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## Crisis management in new product development: A tale of two stories

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### ABSTRACT

This research examines how firms manage crises in new product development (NPD), and suggests that a high level of perceived crisis can result in better new product performance. In addition, the role of team communication is underlined in the relationship between perceived crisis and new product performance. Team communication is categorized into two types: formal vs. informal, each playing a distinct role in crisis management. More importantly, this study argues that there exist dual routes in the crisis-performance relationship: mediation and moderation. A survey study is implemented for hypothesis testing, and data is collected from 119 NPD teams in high-tech industries. Results show that formal communication partially mediates the relationship between perceived crisis and new product performance, and that there is also a direct effect of perceived crisis on performance. Meanwhile, formal communication negatively moderates the direct effect of perceived crisis on new product performance, while informal communication positively moderates this effect. The co-existence of mediation and moderation results in a managerial dilemma regarding formal communication: it positively mediates but negatively moderates the crisis-performance link. Findings suggest that informal communication can play a complementary role in offsetting the negative influence of formal communication.

### 1. Introduction

This research aims to examine how firms manage crises through team communication in new product development (NPD). As NPD becomes more frequent, firms are seeing less than stellar returns on investment (Michelsen, 2008). In spite of this fact, they are more eager to provide customers with new products even though a crisis can be on the horizon (Zook and Allen, 2016). Most firms employ measures to limit the downside exposure should a negative event occur. But crises can lead to catastrophic outcomes, putting firms on the brink of annihilation. Classic events including the Bhopal tragedy (Shrivastava et al., 1988) and Tylenol scare (Pearson and Mitroff, 1993) severely threatened the survival of Union Carbide and Johnson & Johnson, respectively. A recent crisis of Volkswagen's emissions scandal had the same impact on the firm (Jennings, 2015). The field of NPD is never immune from the crisis. For example, the Italian auto manufacturer, Fiat, sought to deviate from its core of low-cost, affordable cars to that of competing on product differentiation but economic conditions in Europe were not fertile to embrace such a change (Financial Times, 2012), thereby plunging it further into debt while its competitors gained market share.

On the other hand, NPD can in fact deliver an organization from a crisis. Firms experiencing a crisis often have unique opportunities of

risking more on a new product that can ensure their survival. Along with proper management of the NPD process, a new product can be successfully launched, which becomes a solution for this crisis (Akgün et al., 2006). For example, prior to Nintendo's Wii console, the firm had yielded considerable market share to Sony and Microsoft. In 2006, falling sales and a shrinking market share called for a drastic change. Nintendo developed and launched the first gaming console that involved the gamer using his/her body as a control for the avatar. This radical innovation catapulted Nintendo as a major player in its industry (Binns et al., 2014). Following this logic, this research suggests that NPD can be a solution and therefore a key outcome for crisis management.

The innovation literature provides insights into many best practices of successful NPD teams. The commonly adopted idea-to-launch process implies certain predictability or a somewhat measurable future. However, the environment is not always stable, which has been highlighted in past studies (e.g., Maltz and Kohli, 1996; Moorman and Miner, 1998). A crisis is a key facet that falls into the category of an unstable environment and therefore studying NPD in such a situation is vital. The term, perceived crisis, is adopted in this research, and it is defined as an NPD team's acknowledgement of a potentially threatening crisis and ability to resolve this crisis by innovating a new product. In

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other words, the NPD team can develop a new product in order to deal with such a threatening situation.

In a crisis setting, the amount of exchanged information is important as members of an organization can see the purpose of continuing to strive for success (Griffin and Hauser, 1996; Lynch et al., 2014). Hence, communication among team members in an NPD project can have a pivotal role to play in delivering the organization from a crisis. To do so, an organization must encourage appropriate team behavior for communication. It is notable that team communication can be either formal or informal (Tang et al., 2015). Formal communication provides team members with information on the situation through formal meetings and written documents; informal communication establishes social networks, and such impromptu meetings can be just as important as formal communication in reacting to uncertain circumstances (Griffin and Hauser, 1996).

In addition, there exist two theoretical routes of team communication between perceived crisis and new product performance: mediation and moderation. It is suggested that both formal communication and informal communication positively mediate the crisis-performance relationship, but that in addition to the mediation effects there is a direct effect of perceived crisis on new product performance. In the meantime, formal communication negatively moderates the direct effect of perceived crisis, while informal communication's moderation is rather positive. As a result, this research points out a dilemma with formal communication: it is a positive mediator but a negative moderator.

The conceptual model was tested based on data from 119 NPD teams in high-tech industries. Results support the conflicting function of formal communication, and indicate the positive moderation effect of informal communication. As a result, informal communication seems to play a complementary role in offsetting the negative effect of formal communication.

This research contributes to the literature in several ways. First, in spite of its importance, extant crisis management literature focuses on how firms deal with external stakeholders or how the management reassures employees. The focus is primarily on public relations and re-establishing trust or the firm's reputation. This research attempts to add that NPD teams can assist in delivering a firm from a crisis. The team may not be directly fighting the crisis; however, they can certainly help by identifying problems and developing solutions which should add to the success of the firm. Second, the crisis literature focuses on communication be it externally as a formal press release/conference to the public or internally throughout the firm as ways to keep employees aware of the situation. This research focuses on internal communication, but distinguishes two types of communication modes, namely formal and informal. They produce a dual role in the relationship between perceived crisis and new product performance. Due to the simultaneous effects, a managerial dilemma regarding formal communication is identified. The remaining of this article will discuss theoretical development of the framework and provide insights into how to resolve this dilemma.

## 2. Research background

### 2.1. Crisis and crisis management

An organizational crisis is defined as a harmful or threatening event that is "highly salient, unexpected, and potentially disruptive" (Bundy et al., 2017, p. 1663). Although the crisis is an actual event, it can be a measure of perception that the value of the organization is seriously threatened (Billings et al., 1980). Research also suggests that people may not make a distinction between crises that pose latent threats and those immediate (Barnett and Pratt, 2000). It may not be important to discuss whether or not a crisis exists, but if it exists in the minds of many people then its consequences will be real (Galtung, 1984). This is particularly crucial to organizations because they respond to the environment based on how they perceive it can be managed (White et al.,

2003). Extant literature of crisis management has been done across various fields, such as consumer packaged goods (Johnson and Peppas, 2003), tourism (Hajibaba et al., 2016), pharmaceuticals (Priporas and Vangelinos, 2008), and automobiles (Fan et al., 2013). Crises can be initiated by various events, including product recall ([www.cpsc.gov](http://www.cpsc.gov)), economic recession (Fan et al., 2017), political and social change (Martins, 2015; Szántó, 1994), natural disaster (Quarentelli, 1988), and so forth.

