external partner and increases innovation performance (Stephan et al., 2019). Further research tapping into the formal and informal processes to align varying, at times even conflicting, organizational goals would be beneficial for a better understanding of PVI. Leadership plays a critical role in articulating shared values and goals, thereby enabling the alignment of the diverse resources necessary for PVI. The top management of PVI actors might also influence regulatory and policy frameworks that can facilitate or hinder ecosystem innovation, highlighting the importance of understanding leadership roles in a PVI context.

5.6 | Relationship between public value innovation and business models

Because PVI is collectively generated by private, public, and societal actors, how the processes of value creation, delivery, and capture unfold in the context of PVI initiatives is a rich domain for future research. The literature defines business models as a system of structures, activities, and processes that constitute a firm's organizing logic for value creation, delivery, and appropriation (Sorescu et al., 2011). As value is co-defined and co-created by an ecosystem of actors under PVI, it calls for a redesign of the underlying business models at different levels (i.e., individual organizations, partnerships, and ecosystems). Thus, there is a strong connection between PVI and how business models change and evolve.

Not surprisingly, scholars have begun a vibrant debate on the interplay between business model innovation, sustainability (Geissdoerfer et al., 2018), and responsible research and innovation (Lehoux et al., 2021). This work has already advanced our understanding of the challenges related to the design and implementation of new socially oriented business models for private organizations, including their engagement with PVI initiatives and ecosystems. The accompanying essay on Business Model Innovation (Section 4) adopts a firm-centric viewpoint and discusses some of the relevant economic, social, and environmental system factors, including the positive and negative externalities of business model innovation. Building on these contributions, PVI research may shed light on important complementary issues. For example, PVI requires structures, mechanisms, and incentives for private and public actors to innovate their existing business models and contribute to challenge-led partnerships. Research questions stemming from the intersection between PVI and business model innovation may include: How and when can existing business models be integrated with PVI projects? What are the synergies between PVI and future markets for new products and services? What is the relationship between PVI and business model innovation? How does PVI impact on an organization's existing business model?

5.7 | How to measure and evaluate the outcomes of public value innovation

The value of innovation is typically measured along various dimensions, capturing processes and performance

outcomes. PVI can be measured on similar dimensions, such as the adoption or diffusion rates of PVI into society, but ecosystem complexities will broaden the objectives. Some of these are mentioned in Table 9 ("quality of life", "wellbeing" or "sustainable economy"), and one could add wide-ranging outcomes such as "knowledge building" or relative "competitiveness" from the standpoint of enhanced standards of living. The high degree to which PVI actors and stakeholders jointly define value also raises several research challenges.

First, who defines "success" or performance goals? Like any innovation, PVI requires funding that is often contingent on (the likelihood of) meeting multiple performance goals, and innovation may be abandoned or compromised if only a few stakeholders see their specific objectives being achieved. Process and performance objectives should reflect the PVI ecosystem and identify the common, unifying goals or collective vision that actors intend to achieve and, as already mentioned, how those goals are aligned.

Relatedly, some performance dimensions may be easier to measure than others or have highly lagged effects (e.g., adoption rate vs. "quality of life"). As overreliance on financial metrics (e.g., net present value) may reduce incentives to conduct radical innovation projects, PVI goals may be "fuzzy" and take decades to achieve. Thus, the importance of early indicators or small-scale pilot project success may be significant during the innovation process. Indeed, current methods to forecast performance may need improvement to appropriately incorporate public value goals such as quality of life into the decision-making process of innovation.

The combination of multiple actors and broad PVI goals will create complex trade-offs of how PVI should be developed and implemented, and only intensify the severity of tensions within the ecosystem. Miller et al. (2018) discuss some of the challenges that arise in societal-based innovation endeavors, often related to enhancing knowledge versus "societal use" (p. 13), which could then translate into macro objectives such as quality of life. What are the collaboration challenges among PVI partners given these complex trade-offs, and how might the PVI process best resolve and manage these trade-offs during PVI development activities and among PVI outcomes?

