Vertical stakeholder collaborations for firm innovativeness in new product development: The moderating roles of legal bonds and operational linkages

Abstract

Drawing on stakeholder and organizational learning theories, this study investigates when and how diverse types of formal mechanisms with varying levels of adaptation and integration properties for bonding stakeholders, including legal bonds and operational linkages, affect a firm's vertical stakeholder collaborations in new product development (NPD). It also explores how vertical stakeholder collaborations in NPD affect a firm's innovativeness and its eventual performance outcomes under technological turbulence. The study contributes to the stakeholder literature by focusing on diverse types of formal mechanisms rather than a single type of formal mechanism for bonding stakeholders. Survey data of 146 firms in Turkey evidence that while legal bonds decrease the likelihood of establishing vertical stakeholder collaborations during technological turbulence, such collaborations enhance firm innovativeness for focal firms holding operational linkages. Moreover, vertical stakeholder collaborations improve firm innovativeness under technological turbulence and enhance firm performance through new product performance.

Keywords: Vertical collaborations; Stakeholders; Innovativeness; Technological turbulence; Legal bonds; Operational linkages

1. Introduction

In a new product development (NPD) context, firms may form stakeholder collaborations with two or more partners to jointly acquire and use knowledge related to the development and/or the commercialization of new products (Ozdemir, Kandemir, & Eng, 2017; Rindfleisch & Moorman, 2001). For firms to gain a competitive advantage, stakeholder collaborations may improve innovativeness, or firms' capability of introducing new products to the market (Alexiev, Volberda, & Van den Bosch, 2016; Li, Xia, & Zajac, 2018; Markovic & Bagherzadeh, 2018; Reypens, Lievens, & Blazevic, 2016). Vertical stakeholders are organizations that operate at diverse points (both upstream and downstream) on the value chain, such as suppliers and manufacturers (Ozdemir et al., 2017; Rindfleisch & Moorman, 2003; Walsh, Lee, & Nagaoka, 2016). Vertical stakeholder collaborations benefit from the diverse positions of the stakeholders in the value chain by providing access to non-redundant and complementary knowledge, crucial for innovativeness (Ozdemir et al., 2017; Rindfleisch & Moorman, 2003). As such, vertical stakeholders provide a focal firm with comparatively better opportunities for innovativeness than horizontal stakeholders (e.g., competitors), as the latter hold more redundant industrial knowledge and experiences due to their similar positions on the value chain (Ozdemir et al., 2017; Rindfleisch & Moorman, 2003; Walsh et al., 2016).

From a stakeholder perspective, however, as vertical stakeholders are characterized by different goals, interests, and expectations, learning from such organizations can be difficult (Desai, 2018; Mesquita, Anand, & Brush, 2008). In technologically turbulent environments, which are characterized by increased levels of partner opportunism, uncertainty, and ambiguity, creating or maintaining stakeholder collaborations that serve the

interests of all parties is more challenging but is of greater importance for firm survival and competitiveness (Calantone, Cavusgil, & Zhao, 2002; Kwok, Sharma, Gaur, & Ueno, 2018). Stakeholder theory suggests that stakeholders can protect their legitimate interests in interactions in their environment through formal mechanisms used for bonding stakeholders (Dentoni, Bitzer, & Schouten, 2018; Mitchell, Agle, & Wood, 1997). While various types of formal mechanisms help bond stakeholders, the stakeholder literature has paid little attention to how these mechanisms affect stakeholder collaborations in NPD (Yang, Fang, Fang, & Chou, 2014). Rather, the literature has focused on how a single type of formal mechanism, predominantly a contractual or legal agreement, individually or in combination with relational mechanisms such as trust-based relations, affects stakeholder collaborations (e.g., Cannon, Achrol, & Gundlach, 2000; Jones, Harrison, & Felps, 2018). However, considering diverse types of formal mechanisms is important because they may enable different levels of mutual adaptation (i.e., investment) and integration for joint innovation practices between or among stakeholders and thus may have varying forms of influences on their collaborative engagements (Estrada, Faems, & de Faria, 2016; Mukherji & Francis, 2008). The current study examines two types of formal mechanisms for bonding stakeholders (i.e., legal bonds and operational linkages) that enable a range of mutual adaptation and integration between vertically linked stakeholders (Cannon & Perreault, 1999; Mukherji & Francis, 2008).

Legal bonds constitute contractual agreements specifying the behavioral standards, roles, and obligations of collaborators to simulate a hierarchy when vertical integration is impractical (Cannon & Perreault, 1999; Karatzas, Johnson, & Bastl, 2016). Although operational linkages include routines of informal interactions, these processes are mainly based on formal and codified systems, procedures, and rules of interlinked structural ties between and among stakeholders (Cannon et al., 2000; Karatzas et al., 2016; Morris,

Brunyee, & Page, 1998). More-integrated types of formal mechanisms for bonding stakeholders, such as operational linkages, are often more mutually binding and difficult to manage and dissolve (Delmas & Tokat, 2005; Karatzas et al., 2016). Yet, particularly in turbulent environments, the less flexible and adaptive properties of legal bonds may generate more constraints for interactions and joint learning, which are necessary to improve a firm's innovativeness (Cannon et al., 2000; Yang et al., 2014).

Stakeholder research has observed varying influences of certain market- and competition-based environmental conditions but is limited in considering the effect of turbulent technological environments on the role of stakeholder collaborations in firm innovativeness (Alexiev et al., 2016). While technological turbulence may pressure organizations to compete in innovativeness, in such settings stakeholders are also challenged to become more adaptive to respond to technological disruptions and emerging technological states. The latter behavior may diminish their learning capacity and value acquisition from stakeholder collaborations (Eng & Ozdemir, 2014). Indeed, the existing view on the effect of technological turbulence on stakeholder collaborations is inconclusive; some studies show that technological turbulence reduces the benefits of accessing diverse knowledge from collaborations (Gao, Xie, & Zhou, 2015), whereas others observe its positive role in taking advantage of partner diversity (De Vaan, 2015). These findings are partly attributed to inconclusive evidence on the effectiveness of legal obligations in facilitating stakeholder collaborations (Shou, Zheng, & Zhu, 2016; Yang et al., 2014); in technologically turbulent contexts, such contracts may restrain a firm's ability to adapt to rapidly changing environmental conditions. In this sense, examining the varying influences of diverse types of formal mechanisms for bonding stakeholders in their collaborative engagements is essential to overcome limitations and maximize the benefits of such collaborations in NPD. Relatedly, whether greater levels of knowledge-complementarity advantages between vertical

stakeholders may help alleviate these limitations in technologically turbulence environments is also worth exploring.

Against this background, and drawing on stakeholder and organizational learning theories, this study investigates two research questions: (1) When and how do diverse types of formal mechanisms with varying levels of adaptation and integration properties for bonding stakeholders, including legal bonds and operational linkages, affect a firm's vertical stakeholder collaborations in NPD? and (2) In technologically turbulent environments, how do vertical stakeholder collaborations in NPD affect a firm's innovativeness and its eventual performance outcomes?