Furthermore, Penrose (2000) asserts that firms perceive a crisis not only as a threat but as an opportunity. Successfully resolved crises involve the firm restoring its reputation and bringing back customers. Siomoks and Shrivastava (1993) find that firms need to face the crisis and not avoid it in order to survive. While they may have a financial burden, successful firms must be capable of dealing with the emotional fallout caused by a crisis. Mitroff et al. (1989) suggest that most firms are not prepared for a crisis but those who are often have key personnel that serves to help the firm navigate the crisis. Effective crisis management involves detecting potential problems and mitigating the risk of what can and cannot be managed. Potential problems that can be fixed will result in no crisis occurrence; however, situations that cannot be planned for and threaten the firm can result in an actual crisis (Mitroff et al., 1987).

Once a crisis has emerged, it is up to the firm on how to manage it. Affected firms can have teams that interact with each other in an effort to bring about a positive change and become more sustainable. Situational crisis communication theory supports different strategies for dealing with crises – for example, firms can deny the situation, diminish the severity of the crisis, or offer to rebuild the relationship with stakeholders depending on their culpability (Coombs, 2007). It is stressed that remaining silent during a crisis is not an appropriate strategy (Xu and Li, 2013). Considering that a crisis is often perceived as being threatening, any attempt to manage the situation is better than doing nothing. In fact, an attempt to manage the crisis likely results in a positive outcome as the current environment may have already had a negative impact on the firm.

### 2.2. Crisis management and new product development

In spite of its threatening nature, a crisis can motivate firms to achieve superior performance. NPD teams, while may not directly fight the crisis, can certainly respond to and help with it. In NPD, teams require not only a strategy for risk taking but also one for risk management to select the projects that have the most potential. The ability to manage risk throughout NPD is vital. It is suggested that NPD teams that can successfully do so are associated with positive project outcomes (Mu et al., 2009). However, a crisis comes about when the unforeseen event occurs. Research in the field of crisis management tends to focus on how to prevent or recover from a crisis; yet, there may exist a systematic approach towards dealing with a crisis (Lin et al., 2006). Effective teams in crisis settings contain members who know their role and engage in more concise behavior and interaction (Stachowski et al., 2009). In NPD, a crisis can be in the form of a sudden change in the environment such as a change in customer tastes after a new product has been launched, a new regulation imposed on firms in a particular industry, or a product recall. Information is often limited as the firm decides which direction it wishes to pursue. As such, NPD team members can experience stress and anxiety due to the threatening nature associated with a crisis and the lack of information as it unfolds. This can lead to inflexibility and poor decision-making by NPD teams as their level of anxiety increases during a crisis (Akgün et al., 2006). On the other hand, NPD team members who are familiar with their roles as well as those of their team members should exhibit more interaction and coordination in the NPD process, which facilitate new product performance.

While crises are generally addressed by senior management, lower-level organizational members – in this study, NPD team members –

**Table 1**  
Review of research on team communication in crisis.

Authors	Empirical setting	Findings
Waller et al. (2014)	Simulation	When a disaster hits, crisis management teams employ a transactive memory system where each member is highly specialized in their respective role so that the situation can be effectively remedied in a short time frame.
Akgün et al. (2006)	Survey	A crisis will promote an NPD team's ability to unlearn, which in turn allows for the team to communicate new information that ultimately changes their beliefs.
King (2002)	Conceptual	Teams that have members who have had prior interactions will be able to effectively communicate better than those that have not.
Pearson and Mitroff (1993)	Interview and survey	Firms that wish to successfully navigate through a crisis must have established clear and open communication channels for information exchange. There should exist formal team members that deal with crises within the organization.
Ucelli (2002)	Conceptual	A firm should establish a formal communication network to deal with a crisis. Communication should be done quickly so that accurate information may be disseminated and misinformation negated.
Weick (1993)	Case study	Team members in a crisis need some sort of communication structure. Fighting the infamous Mann Gulch fire, only 3 out of 15 firefighters survived. Dodge, felt that there was still a team that should adhere to top-down communication (i.e. a team leader giving orders to his subordinates), while ideas can be shared between team members in an informal way.

should also respond to such a threatening situation because it determines their firm's survival. A typical example is the case in Kim (1998), where a "crisis" was fabricated by the government of South Korea through imposition of new regulations designed to spark the Korean vehicle industry. While many executives did not see these new regulations as a significant crisis, employee perception of crisis was high. Because of it, Hyundai was able to design and develop a new Korean car, thereby moving from assembling foreign cars to a more integrated design and manufacturing firm. This case well reflects the role of NPD and engaged team members in crisis and how their perceived crisis can serve as a trigger for innovation.

Few studies have empirically explored the effects of crises on NPD. Akgün et al. (2006) examine the perception of crises by NPD team members and find that it is positively linked to creating new knowledge and processes but do not explore the direct effect of a crisis on project outcomes. In another study, Akgün et al. (2007) find that top management support positively moderates the relationship between perceived crisis and new product success. In both studies, the crisis was a measure of perception. Likewise, the term, perceived crisis, is adopted in this research to describe the extent to which people acknowledge a crisis situation and respond to it in the NPD process.

In summary, for a crisis to be managed, the NPD team and its members should be considered as an appropriate response vehicle as their decisions are not directly affected. In such a situation, the NPD team can manage the crisis by developing a successful new product. As a result, this research explores how perceived crisis impacts a firm's NPD activities, and suggests that team communication builds a link between the two factors.

### 2.3. Communication and crisis management

Extant literature has suggested that communication in a crisis is rapidly developing, and it often plays a key role in resolving crisis-driven issues (Coombs and Holladay, 2014; Griffin and Hauser, 1996). Verhoeven et al. (2014) find that many communication professionals are encountering a crisis more frequently, thus tying these two subjects closer. For communicating during a crisis, it is necessary to have a response strategy to either accept blame or provide objective information. Furthermore, the timing of the response can serve a firm well if they address the crisis first before external stakeholders realize the amount of damage inflicted.

Pearson and Mitroff (1993) assert that for crisis management to be effective, all levels of the firm should have open communication channels. For instance, the CEO and senior management need to provide answers to stakeholders (Siomkos and Shrivastava, 1993). Each crisis presents a unique opportunity for the firm, and therefore there are no set rules or "best-practices" in dealing with a crisis (Coombs, 2015). Research has shown that communication during a crisis is essential as it can either help or hurt a firm (Roshan et al., 2016). Firms can choose

among different ways of reacting to an organizational crisis ranging from denial to reputation repairing (Coombs, 2015). Usually it is critical to set the response to the crisis in motion. It is essential to have information or answers to deal with questions associated with the onset of a crisis (Siomkos and Shrivastava, 1993).

Yet, past research has overwhelmingly weighed on external communication but research on internal communication is rather limited (Heide and Simonsson, 2014). Internal communication can be in the form of meetings, phone conversations or conference calls, and written communiques such as memos or emails. Communicating information is vital towards managing the crisis, and internal communication occurs frequently among members of a crisis response team. Marwitz et al. (2008) suggest that a central command is needed to communicate information to members of the crisis management team. Empirical research has shown that a vast majority of firms have crisis management plans that include internal communication during a crisis (Johansen et al., 2012).