5.8 | Conclusion

Research on PVI represents an important way forward in the increasingly heterogeneous world of societal-based innovation challenges, with implications for theory, policy, and practice. Our discussion has outlined some important themes for future PVI research: 1) the distinctive nature of PVI and theoretical integration with other socially oriented innovations; 2) ecosystems; 3) resources and capabilities; 4) culture and work processes; 5) business model innovation; and 6) measurement. Table 10 presents these themes with what we view as a series of promising research questions on PVI, complemented by suggestions regarding data and methodological approaches that can suit future research on PVI. We hope that this motivates PVI research agendas that can improve knowledge and practical applications toward greater public value outcomes through innovation.

6 | RE-ENVISIONING THE INNOVATION PROCESS IN BUSINESS: A RESEARCH AGENDA FOR RESPONSIVE AND RESPONSIBLE INNOVATION

Ludwig Bstieler, *Rosanna Garcia*, *Cheryl Nakata*, *Victor P. Seidel*

6.1 | The need for innovations responsive to societal challenges

Societies around the world face large, complex, even existential challenges, from destructive climate change and inadequate healthcare to disruptive social inequalities and systemic poverty. As the consequences of failing to address these challenges become increasingly dire, the United Nations has issued an urgent call for all countries to work towards achieving the Sustainable Development Goals (SDGs) in the hopes of ensuring peace and prosperity for humanity and the planet, now and into the future (United Nations, 2024). Inherent in this call to action and the SDGs is innovation, or solutions that are responsive to the needs of the present without compromising the ability of future generations to meet theirs. Critical for the development of such solutions are businesses, as underscored by leaders at the World Economic Forum and other influential gatherings (Directorate-General for Research and Innovation (European Commission) & von Schomberg, 2011).

Innovation scholars face a dearth of understanding on how businesses are to pursue this work (Lee et al., 2019). It has long been advocated that successful innovation rests on first understanding customer needs and then meeting these needs by developing new products and services. Yet, traditional corporate innovation approaches often ignore societal concerns outside of market satisfaction, financial aims, and risk management. For ecological and moral imperatives to matter, firm interests must expand from the ethos of "doing no harm" to "doing no harm *and* doing good" (Varadarajan, 2023).

TABLE 10 Summary of key areas and research questions for future public value innovation (PVI) research.

Areas of future public value innovation research	Main research questions	Data and methods suggestions
Distinctive nature of PVI	• Which actors, distinct in motivations and resources, play a crucial role in PVI? • How do the antecedents, consequences, and processes related to PVI differ from other forms of socially-oriented innovations? • How can these different streams be integrated under a unified framework?	• Interviews with various actors involved with PVI • Case studies of PVI initiatives • Web and text analytics of policy documents linked to PVI projects • Bibliometric analysis of public value literature and related socially-oriented innovation streams
PVI ecosystem	• How do PVI ecosystems emerge, get organized, evolve, and/or dissolve? • Under what conditions can open innovation networks contribute to PVI? • What is the contribution of higher education institutions within PVI ecosystems? • What are the tensions and conflicts within PVI eco-systems?	• Social network data and methods to understand the structure, patterns, and relationships of PVI ecosystems • Secondary data from public sector and higher education sources to understand the role and impact of Universities within PVI ecosystems • Mixed-methods to study the conflict and tensions among PVI ecosystems actors
Resources and capabilities for PVI	• What resources (tangible and intangible) are needed for PVI? • What capabilities are needed for PVI, including the public sector, private sector, and civil society? • What leadership behaviors and capabilities are needed for PVI?	• Development of new capabilities measures specific to PVI • Configurational studies (fsQCA) of resources and capabilities for PVI • Participant observation and ethnographic approaches to understand effective leadership of PVI
PVI culture and work processes	• What dimensions of organizational culture are associated to PVI? • How are culture, processes, and work practices learned, transferred, and shared within PVI eco-systems? • To what extent can PVI be achieved via new ways of working that enable the effective collaboration among private and public actors?	• Text mining and topic modeling techniques to identify salient cultural dimensions • Mixed methods to identify and measure the mechanisms for the integration of culture and knowledge across organizational levels • Quantitative models correlating work practices with PVI collaboration indicators
Relationship between PVI and business model innovation	• How and when can existing business models be integrated with PVI projects? • What are the synergies between PVI and future markets for new products and services? • What is the relationship between PVI and business model innovation? • What are the impacts of PVI on an organization's existing business model?	• Case studies to examine varieties of business model structures that embrace PVI projects into their existing models. • Mixture of primary and secondary data to examine PVI business model outcomes. • Mixed-methods approaches to study how an organization's business model evolves when considering PVI governance and partnerships.
How to measure and evaluate the outcomes of PVI	• What are the "performance" objectives of PVI and who defines them? • How is PVI innovation success defined and measured? • How do public and private partners manage the trade-offs between competing PVI outcomes?	• Identification of a range of financial and nonfinancial outcome variables for PVI from secondary sources. • Longitudinal studies to understand the effectiveness of specific PVI activities and the evolving nature of long-term outcomes. • Case studies to disentangle the different or conflicting perspectives of relevant actors.

