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Communication design logics and innovation management

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Abstract

Effective communication with external or internal stakeholders is crucial for innovation processes. The fourth wave of digital technologies and the fifth industrial revolution have increased the range of communication possibilities, amplifying both the number of communication channels and the availability of data. Yet in existing research that tends to treat communication as an art instead of a science, the evidence only scratches the surface of its mechanics and inner logic. To provide a unified theoretical framework, this study highlights the importance of the four pillars of communication design logic (source, situation, intentions, and impact) in the innovation processes. According to communication theories, individual differences in stakeholders' backgrounds, situations, and intentions might result in systematic variations in what and how they communicate, which influences their subsequent beliefs and reactions to innovation outcomes. By examining relevant communications in terms of their design logic, innovation researchers can address a wide range of questions across ideation, development, and implementation stages. Using novel techniques and unstructured data (e.g., text, image, video, audio mining), the current study reveals tactics for exploring such topics across communication types. The proposed framework also raises several research questions that can be pursued to enhance knowledge of how communication design influences innovation management.

KEYWORDS

communication design logics, digital technologies, innovation processes

1 | THE CRUCIAL ROLE OF COMMUNICATION IN INNOVATION SUCCESS

You can't win on innovation unless you have a way to communicate it to the customer.

—Steve Jobs, Co-Founder, Apple.

For good ideas and true innovation, you need human interaction, conflict, argument, debate.

—Margaret Heffernan, Entrepreneur.

Innovation cannot succeed without effective communication with both external and internal stakeholders and across various stages of the innovation process (Lee & O'Connor, 2003; Lievens & Moenaert, 2000). That is, innovation relies on the expertise and effort of developers but also on the ways that internal and external stakeholders share information, negotiate, and persuade. Effective communication facilitates idea sharing, encourages collaboration, aligns goals and visions, provides timely and constructive feedback, and enables open discussions

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about potential risks and challenges (Tang et al., 2015). Furthermore, digital technology has established various communication platforms that can facilitate the design and development of products, services, processes, and business models (Appio et al., 2021). Accordingly, innovation researchers have studied innovators' strategic choices when communicating with internal stakeholders (Chong et al., 2012; Hage & Hollingsworth, 2000) and external stakeholders (Gruner et al., 2019; Moldovan et al., 2015; Prins & Verhoef, 2007).

Despite clear evidence of the importance of communication, current innovation research lacks a unified and structured approach to, or definition of, effective communication, in that it fails to delve into underlying mechanics or inner logics. Instead, communication studies often appear anecdotal rather than addressing the science that underlies the design features and logic that drives communication. To establish a comprehensive theoretical framework, we draw on the communication design logic (Aakhus, 2007; Aakhus & Jackson, 2005) pillars (i.e., source of communication, the situation, intentions or goal of communication, and impact) and explore how individual differences in stakeholders' backgrounds, situations, and intentions lead to systematic variations in how they communicate, which then influences their subsequent beliefs about and reactions to innovation outcomes. Individuals, groups, organizations, and communities make choices about how they communicate, then implement those choices, and, in doing so, engage in communication design defined as the process of "structuring, shaping, and conditioning discourse" (Aakhus, 2007, p. 113).

With a design logic lens, innovation researchers can gain novel insights related to the ideation, development, and implementation stages of the innovation process. Furthermore, we acknowledge how digital communication technologies and emerging techniques for analyzing unstructured data (Rindfleisch et al., 2017) provide means to explore multiple types and channels of communication. Accordingly, as our main research objectives, we seek to leverage our theoretical framework to explain how communication design influences innovation processes.

In so doing, we make three significant contributions to innovation management research. First, we emphasize the importance of understanding the design logic for external communication, which informs the ideation stage. By examining the digital channels through which external stakeholders communicate (e.g., customer reviews) or interact with the firm (e.g., service chats, social media discussions), we identify some underlying design choices in their communication that reflect their needs and influence others, even if the stakeholders are not fully aware of their choices. In turn, we can clarify how communication shapes ideation processes.

Practitioner Points

- **Enhanced stakeholder communication**: Managers should prioritize effective communication design with both internal and external stakeholders throughout the innovation process. By analyzing and leveraging communication design logics, managers can facilitate idea sharing, collaboration, and alignment of goals, thereby enhancing innovation outcomes.
- **Utilization of digital technologies**: The study emphasizes the use of digital communication technologies and novel techniques for analyzing unstructured data (e.g., text, images, video). Managers can harness these tools to gain deeper insights into stakeholder needs based on their communication data, improving the ideation, development, and implementation stages of innovation.
- **Strategic communication framework**: Adopting a structured approach to communication that considers how these reflect the source, situation, and intentions, as well as the impact can lead to more predictable and favorable innovation outcomes.

Second, we examine communication relations among internal stakeholders during the development stage. As they interact, they communicate the advantages of and concerns about planned innovations (Lievens & Moenaert, 2000). The design logic of these communications, especially in digital channels, signals actors' roles or identities within the organization, their perceptions of the consequences of pursuing or altering innovation, and their understanding of institutional and organizational structures (Vuori & Huy, 2016).

Third, we consider how communication channels can define the implementation of innovations and their subsequent performance consequences, due to their co-constructed nature (Lee & O'Connor, 2003). That is, the communication design logic adopted by innovation developers might predict impacts on innovation adoption, but stakeholder interactions also can lead to unforeseen problem solving or reshaping of the innovation (Stanko, 2016; Wang et al., 2019). Opportunities to shape interactions tend to be short-lived, such that they require a clear understanding of all the stakeholders' co-constructed meanings and perceptions of the benefits and shortcomings of the innovation. As we show, by studying the communication designs and topics adopted by other stakeholders involved in inventing, conducting, and implementing conversations about

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a newly launched innovation, innovators can gain valuable insights for further improvement. The sophistication of these stakeholders' messages, particularly those that are crafted to recommend or dissuade, influences innovation adoption.

To establish these contributions, we first present four broad foundational premises pertaining to the logic of communication design, related to the source, situation, intentions, and impact of communication. Digital technology and new unstructured data methods affect how companies design and develop products, services, and processes. To derive a framework of communication design logic that parallels the innovation process, we apply this conceptual lens to previous communication research in innovation management; we also identify some unstructured data sources and communication technologies that reveal communicative insights in accordance with our proposed paradigm shift. Finally, we draw implications for innovators.

2 | THEORETICAL BACKGROUND: COMMUNICATION DESIGN LOGICS

A communication design logic offers a useful starting point for studying communication and interactions relevant to innovation. Communication is a prime adaptive advantage of the human species; it allows people to share knowledge and coordinate individual efforts (Baumeister & Bargh, 2014). Communication also establishes social reality, such that a lack of understanding of communication makes it impossible to comprehend innovation processes or their actors (Phillips et al., 2004). As communicators interpret and convey meaning during innovation processes, they also create grounds for communication designs, through the forms and patterns of communication they choose. That is, communicators design communication by anticipating the logic by which communication should work, through its affordances and constraints within the innovation process (Barbour et al., 2013). They also reveal something about themselves and influence subsequent outcomes through their communication design.

Therefore, any communicator (individual, organization, AI) consciously or unconsciously makes choices about what and how to communicate, such as which knowledge, sensations, perceptions, emotions, or interpretations to integrate into the communication. For example, individual team leaders likely make conscious decisions in their effort to ensure the quality of communication in the team (Gajendran & Joshi, 2012; Sarin & O'Connor, 2009). But managers and industrial designers often unconsciously adopt different communication designs to describe "good" and "poor" industrial design (Micheli et al., 2012), even if their language choices reflect their opinion and could influence others' opinions. Organizations also strategically choose communication strategies to influence customers' and other stakeholders' perceptions (Akdeniz et al., 2014). For example, the frequency of communication among firms affects their tie strength (Badir & O'Connor, 2015). Finally, AI and generative AI can recommend new products to target audiences that they deem suitable, as well as formulate the communication, which can achieve a more tailored approach but also lead to unconscious biases (Manyika et al., 2019).

In these examples, communicators make creative choices and thereby engage in communication design (Aakhus, 2007; Aakhus & Jackson, 2005). As Aakhus (2007, p. 113) defines it, design is "a natural, describable activity that is evident in ordinary communicators' creativity in language use and capacity to exploit mutual knowledge and principles of interaction." The underlying communication logic encompasses both design activities (e.g., procedures to alter forms of communication) and design elements (e.g., content, framing, and order of verbal [text, transcribed speech] and nonverbal [audiovisual elements such as body language, imagery, and pitch] elements; Grewal et al. 2022). According to communication theorists, the choices among different communication logics fundamentally reflect the decision-maker, their situation, and their intentions, and in turn, they can predict the impacts of communication (Berger et al., 2020; Mokros & Aakhus, 2002). Even if specific communicative logics do not always translate into precisely the same reflective or predictive conclusions, the different logics for designing communication (design activity and its elements) transcend informational content, such that they can provide insights into communicators and the impact of their communications.