Said communication is designed to deal with the perception that employees require more information in order to deal with the crisis. Internal communication can be formal as employees seek direction or consensus through formal meetings and written documents. It can also be informal as people carry casual conversations in the form of "hall talk" (Jaworski and Kohli, 1993). Table 1 serves as evidence that prior research has studied internal communication in the crisis setting. Yet, very little distinguishes between the two types of communication in the crisis setting: formal and informal.

Formal communication is necessary for teamwork (Pinto and Pinto, 1990). In formal meetings, communication is viewed as having a preset, scheduled agenda that contains goals and objectives; the same is true of memos and in fact those documents can set forth the direction for meetings and necessary actions in the workplace (Maltz and Kohli, 1996; Tang et al., 2015). In crisis settings, formal communication helps deliver accurate information so that rumors about the crisis situation can be avoided (Strandberg and Vigsø, 2016).

Informal communication is viewed as having hallway talk and unstructured conversations (Maltz and Kohli, 1996). It allows for more social interaction during and outside of work, which can lead employees to developing their own language and understanding. Informal activities can also bring about communication and better understanding which can lead to productivity (Wong et al., 2014). Informal communication enables people to share information that is not easily disseminated by meetings and written documents (Tang et al., 2015) and researchers have emphasized its role as a complement for formal communication especially in a crisis situation (Griffin and Hauser, 1996).

In NPD, internal communication among team members has been shown to have a positive effect on new product performance (Griffin and Hauser, 1996). Some innovation studies have emphasized that an NPD team should implement both formal and informal communication

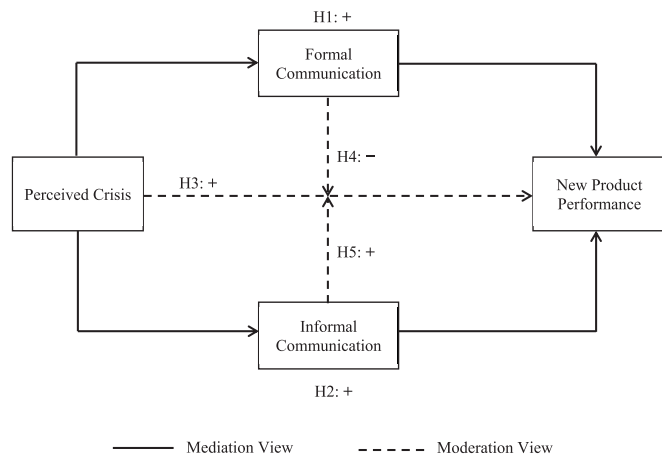


Fig. 1. Conceptual Model.

structures in order to maximize integration across NPD team members (Kahn, 1996). Formal communication can be employed to yield official information sharing (De Luca and Atuahene-Gima, 2007), providing a structured setting where team members can meet and debate decisions associated with the project and build a common forum for feedback (Slotegraaf and Atuahene-Gima, 2011). Informal communication can be used to establish social ties (Madhavan and Grover, 1998), to generate new knowledge (Nonaka and Takeuchi, 1995), and to build a more participative atmosphere where team members can communicate more effectively (Olson et al., 1995). In summary, these two types of team communication are distinguished, and each plays a distinct role in the relationship between perceived crisis and new product performance. The conceptual framework is shown in Fig. 1.

### 3. Hypothesis development

#### 3.1. Mediation effects of team communication

In order for the crisis to influence new product performance, NPD teams need to have more formal communication. This is because when a crisis unfolds, there can be many different voices and opinions being expressed. Such diversity can come from the confusion and threat levels associated with the perception that something is wrong. While team members strive to develop products so as to manage the crisis, they need resort to the use of official channels of communication, thereby reducing the confusion between each other and, equally important, limiting rumors (Mazzei and Ravazzani, 2011). It is suggested that organizations that employ information and communication technologies have a positive impact on innovation performance (Arvanitis et al., 2013). As such, communication is expected to reduce informational errors, and therefore increases the efficiency of NPD. In NPD, formal communication can provide team members with a platform where they can establish mutual understanding in order to develop new organizational routines and set clear goals for the NPD process. In this sense, formal communication is a mediator in the relationship between perceived crisis and new product performance.

In addition, to recapture the sense of normality, team members seek out information that can be shared so that accurate decisions can be made. This information seeking process involves obtaining official information and knowledge through the use of formal communication which includes meetings and memos (De Luca and Atuahene-Gima, 2007). Also, crisis is unpredictable which often requires NPD teams to change their current routines and goals (Lin et al., 2006). As the perceived threat level associated with the crisis increases, this in turn stimulates the NPD team to engage in formal communication so as to help the team integrate shared information and develop collective

interpretation (De Luca and Atuahene-Gima, 2007; Slotegraaf and Atuahene-Gima, 2011).

Furthermore, existing innovation literature has provided plenty of evidence of the effect of formal communication on new product performance. Activities embedded in formal communication, such as information sharing (Troy et al., 2008), problem solving (Slotegraaf and Atuahene-Gima, 2011), development of organizational routines (Moorman and Miner, 1997), and goal setting (Yang et al., 2015), can positively impact new product performance. As a result, it is expected that:

**H<sub>1</sub>:** Formal communication positively mediates the relationship between perceived crisis and new product performance.

**H<sub>1a</sub>:** Perceived crisis is positively related to formal communication.

**H<sub>1b</sub>:** Formal communication is positively related to new product performance.

Despite the role of formal communication, it may not accommodate all the messages needed in an NPD team, and informal communication can serve a complementary role for information sharing (Tang et al., 2015). Because informal communication paves a road where organizational members have necessary information transmitted (Tang et al., 2015), it is expected that this communication mode can be also constructive for the NPD team during the crisis and thus serves as a mediator in the crisis-performance relationship.

First, an increase in the level of internal communication is often brought on by a crisis (Mazzei and Ravazzani, 2011). The internal communication often can be done in a personal nature (Monge and Contractor, 2003) – particularly true for those affected by the crisis. This is because the crisis causes uncertainty and anxiety. Yet, efficient information exchange can reduce the degree of uncertainty associated with the crisis (Loosemore and Hughes, 2001). As a result, team members are likely to engage in informal talk (e.g., in the hallway or breakroom) to mitigate their anxiety (Brownell, 1990), which in turn facilitates the NPD process. In this sense, informal communication can serve as a source of security for team members to warrant better new product performance.

In addition, it is not reasonable to expect firms to employ the same organizational routines and design under crisis conditions (Lin et al., 2006). They should be able to adapt themselves to respond to unexpected incidents. When an NPD team identifies a crisis situation, it is necessary for team members to familiarize each other's work habits, skills, perspectives, and interpersonal styles, which in turn enhances their effectiveness in NPD during the crisis (Griffin and Hauser, 1996). Prior research has suggested that building such familiarity requires personal interaction between team members (Madhavan and Grover, 1998). As such, informal communication mediates the relationship between perceived crisis and new product performance.