This requires transforming the traditional business focus to encompass the wider and longer-term implications of innovation efforts economically, ecologically, and socially. In other words, responding to societal challenges means re-envisioning the corporate innovation process. We propose a research agenda with the goal of stimulating interest in guiding firms in practicing responsible innovation and advancing innovation knowledge.

6.2 | Re-envisioning the innovation process in business

The basis for this new research, which moves from a technology-market dyad (Garcia & Calantone, 2002) towards a technology-market-society triad (Owen et al., 2009), is offered by responsible innovation (RI). Initiated in 2011 by the European Commission to motivate innovations "for social benefit...and addressing public anxiety over unintended and irreversible consequences" (Guston et al., 2014, p. 3), RI research has grown substantially in recent years. However, contemporary RI discourse has been primarily focused on publicly funded scientific research, and in the innovation literature, there has been a paucity of evidence for how the industry perceives RI and what might drive or impede implementation within the corporation (Chatfield et al., 2017).

Responsible innovation shares some key themes with other topics such as social innovation (Cajaiba-Santana, 2014), sustainable innovation (Varadarajan, 2023), and public value innovation (Mazzucato & Ryan-Collins, 2022), as all are concerned with societal ramifications of business practices and broadening stakeholders to arrive at solutions. Unlike social innovation, RI is concerned with a variety of innovation outcomes that go beyond the social domain, such as by providing new products developed under more responsible practices. Distinct from some forms of sustainable innovation, RI takes a broader, ethically based, and reflexive view, while emphasizing the continuous engagement of stakeholders and careful assessment of human, economic, and environmental risks, rewards, and impacts throughout an innovation's lifecycle. Responsible innovation also differs from public value innovation by not necessarily focusing on value co-creation between private and public sectors. Furthermore, RI places a greater emphasis on understanding risks and unintended consequences of innovation, whereas public value innovation attends more to value creation across stakeholder communities. Having developed from a scientific research domain, RI assumes individual and collective exploration of new ideas for ethical societal advancements, whereas public value innovation starts with a premise that public institutions can help align innovation systems with the public good. In summary, while sharing points of connection with social, sustainable, and public value innovation, RI has unique attributes and implications for further research, as we elaborate next.

RI offers an alternative to "business-as-usual" innovation methods by accounting for dynamic social interactions and concerns within *and* outside the firm. It is a call for what has been termed a "meta-responsibility" by all stakeholders that aims to ensure desirable and acceptable innovation outcomes (Stahl, 2013). As a starting point for our research agenda, we discuss the most influential definition of RI. Crafted by the European Commission and its director (Directorate-General for Research and Innovation & von Schomberg, 2011, p. 9), RI is said to be:

> "...a transparent interactive process where societal actors and innovators become mutually responsible to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)."

The definition suggests features of RI and how it may be theoretically interpreted and studied. One feature of RI is a "transparent interactive process," pointing to a systems approach to conceptualize its process elements and complexities. Another feature is that RI is carried out by "social actors and innovators," indicating that diverse and inclusive stakeholder participation is necessary (Stilgoe et al., 2013). A third feature is a focus on "ethical acceptability, sustainability, and societal desirability," which implies RI addresses "wicked" problems insofar as ethical demands are highly uncertain and difficult to satisfy (Blok & Lemmens, 2015). Each feature calls out an opportunity to study RI as a re-envisioned or transformed innovation process used in businesses, leading to our research framework or agenda.

