6-9-2023

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Citation Details

Xiao, Y., & Bharadwaj, N. (2023). The 2022 PDMA Doctoral Consortium: Emerging research priorities in new product development and innovation and insights into community building. Journal of Product Innovation Management. Portico.

Received: 6 April 2023 | Accepted: 1 May 2023

DOI: 10.1111/jpim.12683

JOURNAL OF PRODUCT INNOVATION MANAGEMENT pdma

CATALYST

The 2022 PDMA Doctoral Consortium: Emerging research priorities in new product development and innovation and insights into community building

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Associate Editor: Charles Noble

Abstract

In July 2022, the University of Tennessee at Knoxville (UTK) hosted the fifth Product Development Management Association (PDMA) Doctoral Consortium. As a critical vehicle to promote doctoral student research and scholarly networking, this consortium featured emerging research topics on new product development (NPD) and innovation by promising doctoral students and leading scholars, provided exposure to cutting-edge practice in additive manufacturing, and facilitated opportunities for the NPD and innovation research community building. This article summarizes key insights and synthesizes important research topics emerging from the event.

KEYWORDS

doctoral consortium, new product development and innovation, prominent research topics

1 | INTRODUCTION

In July 2022, the University of Tennessee at Knoxville (UTK) hosted the fifth Product Development Management Association (PDMA) Doctoral Consortium. The event was co-sponsored by PDMA, *Journal of Product Innovation Management* (JPIM), and UTK's Marketing Department, Haslam College of Business, and Office of Research, Innovation, and Economic Development. We are grateful for the generous support from our sponsors.

Over 60 global scholars interested in innovation/new product development (NPD) were invited to participate in this two-and-a-half-day in-person event, including 25 Doctoral Student Fellows, 31 Faculty Fellows, five guest speakers and tour leaders, and four brand ambassadors. Although challenges imposed by COVID-19 prevented several invitees from attending, a diverse group of participants from a host of different academic disciplines (e.g., Architecture & Design, Engineering, Entrepreneurship, Innovation, International Business, Management, Marketing, and Medicine) traveled to UTK from countries such as Australia, Brazil, Germany, Great Britain, and Switzerland (see Appendix A).

In general, a doctoral consortium is a critical vehicle that promotes doctoral student research, explores emerging topics, and provides opportunities for scholarly networking (Noble & Spanjol, 2020). Accordingly, the 2022 consortium featured a dissertation research competition for doctoral student fellows and presentations by distinguished innovation scholars. It also brought together researchers with innovation practitioners through two featured field trips that showcased additive manufacturing.[1] The tour at an Oak Ridge National Lab facility illuminated large-scale additive

[1]We thank Lonnie Love (Corporate Fellow) for leading a tour of the Manufacturing Demonstration Facility (MDF) (https://www.ornl.gov/facility/mdf), and James Rose and Craig Gillam for (this manuscript has been made open access through support provided by Portland State University Library) a site visit of the Fab Lab (https://archdesign.utk.edu/study/studios-learning-labs/fab-lab/).

manufacturing as a source of: product and process innovation, improvements in efficiency and effectiveness over subtractive manufacturing, and environmental benefits (e.g., reducing life-cycle energy and greenhouse gas emissions). The Fab Lab site visit focused on general digital fabrication and small-scale additive manufacturing. Participants were able to observe full-scale prototypes of collaborations involving large-scale additive manufacturing through videos and physical demonstrations of multiple architectural projects and products during the tours (see a site photo in Appendix B).

This article summarizes key takeaways from the 2022 consortium. We begin by explicating the value of a doctoral consortium from the vantage points of both faculty and students, and organize the participants' feedback around the central themes of community creation, professional development, intellectual growth, and relationship building. Subsequently, we identify the important, open research questions in innovation/NPD that participants noted require more scholarly attention.

2 | THE VALUE OF A DOCTORAL CONSORTIUM

We invited faculty and doctoral student fellows to complete a three-question post-consortium survey regarding the 2022 PDMA Doctoral Consortium. We received 38 responses in total. The key insights shared by participants were closely aligned with the four noted benefits in Noble and Spanjol (2020): community creation, professional development, intellectual growth, and relationship building.