In answering these questions, this study aims to make two principal contributions to the literature. First, this study alleviates the deficiency of empirical evidence on the extent to which a firm's innovativeness may be due to technological turbulence as an environmental condition and what proportion of it may depend on stakeholder collaborations (e.g., Alexiev et al., 2016; McAdam, Miller, & McAdam, 2016). This study argues that despite the uncertainties inherent in technologically turbulent environments (Silvestre, 2015; Yeung, Lee, Yeung, & Cheng, 2013), vertically linked stakeholders are likely to align their multiple goals and interests to become more innovative and attain greater performance benefits as a result of their collaborative NPD endeavors. The study extends the existing views on the possible limitations of technological turbulence in a firm's learning by considering the complementary advantages of vertical stakeholder collaborations in facilitating a firm's innovativeness in NPD (e.g., De Vaan, 2015; Hung & Chou, 2013; Markovic & Bagherzadeh, 2018). In other words, this study highlights how greater levels of knowledge complementarity attained in vertical stakeholder collaborations can help manage

technologically turbulent environments to improve firm innovativeness and its eventual performance outcomes.

Second, this study contributes to stakeholder research by examining how legal bonds and operational linkages, as diverse types of formal mechanisms for bonding stakeholders, may affect collaborative stakeholder engagements in NPD (e.g., Feils, Rahman, & Sabac, 2018). Operational linkages are important to consider because they enable vertically linked stakeholders to engage in more-integrated interorganizational routines and systems and thus may be effective in increasing the costs of partner opportunism (Cannon & Perreault, 1999; Karatzas et al., 2016). For example, the limited adaptative and integrative properties of legal bonds may restrain the ability of vertically linked stakeholders to implement proactive strategies for innovation, which in turn may discourage collaboration under technologically turbulent conditions. Conversely, the more-adaptive and integrative property of operational linkages may provide vertically linked stakeholders with greater opportunities for collaboration in NPD (Ozdemir et al., 2017).

2. Theory and hypotheses

2.1. Stakeholder theory and interorganizational learning in NPD

Stakeholder theory offers a framework for managing relationships with a wide array of actors who are bound together by their joint interests and expectations (Freeman, 1984; Parmar, Freeman, Harrison, Wicks, & de Colle, 2010). Stakeholders are "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p. 46). These actors include internal stakeholders, such as employees, and/or external stakeholders, such as vertically and horizontally linked organizations in the value chain. All these stakeholders interact jointly to create and trade value (Parmar et al., 2010; Tantalo & Priem, 2016).

In an NPD context, stakeholders are recognized as important sources of innovation and co-creators of valuable offerings (Goodman, Korsunova, & Halme, 2017; Leonidou, Christofi, Vrontis, & Thrassou, 2018; Li et al., 2018; Reypens et al., 2016). Thus, stakeholder relationships and collaborations have received extensive attention from varying research streams, such as the open innovation field, which focuses on novel means of capitalizing on stakeholder relationships for innovation purposes (Bogers, Chesbrough, & Moedas, 2018; Du, Yalcinkaya, & Bstieler, 2016; Santoro, Vrontis, Thrassou, & Dezi, 2018). More specifically, stakeholder collaborations in NPD can provide several benefits to participating firms, such as easier access to new and valuable knowledge, reduced costs and risks associated with developing new products, increased speed to market, and enhanced opportunities for gaining new competencies (Bogers et al., 2018; Ferraris, Santoro, & Bresciani, 2017; Rindfleisch & Moorman, 2003; Sivadas & Dwyer 2000; Thomas, 2013; Xu, Wu, & Cavusgil, 2013).

To develop a framework for explaining how firms can create value for stakeholders during NPD, understanding how a firm's relationships with stakeholders are characterized is important (Mitchell et al., 1997; Reypens et al., 2016; Tantalo & Priem, 2016). Early work on stakeholders suggests that three traits (i.e., legitimacy, power, and urgency) shape the dynamics of stakeholder–firm relationships (Mitchell et al., 1997). Suchman (1995, p. 574) defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." A stakeholder may have a legitimate claim on the firm, but unless it has the power to impose its will in the relationship or prove that its claim is urgent, it will not achieve salience for the firm (Mitchell et al., 1997). In a relationship between two parties, one party can have valid power over the other party by the extent to which it can bring about the

outcomes it desires (Salancik & Pfeffer, 1974). That is, power accrues to those who control resources needed by the firm (Pfeffer, 1981). Finally, urgency represents the degree to which the stakeholder's claim calls for immediate attention (Mitchell et al., 1997). Urgency can be determined on two criteria: (1) if a relationship or claim is of a time-sensitive nature and (2) if that relationship or claim is critical to the stakeholder. For example, stakeholders may view the relationship as critical if their assets specifically tied to the firm cannot be repurposed without loss of value (Hill & Jones, 1992; Miles, 2017; Williamson, 1985).

Two significant constraints of stakeholder research are its broad focus on stakeholder influences and its limited insights into the different influences of vertical stakeholders on collaborative engagements, the latter of which tend to be more complicated than the influences of horizontal stakeholders (Chakkol, Selviaridis, & Finne, 2018). Importantly, stakeholder studies widely agree that unequal power structures are more evident between vertical stakeholders on the value chain, which makes designing collaboration approaches difficult (Soosay & Hyland, 2015). Some vertical stakeholders may determine or influence the rules of engagement with other organizations through coercive power, which results in compliance rather than collaboration (Busse, Schleper, Weilenmann, & Wagner, 2017; Soosay & Hyland, 2015). Yet the urgent interests of vertical stakeholders drive a need for collaboration, regardless of their power relations (Busse et al., 2017). Given high levels of inter-dependent relationships within the value chains, in vertical stakeholder collaborations, maintaining legitimacy is important even for more resourceful or powerful firms, which may be punished for acting illegitimately against the collective good of their vertically linked stakeholders (Soundararajan, Brown, & Wicks, 2019). Therefore, the attributes (legitimacy, power, and urgency) that characterize the stakeholder relationships can influence acquisition and creation of value within the value chain.

From an interorganizational learning perspective, given their different positions on the value chain, vertical stakeholders hold more non-redundant knowledge and experiences—and thus have more comparative knowledge-complementarity advantages—than horizontal stakeholders, which operate on the same level of the value chain (Ozdemir et al., 2017; Rindfleisch & Moorman, 2003). In this sense, according to some stakeholder scholars, firms should integrate a set of relationships with a range of vertical stakeholders into a model of marketing interaction. Such as strategy would result in more options for the firm to create value (Parmar et al., 2010; Polonsky, Suchard, & Scott, 1999) and may give rise to more efficient and effective collaborations for NPD (Bogers et al., 2018; Ferraris, Belyaeva, & Bresciani, 2018; Markovic & Bagherzadeh, 2018; Santoro, Ferraris, & Winteler, 2019; Walsh et al., 2016). Accordingly, this study considers a firm's NPD collaborations with a wide set of vertical stakeholders, including customers, suppliers, retailers, governments, research institutions, and industrial associations, all of which hold different positions on the value chain. When firms view the elements of their external environment as controllable and subject to their influence, they can proactively work with these stakeholder groups to develop innovativeness.