6.3 | A research framework for transforming the innovation process

It is time to re-envision the innovation process not only because traditional corporate innovation approaches generally ignore SDGs and similar interests but also because RI was originally formulated for scientific discovery of technologies in academic research laboratories. As initially presented by the European Commission, it fails to articulate how profit-driven organizations are to develop a range of societally responsible new products and services and do so while attending to business viability (Lehoux et al., 2021), or in other words the technology-market-society triad. We therefore introduce a framework, diagrammed in Figure 4 and explained hereafter, that identifies key topic areas and relationships for future research. This framework extends and reformulates RI by contextualizing it for corporations to move towards a reflexive, responsive, and responsible innovation process while pursuing financial and operational goals.

This framework captures how, at a macro-level, the SDGs motivate corporations to innovate responsibly at

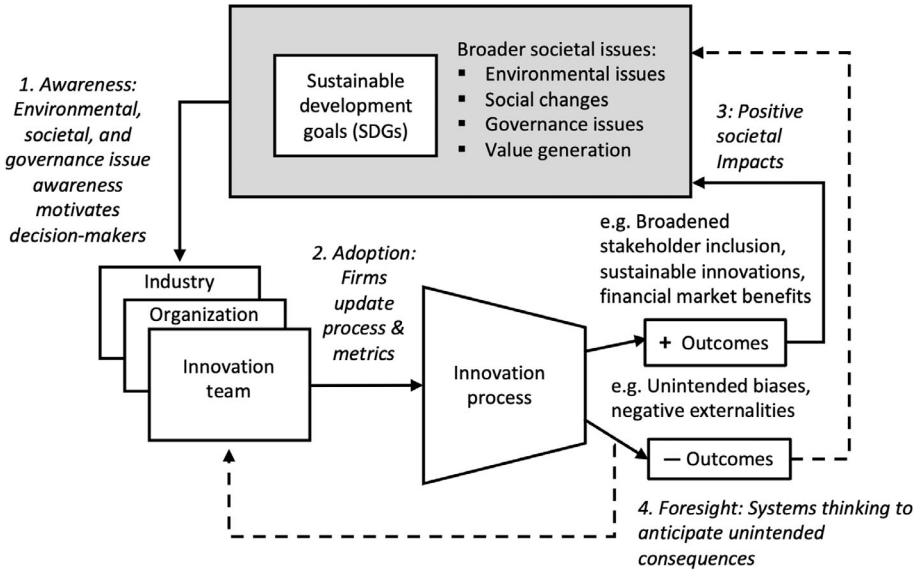

FIGURE 4 Research framework of key topic areas and relationships on responsive and responsible innovation by the firm.

a micro-level. As indicated in Figure 4, the first topic area is awareness by decision-makers on issues related to the SDGs' motivating action. These decision-makers include innovation teams working on specific projects, top-management teams, those in the broader organization, as well as decision-makers across an industry or ecosystem. Awareness informs the second topic area: Adopting new or adapting existing processes and metrics, where changes to the innovation process account for broadened stakeholder-inclusive responsible innovation. Following adoption or adaptation, there can be intended positive outcomes as well as unintended negative outcomes. The third topic area is understanding intended positive outcomes, both in terms of value-creation to the firm as well as for society. However, transforming the innovation process may also result in negative outcomes, such as harmful externalities from a new green-technology initiative or marginalizing biases against certain individuals or groups. This leads to the fourth topic area: developing foresight to anticipate possible negative outcomes through prospective analysis or systems thinking.

Based on this proposed framework, we next present examples of research questions in the four topic areas, highlighting how scholars may apply and find value in the framework. Table 11 contains these examples and additional sample questions to stimulate scholarship.