The extensive theorizing and empirical assessments of various communication design logics make it impossible to detail each of them. Instead, we draw on cross-disciplinary theorizing and empirical insights to propose four broad foundational premises for a communication design logic (Figure 1). We consider some illustrative areas for applying or expanding these premises to explain and predict innovation processes and outcomes from a communication standpoint.

2.1 | Source: Communication design reflects the communicator's background

The communicator, whether an individual, group, or AI, inherently possesses some specific background that determines its fundamental beliefs about how communication should work to achieve goals. Whether the communication

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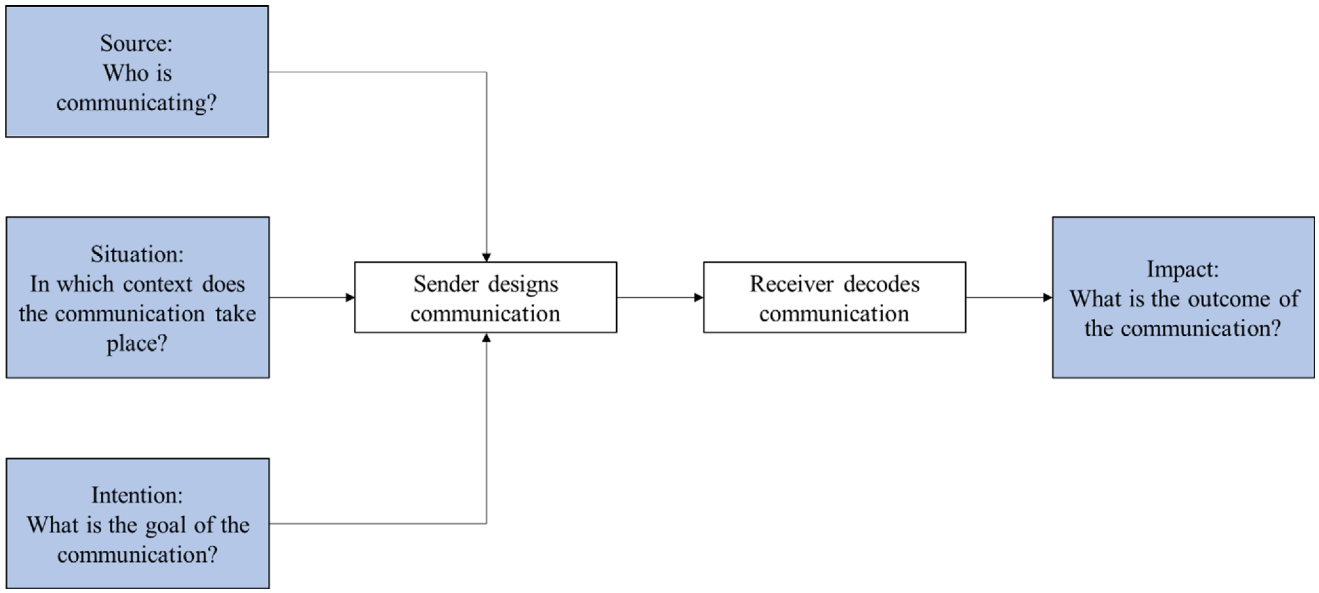


FIGURE 1 Communication design logics.

is verbal (writing, audio) or nonverbal (gestures, images), it aims to express something and achieve specific goals. According to a message design logic (O'Keefe, 1988), communication choices reflect underlying differences in how communicators believe they should design their message. These choices include issuing a single message or a sequence of several messages, the channels used (e.g., online, phone, face-to-face), and the modes (e.g., image, audio, text). Furthermore, because people communicate to express their personalities and attitudes (O'Keefe, 1988), their communication (and its evolution) offers insights into who they are, their background, and ongoing developments (if longitudinal data are available). For example, by determining if the communicator adheres to social norms and rules, by following established communication conventions, we can gain insights into a person's attitudes toward and relationships with others, the organization, or society. A choice of emotion-laden words indicates their sentiment (e.g., they love or hate a new product); depending on the extent of the communication data, it also could reveal their personality (Berger et al., 2020). The chosen formats and channels also reveal communicators' predispositions, which can provide insights into their personalities and attitudes (Aakhus & Jackson, 2005). Overall, communication design reflects communicators' beliefs about how communication works (O'Keefe, 1988), so measuring (by mining or coding) and analyzing the exhibited communication design logics, it is possible to obtain insights into their personality, perceptions, and attitudes.

2.2 | Situation: Communication design reflects the context

Communication is always embedded in a context (e.g., work versus home), and communicators' understanding of that context informs their communication design, including how they interact, share their beliefs, and express their goals. Semiotics (Kress et al., 1997), rhetoric (Gill & Whedbee, 1997), and ethnographies of communication (Gumperz & Levinson, 1991) domains all acknowledge such a contextualized view; the design logics they anticipate, especially those related to conversations, allude to the communicators' social and contextual realities. Furthermore, contextual factors may contribute to or be derived from communication logics. Because communication is grounded in interaction settings, it can provide insights into the relational perceptions among the interactants, context-specific practices, and rules of engagement (Bateson, 1972).

For example, semiotics pertains to how language use and semantic patterns might result from collective social processes (Berger & Luckmann, 1966). With its holistic view of context, rhetoric accounts for various aspects of a situation and the communicative process design logic (e.g., structure, temporality, metaphor) (Gill & Whedbee, 1997). According to Bitzer (1968), rhetorical discourse is constructed to deal with situational exigencies, so it is imbued with the significance of those exigencies. Ethnographies of communication (Gumperz & Levinson, 1991; Hymes, 1964) further emphasize that communication and its design cannot be understood or produced separately from its context of use. Similarly,

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Searle (1995) suggests that language represents and constitutes knowledge about complex social facts. For example, people organize interpersonal messages in ways that support inferences about their relationships with the recipient (Burgoon & Hale, 1987).

As we noted previously, communicators also design messages to achieve various goals, particularly in complex situations that feature multiple, contradictory goals (O'Keefe, 1997). For new product development (NPD) for example, communication must advance the process while managing multiple viewpoints, relationships, and contradictory goals, implying the need for a highly sophisticated communication design (Caughlin et al., 2008). Lammers and Barbour's (2006) institutional theory of organizational communication is also grounded in the notion that communication entails organizing, such that actors recreate situations and organizations through communication and by drawing on social structures. They also appropriate communicative forms, formats, objects, and tools to craft their messages (Aakhus & Laureij, 2012; Lammers, 2011), which enables them to incorporate institutional logics into their own communication designs (Lammers, 2011), reflecting the workings of broader institutions (O'Keefe & Lambert, 1995). The degree to which communicators adhere to or deviate from common institutional logics then reflects their stance toward the broader organization. For example, company convention may be to use an open platform to crowdsource ideas from all employees. The way in which an individual employee communicates on the platform (positive vs. negative, tentative vs. certain), likely indicates their views about that convention. Therefore, by measuring and analyzing communication design, we might determine how, at a particular moment, communicators perceive their relations to recipients or the organizational context.

2.3 | Intentions: Communication design reflects the communicator's goal

Communication is goal motivated (Caughlin et al., 2008). Communicators' intentions or goals become evident in the communication design logic they choose (O'Keefe & Lambert, 1995). Theorizing about speech and image acts, for example, describes elements of communication as performative acts that convey and capture the communicator's intentions (Searle, 1995). Linguistic cues, words, word combinations (e.g., "happy," "not happy"), message development (e.g., coherence, flow), and intercommunicative elements (e.g., mimicking, adapting) all can convey a speaker's intention. The intention to tell the truth (or not) represents a condition that validates the speech act, such that irony, sarcasm, and lies signal insincere assertions. The speaker purposefully misrepresents the truth with the intention to entertain or deceive (Meibauer, 2005). In certain communication contexts, noise-making without words (e.g., coughing) or lack of speech (e.g., embarrassed silence) can convey intentions and goals too (Parry, 1996).

According to O'Keefe (1988, p. 82), the process of producing messages involves "deriving means to serve communicative goals," even if the goals are not "clear, consciously recognized objectives," so individual differences in communicators' message conveyance reflect their specific intentions or goals. During an NPD team meeting for example, the project manager might emphasize (using arguments and emotional appeals) potential market impact and revenue projections, which signals an intention to motivate the team. Citing dates and milestones suggests the manager's goal, moving away from persuasion and toward conveying information. By studying such communication designs, including both processes and elements, researchers thus can uncover speakers' intentions and goals (Caughlin et al., 2008).