Moreover, informal communication can boost cooperative behavior among NPD team members (Madhavan and Grover, 1998), which can foster new product performance. Also, team members can build relationships outside of a formal setting and develop social bonds with each other. Such healthy internal dynamics are essential for effective NPD teams and, consequently, for the successful development of new products (Burke et al., 2006). These informal relationships derived from “hall talk” and away from formal meetings can help foster trust and confidence, thereby facilitating new product performance. Thus, it is hypothesized that:

**H<sub>2</sub>:** Informal communication positively mediates the relationship between perceived crisis and new product performance.

**H<sub>2a</sub>:** Perceived crisis is positively related to informal communication.

**H<sub>2b</sub>:** Informal communication is positively related to new product performance.

While the two types of team communication are viewed as

mediators between perceived crisis and new product performance, this study argues that they do not capture the entire mechanisms behind this relationship. In other words, their mediation effects are partial and thus there exists a direct effect of perceived crisis on new product performance. First, due to the unpredictability of a crisis, a certain degree of trial and error is present and many tasks are done in an exploratory nature (Akgün et al., 2006; Weick, 1993). As such, normal reactions to a crisis may not necessarily work because of the new situation an NPD team is facing. A crisis can force the team to think about unusual ways towards developing a new product because existing products are unable to succeed. This requires team members to set aside existing knowledge in order to think out of the box. However, recent research has found that NPD teams are likely to disseminate commonly known information rather than useful unique information for new product decisions (Xiao et al., 2016). Thus, team communication seems to play a major role in sharing much existing information. Although integrating existing information can facilitate generating new knowledge, it is unlikely to secure all essential components of team creativity needed for dealing with a crisis (Kim and Atuahene-Gima, 2010; Zhang et al., 2015).

Second, the crisis typically results in a sense of urgency. Such a threatening nature necessitates that the situation must be dealt with in a limited timeframe. Thus, the sense of urgency can trigger higher product development speed, and it is commonly agreed that product development speed can enhance new product performance (Henard and Szymanski, 2001). Past research suggests that team utilization of commonly shared information in team communication can indeed increase NPD process efficiency (Kim and Atuahene-Gima, 2010). However, in a highly uncertain environment, where customer needs are fast-changing, it is necessary for NPD teams to explore new opportunities and adopt non-traditional approaches in order to maximize product development speed (Zhang et al., 2015). This requires NPD teams to capture customer needs that have not been recognized before. In this regard, team communication, though playing a facilitating role, is unlikely to capture the entire experimental nature in increasing product development speed. As a result, it is expected that:

**H<sub>3</sub>:** In addition to the two mediations by formal communication and informal communication, perceived crisis has a direct effect on new product performance.

### 3.2. Moderation effects of team communication

In addition to the mediation, team communication can also moderate the direct effect of perceived crisis on new product performance. First, in threatening situations such as a crisis, most people tend to rely on what they know (Quinn and Worline, 2008). However, since the crisis is unanticipated, such a surprise event requires that the NPD team become more creative (Boin and Hart, 2003). When formal communication is high, there may exist an information bias in team meetings where people tend to share commonly held information as opposed to novel information (Zhang et al., 2014). The outcome of holding more meetings and sending out more memos can, to some extent, limit team creativity, an ingredient necessary for dealing with a crisis. As a result, when formal communication is high, it may diminish the magnitude of team creativity needed for enhancing the direct effect of perceived crisis on new product performance. On the other hand, when formal communication is low, NPD team members have more flexibility to focus on different aspects of the process. Flexibility can facilitate creativity and thus strengthens the direct effect of perceived crisis on new product performance.

Moreover, as mentioned earlier, perceived crisis can increase the NPD team's sense of urgency, which increases product development speed. A main function of formal communication is to share information. However, when formal communication is high, there may be too much information to absorb. This is likely to increase complexity to decide which information is more critical for the crisis situation,

prolonging the problem-solving process. In this sense, formal communication can weaken the direct effect of perceived crisis on new product performance. In addition, when formal meetings are frequently held, it may imply that decisions are not being or cannot be made. Either way requires extensive time to reach a consensus. Accordingly, when formal communication is high, the crisis is unlikely to generate high development speed which improves new product performance. In contrast, when formal communication is low, the task for information sharing and integration is less complex, team members can pay sufficient attention to the crisis in order to boost new product performance. Thus, it is proposed that:

**H<sub>4</sub>:** Formal communication negatively moderates the direct effect of perceived crisis on new product performance.

A crisis often requires more creative thoughts as the NPD team may need to come up with a new approach to combat the situation. Informal communication can serve as a context which reduces uncertainty and allows for team members to establish trust (Madhavan and Grover, 1998). When informal communication is high, it allows for bonding as NPD team members familiarize themselves with each other's work and abilities. In addition, a high level of informal communication allows for freely sharing more information outside of formal meetings. Hence, team creativity needed for dealing with a crisis to improve new product performance can be elevated when there is more frequent informal communication. In contrast, when informal communication is low, NPD team members may resist sharing information due to lack of trust and social ties. Those reluctant to trust and unfamiliar with others will resort to more structured (formal) communication.

In addition, as a crisis brings about a sense of urgency, a higher level of informal communication can be beneficial. It is suggested that a high level of cooperation across functions is characterized by informal communication (Pinto and Pinto, 1990). In the NPD process, as the crisis is likely to increase task complexity, it can generate a number of setbacks. The sense of urgency caused by perceived crisis indeed requires team members to work in a more cooperative atmosphere so that the setbacks can be removed. NPD teams should familiarize themselves with procedures and, in addition, understand the role that each team member plays. In doing so, informal communication allows team members to rely on each other without extensive formalization, creating a facilitating context where the team better races against the clock. Furthermore, informal communication can help generate common vocabulary and thus reduce language barriers (Griffin and Hauser, 1996). This is beneficial in a cross-functional NPD team, as team members are often unable to assimilate each other's language (Cronin and Weingart, 2007). When informal communication is high, common vocabulary can enable a smooth NPD process, thereby strengthening the effect of perceived crisis on new product performance. Conversely, when informal communication is low, team members have less chance to be acquainted with each other. This unfamiliarity does not allow them to build a stronger relationship. It does not facilitate dealing with the urgency caused by a crisis, and therefore weakens the direct effect of perceived crisis on new product performance. In summary, it is expected that:

**H<sub>5</sub>:** Informal communication positively moderates the direct effect of perceived crisis on new product performance.