In Table 1, we provide exemplary quotes from faculty and doctoral student fellows. Overall, faculty fellows believed the consortium benefits doctoral students in building their personal NPD/innovation network and provides a precious opportunity for doctoral students to prepare for the job market. The faculty fellows also valued the opportunity to learn about emerging research topics and methodologies, mentor budding scholars, and contribute to the NPD and innovation community. In addition, doctoral students appreciated the opportunity to join the community through the consortium, receive valuable feedback from faculty fellows on their research topics, learn new research methods and topics from presenters, and network with cohorts and faculty fellows for their academic careers. We are hopeful that the insights from these constituencies can help future organizers prepare for events that provide such value to participants. For example, our participants expressed favorable comments about an agenda that had a good balance between (1) group presentations and one-on-one interactions, (2) academic and practical perspectives, and (3) professional and social activities.

Practitioner points

- The PDMA Doctoral Consortium serves as a forum for doctoral students to join the innovation/new product development community, receive valuable feedback on their research, learn about emerging topics and research methods, and network with other doctoral students and faculty fellows.
- It provides faculty fellows an opportunity to mentor the next generation of innovation/new product development scholars.
- It also inspires exploration of emerging innovation/new product development topics and bridges academic scholarship and business practice.

3 | PROMINENT INNOVATION RESEARCH TOPICS

The presentations by the student and faculty fellows also illuminated current knowledge gaps. Our conversations at the consortium and deliberations afterward led us to conclude that the topics in need of greater academic attention include: Sustainability, Business Model Innovation, Digital Innovation, and Innovation Cultures and Networks. Therefore, in the post-consortium survey, we invited participants to elaborate further on these topics and then identified specific questions for future research that coalesce around each topic.

3.1 | Topic 1: Sustainability

Sustainability represents an inescapable business priority in today's business climate (Bharadwaj et al., 2022; Ji et al., 2022; Sheth, 2020). Consumers (Cone Communication, 2017), corporate leaders (Business Roundtable, 2019), investors (The Economist, 2021), non-governmental organizations (Apte & Sheth, 2016), and other primary and secondary stakeholders demand that firms become better stewards of human resources (e.g., economic inequality and discrimination) and the planet (e.g., climate change) (Freeman et al., 2004). Polman and Winston (2021) assert that companies can thrive by placing strategic emphasis on fortifying "people" and the "planet" yet caution that only a minority of companies are "net positive" in terms of preserving resources for future generations. Academics also advocate updating existing innovation frameworks that are steeped in the wasteful take-make-dispose approach to those grounded in a cradle-to-cradle design

TABLE 1 On the value of a doctoral consortium.

	Faculty fellows	Doctoral student fellows
Community creation	"PDMA consortium is one such opportunity, where you hear different perspectives and approaches to studying and understanding innovation and new product processes. The environment is intellectually stimulating." "I had an opportunity to be exposed to a new field of scholars and discuss a lot of interdisciplinary research questions." "Creating a strong innovation research community through engagement beyond networking."	"I got to know many new colleagues and outstanding faculty from across the world, and I was able to delve into innovation management research fields better than before." "I could meet professors and colleagues with different backgrounds and interests in a more intimate and friendly setting than at a regular conference." "I was very motivated by interacting with the consortium participants and organizers." "Very welcoming atmosphere that allowed me to connect with fellow researchers and doctoral candidates from all around the world."
Professional development	"I enjoyed listening to all the student and faculty presentations, and I appreciated the feedback that I got on my own research." "Opportunity to mentor PhD students and give them suggestions on their questions about career management, writing tips, research, and job market." "I enjoyed listening to the PhD student presentations to learn what the current research topics seem to be in the field of marketing/innovation." "It was great to exchange ideas, perspectives, and opinions about the future of innovation and new technologies (e.g., XR technologies and the Metaverse)." "A benefit to me is sharing advice on publishing and careers to young scholars to help them navigate academia."	"I had the privilege of learning from other areas of innovation research than my own and being exposed to different research methodologies that I usually use." "...I received constructive feedback concerning my research projects and guidance for my academic career." "Understanding the research journey post PhD and how to deal with some of the most common challenges faced." "I met so many inspiring people and topics. To get a feeling of how such seminars are run—and to enjoy them immediately." "I gained many suggestions from professors about student life and future academic career."
Intellectual growth	"The visit at the Oak Ridge National Laboratory gave me a measure of optimism in the future of this country, based on all the exciting innovation that is being fostered in the lab." "The ORNL tour was insightful and demonstrated the progress in additive manufacturing." "I learned a lot about one new technology I had not been very familiar with before (i.e., 3D printing). I loved the interdisciplinary exchange with the Prof. from the school of architecture."	"...I was able to increase knowledge and keep myself up to date with new developments and trends in the area of innovation research and practice." "It helped us learn and grow with other doctoral candidates at varying stages in their dissertation work. This allowed me to identify strengths and weaknesses in my own research as well.!" "I gained knowledge of cutting-edge (and diverse/interesting) research (questions) in the area of innovation."
Relationship building	"I loved all the interactions and conversations we had at the event" "A chance to reconnect with friends, colleagues and co-authors." "It was great to meet and interact with the next and upcoming generation of scholars. They bring fresh ideas and novel perspectives that sometimes challenge current ways of thinking." "The event provided networking with leading scholars and motivated doctoral student."	"I met best-in-field faculty and emerging innovation scholars, which helped build my network." "I met amazing young scholars with highly different research interests and had the opportunity to build a network for future cooperation." "One-on-one discussions with distinguished scholars (received valuable feedback) was great for relationship building." "It was great participants were from across the world. This network will be my asset."