Knowledge transfer studies also evidence that firms can increase their innovativeness by acquiring and integrating knowledge from vertical stakeholders (Bellingkrodt & Wallenburg, 2015; De Zubielqui, Lindsay, Lindsay, & Jones, 2019). In particular, stakeholders positioned in the upstream position of the value chain can support improvement of innovativeness through their provision of quality knowledge (De Zubielqui et al., 2019). Absorptive-capacity research complements these studies by suggesting that in addition to acquiring and assimilating such knowledge, transforming and exploiting that knowledge is necessary to develop new and inimitable capabilities, which eventually result in better

performance (Lichtenthaler & Lichtenthaler, 2009; Zahra & George, 2002). However, it is also important to investigate the collective impact of various vertical stakeholders on innovativeness within uncontrollable and uncertain environments, such as technologically turbulent settings, an area of research that is currently lacking in the stakeholder literature (Alexiev et al., 2016; Leonidou et al., 2018). Despite the uncertainties of technologically turbulent environments (Silvestre, 2015; Yeung et al., 2013), how vertically linked stakeholders in such contexts may align their multiple goals and interests to become more innovative and attain greater performance benefits in their collaborative NPD behavior is worth exploring.

2.2. Formal mechanisms for bonding stakeholders in NPD

To successfully manage stakeholders, monitoring how effectively the needs and expectations of each stakeholder group are being met is important. At the same time, firms should continuously modify corporate policies and priorities by considering differing stakeholder interests (Freeman, Harrison, & Wicks, 2007; Tantalo & Priem, 2016). Many stakeholder theorists suggest that good stakeholder management will lead to stronger stakeholder commitment, which may open up opportunities for collaborative value creation and, thus, competitive advantage (Parmar et al., 2010; Tantalo & Priem, 2016). Yet the conflicting goals, interests, and expectations of diverse types of multiple stakeholders may erect potential barriers to exchanging value as well as to learning new knowledge and capabilities from each other (Hoskisson, Gambeta, Green, & Li, 2018).

This study examines two formal mechanisms for bonding stakeholders: (1) legal bonds and (2) operational linkages in the form of systems, procedures, and routines, which are often used to help alleviate the challenges associated with managing stakeholder legitimacy, power, and urgency in NPD collaboration (Jensen & Meckling, 1976; Cannon et al., 1999; Karatzas et al., 2016; Suchman, 1995). Firms need to pay attention to both the urgent and legitimate

interests of all relevant vertically linked stakeholders in their operational and strategic interactions with them, such as in the exchange of valuable new knowledge to assist with NPD (Barringer & Harrison, 2000). Formal integration mechanisms for bonding stakeholders help firms gain legitimacy for demands about the urgency of their claims from stakeholders (Karatzas et al., 2016). While these mechanisms are time bound, the more integrated and mutually bounding property of operational linkages often increases the need for urgently addressing a claim for the benefit of all parties (Cannon et al., 2000; Karatzas et al., 2016). Vertically linked stakeholders often benefit from learning new knowledge and capabilities through their interdependent relationships and varying power relations (Rindfleisch & Moorman, 2003; Soosay & Hyland, 2015). Formal mechanisms also help monitor and reduce opportunistic behavior accruing from power-imbalanced relationships with multiple stakeholders due to their legally bounding and enforceable properties (Karatzas et al., 2016).

Importantly, from an interorganizational learning perspective, vertical stakeholder collaborations (e.g., suppliers, customers, universities, research institutions) in NPD are continuously at risk of experiencing knowledge spillovers (e.g., unintended leakage of internal proprietary knowledge), either voluntarily or involuntarily. In such collaborations, the main matter of concern is the ability of participating firms to internalize and appropriate the core proprietary knowledge and capabilities of the other party to achieve better performance themselves (Yang et al., 2014). Although spillovers of core proprietary knowledge are higher in horizontal collaborations, uncertainties about the self-interests of vertically linked partners still arise from the latter's involvement with other competitive firms (Ozdemir et al., 2017; Thomas, 2013). As these stakeholders often have a greater variety of conflicting interests than horizontal stakeholders, attaining value may be more difficult in these relationships (Madsen & Ulhøi, 2001). Particularly under high technological

turbulence, the utilization of legal bonds may help protect proprietary knowledge, but at the same time, its inflexibility may generate constraints for interactions and joint learning (Cannon et al., 2000; Yang et al., 2014). Previous empirical work is inconclusive about the usefulness of legal bonds in terms of benefiting from stakeholder collaborations particularly in turbulent environments (De Vaan, 2015; Gao et al., 2015). The role of legal bonds can thus be examined in the context of the relationship between high technological turbulence and numerous organizational collaborations.

By contrast, operational linkages between stakeholders can enhance the value attained through vertical stakeholder collaborations during NPD. More specifically, integrated systems, procedures, and routines facilitate the sharing and flow of knowledge and experiences between and among stakeholders (Cannon & Perreault, 1999; Hunter & Perreault, 2007). Despite the apparent importance of the quality of operational linkages in NPD, previous studies have mostly examined their role in supply chain and operations management (Flynn, Huo, & Zhao, 2010). Thus, there is a need to understand the nature of these linkages and the related extent to which they affect vertical stakeholder collaborations and NPD outcomes, including firm innovativeness, as proposed in Fig. 1.

2.3. Mediating role of vertical stakeholder collaboration in technological turbulence and firm innovativeness

Technological turbulence can be related to stakeholder collaboration and firm innovativeness. Technologically turbulent environments are characterized by frequent and unpredictable changes in product technology and their rates of obsolescence (Calantone, Garcia, & Dröge, 2003; Kandemir, Cavusgil, & Yaprak, 2006; Song & Montoya-Weiss, 2001). Accordingly, the occurrence of new technologies in highly turbulent environments requires firms to become more innovative to achieve superior competitive positions (Jaworski & Kohli, 1993; Lee, 2010; Zhou, Yim, & Tse, 2005). Previous studies show that

technological turbulence creates opportunities for innovation and forces firms to quickly introduce new or modified products to minimize the threat of product obsolescence (Alexiev et al., 2016; Calantone, Harmancioglu, & Dröge, 2010; Jaworski & Kohli, 1993).

As most major innovations are driven by research and development efforts outside the industries in highly technologically turbulent environments (Kohli & Jaworski, 1990), firms face challenges that may drive them to obtain new technological knowledge and capabilities externally (Cassiman & Veugelers, 2006; Powell, Koput, & Smith-Doerr, 1996). Indeed, high levels of exploratory (i.e., outside the firm) learning can facilitate innovation in turbulent environments (Lichtenthaler, 2009). Collaborative partnering with diverse stakeholders provides an efficient and effective arrangement for addressing the uncertainties inherent in novel products (De Vaan, 2015), as firms may learn from stakeholders about the latest technological developments in the marketplace (Rindfleisch & Moorman, 2001). Accordingly, the current study posits that firms may prefer to initiate collaborations with vertical stakeholders in technologically turbulent environments, as these collaborations allow firms to gain access to complementary technological knowledge and resources, ease identification of new market opportunities, and speed up new product launches (Chatterjee, 2004; Sheng, Zhou, & Li, 2011).

From a stakeholder perspective, firms can both influence and be influenced by their external environments (Du & Williams, 2017). For example, technologically turbulent environments enhance the legitimacy and urgency of meeting stakeholder demands for vertically linked stakeholders (Yeung et al., 2013). The mutual need for the non-redundant and complementary knowledge of vertical stakeholders in the innovation process may stimulate firms' knowledge-sharing practices and joint learning to achieve innovation and new technologies (Ozdemir et al., 2017; Rindfleisch & Moorman, 2003).