## 4. Research method

### 4.1. Sampling procedure

This study focused on high-tech industries in the Northeastern region of the United States. High-tech industries often have an unpredictable, fast-changing environment, making it an ideal empirical context to examine crisis management. A survey study was conducted to test the conceptual framework. One hundred and forty-six alumni

and students in an executive graduate program of technology management were recruited to serve as contact persons, each of whom was asked to recruit an NPD project leader in his or her own firm. Because this executive program had an emphasis on technology management, all alumni and students were professionals involved in their firms' innovation management and had direct contact with key personnel participating in NPD. Each of them first recruited an NPD leader in his or her firm; then every recruited leader's eligibility was checked before the survey was distributed: The leader must (a) serve at a management position, and (b) have direct involvement throughout the development process for a recently launched new product. Among the 146 completed responses, 27 were removed because they were not considered as high tech based on OECD's technology intensity definition ([www.oecd.org](http://www.oecd.org)). The remaining 119 cases (81.5%) were used for data analysis. Researchers often adopted email lists from either professional associations or commercial panels to reach out potential respondents, which may result in a response rate ranging between 10% and 30% (e.g., Cui and Wu, 2016). The method of email questionnaire did not allow for building rapport between researchers and respondents, causing a relatively low response rate. On the other hand, in this study contact persons were alumni and students in an executive graduate program. They personally recruited eligible NPD leaders in their firms, who participated in this study; as such, this method facilitated much higher willingness to complete the survey.

4.2. Sample characteristics

Respondents were project leaders at management positions who were directly involved in innovation practices in their firms, and thus had sufficient knowledge to answer the questionnaire. Their job titles are summarized in Table 2. In addition, participating firms were across a number of high-tech industries, including information technology and telecommunication, electronics, pharmaceuticals and healthcare, chemicals, aerospace, and others. Firm characteristics are summarized in Table 3. The NPD project was viewed as the unit of analysis. Each examined NPD team was a cross-functional team, where personnel from more than one functional departments worked for the NPD project. Respondents were asked to answer the questionnaire based on a recently completed project. In addition, the developed product must have been launched in the market for at least six months at the time of survey so that respondents well acknowledged the product's performance.

4.3. Measure

Table 4 displays all scale items, factor loadings, and reliability indices. Descriptive statistics and correlation matrix are provided in Table 5. All multi-item constructs, including perceived crisis, formal/informal communication, new product performance, and four control variables, were measured in 11-point Likert scale: 0 = Strongly Disagree; 5 = Neither Agree or Disagree; 10 = Strongly Agree. Respondents were asked to rate each scale item to indicate the extent to which they agreed or disagreed with each statement.

Table 2  
Job titles of respondents.

Titles of respondents	Frequency	Percentage
(senior) engineer/technical lead	43	36.13%
product/project manager	26	21.85%
department manager	14	11.76%
marketing manager	9	7.56%
senior manager	6	5.04%
others	21	17.66%
Total	119	100%

Table 3  
Firm characteristics.

Firm characteristics	Frequency	Percentage
<b>Number of employees</b>		
11-50	7	5.88%
51-100	3	2.52%
101-250	3	2.52%
251-499	8	6.72%
500-5000	34	28.57%
Over 5000	60	50.42%
Missing	4	3.37%
Total	119	100%
<b>Annual revenue</b>		
Less than \$500,000	1	0.84%
\$500,001-\$5 million	5	4.20%
\$5 million- < \$50 million	11	9.24%
\$50 million-\$100 million	15	12.61%
> \$100 million-\$500 million	15	12.61%
> \$500 million	66	55.46%
Missing	6	5.04%
Total	119	100%

4.3.1. Perceived crisis

Perceived crisis is defined as an NPD team's acknowledgement of a potentially threatening crisis and their ability to resolve this crisis by innovating a new product (Akgün et al., 2007). In this regard, an NPD team can develop a new product in order to cope with the crisis situation. In line with this logic, scale items were adopted from Akgün et al. (2006). Respondents were asked to assess the extent to which their firm or division had a crisis that this NPD project will help solve, concerning (a) customers, (b) environment, and (c) profitability.

4.3.2. Formal communication and informal communication

Formal communication is viewed as having a preset, scheduled agenda that contains goals and objectives, and it is often implemented in meetings, and written letters and memos (Tang et al., 2015), while informal communication is viewed as having hallway talk and unstructured conversations without scheduled agenda (Maltz and Kohli, 1996). Pinto and Pinto's work (1990) is among the first to examine project team communication in NPD. They distinguish formal communication from informal discussion in the NPD team. As such, scale items were adopted from their study (Pinto and Pinto, 1990). As for formal communication, respondents were asked to evaluate the extent of discussion between team members through meetings and memos; as for informal communication, respondents were asked to evaluate the extent of informal discussion between team members at break occasions (at lunch and after work) and locations (water cooler and at coffee maker).

4.3.3. New product performance

Financial outcomes have been identified as a core measure for new product success or failure (Griffin and Page, 1993). Thus, many past innovation studies have viewed financial outcomes as a key index for new product performance (e.g., Kim and Atuahene-Gima, 2010; Zhang, Cui, and Wu, 2015). This study adopted a similar logic and scale items from Moorman and Miner (1997) were employed to measure new product performance. Respondents were asked to assess the new product in terms of (a) profit, (b) return on investment (ROI), and (c) management's expectations.

4.3.4. Control variables

Several control variables were included in the model testing. First, team size was controlled for, because it may influence communication frequency among members. This variable was transformed in log function for normality. Management guidance and team improvisation were controlled for, because both are suggested to affect new product performance especially in crisis management. Scale items respectively

**Table 4**  
Measure, Confirmatory Factor Analysis and Convergent Validity.

Construct	Scale Item	SFL	α	CR	AVE
Perceived Crisis*	The team felt that there was a crisis with customers or potential customers that this project would help resolve.	0.866	0.791	0.801	0.577
	The team felt that there was crisis in the environment (concerning competitors, suppliers, or legal regulations) that this project would help alleviate.	0.752			
	The team felt that there was a crisis in the company or division (lower sales, profits, etc.) to which this project would help solve.	0.645			
Formal Communication*	Team members conducted frequent formal communications through team meetings with fellow project team members.	0.983	0.803	0.834	0.722
Informal Communication*	Team members conducted frequent formal communications through memos with fellow project team members.	0.691	0.862	0.862	0.758
	Team members conducted frequent informal communications at lunch or after work with fellow project team members.	0.869			
New Product Performance*	Team members conducted frequent informal communications at water cooler/coffee maker with fellow project team members.	0.872	0.937	0.938	0.835
	This project... overall, met or exceeded profit expectations.	0.951			
	met or exceeded return on investment (ROI) expectations.	0.932			
Control Variables	met or exceeded overall senior management's expectations.	0.855			
	Team Size	Approximately how many people were on this core team at project go-ahead?			
Management Guidance*	Senior management provided guidance to the team.	0.987	0.960	0.962	0.894
	Senior management provided direction to the team.	0.974			
	Senior management helped set the vision of the project.	0.871			
Improvisation*	The team figured out the new product development process as it went along vs. following a rigid well-defined plan.	0.696	0.761	0.769	0.531
	The team improvised in developing this product vs. strictly following the plan.	0.861			
	The team improvised in commercializing this product vs. strictly following the plan.	0.607			
Co-location*	The core engineers on this team were located within a short walk of the core marketers.	1.000	0.895	0.905	0.828
	The core engineers on this team were located so close to the core marketers that they could talk to one another without using a telephone.	0.810			
Domestic Location	What percent of the core team was permanently located in one country?				
Multinational	0 = National Company; 1 = Multinational Company				
Technological Turbulence*	The technology used in this product was rapidly changing.	0.969	0.807	0.824	0.707
	The technology in this industry was changing rapidly.	0.689			
Industry	What industry was this product in?				