philosophy that can accommodate material reclamation (Rose & Bharadwaj, 2023).

In this regard, the participants shared in their responses a host of questions relating to environmental or social sustainability. Below, we list these research questions under four key themes that require academic attention and a battery of questions that can stimulate thinking about addressing today's and tomorrow's pressing challenges. Some research questions are direct quotes from participants and listed anonymously.

Theme 1: Strategic decisions

- How can firms be more inclusive in their new product development processes (e.g., include marginalized groups in marketing research, product testing, and market testing of new products)?
- How can designers be further supported by marketing and senior management on sustainable innovation?
- How can firms foster inclusive design into their innovation/NPD process?
- How can firms anticipate unintentional negative effects of products and services on people and the planet?
- How can innovation help people to mitigate or adapt to climate change?
- How can firms innovate to better serve the needs of those at the *bottom of the pyramid*?

Theme 2: Consumer decision-making

- In which contexts and for what consumers do sustainable innovation matter?
- How does eco-product labeling affect consumer purchases?
- How does marketing impact the success of sustainable innovation in the marketplace?

Theme 3: Fortifying the nomological network

- What are the antecedents and financial consequences of sustainable innovations?
- What are the key success factors of sustainable/green innovation?
- What are the factors of sustainable product design that engender successful market introductions?
- Does a strategic emphasis on sustainable innovation increase the likelihood that firms will survive/outperform rivals?

Theme 4: Policy

- What is the role of environment-related regulations and policies in shaping sustainable consumption?
- How can innovation foster social change?
- How can firms be incentivized to design and market more sustainable innovations (that do not use up the world's resources or create excessive pollution)?
- What are the ethical implications of new service development that relies on algorithms?
- How should we balance the need for financial/market/consumer-driven innovation with environmental/societal/ governance-based pressures for sustainability?
- What are the enablers of sustainable business models that would hasten the progress toward a circular economy?
- How can developed nations support emerging nations to pursue sustainable innovation?
- Are we approaching a point in which we are producing too much innovation?

3.2 | Topic 2: Business model innovation

Business model innovation refers to 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). In this conceptualization, a firm can update: the resources and processes that underlie the development and manufacturing of its goods and services; the manner in which it communicates and delivers its goods and services to match the situation; and/or its cost, pricing, and revenue functions. The participants identified a host of important open questions in this realm.

Theme 1: Adapting to new technologies

- Can artificial intelligence (AI) and machine learning assist in harnessing the torrent of marketplace information to generate incremental and/or radical value propositions that can better satisfy customer requirements?
- How do business models need to develop to benefit the most from the opportunities AI offers?
- How will virtual reality/augmented reality impact a firm's business model?
- How can firms incentivize and manage business model innovation toward the metaverse?
- How can firms leverage 3D printing to displace existing business models?

Theme 2: Open innovation

- How will the new paradigm of open innovation impact existing business models?
- How will open innovation change the role of marketing in organizations?

- How will open innovation impact the user experience?

Theme 3: Adapting to new marketplace realities

- How does the process and nature of innovation evolve post disruptive changes (e.g., pandemic)?
- What emerging business models are likely to disrupt the innovation process? What dis/similarities exist when the context is: B2B vs. B2C?; domestic vs. international?; goods vs. services?; and profit vs. not-for-profit?
- How can firms incentivize and manage business model innovation toward sustainability?
- Is making innovations better than buying them?