2.4 | Impact: Communication design influences communication outcomes

Communicators prioritize certain meanings while excluding others through their communication design. From a constructionist perspective, reality is a social construction, and communicators both create and consume symbols (Morgan & Smircich, 1980). Every communicative process or element evokes typifications and associations, through connotations. Because they encourage others to view the world in particularly framed terms, it is possible to use communication design logics to predict the subsequent perceptions and reactions of recipients too. Fairclough (1992) even refers to discourses as positioned representations that give rise to corresponding conceptualizations of social relations and practices, and Bateson (1972) suggests that communication creates metacommunicative mental frames that evoke situational perceptions. Then Searle (1976) delineated the performative function of speech acts that can invoke behavioral changes (i.e., perlocutionary acts).

Rhetorical principles also apply to wider, macro-level discourses and their constructive effects on people's interpretations and opinions (Charland, 1987). Phonological features (e.g., pitch level, pauses, speech rate, intonation patterns) in vocal communication can affect the cognitive fluency with which message recipients judge propositions as credible and desirable (Alter & Oppenheimer, 2008). Macro-level speech acts reflecting the overall presentation of informational content (van Dijk, 1997) can influence reading and cognitive processing, such that recipients react

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to speech, imagery, and writing (Naveh-Benjamin & Ayres, 1986). Even the choice of communication channels can determine the impact of the communication on recipients and their reactions (Mokros & Aakhus, 2002). The word choice, inclusion of a specific image, pitch, and the decision to have a face-to-face meeting all affect how recipients react to the communication. If communicators leverage their understanding of their audience and the purpose of the communication effectively and select an appropriate communication design logic, they can communicate their messages clearly and achieve their desired outcomes. For researchers, a communication design logic also might reveal critical interdependencies among the choices that the communicator makes and the influence that their communication has on the receiver.

3 | COMMUNICATION DESIGN LOGICS IN THE INNOVATION PROCESS

To build a framework of communication design logic for innovation management, we integrate these four foundational premises for the logic of communication design, together with the three key stages of innovation processes and four types of communication enabled by new technology. By combining these conceptual vectors into a single framework, we can identify distinct sets of communication insights, technology-enabled communication modes, and stages of the innovation process that present promising opportunities for further research that takes a design logic perspective. We also map existing research onto the framework to reveal some research opportunities, based on current gaps and ongoing technology developments. In support of these efforts, we review existing innovation literature related to communication, as published in *Journal of Product Innovation Management* and other FT50 journals since 2000.

3.1 | Simplified innovation process

The simplified innovation process comprises three stages: ideation, development, and implementation. These stages are cross-functional and span internal and external communication. Even if the focus differs, communication is crucial at each stage (Figure 2).

In the ideation stage, outside-in communication prevails, as innovation managers and teams seek information from external stakeholders, prompting customers, partners, and suppliers to communicate ideas for innovations, in the form of expressed or latent needs (Atuahene-Gima et al., 2005). These needs might be communicated directly to the firm or shared in customer communities, online reviews, or word of mouth. Innovation managers gather these signals and apply processes to articulate, structure, refine, and evaluate the potential of these ideas. This unstructured, exploratory, fuzzy stage (Kim & Wilemon, 2002) usually does not involve significant resource investments in actual innovation projects. The aim is to select innovative ideas with the best potential to become valuable innovations and move those ideas to the development stage (Verworn, 2009).

During this development stage, innovation projects get formally structured, including clearly allocated leadership roles, scopes, action plans, milestones, deliverables, and resources. Most communication takes place within innovation teams or between innovation teams and other parts of the organization, with less involvement of external stakeholders. Key activities include the design, prototyping, and validation of technical and market assumptions (Cooper, 2008). Therefore, communication functions mainly to identify problems that the

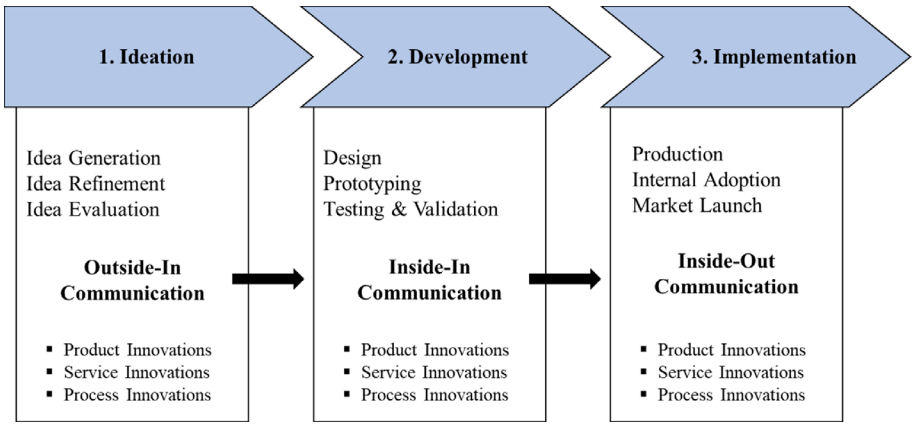


FIGURE 2 Communication in the simplified innovation process.

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solutions need to address, possibilities, and constraints, as well as to enable comparisons of alternative design solutions based on functional, aesthetic, and economic considerations. Repeated iterations between design and prototyping facilitate technical and market tests that then should be supported by written and verbal communication in project meetings, project reviews, data analyses, and user interactions. This process can lead to the validation of strategic and operational assumptions about the innovation project, after which firms release formal communications, both internally and externally.

Finally, in the implementation stage, the innovation moves into production; a new product, service, or process is released to internal or external customers. Innovation managers and teams must communicate with external stakeholders to motivate them to adopt the innovation, such as by describing its benefits and reducing perceived risks (Fidler & Johnson, 1984). Internal adoption may be limited by resistance to innovation, and here again, communication is critical for facilitating change. Senior leaders could share endorsements; innovation teams might interact directly with other parts of the organization to enhance their awareness, understanding, and knowledge of innovative products and services. Innovation commercialization and market launches often represent the most communication-intensive activities in the entire innovation process, requiring significant resources to support advertising, promotions, channel development, and integrated marketing communications (Srinivasan et al., 2009). Prelaunch activities, such as new product preannouncements, also can help create hype, particularly for high-tech products (Su & Rao, 2010; Warren & Sorescu, 2017).

3.2 | Four types of communication enabled by new technology

Acknowledging different types of communication can be valuable for improving all three NPD stages. Figure 3 displays four typical communication types, defined by the number of senders (one vs. many) and receivers (one vs. many). *One-to-one communication* takes place in a directed manner between two entities (e.g., email exchanges between innovation managers). *One-to-many communication* takes place in a directed manner from one entity toward a group (e.g., online blogs, where a single user shares experiences with the company and other users). *Many-to-one communication* occurs in a directed manner from a group of entities toward one entity (e.g., customer feedback portals, where multiple users share their experiences with the company). *Many-to-many communication* takes place in a directed manner from one group of entities toward another group of entities (e.g., idea discussions in crowdsourcing platforms).

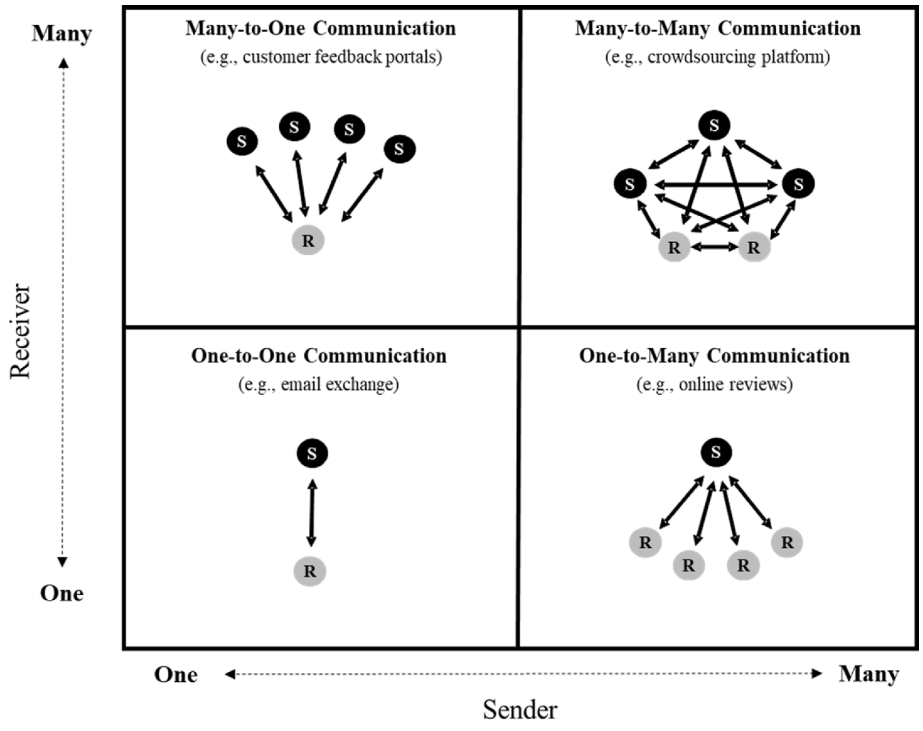


FIGURE 3 Four types of communication enabled by technology.