Notes: All factor loadings are standardized and significant at the 0.01 level (two-tailed).

SFL = Standardized Factor Loading, α = Cronbach's Alpha, CR = Composite Reliability, AVE = Average Variance Extracted.

\* Measured in 11-point Likert scale: 0 = Strongly Disagree; 5 = Neither Agree or Disagree; 10 = Strongly Agree.

from Green (1995) and Moorman and Miner (1998) were adjusted for these two variables. In addition, team communication can be affected by different locations of team members. As such, co-location of the project team and percentage of team members located in the US (i.e., domestic members) were used as control variables. For co-location, scale items from Maltz and Kohli (1996) were adjusted. Next, whether or not participating firms were national or multinational was considered as a firm-level control variable, and it was measured in dummy coding. Due to the focus on high-tech industries in this research, technological turbulence was included as a control variable, and scale items from Jaworski and Kohli (1993) were adjusted. Lastly, industry

was coded into five dummy variables.

4.4. Measurement model, convergent validity, and discriminant validity

EQS. 6.3 was used for confirmatory factor analysis (Byrne, 2006). The following fit indices show satisfactory model fit and uni-dimensionality:  $\chi^2 = 236.805$ , d.f. = 142,  $p < .01$ ; Tucker-Lewis index (TLI) = 0.915; comparative fit index (CFI) = 0.936; incremental fit index (IFI) = 0.938; standardized root mean square residual (SRMR) = 0.061; root mean square error of approximation (RMSEA) = 0.076. In addition, as Table 4 shows, all reliability indices exceeded 0.70, all

**Table 5**  
Descriptive Statistics, Correlations, and Discriminant Validity.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Perceived Crisis	4.714	2.591	(0.760)									
2. Formal Communication	6.723	2.474	0.161 <sup>†</sup>	(.850)								
3. Informal Communication	6.571	2.512	0.057	0.420**	(.871)							
4. New Product Performance	4.888	3.267	0.262**	0.321**	0.108	(0.914)						
5. Team Size (log)	2.431	0.812	- 0.094	0.224*	- .007	0.093	n/a					
6. Management Guidance	5.857	2.872	0.110	0.361**	0.143	0.228*	0.289**	(.945)				
7. Improvisation	5.723	2.296	0.051	- 0.078	0.191 <sup>†</sup>	0.003	- 0.083	- 0.099	(0.729)			
8. Co-Location	4.983	3.762	0.188*	- .036	0.042	0.120	- 0.194*	0.065	0.034	(0.910)		
9. Domestic Members	0.951	0.094	- 0.092	0.131	0.085	0.010	0.022	- 0.042	0.016	- 0.193*	n/a	
10. Technological Turbulence	5.664	2.816	0.041	0.173 <sup>†</sup>	0.115	0.000	0.298**	0.218*	0.035	- 0.210	0.107	(0.841)

Notes: Diagonal values in parentheses are values of square root of AVEs. Dummy variables are not included in the table.

SD = Standard Deviation, n/a = Not Applicable.

<sup>†</sup>  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$  (two-tailed).

standardized factor loadings exceeded 0.60, and all average variance extracted (AVE) exceeded 0.50. Evidence indicates satisfactory reliability and convergent validity of each construct. As the correlation matrix in Table 5 shows, the square root of a given AVE exceeded correlation coefficients between the pair of corresponding constructs, indicating satisfactory discriminant validity (Fornell and Larcker, 1981).

#### 4.5. Test of survey bias

Since data collection was conducted via an executive program, questionnaires were distributed and collected in a consistent timeframe. Thus, non-respondent bias, often measured as early vs. late responses, is not a concern in this study.

In this study, the performance measure was based on three self-report survey items, causing possible bias towards actual new product success/failure. Objective data from a sub-sample was collected to address this issue. Information about actual profits (35 cases) and sales (31 cases) was obtained. Respondents were asked to provide exact numbers of actual profits and sales in comparison to their firm's initial estimation. It was found that these two objective measures highly correlated to the subjective measure of new product performance used in model testing ( $r = 0.784, p < .01$  and  $r = 0.684, p < .01$ , respectively). Accordingly, the self-report on the performance measure is reliable in this study.

Several actions were taken to reduce common method bias. First, in the questionnaire design, scale items for independent and dependent variables were placed in different sections, and there was a title in each section for transition. This tactic allowed respondents to pause and have time to read instructions (Kortmann, 2014; Podsakoff et al., 2003). Second, only respondents at management positions were recruited to answer the survey. This was particularly appropriate for this cross-sectional study because it examined “concrete and externally oriented constructs,” sampled “highly educated respondents,” and hypotheses and constructs were “strongly rooted in theory” (Rindfleisch et al., 2008, p.276). Such a research design can largely reduce the common method bias in a cross-sectional study (Rindfleisch et al., 2008).

In addition, three post hoc techniques were employed to examine common method bias. First, Harman's single-factor method was used to test the eight multi-item constructs (shown in Table 4). All scale items were loaded on one latent variable. The single-factor model showed the following model fit:  $\chi^2 = 1156.687$ , d.f. = 169,  $p < .01$ ; TLI = 0.255; CFI = 0.338; IFI = 0.347; SRMR = 0.193; RMSEA = 0.224. Compared with the measurement model, the single-factor model had a significantly poorer fit ( $\Delta\chi^2 = 919.882$ ,  $\Delta$ d.f. = 27,  $p < .01$ ). Second, the marker technique was adopted (Lindell and Whitney, 2001). Percentage of exporting sales was selected as the proxy for common method variance, because it was theoretically unrelated to crisis management. The lowest positive correlation between the marker variable and other variables ( $r = 0.017$ ) was partialled out in the correlation matrix. All unadjusted significant correlations at the 0.05 level remained significant after the adjustment. Third, a new measurement model was created, where items were loaded on not only their theoretical constructs but also a common latent variable (Fürst et al., 2017). It was shown that factor loadings on their theoretical constructs still remained significant at the 0.05 level, and they, rather than the common variable, explained a majority of variance (i.e., over 50%) of their corresponding constructs. In summary, common method bias is not a concern in this study.