Furthermore, the extent of interaction and communication with vertically linked stakeholders during NPD is likely to affect innovativeness of a focal firm (Alexiev et al., 2016; Ozdemir et al., 2017). Intensive communication and interaction between vertically linked stakeholders (the more, the better) result in proactive strategies for innovation (Sobrero & Roberts, 2002). With increased interactions, firms become more familiar with each other, which in turn increases the level of mutual trust and value creation (Tantalo & Priem, 2016). More trust means less concern about transferring and sharing innovative knowledge that has the potential to create a competitive edge (Rindfleisch, 2000). In technologically turbulent environments, vertically linked stakeholders (which have greater dependency on each other than horizontally connected counterparts such as competitors) can provide their partners with complementary knowledge and resources to achieve improved information utilization and consequently enhance their innovative endeavors and help them adapt to changing market conditions in a proactive way (Calantone et al., 2003; Ozdemir et al., 2017; Rindfleisch & Moorman, 2001; Rubera & Kirca, 2012). As knowledge becomes obsolete at an accelerating rate in environments characterized by complex and fast-changing technologies (Su, Ahlstrom, Li, &, Cheng, 2013), innovations are more likely to emerge from networks of learning in which firms can have more opportunities to quickly access novel and unique knowledge, rather than from individual firms that must develop knowledge on their own (Gulati, 2007). Thus, we hypothesize that:

H1. Vertical stakeholder collaboration mediates the relationship between technological turbulence and firm innovativeness.

2.4. Mediating role of firm innovativeness in vertical stakeholder collaboration and new product performance

Prior studies suggest that firms can enhance their innovation by interacting with different collaborators such as customers, suppliers, governments, and/or research institutions (Eisenhardt & Tabrizi, 1995; Tsai, 2009). Vertically linked stakeholder collaborations involve dissimilar partners in the value chain, such as suppliers, wholesalers, and retailers, that could share and perform related activities. For example, Cetindamar, Catay, and Basmaci (2005) analyze Turkish firms and show that firms develop collaborations with different partners in their supply chain to achieve better innovation outcomes. Such partnerships can give focal firms access to a variety of new and alternative knowledge domains and increase their potential to find novel combinations of solutions resulting in new products (Jiang, Tao, & Santoro, 2010; Lau, Tang, & Yam 2010; March, 1991; Park, Chen, & Gallagher, 2002; Phelps, 2010; Quintana-Garcia & Benavides-Velasco, 2008; Rindfleisch & Moorman, 2003; Vanhaverbeke, Gilsing, Beerkens, & Duysters, 2009). Some studies show that collaborations with customers positively influence new product performance (Faems, Van Looy, & Debackere, 2005; Freel, 2003; Miotti & Sachwald, 2003). As such, customers may provide benefits to focal firms in their NPD activities by offering help in identifying market opportunities and obtaining new ideas for product solutions (Tsai, 2009). Other studies show that collaborations with universities and research institutions positively affect new product performance (Faems et al., 2005; Nieto & Santamaria, 2007). Universities and research institutions also represent important vertical stakeholders for innovation, as firms can highly benefit from new scientific knowledge (Caloghirou, Kastelli, & Tsakanikas, 2004; Hemmert, 2004).

This study suggests that a firm's vertical stakeholder collaborations can influence its new product performance by enhancing its innovativeness. Innovative firms are characterized by their high level of openness to new ideas and willingness to change (Hurley & Hult,

1998). Focal firms collaborating with vertical stakeholders are exposed to heterogeneous contexts and may benefit from diverse ideas and experiences, which make them think "outside the box" and become more innovative (Vasudeva & Anand, 2011). These firms with vertically linked partners, which hold new complementary knowledge and resources, can engage in generative learning practices that require unlearning of existing knowledge and development of new mental models in a proactive sense (Baker & Sinkula, 2007; Morgan & Berthon, 2008; Wang, 2008). Given the cyclical process of acquiring and acting on new knowledge in generative learning, firms with vertical stakeholders involved in this type of learning can enhance their problem-solving capacity for innovation, resulting in better new product performance (Morgan & Berthon, 2008). Thus, we hypothesize that:

H2. Firm innovativeness mediates the relationship between vertical stakeholder collaboration and new product performance.

2.5. Mediating role of new product performance in firm innovativeness and firm performance

Studies suggest that innovation capability is a highly significant determinant of firm performance (e.g., Calantone et al., 2002). However, the effect of firm innovativeness on firm performance is contingent on attaining improved new product performance. Research also suggests that a firm's innovativeness is a significant predictor of its new product performance (e.g., Cavusgil, Calantone, & Zhao, 2003). However, excessive knowledge exploration and orientation to innovativeness may negatively affect firm performance (March, 1991). Ittner and Larcker (1997) show that firms need to have efficient product development processes, including faster product development cycle times with cross-functional team integration and successful new product introductions, to enhance firm performance. More specifically, according to Griffin (1997), half the market and profit success of firms with successful product development practices can be attributed to the gains from their new product

introductions. Thus, to attain improved firm performance, innovative firms need to enhance their new product performance. Consequently, we hypothesize that:

H3. New product performance mediates the relationship between firm innovativeness and firm performance.

2.6. Moderating effects of legal bonds and operational linkages

Legal bonds between firms are suggested mainly to reduce the risks of collaboration, facilitate knowledge transfer, and enhance the effectiveness of stakeholder collaborations in NPD (Lee & Cavusgil, 2006). This neoclassical approach to cooperation assumes that partners are risk-averse, especially in industries perceived as technologically turbulent. As firms using legal bonds do so as a way to cope with the uncertainty of technological turbulence, we might assume that legal bonds would dissuade risky stakeholder collaboration. Yet previous studies report inconsistent findings about the role of legal bonds in stakeholder collaborations under high technological turbulence (e.g., Lee & Cavusgil, 2006; Weber & Mayer, 2011). Negative findings may be due to the increasing tendency to protect knowledge through means such as legal bonds, which undermine interactions, joint learning, and subsequently stakeholder performance in NPD (Yang et al., 2014). Particularly in the context of turbulent business environments, in which firms face pressures to focus on learning new knowledge and capabilities and deal with unforeseen conditions that may reduce the potential for value captured from stakeholder collaborations (Hoskisson et al., 2018; Kazadi, Lievens, & Mahr, 2016), legal obligations may stifle their ability to adapt the process of stakeholder knowledge exchange to the requirements of changing environmental conditions. In turn, this scenario may discourage firms from engaging in vertical stakeholder collaborations. Thus, we hypothesize that:

H4. Legal bonds negatively moderate the relationship between technological turbulence and vertical stakeholder collaboration.