6.4 | Research questions on awareness and adoption

The first topic area, awareness among decision-makers and subsequent motivation to take action, can influence not only organizations but also industries. Consider two brief examples. Allbirds, a shoe wear company based in New Zealand, developed renewable sugarcane-based midsole materials to replace prior petroleum-based technology, resulting in a carbon-negative product. They then made the technology broadly available with the aim to help lower carbon emissions industry-wide. OVO Energy, a UK-based energy supplier, is one of a wave of firms that provide technology that helps electric vehicles integrate into a home grid network. By using their batteries to provide energy at specific times, with an objective of improving performance across the retail energy industry, society and the environment are also positively impacted. However, these types of examples are not the norm in industry. RI provides a vehicle to explore and to consider how awareness (and subsequent adoption) of responsible innovation shapes inter-organizational actors, expanding the scope and potential for how whole industries, ecosystems, and society can transform.

Several research questions come from considering these effects of awareness across decision-making levels. Extant research details the role of top management teams and organization-wide change in working to transform industries and ecosystems, such as how executives' cognition frames what opportunities are available (Kaplan, 2008). Senior leadership vision has been shown important for making far-reaching changes (Carton et al., 2014). As with the Allbirds example, top management teams may be the champions for communicating a vision of how responsible innovation can change the nature of an industry. In the OVO example, insights from one team on EV car charging might then lead to broader thoughts on changes to other elements of the energy ecosystem, increasing awareness of RI across the

TABLE 11 Example research questions and tensions in responsible innovation (RI).

Topic area	Sample research questions	Possible tensions (related research)
1. Awareness: *Awareness among decision-makers of RI as impacted by the UN SDGs*	• How does a visionary motivated by the SDGs establish awareness of RI across organizational boundaries? • Are top-down or bottom-up managerial approaches better for RI? • How can multi-disciplinary teams collectively address the broader impacts of innovating responsibly? • How should costs of RI be shared between the stakeholders: consumers, the firm, governments, society?	• Stakeholder tensions: Designing for multi-stakeholder perspectives; Sharing meta-responsibility (Gao & Bansal, 2013; Stahl, 2013; Voegtlin & Scherer, 2017) • Motivational tensions: Consumer versus corporate responsibility (Schlaile et al., 2018)
2. Adoption: *Team, organizational, and industry adoption of RI-informed processes*	• How should RI with its long-term impact be framed for organizational adoption, which has short-term goals? • How can firms embed a reflexive RI ethos into the innovation process? • How does team composition affect insights at the project level and the industry level? • Who drives innovation? Policy makers or corporate governance?	• Time horizon tensions: Need for short-term profits versus long-term impact (Chatfield et al., 2017) • Agency tensions: Policymakers versus firms (Stahl, 2013)
3. Positive impacts: *Outcomes that further ESG or value generation*	• When developing RIs for multiple stakeholders how should firms value risk reduction, cultural fit, organizational fit, environmental impact, and so forth? • How can companies consistently develop innovations that not only do no harm, but also do good? • How do metrics for innovation activities and outcomes need to be adapted?	• Value tensions: not all values same across stakeholders (Owen et al., 2009) • Standards tensions: Lack of consistency in privacy, security, and so forth approaches (Chatfield et al., 2017) • Outcome tensions: Pecuniary versus other outcomes (Blok & Lemmens, 2015; Stilgoe et al., 2013)
4. Foresight: *Using systems thinking to anticipate unintended consequences*	• How can companies incorporate reflexivity into the innovation process so they forecast for unintended consequences, both negative and positive? • What team structures and management styles assist in routinizing reflexivity and the metacognition that produce valuable foresight?	• Unintended consequences: Epistemic and ontological uncertainty of innovating responsibly (Stilgoe et al., 2013).

organization. Extending these approaches through an RI lens, researchers can pursue questions such as: How does a vision of addressing wider and longer societal interests translate and create impacts across organizational boundaries? Are top-down or bottom-up managerial approaches better for innovating responsibly?

On the second topic area, adoption, sustainability scholars have noted the "unsustainable truth" about stage-gate and other current innovation methods (Bansal & Grewatsch, 2020), underscoring the need to study the adoption of RI-informed processes. While corporate innovation has been long grounded in efficiency-minded best practices, alternative approaches that embrace the technology-market-society triad may challenge existing organizational incentives and structures. Possible research questions around adoption of innovating responsibly include How should RI with its long-term impact be framed for organizational adoption, which has short-term goals? How does the composition of teams affect not only project-level innovations but also collectively and over time industry-level innovations?