## 5. Results

state that formal communication and informal communication positively mediate the relationship between perceived crisis and new product performance. PROCESS analysis was adopted to test the mediation effects (Hayes, 2013). According to Table 6 and Fig. 2, perceived

crisis was positively related to formal communication ( $b = 0.200, p < .05$ ), but not informal communication ( $p = .627$ ). Formal communication ( $b = 0.317, p < .05$ ), rather than informal communication ( $p = .878$ ), was positively related to new product performance. Based on the bootstrapping results, the indirect effect of formal communication was positive and significant ( $a \times b = 0.063, SE = 0.044, 95\% CI = [.004, .191]$ ); the indirect effect of informal communication was not significant ( $95\% CI = [-0.021, .045]$ ), because the confidence interval included zero. As a result, are supported, while are not supported. Furthermore,  $H_3$  proposes that in addition to the indirect effects, perceived crisis has a direct effect on new product performance. According to Table 6, the direct effect of perceived crisis was positive and significant ( $b = 0.257, p < .05$ ). Thus,  $H_3$  is supported.

state that formal communication negatively moderates the direct effect of perceived crisis, but informal communication positively moderates this effect. Variables included in the moderation testing were mean-centered (Aiken and West, 1991). According to Table 7, the interaction of perceived crisis and formal communication is negatively related to new product performance ( $b = -0.254, p < .05$ ), and positively related to informal communication ( $b = 0.278, p < .05$ ). Thus, are supported. Furthermore, a simple slope analysis was implemented. High and low levels of team communication were set at one standard deviation above and below the mean. Perceived crisis had a positive effect on new product performance when formal communication was low ( $b = 0.538, t = 2.681, p < .01$ ), but its effect was not significant when it was high ( $t = -0.403, p = .688$ ). Perceived crisis had a positive effect on new product performance when informal communication was high ( $b = 0.586, t = 3.264, p < .01$ ), but its effect was not significant when it was low ( $t = -0.515, p = .608$ ). The graphs of moderation are presented in Fig. 3A and Fig. 3B.

## 6. Discussion

This research investigates crisis management in NPD and how team communication bridges the link between perceived crisis and new product performance. Two types of team communication, namely formal and informal, are distinguished. It is suggested that they are both mediators and moderators in the crisis-performance relationship. With empirical testing in high-tech industries, findings indicate that crisis perception positively influences new product performance directly and indirectly (via formal communication). Moreover, formal communication negatively, but informal communication positively, moderates the relationship between crisis perception and new product performance. While a positive mediating effect of informal communication is hypothesized, the result is insignificant. This is may be because informal communication at times can generate unnecessary rumors, and rumors do not facilitate reduction in anxiety among team members. When rumors start to spread, the negative effect may offset the facilitating effect of informal communication. This may be an alternative explanation for the insignificant mediating effect of informal communication.

### 6.1. Theoretical implications

First, very few studies have addressed crisis management in NPD. As stakeholders are increasingly alert to corporate ethics and product safety, crisis management is undoubtedly becoming crucial to firms. This study fills a research gap by examining how the perception of a crisis impacts the firm's NPD process. It, to some extent, extends the dynamic capabilities theory, which suggests that successful firms should be able to adapt to a changing environment by using a combination of their competencies. In this research the crisis is viewed as an impactful aspect of the environment. It is suggested that NPD can be an effective solution for a crisis, and that during the NPD process, team communication bridges a link between crisis management and new product success. In this regard, findings in this study provide novel



**Table 6**  
Mediation view of team communication.

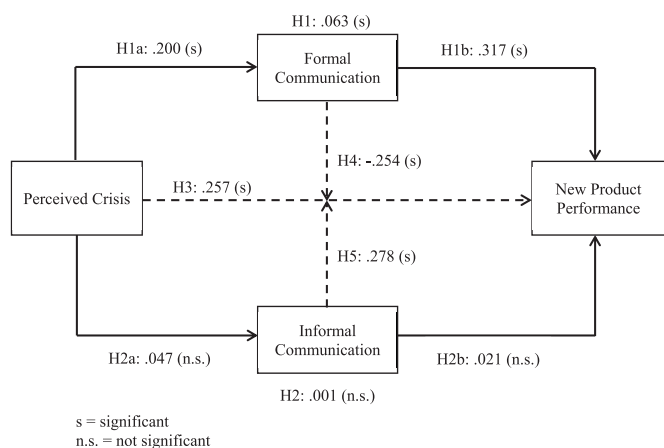
	Model 1	Model 2	Model 3
	Formal communication	Informal communication	New product performance
Formal Communication			0.317*
Informal Communication			0.021
Perceived Crisis	0.200†	0.047	0.257*
Team Size (log)	0.514†	-.188	0.230
Management Guidance	0.219**	0.129	0.160
Improvisation	-0.064	0.190†	0.046
Co-Location	-0.030	0.033	0.074
Domestic Members	6.609†	0.535	3.515
Technological Turbulence	0.036	0.047	-.112
Multinational	0.538	-0.169	0.242
Industry_1	-1.38	-2.002†	1.563
Industry_2	-1.582†	-.686	0.800
Industry_3	-.463	0.319	-5.029
Industry_4	-2.216*	-1.476	0.652
Industry_5	0.516	-3.618	6.701*
R <sup>2</sup>	0.249	0.127	0.236
F value	2.672**	1.178	2.124*
<b>Direct Effect</b>		<b>Direct Effect</b>	<b>SE</b>
Perceived Crisis → new product performance		0.257 (p < .05)	0.121
<b>Indirect Effect (bootstrapping analysis)</b>		<b>Indirect Effect</b>	<b>95% CI</b>
Perceived Crisis → formal communication → new product performance		0.063	0.044
Perceived Crisis → informal communication → new product performance		0.001	0.015
			[.018, .496]
			[.004, .191]
			[- 0.021, .045]

Notes: All coefficients are unstandardized.

† p < .10.

\* p < .05.

\*\* p < .01 (two-tailed).



**Fig. 2.** Results.

insights into how firms build dynamic capabilities in a fast-changing crisis setting.

Second, several mainstream theories in the innovation literature, such as organizational learning, knowledge-based view, and absorptive capacity, generally agree that information sharing is a success factor for NPD and team communication is the vehicle of information sharing. However, a majority of innovation studies view communication as a single construct. While it is generally agreed that team communication has its facilitating role in new product success, distinction between formal and informal modes allows for a closer look at their respective effects. Indeed, two theoretical routes are identified in this study: mediation and moderation. Especially because their moderation effects are opposite, it underlines the importance of examination of sub-dimensions of team communication in NPD. While formal communication partially mediates the relationship between perceived crisis and new

**Table 7**  
Moderation view of team communication.

	Model 1: control-only	Model 2: main effect	Model 3: moderation
<b>Main effects</b>			
Perceived Crisis		0.204*	0.186†
Formal Communication		0.240*	0.160
Informal Communication		0.016	0.053
<b>Moderation effects</b>			
Perceived Crisis × Formal Communication			-.254*
Perceived Crisis × Informal Communication			0.278*
<b>Control variables</b>			
Team Size (log)	0.061	0.057	0.061
Management Guidance	0.242*	0.140	0.124
Improvisation	0.036	0.032	0.097
Co-Location	0.115	0.085	0.106
Domestic Members	0.130	0.101	0.127
Multinational	0.072	0.037	0.038
Technological Turbulence	-0.053	-0.097	-0.122
Industry_1	0.131	0.133	0.128
Industry_2	0.092	0.116	0.087
Industry_3	-0.156	-.141	-0.144
Industry_4	0.078	0.072	0.057
Industry_5	0.164†	0.188*	0.157†
R <sup>2</sup>	0.135	0.236	0.284
F value	1.375	2.124*	2.354**
F Change		4.565**	3.347*

Notes: All coefficients are standardized.