As vertically linked stakeholders' operations strive to achieve desired NPD collaboration objectives, firm innovativeness may depend on operational linkages in terms of resource ambiguity and/or causal mechanisms of tacit knowledge. Stakeholder studies recognize the linkages between a firm and its multiple stakeholders in operational terms (Driessen & Hillebrand, 2012). Vertical stakeholders in the industry supply chain are likely to exploit their differences, such as in the case of exploiting intermediaries, and involve operational cooperation. More specifically, because of their linkage with the firm, stakeholders have a stake in its operations (i.e., the prospect of gaining greater or lesser benefits or experiencing greater or lesser harm as a result of the firm's operations) (Post, Preston, & Sachs, 2002). Operational linkages or coordinating systems and procedures as part of a close, cooperative, and continuing relationship between stakeholders can support knowledge exchange to enhance performance of collaborative engagements (Cannon & Perreault, 1999; Hunter & Perreault, 2007). Firms in vertical collaborations to develop new products often exchange resources (e.g., technical and operational knowledge) to implement processes in their NPD. Extant literature concentrates mainly on trust-based relationships rather than operational linkages, the latter of which can enhance stakeholder commitment in terms of joint investment and utilization of resources with a potentially greater impact on stakeholder performance. Previous studies focus narrowly on the role of operational linkages in collaborative engagements during supply chain management (Prahinski & Benton, 2004) and, as such, lack empirical evidence of the extent to which such links may affect the performance of collaborations with multiple stakeholders in NPD. In particular, operational

linkages between partners in vertical collaboration support complementary resources and thus increase firm innovativeness. This leads to the following:

H5. Operational linkages positively moderate the relationship between vertical stakeholder collaboration and firm innovativeness.

- INSERT FIGURE 1 -

3. Research methodology

3.1. Sample

We randomly derived a list of 800 high- and medium-high-technology manufacturing firms in Turkey from the Turkish Statistical Institute in 2012 (OECD, 2013). The use of a random selection strategy is in line with previous studies on stakeholder research, which gives firms an equal chance of being selected within their sampling frames to reduce sampling bias and error problems (e.g., Banerjee & Cole, 2010). In the initial stage of data collection, we called all the firms in the sampling frame, not only to find out whether they had collaborated with vertically linked stakeholders in the last five years but also to identify a relevant respondent from the senior management or executive team with the most active involvement in NPD projects, as well as knowledge and experience in NPD. The screening procedure, which required multiple vertical collaborations for NPD purposes, revealed that 548 firms were eligible for the study. This sampling frame consisted of firms operating in the electrical and electronic machinery (70%), chemicals (18%), and automotive (i.e., auto manufacturers) (12%) industries.

The sample of firms from high- and medium-high-technology industries was well suited for vertical stakeholder collaborations because firms in these industries are particularly susceptible to changes in the underlying technologies of their products. Moreover, between 2006 and 2016, R&D investments and expenditure as a percentage of Turkey's GPD were

among the lowest in Europe (Eurostat, 2017). This may be because Turkey has a higher uncertainty-avoidance culture index than the other countries in Europe, which may limit risk-taking innovation endeavors (Hofstede, 2001; Ozdemir et al., 2017). While government support for innovation is limited, funding for innovation is also lacking because the country's venture-capital and business-angel sectors are underdeveloped (OECD, 2017; Ozdemir et al., 2017; World Bank, 2017). As a result, it is crucial for Turkish firms to develop collaborations with vertical stakeholders to access complementary resources. Thus, this study focuses on collaborations with vertically linked stakeholders, which constitute significant sources of learning innovative skills and practices for firms in the context of Turkey (Ozdemir et al., 2017). In addition, the sample contained manufacturing firms, mainly because Turkey has an established manufacturing industry, and sustaining this sector through innovation and R&D is essential for growth of the Turkish economy (TUBITAK, 2011).

3.2. Data collection

The primary data came from a self-administered, structured, Internet-based questionnaire. In this study, we adopted a quantitative research method because the research objectives required testing certain casual, mediation, and moderation effects and also to reach generalizable findings (Johnson & Christensen, 2010). In the data collection process, a single respondent completed the questionnaire from each firm. The respondents consisted of senior managers, including CEOs (12%), sales and marketing managers (44%), R&D/product/project development managers (35%), production and planning managers (5%), and account and finance managers (4%). The respondents needed to have active involvement in NPD projects involving diverse types of stakeholders and knowledge of and experience with NPD in their respective firms.

Before data collection, we sent a personalized message to each target respondent, asking for their participation in the research and assuring participant anonymity. We offered

the respondents an executive summary of the findings as an incentive for their participation. Two months after the initial emails, a reminder was sent to firms that did not respond to the initial request. When computing the t-test results using the study variables (Armstrong & Overton, 1977), we found no statistically significant differences between early and late respondents. In total, 176 responses were collected, for a response rate of 32%. After elimination of responses with too much missing data, 146 effective responses remained.

3.3. Measurement

In developing our questionnaire, we used empirically validated established scale items and, whenever appropriate, anchored them using a 7-point Likert scale (1 = "very strongly disagree," 7 = "very strongly agree"). The questionnaire was originally designed in English and then parallel-translated into Turkish by two independent translators. The parallel translations were then merged into a final draft, which was then back-translated into English by an independent translator to check the nuances of translations in the source and target languages.

We measured all the constructs using reflective scales, which treat measures as a combination of a latent variable and an error (Fornell & Bookstein, 1982). We followed the scale development and testing procedures Churchill (1979) suggests by first reviewing the literature and generating a relevant pool of items, which were subsequently reviewed by five academics who have conducted research on collaborative NPD and stakeholder relationships. On the basis of their review, we dropped some of the items and modified a small number of them. We also identified a few senior managers from the Turkish Statistical Institute directory, explained the study, and requested their collaboration. We emailed the managers in advance of the interviews about the purpose of the study and the interview protocol based on the questionnaire. We conducted interviews with 10 managers following a semi-structured

format, and each interview lasted an average of one hour. In our interviews, we asked the respondents to evaluate the main themes or questions of our questionnaire and requested their recommendations for any additional important questions. We incorporated their comments to ensure that the questionnaire was in an understandable and logical format. This measurement development process guided the constructs in the model.

The *vertical stakeholder collaboration* construct built on the studies of Rindfleisch and Moorman (2001, 2003) and Lhuillery and Pfister (2009) and conceptualized a focal firm's relationships with stakeholders on different positions of the value chain in various industry sectors. We adopted seven items to assess the extent to which firms formed vertical stakeholder collaborations for NPD purposes.

Firm innovativeness refers to firm-level capability that demonstrates a firm's proactiveness in exploring new opportunities rather than exploiting current strengths (Hult, Hurley, & Knight, 2004; Menguc & Auh, 2006). We derived the scale for this construct from Calantone et al. (2002) and Menguc and Auh (2006). To operationalize this construct, we used six items to assess the extent of information seeking of innovative ideas, frequency of trying out new ideas, and seeking new ways of doing things.

Technological turbulence measured the speed and rate of technological change or progress in a particular industry (Jaworski & Kohli, 1993). The items of this construct came from Jaworski and Kohli (1993), with three items assessing the extent to which the industries are characterized by rapid changes in technology, major opportunities provided by technological changes, and large numbers of new products based on technological breakthroughs.

Operational linkages measured the extent to which the systems, procedures, and routines between a focal firm and its vertically linked stakeholders are linked to facilitate operations, knowledge flow, and information sharing (Cannon & Perreault, 1999). We

adopted the two measurement items from Cannon and Perreault (1999) and Cannon et al. (2000).

We measured *legal bonds* with three items to assess the extent to which a focal firm and its vertically linked stakeholders used detailed and binding contractual agreements specifying their obligations and roles during their collaborative NPD engagements (Cannon & Perreault, 1999). The measurement items of this construct came from Cannon and Perreault (1999) and Cannon et al. (2000).

We measured *new product performance* with four items adopted from Atuahene-Gima and Ko (2001) and Moorman (1995). The items evaluated the extent to which the firm's new products achieved market share, sales, and profit objectives.