6.5 | Research questions on positive societal impacts and foresight on unintended consequences

The third topic area is the intent of a responsive-responsible innovation process to produce positive

impacts for firms as well as society as a whole. Innovation teams are often the locus for much experimentation in organizations, where team members can learn to improve their potential impact (Seidel & Fixson, 2013), and such learning may extend to integrating new sustainability or responsible metrics into their processes, not only for their own benefit but for the broader industries and society. Beyond profit maximization important outcomes of RI can include equity, inclusiveness, diversity, and social justice (Stilgoe et al., 2013). Research questions that arise in this area include How do metrics for innovation activities and outcomes need to be adapted or created anew in view of this wider agenda? How can companies effectively negotiate the opposing pulls of developing innovations good for the bottom-line and good for people and the planet?

The fourth topic area is focused on the need for foresight, as businesses must anticipate detrimental, unintended consequences of new technologies, for which risk-based estimates commonly fail to warn of harmful future effects. An illustration is an innovation process for developing green technologies that can also increase the use of rare earth metals, displacing marginalized communities. While past research has looked at how reflexive practices help innovation teams develop better products (Seidel & Fixson, 2013), there is a need for more reflexivity in a broader set of actions, along with systems thinking to illuminate the dynamic intricacies of generating solutions for complex ethical dilemmas. The current discussion around the benefits and risks associated with artificial intelligence illustrates this dilemma. Co-creating foresight capacity and future literacy among multiple actors may be a path forward to take into account wide-ranging and complex factors shaping broader industry and societal impacts by exploring possible futures and pathways (Wibeck et al., 2022). Reflexivity, at the level of organizational practice, means reflecting on one's own activities, commitments, and assumptions, being aware of one's epistemic limits, and being ontologically cognizant that a particular framing of an issue may not be universally held among stakeholders (Stilgoe et al., 2013). Reflexivity might advance the capacity to adapt to unintended consequences and to improve the integration of co-creation processes into the innovation process. Possible research questions that arise in the topic area of unintended consequences are How can firms establish a co-creation process that allows for jointly vetting unintended consequences of forthcoming innovations? How can companies incorporate reflexivity into the innovation process so they more accurately anticipate both short-term and long-term outcomes? What team structures and management styles assist in routinizing reflexivity and the metacognition necessary for valuable foresight?

6.6 | Tensions highlighted by RI

Numerous studies have noted that innovating with a technology-market-social RI approach inherently comes with points of tension (Blok & Lemmens, 2015; Stahl, 2013; Voegtlin & Scherer, 2017). Scholars studying this new re-configuration of innovation will need to attend to these underlying tensions to guide the corporate shift towards a more ethical, meaningful, and conscience-led process for new product and service development. Again, we highlight a few of these tensions as a means of stimulating thought and refer to Table 11 for further examples.

Innovating responsibly requires taking a systems-level integrated approach that draws perspectives from across micro-, meso-, and macro-levels (Gao & Bansal, 2013), and this, in turn, necessitates what can be termed a "meta-responsibility" across stakeholders. Meta-responsibility encompasses "a responsibility for the maintenance, development, and coordination of existing responsibilities" (Stahl, 2013, p. 712), as stakeholders mutually align their efforts for desired outcomes. The SDGs represent wicked problems that cannot be solved by single actors but require the cooperation of governments, NGOs, competitors, and the general public. However, this multi-stakeholder approach frequently results in tensions, as pecuniary goals must be balanced with nonpecuniary outcomes. For example, conflicting timelines for measuring outcomes arise as publicly traded companies must show quarterly results, yet the impact (both positive and negative) of innovating responsibly may not be seen for years or decades (Chatfield et al., 2017). Questions also often arise on who pays for product development in innovation systems when society or the environment may benefit more than the firm (Garcia et al., 2019). In the United States, there is a recent backlash on ESG (environmental, social, and governance) investments because shareholders of pension funds may be negatively impacted when the focus is not on profit maximization (Sorkin et al., 2023). The role of the government may also lead to agency tensions, as policy makers may end up mandating innovations that may not be in the best economic interest of the firm. For RI to be widely adopted, academics must guide the firm on how to manage these tensions and others noted in Table 11.