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All four types of communication can occur face-to-face, over the phone, in writing, or through other communication modes, such as visuals (Feiereisen et al., 2013) or virtual worlds (Michaud & Appio, 2022). They also can be internal, external, or both. Internal communication data can be directly sourced from a company. Notably, few business activities generate as much communication data as innovation processes, which grant companies critical insights into their core operations and strategies. For example, external data can be collected and analyzed qualitatively (e.g., netnography) or quantitatively (e.g., application programming interfaces of social media platforms). By sourcing these external communication data, companies can augment their internal data and thereby improve their innovation decisions.

3.3 | Classification of previous communication research in innovation management

Table 1 provides a review and classification of communication research in innovation management published by *Journal of Product Innovation Management* and FT50 journals since 2000.[1] It covers the different stages of the innovation process and examples of all four types of communications, as well as the four key communication insights we propose in our framework.

Many studies focus on the source of communication, sometimes in combination with other communication features, such as impact. For example, Akdeniz et al. (2014) investigate how different sources of communication about new product quality (firm vs. third-party reviews) affect customers' quality perceptions; Kawakami et al. (2013) delineate how consumers' perceptions of innovation adoption vary according to different communication sources (personal vs. virtual word of mouth). In addition, Lisak et al. (2016) argue that global leaders with multicultural identities represent sources of goal-oriented innovation communications. A subset of studies also addresses situational characteristics, such as when Chong et al. (2012) describe the contingency effects of team proximity and time pressures on the effectiveness of team communications. In a customer cocreation context, Mahr et al. (2014) show that communication channel characteristics moderate the value of cocreated knowledge during the innovation process. Hoegl and Proserpio (2004) caution that the contributions of communication to teamwork quality depend on the team's spatial proximity.

Valuable insights into communication intentions emerge from studies that review the goals of communication during innovation processes. Globocnik and Salomo (2015) suggest that deliberate attempts to bypass formal communication channels and use "unorthodox" methods correlate with employees' intentions to convince top management of the merits of innovative ideas. According to Walter et al. (2011), if innovation champions take too much responsibility for an innovation project, they may discourage contributions from other team members, which increase their resistance to change. Moldovan et al. (2015) also find that early adopters can choose a communication strategy that serves the dual goals of sharing information about the innovation (to exhibit knowledge) and dissuading others from adopting it (to protect uniqueness).

Studies of the impact of communication on innovation outcomes span the different stages and modes of communication too. For example, Leenders et al. (2007) investigate the curvilinear relationship between communication patterns and NPD team creativity during the ideation stage; Sarin and O'Connor (2009) study the impact of leadership characteristics on the quality and formalization of NPD team communications; Song and Parry (2009) investigate how the fit of communication and promotion tools with the new product type affects adoption by consumers; and Stanko (2016) documents that, in online communities, more frequent interactions among members drive innovation remixing, such that the community uses an existing innovation as source material or inspiration to develop further innovations.

Although prior studies address some dimensions of our framework, they rarely focus on the core elements of the communication design logic. Instead, a main limitation of existing communication research in innovation is the tendency to relate source, situation, interaction, and impact, without clarifying the logic that senders use to design messages and receivers use to decode them. In some notable exceptions, Kalogerakis et al. (2010) show that the use of inventive analogies[2] in the ideation stage fosters communication between designers and engineers in innovation consulting teams, as well as between consultants and clients in interfunctional innovation teams. Micheli et al. (2012, p. 703) describe the different, overlapping

[1]We searched for articles that included the keywords "innovat*" and "communication" in the title or abstract, using the EBSCOhost database. From the initial sample, we excluded research in which the role of communication in the innovation process was not integral to the research questions, framework, or contribution and instead reflected generic keywords. We thus identified 41 articles (21 from *JPIM* and 20 from FT50 journals) published between 2000 and 2019.

[2]Inventive analogies, a cognitive strategy for creative problem-solving, transfer solution-specific elements of a product design from an established source of knowledge to a target object, during the design process. For example, Nike might identify shock-absorber suspensions in Formula 1 cars as inventive analogies for deriving new shoe designs.

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TABLE 1 Selected key literature on communication and innovation research since 2000.

Authors	Key findings	Stage	Type	Design insight
Akdeniz et al., 2014	Firm-controlled communication strategy of internal signals (e.g., price, advertising), interact with independent third-party reviews to influence perceived product quality.	Implementation	One-to-many Many-to-many	Source and Impact: *Company and third-party communications* (i.e., *reviews*) *jointly impact the perception of new product quality.*
Antioco et al., 2008	Informal communications patterns contribute to ongoing product design modification decisions making and under certain conditions help reduce decision-making bias.	Development	Many-to-many	Situation: *Employees willingness to engage in new product design modifications is contingent on communication patterns.*
Badir and O'Connor, 2015	Communication features (frequency level and media-richness) used to transfer and exchange knowledge determine the future strength of the ties between innovation partners.	Implementation	One-to-one	Impact: *Interfirm communication affects the social ties strengths between innovation partners.*
Bohlmann et al., 2010	A firm's ability to speed innovation diffusion varies according to within- and cross-segment communications within a heterogeneous network structure.	Implementation	Many-to-many	Source and Impact: *Communication within market networks drives the speed of innovation diffusion.*
Chong et al., 2012	Time pressure moderates the relationship between team proximity and team communication. Different contingency effects associated to challenge vs. hindrance time pressures.	Development	Many-to-many	Situation: *Effective communication within innovation teams is contingent on team proximity and time pressures.*
Foss et al., 2011	Internal communication among innovation employees mediates the effects of customer interactions and delegation of responsibilities on innovation performance at firm level.	Implementation	One-to-one One-to-many	Impact: *Effective internal communication among employees transfers the benefits of customers interaction on innovation performance.*
Gajendran and Joshi, 2012	In globally distributed teams LMX and frequent leader–member communication can enhance member influence on team decisions. This joint effect is strengthened as team dispersion increases. At the team level, member influence on team decisions has a positive effect on team innovation.	Development	One-to-one	Source and Impact: *Quality and frequency of leader-member communication enhance team innovation in globally dispersed teams.*
Gibson and Gibbs, 2006	Geographic dispersion, electronic dependence, structural dynamism, and national diversity of virtual teams hinder innovation through unique. mechanisms, many of which can be overcome by creating a psychologically safe communication climate.	Development	Many-to-many	Situation: *Psychologically safe communication environments help overcome the challenges of virtuality for innovation teams.*
Globocnik and Salomo, 2015	Under certain conditions, employees use unorthodox approached such as bypassing formal communication channels to convince top management of the merits of their innovation ideas.	Ideation Development	One-to-one	Situation and Intention: *Unorthodox communication tactics may enhance employees' ability to promote innovation ideas internally.*
Gruner et al., 2019	Investments in social media communication and online advertising are related to the sales volume and profits of new products within six months of being launched.	Implementation	One-to-many	Impact: *Social media communication and online advertising drive new products sales.*

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TABLE 1 (Continued)