Finally, we measured *firm performance* with six items adopted from Kirca, Jayachandran, and Bearden (2005) to assess the extent to which the firms are satisfied with their financial performance, including overall firm performance and also relative to major competitors, firm sales growth, growth in return on investment (ROI), firm profitability, and firm ROI or internal rate of return (IRR).

4. Data analysis and results

4.1. Measurement model

We used confirmatory factor analysis (CFA) to evaluate the psychometric properties of the measures (Anderson & Gerbing, 1988; Bagozzi, Yi, & Phillips, 1991). This approach resulted in a CFA that included seven factors: technological turbulence, vertical stakeholder collaboration, firm innovativeness, new product performance, firm performance, legal bonds, and operational linkages. We conducted the CFA using the maximum likelihood estimation procedure, with the raw data input as in EQS 6.1 (Bentler, 1995). After we dropped items

with low factor loadings or high cross-loadings, the confirmatory model fit the data satisfactorily. Table 1 details the constructs and retained items.

– INSERT TABLE 1–

We assessed the convergent and discriminant validity of the focal constructs. Each measurement item loaded only onto its latent construct. The chi-square test for our theoretical variables was statistically significant ($\chi^2_{(278)} = 434.16$, $p < 0.05$). However, the fit indices indicated a good fit with the hypothesized measurement model (Bentler–Bonett non-normed fit index [NNFI] = 0.92, comparative fit index [CFI] = 0.93, Bollen's incremental fit index [IFI] = 0.93, and the root mean square error of approximation [RMSEA] = 0.07; Table 1) (Hu & Bentler, 1999). The ratio of the chi-square to the degrees of freedom was 1.56, which is below 4. Furthermore, all the factor loadings were statistically significant ($p < 0.01$). The composite reliabilities of six constructs ranged from 0.83 to 0.95, which were both greater than 0.70 and thus acceptable (see Nunnally, 1978). Thus, we concluded that the measures demonstrated adequate convergent validity and reliability.

We examined discriminant validity by calculating the shared variance between all possible pairs of constructs, verifying that they were lower than the average variance extracted (AVE) for the individual constructs (Fornell & Larcker, 1981). These results showed that the AVE by the measure of each factor was larger than the squared correlation of that factor's measure with the measures of all other factors in the model (see Table 1). Given these values, we concluded that all factors in the measurement model possessed strong discriminant validity. In light of this evaluation, all factors possessed both convergent and discriminant validity, and the CFA model adequately fit the data (see Table 1). Furthermore, we used Harman's one-factor test in CFA to examine common method variance (CMV). We compared the fit indices of the six-factor CFA model with that of the one-factor CFA model.

A worse fit for the one-factor model suggested that CMV did not pose a serious threat (Podsakoff & Organ, 1986). The one-factor model had a chi-square of 1795.95, with 299 degrees of freedom, and the seven-factor measurement model had a chi-square of 434.16, with 278 degrees of freedom. Thus, the chi-square difference was significant ($\Delta\chi^2 = 1361.79$, $\Delta df = 21$, $p < 0.05$), suggesting that CMV is not a problem in the measurement model.

4.2. Hypotheses testing results

As Table 1 shows, we estimated the hypothesized model by using structural equation modeling, with the EQS 6.1 program. Firm age and size measured by the number of employees served as control variables in the model. Table 2 provides the results of the hypotheses testing, along with parameter estimates, their corresponding t-values, and fit statistics. Although the chi-square test was statistically significant ($\chi^2_{(224)} = 385.12$, $p < 0.05$), the scores achieved for the fit measures indicated that the hypothesized model had reasonable fit with the data (NNFI = 0.90, CFI = 0.92, IFI = 0.92, and RMSEA = 0.08).

– INSERT TABLE 2 –

Technological turbulence was significantly and positively associated with the extent to which a firm collaborates with its vertical stakeholders ($\beta = 0.31$; $p < 0.01$). Moreover, the effect of vertical stakeholder collaboration on a firm's innovativeness was positive and significant ($\beta = 0.25$; $p < 0.05$). Firm innovativeness had a significant and positive effect on a firm's new product performance ($\beta = 0.39$; $p < 0.01$). Finally, new product performance was significantly and positively associated with firm performance ($\beta = 0.50$; $p < 0.01$). Table 2 shows the effects of the control variables.

H1 proposes that vertical stakeholder collaboration mediates the relationship between technological turbulence and firm innovativeness. As indicated in the previous paragraph, technological turbulence had a significant, positive effect on vertical stakeholder

collaboration. In addition, we found a significant effect of vertical stakeholder collaboration on firm innovativeness. We tested an alternative specification of the model that included a direct effect of technological turbulence on firm innovativeness. We tested this specification through a chi-square difference test (Cannon & Homburg, 2001). The one-degree-of-freedom test compares the improvement in the model's fit when the re-specified model frees a path from technological turbulence directly to firm innovativeness. Accordingly, when we added a path, the fit did not improve ($\chi^2_{\text{diff (1)}} = 2.93$, $p > 0.10$). The direct effect of technological turbulence on firm innovativeness was marginally significant ($\beta = 0.16$; $p < 0.10$). Overall, these results provide support for H1, which suggests that vertical stakeholder collaboration fully mediates the relationship between technological turbulence and firm innovativeness.

H2 proposes that firm innovativeness mediates the relationship between vertical stakeholder collaboration and new product performance. As detailed previously, vertical stakeholder collaboration was significantly associated with firm innovativeness. Moreover, firm innovativeness had a significant effect on new product performance. We tested an alternative specification of the model that included a direct effect of vertical stakeholder collaboration on new product performance. When we added a path from vertical stakeholder collaboration to new product performance, the fit did not improve ($\chi^2_{\text{diff (1)}} = 2.49$, $p > 0.10$). In addition, the direct effect of vertical stakeholder collaboration on new product performance was not significant ($\beta = 0.12$; $p > 0.10$). Overall, these results provide support for H2, which suggests that firm innovativeness fully mediates the relationship between vertical stakeholder collaboration and new product performance.

H3 suggests that new product performance mediates the relationship between firm innovativeness and firm performance. As explained previously, firm innovativeness had a significant effect on new product performance, which in turn had a significant effect on firm performance. When we added a path from firm innovativeness to firm performance, the fit

did not improve ($\chi^2_{\text{diff (1)}} = 0.67$, $p > 0.10$). The direct effect of firm innovativeness ($\beta = 0.07$; $p > 0.10$) on firm performance was not significant. Thus, our results provide support for H3, which suggests that new product performance fully mediates the relationship between firm innovativeness and firm performance.

H4 suggests that legal bonds negatively moderate the relationship between technological turbulence and vertical stakeholder collaboration. We entered the effects of technological turbulence, legal bonds, and the interaction of both variables. The interaction effect was significant ($\beta = -0.16$; $p < 0.05$; one-tailed test), indicating support for H4.

Finally, H5 proposes that operational linkages positively moderate the relationship between vertical stakeholder collaboration and firm innovativeness. Similarly, we entered the effects of vertical stakeholder collaboration, operational linkages, and the interaction of both variables. The interaction effect was significant ($\beta = 0.18$; $p < 0.05$; one-tailed test). Thus, H5 was supported.