6.7 | Methodological considerations for the research framework

To pursue this research agenda, the question raised is what data sources, methods, and challenges need or

should be attended to in understanding the corporate responsive and responsible innovation process? In Table 12, we present a few sample possibilities by topic area.

Related to the first topic of awareness, recent research suggests consumers, corporate decision makers, and country leaders take an "environmental oath" to lower and minimize harm to the natural environment caused by their activities and decisions (Varadarajan, 2023). If the responsive-responsible innovation process is to be integrated into firms, replacing a standard method that ignores or superficially attends to SDGs and societal concerns, a question arises as to how to communicate this vision within and outside organizational boundaries relevant to awareness by decision-makers. Surveys, department interviews, and textual analyses as well as CSR reports may be helpful data sources and methods to gain insights.

A key methodological issue in the topic of adoption is operationalizing RI. If a new RI-informed innovation approach is to be embraced by firms, it is important to be able to capture the construct empirically to understand determinants and impacts. The European Commission and von Schomberg's definition provide a reasonable starting point as we presented earlier, but there is a need for translation into a scale or scales that encompass the multiple, admittedly complex, features of RI. One benefit of doing so is to make the construct measurable, while other benefits lie in implementing comparable studies and thus accumulated learning across firms, industries, or countries. Pursuing the measurement issue involves literature reviews, rigorous scale development, and addressing theoretical ambiguities surrounding RI.

Traditionally, innovations have a positive bias and are seen as desirable economic activity. On the third topic, there is a need to study how managers approach RI in light of intended positive outcomes. Capturing ways that innovation teams are anticipatory, reflexive, inclusive and responsive to both positive and negative outcomes (Stilgoe et al., 2013) needs to be understood. The challenge for the researcher will be access to these teams. Ethnography, discourse analysis, and case studies may be the best methods of recording and analyzing how teams approach RI and the subsequent impacts on the industry.

In the final topic, foresight, there is the question of how firms can develop the capacity to anticipate unintended consequences of their innovation efforts. Collaborative knowledge mapping, much like road-mapping, might facilitate foresight in view of global challenges and problems that require a different kind of thinking. Innovation processes will need to be modified to promote features or principles of RI, such as to involve various stakeholders along the different stages of development as avenues for anticipating the long-term impacts of innovations. Longitudinal studies capturing changes and impacts over time would provide valuable insights. Also helpful would be industry-level data, simulations, experiments, and systems dynamics modeling to help disentangle the chains of causality.

6.8 | Final thoughts

We hope the outlined research agenda stimulates and inspires innovation management scholars to study, and business practitioners to realize, a reimagined and

TABLE 12 Sample data, methods, and challenges tied to the responsible innovation (RI) research framework.

Topic area	Example research question	Example data source	Example method	Related challenges
1. Awareness: *Awareness among decision-makers of societal issues as represented by the UN SDGs*	How is a vision of RI communicated within and across organizational boundaries?	CSR reports; company data	Interviews, Surveys, Textual analysis, NLP	RI is not well understood nor disseminated.
2. Adoption: *Team, organizational, and industry adoption of RI-informed processes*	How to operationalize RI?	Literature; policy documents; industry reports; CSR reports	Literature review; meta-analysis; NLP; scale development	Lack of clarity impedes progress. Linking to existing theories
3. Positive impacts: *Outcomes that "avoid harm" and "do good"*	How can corporate RI practices motivate industry-level goals?	Industries undergoing transformation	Comparative case studies; ethnography; discourse analysis; simulations	Access to managerial decision-making data
4. Foresight: *Using systems thinking to anticipate unintended consequences*	How can unintended consequences of innovation be anticipated and addressed?	Industry level data	Simulation; system dynamics modeling; experiments; comparative case studies	Untangling causality

impactful process of responsibly developing new products and services. The impacts go well beyond profitably meeting market demands by addressing longer and wider societal needs through innovations that preserve the dignity of all people and respect the value of finite resources. Although tensions and costs will be encountered in this pursuit, sticking with what we in the innovation community know and already do is ultimately limiting, contrary to the very spirit of the enterprise we call innovation.

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