Authors	Key findings	Stage	Type	Design insight
Hage and Hollingsworth, 2000	The frequency and intensity of communications within and across radical innovation networks facilitates the ideation of radical solutions.	Ideation	Many-to-many	Impact: *Communication of both tacit and codified knowledge enhances the process of radical innovation ideation.*
Hoegl and Gemuenden, 2001	Communication is a key dimension of teamwork quality (TWQ). TWQ is positively related to team performance (efficiency and effectiveness) and employee outcomes (work satisfaction, learning).	Development	Many-to-many	Impact: *Communication contributes to innovation project performance indirectly by enhancing teamwork quality.*
Hoegl and Proserpio, 2004	Team proximity is positively related to communication, which is in turn a key dimension of teamwork quality.	Development	Many-to-many	Situation: *In more geographically dispersed teams, appropriate communication channels should be designed to overcome the proximity barrier and preserve teamwork quality.*
Kalogerakis et al., 2010	Specialized design and engineering companies offering services to clients in diverse industries use inventive analogies in the product design process to improve communication within the project team and between the project team and the customer.	Ideation	One-to-one One-to-many	Source and Impact: *Analogies contribute to effective communication during the product design process across knowledge application fields.*
Kawakami et al., 2013	Personal and virtual word of mouth are directly related with variety of innovation use, which is in turn related with intensity of use. However, personal, and virtual word of mouth have opposite indirect effects on both intensity of use and variety of use through (1) the perceived size of the local adopter population and (2) the availability of complementary products.	Implementation	Many-to-many	Source and Impact: *Personal and virtual word of mouth communication affect innovation use, both directly and indirectly, by shaping consumer perceptions of adoption benefits.*
Lee and O'Connor, 2003	The relationship between a firm's communication strategy and new product performance is moderated by innovativeness (degree and type).	Implementation	One-To-many	Situation and Impact: *Communication strategy affects new product performance contingent on new product innovativeness.*
Leenders et al., 2007	The presence of subgroups and centralized communication has a negative relationship with NPD team creativity; disagreement (frequency of communication) has a (inverted) U-shaped relationship with NPD team creativity.	Ideation	Many-to-many	Impact: *Communication patterns translate the benefits of systematic design methodology principles on NPD team creativity.*
Lievens and Moenaert, 2000	Intra-project and extra-project communications (organizational liaison and gatekeepers) help reduce innovation project uncertainty and enhance the performance of new financial services.	Development Implementation	One-to-one One-to-many	Situation and Impact: *Communication (intra- and extra-team) reduces innovation uncertainty and enhances innovation performance in financial services contexts.*
Lisak et al., 2016	Multicultural team leaders with high global identity promote innovative goals, which in turn enhances team communication inclusion and its positive impact on team innovation.	Development Implementation	One-to-many Many-to-many	Source and Impact: *Innovation goals communicated by global leaders can improve team innovation* via *team communication inclusion.*

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TABLE 1 (Continued)

Authors	Key findings	Stage	Type	Design insight
Lu and Shin, 2018	In the case of radical innovations, the acts of formulating (firms) and absorbing (customers) communication are costly, such that marketing communication is a costly two-sided process that involves efforts from both firms and consumers.	Development Implementation	One-to-many	Intentions: *The innovator's intention to maximize market share of the radical innovation* (versus *maximize market size*) *will lead to different communication choices. The effect of communication is contingent of customers communication efforts.*
Mahr et al., 2014	The data analysis indicates that customer cocreation is most successful for the creation of highly relevant but moderately novel knowledge. These effects are contingent on the richness and reach of the communication channels enabling cocreation.	Ideation Development	Many-to-one One-to-one	Situation: *Communication channels moderate the value of cocreated knowledge during the innovation process.*
Micheli et al., 2012	NPD managers and industrial designers use different communication languages for describing "good" and "poor" industrial design. Managers are commercially orientated in the "ends" they want to achieve, and designers perceive more antecedents ("means") necessary to achieve their "ends."	Development	One-to-one	Source and Intention: *Communications between NPD managers and designers are linked to different goal orientations* (*means* vs. *ends*).
Moldovan et al., 2015	Early adopters may experience a communication dilemma that derives from the clash between their need to exhibit the innovation they adopted and their desire to preserve their uniqueness by preventing imitation by others. This dilemma might be resolved by a "share and scare" communication strategy.	Implementation	One-to-many	Source and Intention: *Under certain conditions, early adopters can choose a communication strategy to disseminate information about the innovation, while trying to dissuade others from adopting it.*
Montoya et al., 2009	Communication via ICTs in virtual NPD teams is contingent on a range of factors, including task type, organizational context, and ICT type as critical contingency variables affecting ICT use.	Development	Many-to-many	Situation: *The use ICT communication in virtual NPD teams is contingency on tasks, technology, and organizational features.*
Oke and Idiagbon-Oke, 2010	Communication channel richness partially mediates the effect of NPD task analyzability on innovation network ties and development time.	Development	One-to-one One-to-many	Situation: *Communication channel design should account for the fit between channel richness and task analyzability.*
Patzelt et al., 2011	An analysis of 1632 persistence decisions nested within 51 scientists responsible for R&D projects reveals that more positive feedback enhances persistence of underperforming R&D projects, and that this effect becomes stronger with increasing network size, network density, and communication frequency.	Development	Many-to-one	Situation and Intention: *High frequency communications reinforce the effect of positive feedback on escalation of commitment* (i.e., *persistence with underperforming innovation projects*).
Pemartín et al., 2018	The key facets of collaborative communication—frequency, formality, reciprocal feedback, and rationality—influence NPD collaboration results via two routes: the direct resource-based route and the indirect relational route mediated by trust.	Development Implementation	One-to-one	Impact: *Communication features influence the outcomes of interfirm innovation collaborations, both directly and indirectly.*

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TABLE 1 (Continued)

Authors	Key findings	Stage	Type	Design insight
Ruppel and Harrington, 2000	Employee communication and trust mediate the effects of ethical work climate on employee commitment and innovation.	Implementation	One-to-one One-to-many	Impact: *Employee communication (peer to peer and with management) is a mechanism to build trust, commitment, and innovation.*
Sarin and O'Connor, 2009	Participative management style and initiation of goal structure by the team leader have a positive effect on functional conflict resolution, collaboration, and communication quality within the NPD team while discouraging dysfunctional conflict resolution and formal communications.	Development	One-to-many	Source and Impact: *How team leaders communicate influences the quality of communication within NPD teams.*
Song and Parry, 2009	Written and verbal communication tools can be effective when consumers make adoption decisions based on search attributes. However, when adoption depends on experience attributes, marketers must find ways to effectively expose consumers to these attributes.	Implementation	One-to-many	Situation and Impact: *The mix of communication and promotion tools needs to be matched with the type of new product adoption decisions to enhance innovation adoption by consumer.*
Song et al., 2007	This study attempts to reconcile differences in the literature on the benefits of computer mediated communications (CMC). Investing in CMC technologies is better than co-locating R&D staff for knowledge dissemination. Moreover, the two communication channels strengthen each other.	Development	Many-to-many	Situation: *Computer mediated communications and co-location on R&D staff are joint drivers of knowledge dissemination during the innovation process.*
Srinivasan et al., 2009	Investors react favorably to companies that launch pioneering innovations, which have higher perceived quality, which are backed by substantial advertising support, and that are in large and growing categories. Advertising support for pioneering innovations is nine times more effective than for more incremental new products.	Implementation	One-to-many	Impact: *Marketing communications for new products generate positive financial returns, in particular for radically new products.*
Stanko, 2016	Within online communities, more frequent interactions among members drive innovation "remixing" (i.e., community's use of an existing innovation as source material or inspiration to aid in the development of further innovations).	Ideation	Many-to-many	Impact: *High frequency communications stimulate innovation remixing in online innovation communities.*
Tang et al., 2015	When NPD teams face tasks defined by exploration, informal communication and face-to-face communication are positively associated with transactive memory systems (TMS), whereas for tasks defined by exploitation, formal communication and computer-mediated communication are positively related with TMS.	Ideation development	One-to-many Many-to-many	Situation and Impact: *The effectiveness of communication modes/contexts varies under different innovation task environments.*

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TABLE 1 (Continued)

Authors	Key findings	Stage	Type	Design insight
Verworn, 2009	Innovation efficiency and R&D managers' overall satisfaction with teamwork, are positively related to communication within innovation teams and between functions.	Development	One-to-one	Impact: *Communication drives innovation project outcomes and employee satisfaction with the project.*
Vuori and Huy, 2016	Shared emotions (i.e., fear) of top-managers (TM) and middle-managers (MM) hinder communication patterns and influence innovation processes and outcomes (i.e., focus on short-term product innovation at the expense of long-term innovation development).	Ideation Development	One-to-one One-to-many	Source and Impact: *TM–MM communication patterns, influenced by emotions, contribute to innovation outcomes at the organizational level.*
Walter et al., 2011	Being too persistent in the face of adversity or taking too much responsibility for the innovative idea might undermine the power of the champion's justifications for an innovation and thereby increase resistance to change. An "over-performing" champion may interpret opposing communications as an unwarranted and injurious response.	Development Implementation	One-to-many	Source and Intention: *Interpretation of communication intentions by the innovation champion may (paradoxically) increase resistance to change.*
Wang et al., 2019	A "mismatch" of the fundamental motivations behind authentic creation narratives and traditional persuasive messages enhances adoption and triggers "takeoff" cocreated innovations. This effect is mediated by potential adopters' narrative self-referencing and attenuated for expert consumers.	Implementation	One-to-many	Intention and Impact *Designing counterintuitive messages* (e.g., *approach + avoidance messages*) *of cocreated innovations between the firm and the user-innovator contributes to higher adoption rates and sales.*
Warren and Sorescu, 2017	Positive expectations of future innovation output cause an ex-ante increases in stock prices and a smaller ex-post market reaction when an actual new product is announced.	Implementation	One-to-many	Impact: *The effect of new product pre-announcement communications on stock returns is a function of prior firm's communications, prior competitors' communication, and prior investors' sentiment about past news regarding the firm.*
Yeniyurt et al., 2014	In buyer–supplier co-innovation scenarios, buyer communications have a positive effect on supplier's involvement in buyer innovation, which in turn is positively related to innovation performance and revenues for both buyer and supplier.	Development	One-to-one	Impact: *Communication has a positive effect* (via *higher collaborative engagement*) *on innovation performance and financial performance in buyer–supplier co-innovation settings.*
Ziamou and Ratneshwar, 2003	Explicit comparisons of a new functionality with an existing functionality are effective (backfire) when the new functionality is offered in a device or physical product that is atypical (typical) of the existing functionality.	Implementation	One-to-many	Situation and Impact: *The effectiveness of comparison-based new product communication is contingent on the typicality of the physical product with respect to the existing feature improved by the innovation.*