Theme 4: Theoretical updates

- What new theories are needed to better inform the antecedents, components, and consequences of business model innovation research?
- What adaptations to existing theories and frameworks are needed to conceptualize the cradle-to-cradle design of new products?
- What are the enablers of business models to better align firms with the circular economy?
- What factors and business models are needed to motivate firms to undertake the cradle-to-cradle design of new products?

3.3 | Topic 3: Digital innovation

Simply put, digital innovation means the "use of digital technology during the process of innovating" (Nambisan et al., 2017, p. 233). The digital revolution brings new tools (such as virtual reality) (Harz et al., 2022) and new data (such as 3D printing) (Rindfleisch et al., 2017) in innovation, which reforms managerial decision-making (Bharadwaj, 2018) and consumer acceptance and adoption of innovation (Xiao & Spanjol, 2021). Digitalization reduces the NPD cycle and fundamentally inspires many different aspects of innovation (Wetzels, 2021). Four themes emerged from the doctoral consortium related to digital innovation.

Theme 1: AI and innovation

- To what extent can AI prevent or reinforce cognitive biases in the NPD process?
- Will AI increase or limit consumer voices in innovation?
- How will consumers interact with AI and Digital Innovations? While initial research shows consumers are wary of it, the underlying reasons are still to be parsed out.
- With the help of AI, how to carry out more groundbreaking research and inspire breakthrough innovation?
- How can companies collect (enough) data to integrate AI and digital innovation to advance different industries?
- How can researchers and firms integrate AI and data analytics in digital transformation?
- How can AI foster green customer and firm impacts?

Theme 2: Extended reality and innovation

- What NPD opportunities and challenges will extended reality (XR) technologies bring to different companies (B2B, B2C, physical goods, and service companies)?
- What has been working and not working for using XR technology in innovation?
- How to extract, analyze, and leverage rich data from XR devices for innovation?
- How can VR be used as an effective approach to reducing economic risks in new product development?
- How can marketers use virtual reality (VR) and augmented reality (AR) to better represent customer ideas in new product development?
- What potential roles will the metaverse play in sustainable innovation?
- How will the metaverse shape the cocreation of new brands and products between firms and users?
- What are the synergies of using VR and neurophysiological tools in innovation research?

Theme 3: Consumer interaction with digital innovation

- What are the roles of humans in the picture of AI/digital innovation?
- How to consider consumers' needs and limitations when interacting with AI/digital innovation?
- How does adopting AI affect consumers' attitudes toward new brands?
- How will digital innovation reform consumer experiences in searching for and sharing new product innovations?
- How can firms use personas to facilitate open innovation and new product diffusion?

Theme 4: The impacts of digital technology on innovation

- What are the synergies of digital innovation and sustainability? How could AI foster green customer outcomes?
- How can (should) higher education and firms collaborate effectively in the digital era to create impactful innovation?

- How does AI impact innovation processes in organizations?
- How will AI and other digital technologies impact innovation activities?
- What is the role of hyperconnected digital experiences in innovation and new product development?

3.4 | Topic 4: Innovation cultures and networks

The last important topic includes organizational innovation cultures and networks. Cultures reflect shared assumptions, values, and norms (Schein, 1984), and innovation culture in an organization usually includes four dimensions: intention, infrastructure, influence, and implementation (Sharifirad & Ataei, 2012). An innovation network involves "multi-scalar actor networks and institutional contexts that jointly support (or hinder) the formation and diffusion of novelty" (Binz & Truffer, 2017, p. 1286). Accompanied by the rise of new technologies and market changes, some research questions emerge for organizational innovation cultures and networks.

Theme 1: Innovation cultures

- How can an inclusive design mindset get activated and embedded in an organization, and how does it shape the new product development process?

TABLE 2 Related articles published in JPIM in 2020–2023.