5. Discussion

The findings of this study show that vertical stakeholder collaboration mediates the effect of technological turbulence on firm innovativeness. Compared with other environmental conditions, in the context of technologically turbulent environments, firms are under greater pressure to improve innovativeness skills to develop new products using emerging technologies and succeed in NPD (Tsai, Liao, & Hsu, 2015). In such environments, innovativeness improves a firm's ability to proactively take advantage of new technological opportunities, minimize the threat of technological obsolescence, and develop new products with a greater level of technological newness (Alexiev et al., 2016; Hung & Chou, 2013; Kandemir et al., 2006). In this sense, our findings suggest that vertical stakeholder collaborations help improve such capabilities by providing firms with access to valuable non-

redundant partner-specific knowledge and resources, which are particularly vital in technologically turbulent environments. In particular, such collaborations can provide access to explicit and tacit knowledge on emerging technologies for the improvement of innovation outcomes. The findings support the view that vertically linked stakeholders help expand the knowledge base of the cooperating firms through inter-organizational learning and also help them invent innovative offerings for the market (Walsh et al., 2016). This finding is also consistent with Subramanian and Soh's (2017) study, which shows that as the diversity of partner knowledge expands, the capability to produce an innovation outcome combining new ideas from diverse knowledge domains is improved. Indeed, Duysters and Lokshin's (2011) study shows that firms regarded as innovators have different types of stakeholder relationships than imitators and non-innovators.

The findings also support one of the main tenets of stakeholder theory (see Freeman, 1984); that is, a focal firm's environment (i.e., level of technological turbulence) will affect its decisions about vertical stakeholder collaborations, and its responses (i.e., development of firm innovativeness) will be influenced by vertically linked stakeholders in their NPD collaborations. Although exchanging knowledge and engaging in learning with vertical stakeholders may be challenging, due to differing goals, interests, and expectations (Kazadi et al., 2016), stakeholders' mutual reliance on knowledge in technologically turbulent environments may legitimize the urgency of addressing their collaborators' needs related to NPD.

Stakeholder theory views firms as "nexus of contracts" (Hoskisson et al., 2018), in the sense that legal bonds as formal mechanisms help reduce partner opportunism and improve the odds of collaboration success (Gesing, Antons, Piening, Rese, & Salge, 2015). Contrary to this perspective, we show that in technologically turbulent settings, legal bonds weaken a firm's relationships with its vertically linked stakeholders. In other words, our study reveals

that legal bonds negatively moderate the effect of technological turbulence on a firm's vertical stakeholder collaborations. This finding suggests that in these settings, legal bonds may restrict a firm's willingness to collaborate with vertically linked stakeholders mainly because of the limiting influence of knowledge protection on joint learning for innovation (Yang et al., 2014).

In addition, our study reveals that firm innovativeness mediates the influence of vertical stakeholder collaboration on new product performance. Extant research in supply chain management indicates that supplier innovativeness can improve supply chain agility, enabling a supply chain to rapidly respond to changes in the business environment, which can lead to faster time to market and enhanced new product performance (Kim & Chai, 2017). Conversely, some studies find evidence that firms' varying motivations and power relations negatively influence the level of their innovativeness (Matanda, Ndubisi, & Jie, 2016). In addition, recent studies show that firm innovativeness is associated with a higher level of unexpected product failure costs (Mackelprang, Habermann, & Swink, 2015). The current study, however, suggests that vertical stakeholder collaborations help a focal firm achieve improved new product performance through the development of innovativeness skills.

This study further shows that operational linkages as a type of formal mechanism for bonding vertical stakeholders positively moderate the effect of vertical stakeholder collaborations on firm innovativeness. With integrated systems, procedures, and routines, firms facilitate sharing and flow of knowledge and experiences between and among stakeholders (Karatzas et al., 2016; Vesalainen & Kohtamäki, 2015). From a stakeholder perspective, the importance of operational linkages is based on their role not only as facilitators of knowledge sharing and exchange but also as mechanisms for reducing conflicting goals and interests (Karatzas et al., 2016). In NPD, operational linkages between

stakeholders ensure the continuity of their communication and interactions and have more mutually binding consequences on performance in NPD than arm's-length relationships or even relationships driven only by mutual trust. Thus, from a stakeholder view logic, we suggest that operational linkages can enhance the power, legitimacy, and urgency of vertical stakeholder collaborations in NPD.

Finally, the results show that the role of firm innovativeness in firm performance is contingent on improving new product performance. This finding is consistent with studies that show that firm innovativeness enables firms to translate their market knowledge into practice to improve firm performance in terms of profitability and growth in sales and market share (Kyrgidou & Spyropoulou, 2013). Similarly, the findings confirm the view that stakeholders with a greater degree of innovativeness have superior NPD performance, due to their stronger tendency to create highly distinctive new products in a more timely manner (Nguyen, Ngo, Bucic, & Phong, 2018).

5.1. Theoretical Implications

The literature on stakeholder collaborations offers inconsistent findings on the role of diverse environmental conditions (e.g., market heterogeneity, competitive intensity, environmental turbulence) in the relationship between stakeholder collaboration and firm innovativeness by observing either some mediation effect or no mediation effect (Alexiev et al., 2016). The current study decreases the gap in empirical evidence on the extent to which a firm's innovativeness may be due to technological turbulence as an environmental condition and what proportion of it may depend on stakeholder collaborations (e.g., Alexiev et al., 2016; McAdam et al., 2016).

In addition, this study addresses the inconsistent findings on the role of contracts or legal bonds in environments characterized by high technological turbulence. Previous studies have also overlooked how operational linkages in terms of linked systems, procedures, and

routines may affect the outcomes of NPD, instead concentrating mainly on mechanisms such as trust-based relationships in inter-organizational collaborations (e.g., Jones et al., 2018). The studies focusing on operational linkages examine the concept in the context of supplier and/or supply chain relationships (e.g., Flynn et al., 2010; Saccani, Visintin, & Rapaccini, 2014) and do not explore how operational linkages may complement firm innovativeness to achieve superior new product outcomes (Karatzas et al., 2016). This study elaborates the previous literature by examining operational linkages in the context of vertical stakeholder relationships during NPD. In this way, the study also contributes to the stakeholder literature, which has neglected the role of diverse types of formal mechanisms, including legal bonds and operational linkages with different degrees of adaptation and integration properties, in vertical stakeholder collaborations (Yang et al., 2014).

On the one hand, previous research has associated firm innovativeness with performance in NPD (Rubera & Kirca, 2012); on the other hand, studies on alliances and merger and acquisitions suggest that as a result of varying firm motivations, stakeholder collaborations may influence knowledge transfer and innovativeness negatively (De Man & Duysters, 2005). The current study builds on this literature by suggesting that, because vertically linked stakeholders have a breadth of knowledge and capabilities that are often beyond the knowledge base of their collaborating partners, they not only help improve innovativeness skills beyond the knowledge and capabilities of their collaborators but also support them to eventually reduce unexpected product failures through improved new product performance (e.g., Ozdemir et al., 2017).

Finally, previous research has assessed how firm innovativeness may affect new product performance (e.g., Story, Boso, & Cadogan, 2015) and firm performance (e.g., Tsai & Yang, 2013) separately. Thus, the literature lacks empirical evidence on whether firm

innovativeness can enhance overall firm performance only through improved new product performance. For example, firm innovativeness can influence other types of performance outcomes such as export performance (Boso, Story, Cadogan, Micevski, & Kadić-Maglajlić, 2013), which may also be effective in enhancing overall firm performance. Our findings advance these studies by showing the importance of firm innovativeness in fully using the benefits of NPD for firm performance through new product performance improvements.