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languages that product managers and designers use to describe good versus poor designs, featuring "a common element but also specific terms used by each group, which reflect their perspectives and goals." As Wang et al. (2019) show, marketers of co-created innovations might intentionally create a "mismatch" in the fundamental motivations behind authentic creation narratives (i.e., offered by the creator) and traditional persuasive messages (i.e., from the firm). This cognitive mismatch enhances potential adopters' narrative self-referencing and thus the effectiveness of communications. With experimental evidence, Ziamou and Ratneshwar (2003) indicate that communications involving explicit comparisons of a new product functionality with an existing functionality are effective (backfire) when the new functionality is offered in a device or physical product that is atypical (typical) of the existing functionality. Finally, by studying interfirm collaborative communications at the innovation project level of analysis, Pemartín et al. (2018) determine that specific features of collaborative communication between innovation partners influence the outcomes, both directly and indirectly through trust. They argue that a communication logic that optimizes frequency, formality, reciprocity, and rationality can benefit innovation partnerships.

3.4 | Selected data sources for communication insights

A straightforward way to organize communication data relevant to innovation research is to consider the stages of the innovation process and types of communication (e.g., one-to-one communication, many-to-many communication).

In the ideation stage, one-to-one communication, such as consumer interviews, can yield in-depth qualitative data about pain points or preferences that can inform innovative product ideas. One-to-many communications such as online customer reviews likely offer feedback on product performance, which should guide innovative improvement efforts. Collaborative many-to-one ideation platforms, like online discussion forums. Foster creativity by enabling diverse groups to brainstorm collectively on a question or discussion topic. Many-to-many idea submission portals can crowdsource ideas and prioritize the most promising ones.

During product development stage, customer emails provide direct one-to-one feedback. Webinars hosted by a firm can educate large audiences about new product features, in the form of one-to-many communication. Open-source projects (e.g., python) allow for collaborative innovations in many-to-many communications.

Finally, during the implementation stage, live service chat logs capture customer feedback in a one-to-one format. Influencers reach a broad audience (one-to-many communication) and thus enable innovators to assess market responses. Online communities and their many-to-many communications reveal customer sentiments and points of pain.

As Table 2 illustrates various suggestions of where such communication data can be found. While we focus mostly on online communication data, explorations of offline communications are just as relevant.

4 | CREATING VALUE WITH COMMUNICATION DESIGN LOGICS

We summarize our proposed framework of the communication design logic in the innovation process in Figure 4, which also features two examples of how this logic can reveal insights into the source, situation, intention, and impact of communication and fuel innovation.

4.1 | Case study 1: Obtaining source insights for ideation at Sephora

Sephora is a French multinational personal care retailer that develops beauty products under its private label. It operates the Sephora Lab for collaborative innovation to integrate its frontline employees into collaborative brainstorming and idea sharing (LVHM, 2015). Frontline employees engage in many-to-many communication during the ideation stage; customers' communication reveals their preferences, hidden needs, and unmet demand (i.e., source insights). This communication occurs both offline and online. Leveraging a network of 2700 stores, Sephora uses its "Idea Central" program to consolidate insights about its customers obtained by employees, regardless of rank or function within the company. Thus, employees manually detect source insights that reflect customers' backgrounds and feed them into Sephora's ideation stage. In addition, Sephora engages in many-to-many communication online, through the vibrant Beauty Insider Community and its 5.5 million members (Istochka, 2023). This online community enhances collaborative brainstorming and idea-sharing among customers, unearthing a wide array of perspectives, experiences, and knowledge. However, as online communities grow, it becomes more difficult to detect source insights manually. Instead, Sephora turns to machine learning and text mining to identify new product ideas from these sources.

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TABLE 2 Selected data sources for communication insights on innovation management.

	One-to-one communication	One-to-many communication	Many-to-one communication	Many-to-many communication
1. Ideation	• Individual interviews • Customer feedback forms • Email exchanges • Video chat (Zoom, Microsoft Teams) • Service chat (LiveChat, Intercom)	• Online customer reviews • Customer feedback surveys (SurveyMonkey, Typeform), • Social media interactions (Twitter, Facebook)	• Online forums • Brainstorming sessions • Collaborative ideation platforms (MURAL, Stormboard), • Online brainstorming tools (IdeaScale, Crowdicity)	• Idea submission portals • Open-source project interactions
2. Development	• Customer emails • Customer support tickets • Direct messaging (Zendesk) • In-person consultations • Service logs	• Virtual product demonstrations • Social media announcements • Email newsletter • Blog posts	• Innovation platforms (e.g., Miro • Collaboration platforms (Slack, Microsoft Teams),	• Project management tools (Trello, Asana) • Online collaboration tools (Google Docs, Microsoft SharePoint) • Team meetings
3. Implementation	• Customer service interactions (e.g., live chat logs, email exchanges, support tickets), • User feedback surveys	• Social media posts • Customer testimonials • Marketing campaign • Influencer campaigns • Press releases	• User groups • Customer feedback surveys	• Online feedback aggregators (e.g., Yelp, TripAdvisor) • Online feedback portals

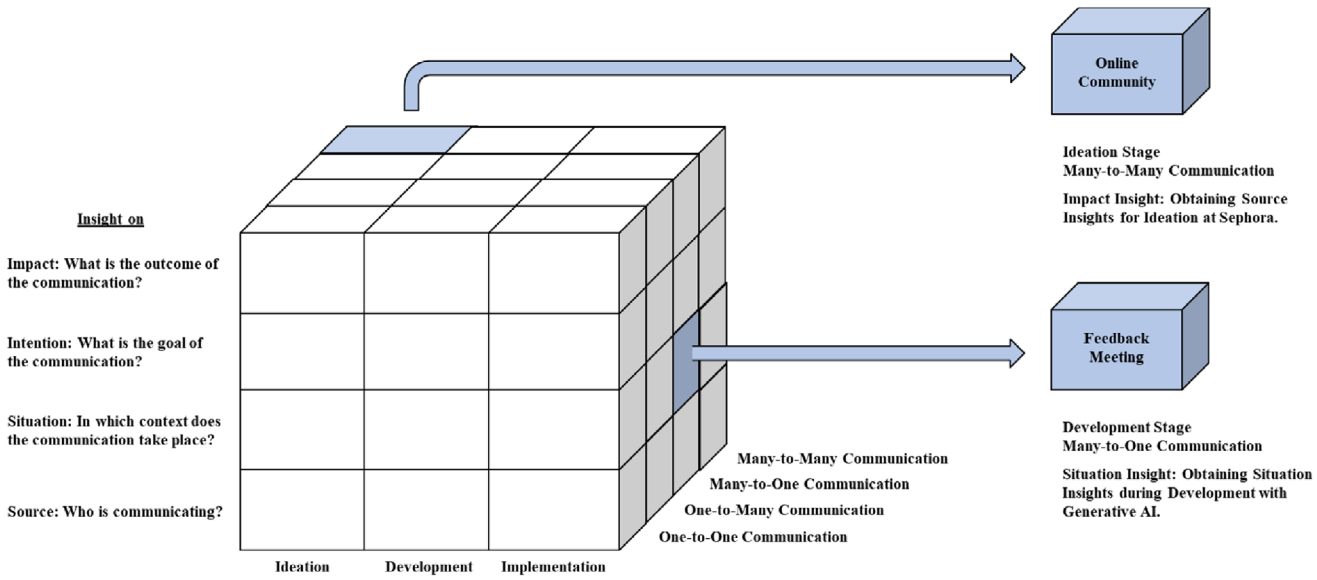


FIGURE 4 Framework of communication design logics in the innovation process.