† p < .10.

\* p < .05.

\*\* p < .01 (two-tailed).

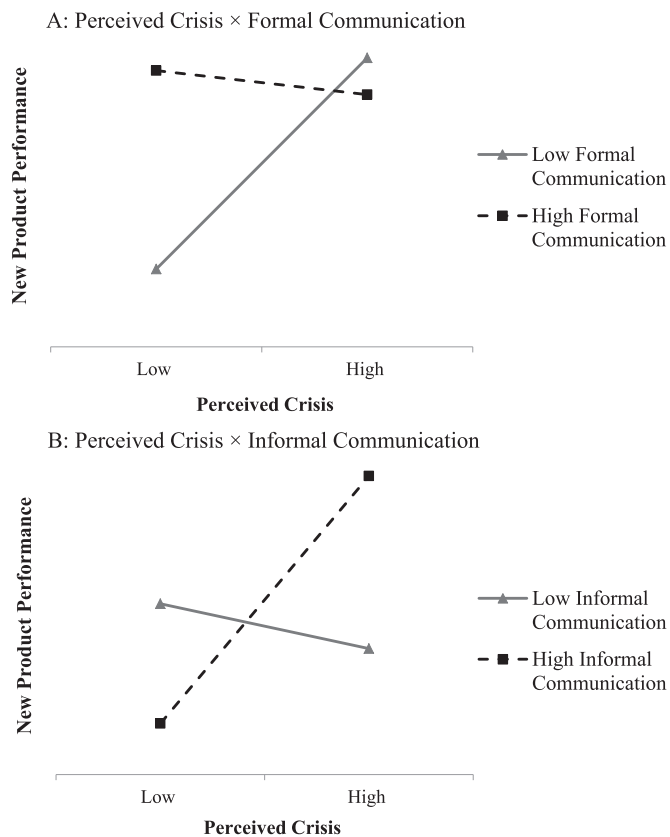


Fig. 3. Moderation effects of team communication.

product performance, it negatively moderates the same relationship. However, informal communication does not mediate the crisis-performance relationship but, in fact, positively moderates this relationship.

Third, results underline the coexistence of mediation and moderation effects of team communication in the relationship between perceived crisis and new product performance. This sheds light on simultaneous theoretical development of the conceptual framework. While a majority of studies of structural models imply unidirectional relationships, this research underlines the fact that a single factor can have both fostering and impeding effects in a given empirical context. Mainstream theories in the innovation literature agree that communication can facilitate new product success. However, due to the negative moderation by formal communication, this research challenges extant literature and claims that “the more the communication” may not lead to “the better the performance.” In this regard, a contingency perspective should be adopted and a tradeoff between the two types of communication needs to be recognized so that new product performance can be maximized.

## 6.2. Managerial implications

The mixed effects for mediation and moderation of formal communication lead to a key question for managers: How much is too much? First, formal communication is a mediator, suggesting that it cannot be completely avoided as a crisis requires it. In the onset of a crisis, the NPD team should formally communicate through meetings and memos. This will ensure that team members have been briefed on any pertinent information and avoids any confusion on the situation. However, a balanced approach should exist. While NPD teams implement formal communication, a moderate level of it may be ideal so that they can avoid a negative moderation effect on new product performance due to too much of a good thing. Too much formal communication will hinder the positive effect of perceived crisis on the NPD

team as time is spent inefficiently and decisions are not being made and/or executed.

If a team maintains a moderate level of formal communication, what else a team can do to facilitate perceived crisis in the NPD process? Based on the findings, it is recommended that managers should consider informal communication as an alternative for information sharing and problem solving. The insignificant mediation of informal communication indicates that the onset of a crisis does not bring out informal communication spontaneously. As mentioned earlier, this is may be because informal communication can generate unnecessary rumors. If so, team members may be reluctant to socialize outside of a formal working environment in the crisis situation. Without socialization, the chance of informal communication is further reduced (Xu et al., 2017). Yet, findings suggest that informal communication positively moderates the crisis-performance relationship. This suggests that it does not hurt crisis management and has, at least, a positive (indirect) influence on new product success. Accordingly, it is recommended that managers should consider allocating sufficient time in an informal setting so that team members get acclimated to each other and have discussions that may appear to be in a formal setting. Ideally, this should be done prior to a crisis so that they have a chance to establish relationships with each other. When a crisis arrives, informal communication should be done to resolve it as quickly as possible. A well-known example of an informal approach is Honda (Nonaka and Takeuchi, 1995). Managers at Honda often organized unofficial meetings where people can comprehend cognitive and behavioral etiquette and build mutual understanding; as such, when they joined a team, they were more likely to socialize with each other, thereby improving frequency and quality of informal communication. In this regard, NPD teams can remain necessary formal communication and meanwhile use socialization strategies to foster informal communication.

## 6.3. Limitations and future research

This research is not without limitations. First, while the sample included multiple high-tech industries, crises in different industries may play varying roles. In this regard, future research should examine the uniqueness of industry characteristics. NPD teams operating in industries that are used to turbulent environments may have an advantage when it comes to a crisis as they are more ready to adapt to changing environments. On the other hand, a sudden event is likely to impact industries that are used to stable environments.

Second, all sampled NPD teams in this study were located in a single geographic area, which may, to some extent, limit generalization of the findings to other contexts. For instance, NPD teams in other national cultures may have different styles of interaction – especially informal communication. In this regard, it is recommended that researchers collect data from countries with different cultures to re-examine the conceptual framework.

Third, although objective data from a subsample was collected to validate survey quality, model testing was based on survey responses. It is recommended that researchers collect actual financial and/or marketing measures in a full sample to examine new product performance. Likewise, team communication can be examined based on objective data. For instance, researchers can obtain documents such as emails and memos to codify communication content. Such a method will allow an investigation of “what to discuss” in addition to “how often to discuss.” In addition to objective data, future research may include variables related to new product outcomes apart from financial/marketing measures. For instance, how a team communicates may impact characteristics of a technology (e.g., incremental vs. breakthrough), which in turn affects new product success. Researchers should consider investigating various aspects of new product outcomes in the future.

Last, this study examines two types of team communication as moderators that strengthen or weaken the relationship between perceived crisis and new product performance. It is recommended that

researchers take into consideration more team-level variables that may affect the crisis-performance relationship, such as incentive measures, team organization, and team composition.

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