Topics	Search keywords for JPIM articles (2020–2023)	Identified no. of fit articles	Non-empirical	Empirical	Research focus	References
1. Sustainability	(Sustainable) OR (sustainability) OR (environment) OR (policy) OR (ethical) OR (inclusive design) OR (bottom of the pyramid) OR (developing) OR (eco)	10	2	8	Echo-innovation decisions, green innovation, sustainability and responsible value creation, design thinking and capabilities	(Alam et al., 2022; Bammens & Hünermund, 2020; Cautela et al., 2022; Klein et al., 2021; Klenner et al., 2022; Kotlar et al., 2020; Krammer & Kafouros, 2022; Lehoux et al., 2021; Rylander Eklund et al., 2022; Zhao et al., 2023)
2. Business model innovation	(Business model innovation) OR (Open innovation) OR (3D printing) OR "maker innovation"	7	1	6	Business model innovation, open innovation and ecosystem, platform-based business	(Alam et al., 2022; Barlatier et al., 2022; Guo et al., 2020; Heidenreich et al., 2022; Klein et al., 2021; Sjödin et al., 2020; Trabucchi et al., 2020)
3. Digital innovation	(Digital, augmented reality) OR (virtual reality) OR (artificial intelligence)	8	8	0	Digital tools and innovation transformation; artificial intelligence and innovative idea generation; smart products	(Cooper, 2021; Garbuio & Lin, 2021; Lanzolla et al., 2021; Marion & Fixson, 2021; Michaud & Appio, 2022; Raff et al., 2020; Rosa, 2021; Weiss et al., 2022; Wetzels, 2021)
4. Innovation cultures and networks	(innovation culture) OR (global/international) OR (network)	2	0	2	Political instability and firm innovation, design thinking, and cultural fit	(Carlgren & BenMahmoud-Jouini, 2022; Krammer & Kafouros, 2022)

- How is firm tradition influencing NPD? What are the measurable dimensions of tradition in innovation?
- How can firms identify factors that benefit and hurt performance when developing new product lines that pursue performance versus affordability in different cultures?
- What are the consequences of pursuing high-end vs. low-end encroachment innovation strategies in different cultural and environmental contexts?

Theme 2: Innovation networks

- Does quality trump network effects? Is the product itself more important than what others say in shaping the adoption of new products? How to transfer or diffuse business innovation across nations (within the context of MNCs) with a special focus on protecting intellectual property rights?
- What methods are beneficial for identifying the disconnections between European (qualitative) and US-based (quantitative) research approaches for innovation inquiries?
- Reverse innovation represents global innovation that introduces innovation from a developing country to a developed one (Von Zedtwitz et al., 2015). Under new global environmental (e.g., natural disaster, COVID), market (e.g., influencer economy), and technological (e.g., nanotechnology, machine learning) disturbances, what are key capabilities and performance indicators for firms in developed countries to pursue reverse innovation?

Based on these research topics emerging from the doctoral consortium, the co-chairs searched JPIM articles between 2020 and 2023 to explore the connections between recent JPIM publications and the above-mentioned four topics. Note that our literature search focused on this search timeframe as it helps us compare new topics post the 4th PDMA Doctoral Consortium in 2019 (Rindfleisch et al., 2020). The search results showed that JPIM articles in the past 3 years had covered the four new themes emerging from our study post-doctoral consortium. We identified more articles published in the journal related to the first three topics than the last topic in the searched timeframe. One possibility is that the last topic, that is, innovation cultures and networks, has caught research interests in NPD and innovation earlier than the other three topics. Overall, we encourage scholars to continually explore important research questions in the four topics (Table 2).

4 | CLOSING REMARKS

We are grateful to have hosted the 2022 PDMA Doctoral Consortium. This event provided doctoral students with an excellent opportunity to present their dissertation research and receive feedback from innovation/NPD experts. It also informed them about *JPIM*'s research priorities and guided them on the journal's research priorities and review process. Furthermore, it offered to them an opportunity to learn about emerging topics and expand their professional networks. Faculty fellows got a chance to listen to presentations on emerging topics, reconnect with leading innovation/NPD scholars, interact with leading practitioners in the realm of additive manufacturing, and assist in setting the future research agenda for innovation/NPD scholars.

There are a host of other emerging topics that warrant the attention of innovation/NPD scholars. We hope this article synthesizes the key learnings from our event and fuels further scholarly attention to topics for which special issues are currently underway (e.g., "Innovation Management in a Circular Economy").

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest.

ETHICS STATEMENT

The authors have read and agreed to the Committee on Publication Ethics (COPE) international standards for authors.