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4.2 | Case study 2: Obtaining situation insights during development with generative AI

Generative AI allows companies to obtain situational insights during feedback meetings, in which many employees report to one project leader in the development stage. Employee communications can provide reflective insights into the team's collaborative and innovative climate, which in turn help team leaders understand and improve these climates (Chong et al., 2012). However, the complexity of managing team dynamics becomes overly challenging for large innovation teams. Using audio and video analytics, advanced generative AI systems can serve as reliable sources of input for team leaders and suggest interventions to maintain psychologically safe innovation environments (Gibson & Gibbs, 2006). For example, an AI-driven "team health barometer" (Bibhudatta, 2023) can measure and proactively address team dynamics by automatically detecting verbal and nonverbal communication signals from both presenters and the audience, whether in meeting rooms or virtually. Threats to the innovation climate might manifest subtly during meetings, such as if men with louder voices interrupt women with softer voices. To prevent this concern, AI can serve as a vigilant listener and interrupt in real time to restore an open and productive innovation climate (Lazar, 2023).

5 | DISCUSSION

Innovation management is a dynamic, complex process that requires effective communication among stakeholders to foster creativity, collaboration, and successful outcomes (Foss et al., 2011). We propose a comprehensive framework of the communication design logic for the innovation process to shed light on the interplay between communication and innovation. By blending four foundational communication design logics with the three key stages of the innovation process and four types of technology-enabled communication, we provide a clear categorization of communication research into distinct innovation processes. Our approach also reveals where researchers can find data sources from which to derive communicative insights.

The four foundational premises of the reflective and predictive communication design logic (source, situation, intentions, and impact) provide the pillars of our framework and the conceptual bases for understanding the intricacies of communication in innovation processes. Communication design logic, rooted in the communicator's (source's) background, influences how messages are crafted and delivered (O'Keefe, 1988). The situation in which the communication occurs also shapes choices of modes, channels, and strategies (Aakhus & Laureij, 2012). The intentions behind communication (e.g., persuasive, informative, collaborative) guide communication design too (Caughlin et al., 2008). Finally, the impact of communication on innovation outcomes reflects the choices that actors make during the process (Mokros & Aakhus, 2002).

Applying this communication design logic to the innovation process creates a useful conceptual lens for categorizing previous research. That is, analyzing existing literature according to source, situation, intentions, and impact dimensions produces overarching insights into the role of communication in each stage of the innovation process. Communication design considerations prompt innovation researchers to ask how communication between internal and external stakeholders might inform and determine innovation processes. For example, external stakeholders who communicate about their needs in a one-to-many fashion (e.g., customer reviews) or in direct interactions with the firm (e.g., service chats) make observable choices in designing their messages, and their communication design choices reflect their needs; they also might influence others' needs, even if they are not consciously aware of doing so. During internal development processes, the degree of emotionality (or intensity) in a message (e.g., "I hate that there is no solution for this") signifies the relative importance of stakeholders assigned to the topic. The level of concreteness (e.g., "It needs another holster on the left front for a cup") suggests how formalized the need is; a greater degree of uncertainty or abstraction (e.g., "I do not know where to find the answer") suggests a lack of any established or well-formalized solution. Whereas individual stakeholders design messages in their daily communication, collecting and collating such communication across a stakeholder group can reveal collective beliefs, needs, and wants. For example, as internal stakeholders interact during the development stage, they create communication to articulate the advantages and negotiate concerns about planned developments. Their communication design logic reflects the context, including their role within the organization, their perceptions of the consequences of pursuing or altering the innovation, and their understanding of institutional and organizational structures. Finally, innovation implementation, performance, and downstream consequences are driven, influenced, and co-constructed in communicative interactions among stakeholders.

In addition to mapping existing research, we highlight some key data sources that can provide communication insights, including communications and external data gathered from social media or online communities. Researchers can uncover how communication influences

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TABLE 3 Research directions for communication insights on innovation management.

	One-to-one communication	One-to-many communication	Many-to-one communication	Many-to-many communication
1. Ideation	• What CDLs reflect and evoke stakeholders' perceptions of involvement, commonality, and trust in ideation discussions? • How can CDLs in new communication technologies where one-to-one communication is taking place enhance ideation?	• What is the impact of Gen AI and AI-powered chatbots' CDLs on idea generation? • How do a firm's timing and choice of channel of communication influence perceptions of trust and ethical standards that influence responsible data usage and sharing in stakeholder collaboration?	• How can the CDLs of participants reveal the challenges and opportunities in collective brainstorming? • How can CDLs facilitate (hinder) collaboration on open innovation platforms?	• How do the CDLs in organizations promote inclusive practices and culture during ideation? • What are the effects of new communication technologies in cross-functional team ideation?
2. Development	• How can insights into the CDLs enhance the understanding of relational dynamics between individuals? • How can organizations leverage virtual reality to enhance relational dynamics during innovation development?	• What are the implications of a customer's CDLs in their social media posts for co-creation? • How can a firm communicate on social media to optimize customer co-creation efforts?	• How can CDLs in project team members reporting to the project lead reveal interpersonal relations that help (hinder) the innovation development? • How can in new communication technologies, where multiple individuals reporting to one, enhance collaboration?	• Which CDLs are persuasive in decision making in innovation development teams? • How can effective communication support cross-functional alignment?
3. Implementation	• How do the CDLs in customer interactions impact a customer's likelihood to increase adoption?	• How can the CDLs in customer reviews serve as an early warning system for a new product or service?	• How can the CDLs by beta users serve as an early warning system for a new product or service?	• At an organizational level, how can the CDLs indicate the level of agreement regarding the implementation of a new product or service?

Note: CDLs = communication design logic, including verbal (e.g., linguistics, speech, and audio cues) and nonverbal (e.g., audiovisual elements, body language, imagery, vocalics) elements and procedures on how these are used.

idea generation, collaboration, and stakeholder engagement by exploring various types of communication (i.e., one-to-one, one-to-many, many-to-one, and many-to-many). Moreover, communicators can design their communication using verbal (e.g., text, audio) and nonverbal (e.g., images, visuals, gestures) modes, both of which have substantial influences on recipients and thereby pose challenges (that ideally are accounted for in communication studies) and opportunities for new insights in innovation research. Growing interest in effective methods for studying text, image, audio, and video data highlights the potential impact of cross-modal research. In Table 3, we suggest research directions for each type of communication, such as the impacts of virtual reality and AI on ideation, the role of social media influencers in implementation, and the effects of personalized communication on customer experiences.

6 | IMPLICATIONS FOR INNOVATION RESEARCH

Examining the implications of multiple modes of communication involves a broad array of verbal (e.g., linguistics, speech, audio cues) and nonverbal (e.g., facial cues, gestures, postures, visuals) elements, as well as considerations of how they get used. One critical aspect of communication is that all these modalities add variance to the reflections on the communicator and predictions of communicative outcomes. We propose, without any claims of being exhaustive,

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a flexible set of propositions and illustrative research questions to encourage considerations of how communication design logics can be reflective or predictive of different outcomes of interest.

The research suggestions in Table 3 reflect the diverse array of communication insights that are possible across various stages of the innovation process, as well as how different communication design logics can reveal important insights about the communicator and the likely outcomes of their communication efforts. Each stage of the innovation process (ideation, development, and implementation) contributes a specific element of competitive advantage. Ideation generates novel and useful ideas that are unique and difficult to imitate by translating a high volume and variety of external inputs into new ideas and designs, so many-to-one and many-to-many communication likely are relatively more salient. During the development stage, the core competitive advantage lies in the way innovation work gets organized in teams and across organizational units, which requires strong leaders and inside-in communication, implying that one-to-one communication may be relatively more crucial. Finally, competitive advantage in the implementation stage stems from the deployment of resources and strategies for external promotions, adoption, and diffusion of innovation (inside-out communication), signaling a relatively higher importance of one-to-many communications, through which the innovator attempts to persuade customers, users, partners, and other actors to buy, adopt, and support the innovation.

6.1 | Ideation

6.1.1 | One-to-one communication

The communication design logics (e.g., word choices, gestures) in the innovation conversations may characterize the level of involvement, commonality and similarity, and trust between two stakeholders (e.g., verbal affirmations, mimicking gestures, leaning forward, nodding). More research is needed to understand the implications of both verbal and nonverbal communication elements for ideation processes.

New communication technologies, such as virtual reality environments (VREs) (e.g., Leveau & Camus, 2023), can be useful to measure and investigate specific communicative elements and procedures that enhance ideation. For example, VRE conversations between a participant and an interviewer. Virtual and augmented reality experiments and field studies may reveal how the communicative design logic adopted for immersive simulations, interactive tools, and multi-user collaboration spaces influence idea generation and creativity.

6.1.2 | One-to-many communication

Several opportunities exist for understanding how one-to-many communications, and their design, relate to ideation processes and circumstances. For example, to better understand of the impact of Gen-AI and AI-powered chatbots (He & Zhang, 2023), comparative studies might analyze idea generation efforts that are facilitated or hindered by chatbots' communication design logics (e.g., dominance vs. non-dominance in the linguistic cues). Delineating the implications of Gen-AI- and AI-powered chatbots, communicative choices for stimulating idea generation can inform organizations' decisions about how to integrate these technologies into their innovation processes. Moreover, a firm's timing and choice of communication channel may affect the perceptions of responsible data usage and sharing in stakeholder collaboration within innovation processes. Investigating the influence of communication strategies (e.g., timing and channel) on perceptions of trust and ethical standards among stakeholders could provide essential insights into enhancing collaboration and compliance at the ideation stage.

6.1.3 | Many-to-one communication

To investigate why collective brainstorming works (or does not work), we suggest user-centered studies that assess participants' perceptions, satisfaction, and creativity in brainstorming sessions by manipulating or assessing the communication design logics of the participants. The interplay between communication technology and human creativity during such brainstorming can also offer insights into the future of collaborative ideation. Bouschery et al. (2023) suggested that AI-augmented frameworks may bolster the quality and productivity of innovation teams during idea generation. Open innovation collaboration and knowledge sharing platforms allow innovators to maintain transparent and immutable records of idea ownership (Tan & Saraniemi, 2023). Researchers could uncover the best communicative practices when using such ideation platforms (e.g., IdeaChain, Katalyo).

6.1.4 | Many-to-many communication

Longitudinal studies could also explore if and how organizations can create a culture of innovation in the many-to-many communications during ideation by tracking the development of communication around innovative ideas and assessing which verbal and nonverbal communicative elements promote inclusive communication practices and culture. Moreover, how such ideation practices and

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cultures are impacted by new communication technology, for example, augmented reality (Rauschnabel et al., 2022) and AI (Piller et al., 2023) is an interesting topic of future research.

6.2 | Development

6.2.1 | One-to-one communication

Future research should explore how communication design logics, or changes in communication patterns, enhance our understanding of relational dynamics between individuals. For example, research could investigate which communication designs logics (e.g., communication frequency, mode, sentiment, topics) can improve cohesion, trust between individual development team members. Such studies could also reveal critical intervention points for enhancing team performance and innovation development success. Following the advances in communication technologies, investigations of how organizations can leverage communication channels (e.g., virtual reality) to enhance relational dynamics between team members and achieve a more effective knowledge sharing in innovation development (Harz et al., 2022) may benefit the employees well-being as well as innovation.

6.2.2 | One-to-many communication

Social media communications by customers offer opportunities for innovation co-creation (Tajvidi et al., 2020). Researchers could explore the communication design logic of existing and potential customers and delineate their stated motivations, attitudes, and intentions regarding current products. By analyzing communication patterns, such as sentiment, researchers can better understand consumer expectations and preferences. Research efforts could also address how companies should communicate on social media to gather more insights from customer co-creation efforts. By examining communication aspects such as content type, engagement methods, and the timing of interactions, studies can reveal how to better encourage their creative contributions to innovations.

6.2.3 | Many-to-one communication

The way team members communicate to the project lead or decision maker during an innovation development process can reveal their interpersonal relations (e.g., dominance, agreeableness) as well as the broader reporting culture (e.g., formal vs. informal, rational vs. emotive tone) at the organization. Research should investigate which communication aspects reveal relational or organizational circumstances that help or hinder the developmental process. For example, project team members reporting communication to the project lead reveal interpersonal relations that help (hinder) the innovation development.

6.2.4 | Many-to-many communication

The development stage of an innovation is special in that there is a lot of uncertainty and decisions need (in part) to be made based on heuristics rather than the systematic processing of facts. Such situations increase the influence of persuasive communications. We suggest testing the efficacy of different persuasive communication design logics in influencing stakeholders' attitudes and behaviors (Hoffmann et al., 2020). Details of how effective communication can support cross-functional alignment during innovation development may also involve longitudinal studies that track the implementation and outcomes of communication initiatives.

6.3 | Implementation

6.3.1 | One-to-one communication

Research on the implementation stage of new innovations could study data on interactions between the firm (or its representatives) and the target customer to understand the implications of their communication design logics. Such research may pinpoint specific message formulations (e.g., listing benefits and emotional appeal) that can significantly impact consumer acceptance and enthusiasm for new products or services. Moreover, we need a better understanding of how communication needs to be adapted depending on the specific audience and different types of endorsers (e.g., experts, influencers, celebrities, and news).

6.3.2 | One-to-many communication

Review platforms, where a customer shares her experience with others, tend to impact the degree to which new products and services are adopted (Rullani & Haefliger, 2013). Text mining or image mining early communication by individual customers about newly launched products and services in online reviews can uncover their views early on. Specific communication elements that might be early warning signals include an increase in negative sentiment, recurring complaints about certain features, questions

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TABLE 4 Illustrative managerial implications for innovation management.

	One-to-one communication	One-to-many communication	Many-to-one communication	Many-to-many communication
1. Ideation	• Individual informal communication can indicate the collective intentions toward innovation acceptance and development (Leenders et al., 2007)	• Encourage the use of written and verbal tools for consumer engagement, especially when product adoption is based on search attributes (Song and Parry, 2009).	• Focus on enabling cocreation with customers for relevant and moderately novel knowledge, leveraging rich communication channels (Mahr et al., 2014).	• Promote informal and diverse communication to facilitate creativity and leverage systematic design principles (Leenders et al., 2007).
2. Development	• The CDL in interactions between NPD managers and designers reveals potentially different goal orientations (means vs. ends) (Micheli et al., 2012). • Foster frequent interfirm knowledge exchange to build strong social ties and collaborative innovation (Badir and O'Connor, 2015; Micheli et al., 2012).	• Utilize participative management and goal-oriented communication to enhance team collaboration and reduce biases (Sarin and O'Connor, 2009).	• Integrate customer feedback into development, reflecting on the varied customer intentions and needs. • Encourage high-frequency, positive feedback to enhance commitment and persistence in development projects, especially in large networks (Patzelt et al., 2011).	• Support diverse communication patterns, including ICT, to drive knowledge dissemination and innovation team effectiveness (Antioco et al., 2008; Chong et al., 2012).

about product use. By examining how these communication indicators can be systematically identified and addressed, research can guide companies to proactively manage and refine their offerings.

6.3.3 | Many-to-one communication

Prior to the final launch, firms tend to release a beta version of a product to a select group of users. Their feedback is then gathered and integrated by a central decision-maker or a specific team responsible for product adjustments. Here again, any communication design logics that may serve as early warning signals would help to make better use of this process.

6.3.4 | Many-to-many communication

Future research should investigate how verbal and nonverbal communication elements during the implementation phase of a new product or service can serve as indicators of agreement level and potential success or failure. For example, the frequency, sentiment, and type of communications related to the new product or service implementation may suggest the likelihood of a successful integration of a new system into an organization. Such research may also aim to understand communication strategies that foster higher agreement and engagement across organizational levels during implementation.

7 | CONCLUSIONS

In this paper, we provide a unified communication design logic framework to provide insight regarding the role of communications in the innovation process. Along the innovation process, the way that actors design their communication provides reflective insights into their backgrounds, situations, and intentions. For organizations seeking to stay competitive and meet customers' evolving needs, understanding the role of communication design in innovation processes thus is essential. We provide insights, from a communications perspective, how the way communicators construct their messages and communications helps to understand stakeholders in innovation processes. As Table 3 reveals, many managerially relevant research questions need to be addressed. In Table 4, we also synthesize findings from prior research to highlight actionable suggestions that become apparent through the study of communication throughout the innovation process. Such research offers managerial insight on: (1) how communication designs can provide insights into key stakeholders, their

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situation, and their intentions in the innovation process and (2) how communication design might enhance the effectiveness and impact of communication throughout the innovation stages.

Independent of the innovation process stage or communication type, innovation researchers should seek to develop or introduce tools from other disciplines (e.g., computer science) that are able to convert unstructured communication (e.g., text, audio, images) into data and information. These newer and novel methodologies will aid innovation research in analyzing communication design logic across multiple modalities (linguistic, audio, and images, as well as physical signals, such as gestures and postures). We hope this paper stimulates research in all these different aspects of communication in the innovation management process.

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