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How to cite this article: Xiao, Yazhen, and Neeraj Bharadwaj. 2023. "The 2022 PDMA Doctoral Consortium: Emerging Research Priorities in New Product Development and Innovation and Insights into Community Building." *Journal of Product Innovation Management* 1–11. https://doi.org/10.1111/jpim.12683

APPENDIX A

2022 PDMA-UTK doctoral consortium participant list.

First name	Last name	Institution	Country
BJ	Allen	Brigham Young University	USA
Gloria	Barczak	Northeastern University	USA
Neeraj	Bharadwaj	University of Tennessee, Knoxville	USA
Sebastian	Bouschery	RWTH Aachen University	Germany
Deepa	Chandrasekaran	University of Texas at San Antonio	USA
Victor	Chernetsky	Michigan State University	USA
Marcelo Francisco	de la Cruz	Ludwig-Maximilians-Universität Munich	Germany
Emelia	Delaney	King's College London	UK
Kevin	Giang Barrera	Georgia State University	USA
Abbie	Griffin	University of Utah	USA
Marius	Hatzenbuehler	WHU—Otto Beisheim School of Management	Germany
Sebastian	Hohenberg	University of Texas at Austin	USA
Subin	Im	University of Tennessee-Chattanooga	USA
Jan	Keim	Bern University of Applied Sciences	Switzerland
Rizwan	Khan	University of New South Wales	Australia
Sahoon	Kim	University of Illinois at Urbana Champaign	USA
Ahmet H.	Kirca	Michigan State University	USA
Lucas	Lange	WHU—Otto Beisheim School of Management	Germany
Ruichun	Liu	University of Illinois at Urbana Champaign	USA
Alan	Malter	University of Illinois at Chicago	USA

(Continues)

First name	Last name	Institution	Country
Kohei	Matsumoto	University of Illinois at Chicago	USA
Ravi	Mehta	University of Illinois at Urbana Champaign	USA
Unnati	Narang	University of Illinois at Urbana Champaign	USA
Pravin	Nath	Clemson University	USA
Charles	Noble	University of Tennessee, Knoxville	USA
Tim	Pollock	University of Tennessee, Knoxville	USA
S.P.	Raj	Syracuse University	USA
Priya	Rangaswamy	Texas A&M University	USA
Aric	Rindfleisch	University of Illinois at Urbana Champaign	USA
Rodolfo	Rocha	University of São Paulo	Brazil
Rebecca	Slotegraaf	Indiana University	USA
Alina	Sorescu	Texas A&M University	USA
Jelena	Spanjol	Ludwig-Maximilians-Universität Munich	USA
Michael	Stanko	North Carolina State University	USA
Sanjana	Surange	Texas A&M University	USA
Debra Lee	Surface	University of Massachusetts Lowell	USA
Gerard	Tellis	University of Southern California	USA
Janell	Townsend	Oakland University	USA
Vinod	Venkatraman	Temple University	USA
Nooshin	Warren	University of Arizona	USA
Beatrice	Weber	Karlsruhe Institute of Technology	Germany
Lisa	Welzenbach	Ludwig-Maximilians-Universität Munich	Germany
Yazhen	Xiao	University of Tennessee, Knoxville	USA
William	Zhou	University of Massachusetts Lowell	USA
Erika	Zuloaga Cosme	University of Texas at San Antonio	USA

APPENDIX B: Photos

2022 PDMA Doctoral Consortium participants

Dissertation presentation winners: Priya Rangaswamy and Sebastian Bouschery

Manufacturing demonstration facility (MDF) tour

UTK campus tour

Fab Lab tour

Evening festivities

AUTHOR BIOGRAPHIES

Dr. Yazhen Xiao (Ph.D., University of Illinois at Chicago) is an Assistant Professor of Marketing at Portland State University. Her research interests include innovation and new product development, digital innovation adoption, and service coproduction. She has published in refereed journals, such as the Journal of the Academy of Marketing Science, Journal of Product Innovation Management, Technovation, Journal of Business Research, Journal of Business Ethics, and Journal of Service Research.

Dr. Neeraj Bharadwaj (Ph.D., University of Wisconsin) is the Proffitt's Professor in Marketing at University of Tennessee's Haslam College of Business. His specializations include corporate sustainability, innovation, branding, and livestream retailing. He has published over 20 articles in such leading outlets as: Journal of Marketing, Journal of the Academy of Marketing Science, International Journal of Research in Marketing, and Journal of Product Innovation Management, among others.