5.2. Managerial implications

This study offers several important implications for practitioners. First, in technologically turbulent environments, managers should extensively form NPD collaborations with their vertically linked stakeholders to enhance their firms' innovativeness to address risk and failures. Such collaborations would be particularly important for firms in developing countries such as Turkey, which operate in settings with limited opportunities for public and private funding support of innovation initiatives. In such settings, vertical stakeholders with complementary resources and capabilities would constitute the main source of developing innovativeness capability (Ozdemir et al., 2017).

Second, managers need to be aware that in technologically turbulent environments, forming legal bonds with vertically linked stakeholders may become a barrier for incentivizing inter-organizational collaborations, because technological turbulent environments require firms to have the flexibility to adapt their NPD processes to the technological changes in the environment. Legal bonds include standards of rules and behaviors (Karatzas et al., 2016), and thus they bring rigidity to the process of vertical stakeholder collaborations and limit adaptability to environmental changes. Managers should avoid using formal mechanisms such as legal bonds in an inflexible way, so as to be poised to exploit the benefit of operating within technologically turbulent environments in vertical stakeholder collaborations. Managers should find ways to overcome the limitations imposed

by legal bonds on joint innovation practices. For example, they could attempt to forge trust-based and long-term relationships with their partners to give them the incentive to act independently of the norms and rules imposed by legal bonds to achieve certain collaborative NPD objectives in technologically turbulent environments.

Third, managers need to deploy operational linkages with their vertical linked stakeholders to enhance the benefits from collaborative NPD engagements around the development of firm innovativeness. Operational linkages can help managers facilitate the flow of information from their collaborating stakeholders. Managers can intensify their operational linkages with these stakeholders by involving them in key product development meetings to exchange ideas and share innovation-related experiences. Closer collaborations through integrated systems, procedures, and routines with vertically linked partners would help learn tacit knowledge, which is required to develop innovativeness capability (Cavusgil et al., 2003; Karatzas et al., 2016).

Finally, managers also need to understand that during collaboration with vertically linked stakeholders, the focus should be on developing firm innovativeness before concentrating on how to ensure new product success. Thus, in such collaborations, managers need to focus on joint projects that would enhance their exploration of new opportunities rather than exploiting current strengths (Ozdemir et al., 2017). If a firm co-develops new offerings that provide a distinct advantage over its current offerings, it would be better able to exploit the benefits of vertical stakeholder collaborations in terms of generating improved performance in the market. If a firm fails to develop innovativeness through vertical stakeholder collaborations, it may not achieve new product performance and, at a broader level, might fail to meet the goals set for overall performance.

5.3. Limitations and future research directions

This study has several limitations, which might generate fruitful future research avenues. First, this study does not measure the relative power-dependence relationships of stakeholders or investigate how they may affect vertical stakeholder collaborations and their associated outcomes. Using a stakeholder theory approach, future studies could examine varying effects of diverse types of vertically linked stakeholders on different NPD outcomes, based on their firm-specific power-dependence relationships. For example, by examining such relationships of stakeholders operating at upstream and downstream positions in the value chain, studies could test how varying effects of power relations in vertical collaborations may affect knowledge sharing and exchange and learning new firm-level capabilities. Similarly, studies could focus on the dark side of stakeholder relationships in the context of power-dependence relationships. In particular, research could investigate conflicts between stakeholders, which could arise from ethical issues or variations in the urgency of their claims, and explore power-dependence relationships in reducing the negative effects of such conflicts on the development of innovation-related capabilities and performance.

Second, this study focused only on a limited number of mediating variables associated with stakeholder collaborations and learning. Future studies could more deeply conceptualize additional mediating variables, such as partner selection processes, absorptive capacity, coordination flexibility, and knowledge integration mechanisms, to examine the relationship between stakeholder collaborations and NPD outcomes (Li, Li, Wang, & Ma, 2017; Monczka, Petersen, Handfield, & Ragatz, 1998). Previous studies show that knowledge integration mechanisms can contribute to the effectiveness of a firm's market knowledge of its product innovation performance (De Luca & Atuahene-Gima, 2007; Tsai et al., 2015). In this sense, further research could examine the extent to which knowledge integration mechanisms mediate the effect of non-redundant knowledge obtained from vertical stakeholder collaborations on firm innovativeness. In addition, coordination flexibility can

explain a certain proportion of the relationship between technological turbulence and firm innovativeness. In technologically turbulent environments, the flexibility to coordinate dynamic external knowledge within a firm can significantly contribute to the development of firm innovativeness (Li et al., 2017; Zhou & Wu, 2010). Furthermore, this study only examined legal bonds and operational linkages as the formal mechanisms for bonding stakeholders with different levels of adaptive and integrative properties. Future research could examine the effects of additional types of formal mechanisms, which may have various other properties.

The concept of firm innovativeness used in this study was grounded in innovation strategy. The main theoretical arguments posit that vertical stakeholder collaboration provides a means for exploring new opportunities for innovation (e.g., Ozdemir et al., 2017; Rindfleisch & Moorman, 2003). Further research could examine how and to what extent collaborating with innovative vertical stakeholders during NPD may help improve cost leadership strategy through knowledge exploration, and specifically the development of novel process innovation outcomes (e.g., Li et al., 2018).

The cross-sectional data of this study meant that it was not possible to observe the effect of time or any other contingency factors that might have contributed to the development of firm innovativeness. Although the sample of firms studied operate in fast-changing and turbulent environments, the pace of growth may be influenced by government support for innovation. In recent years, firms in high-tech industries have only accounted for 10.6% of Turkey's gross domestic product (OECD, 2013). Thus, readers should exercise caution in generalizing the findings of this study to other countries. The findings may be generalized to the developing economies characterized by limited financial resources for innovation and in which vertical stakeholder collaborations may constitute a key source for

innovation during NPD endeavors. Thus, future work could design longitudinal research to examine the effect of stakeholder collaborations over time in other emerging and/or developed countries, while considering institutional factors.

5.4. Conclusion

This study draws on stakeholder and organizational learning theories to investigate the role of vertical stakeholder collaborations in technologically turbulent environments in a firm's innovativeness and its eventual performance. The study also examines when and how the different types of formal mechanisms with varying levels of adaptation and integration properties for bonding stakeholders, including legal bonds and operational linkages, affect a firm's vertical stakeholder collaborations and its associated outcomes in NPD.

The study shows that vertical stakeholder collaborations generate firm innovativeness in technologically turbulent environments. The findings also reveal that while vertical stakeholder collaborations positively influence new product performance, this influence is also contingent on the development of firm innovativeness in collaborative engagements with vertically linked stakeholders. Developing effective firm innovativeness is important not only for new product performance but also for overall firm performance. The results illustrate that technological turbulence stimulates vertical stakeholder collaborations; however, legal bonds may diminish the deployment of vertical stakeholder collaborations in such settings. Finally, the results evidence the important role of operational linkages as a formal mechanism for bonding stakeholders in improving firm innovativeness during vertical stakeholder collaborations undertaken for NPD.

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Fig. 1. Firm innovativeness and new product performance in vertical stakeholder collaborations.

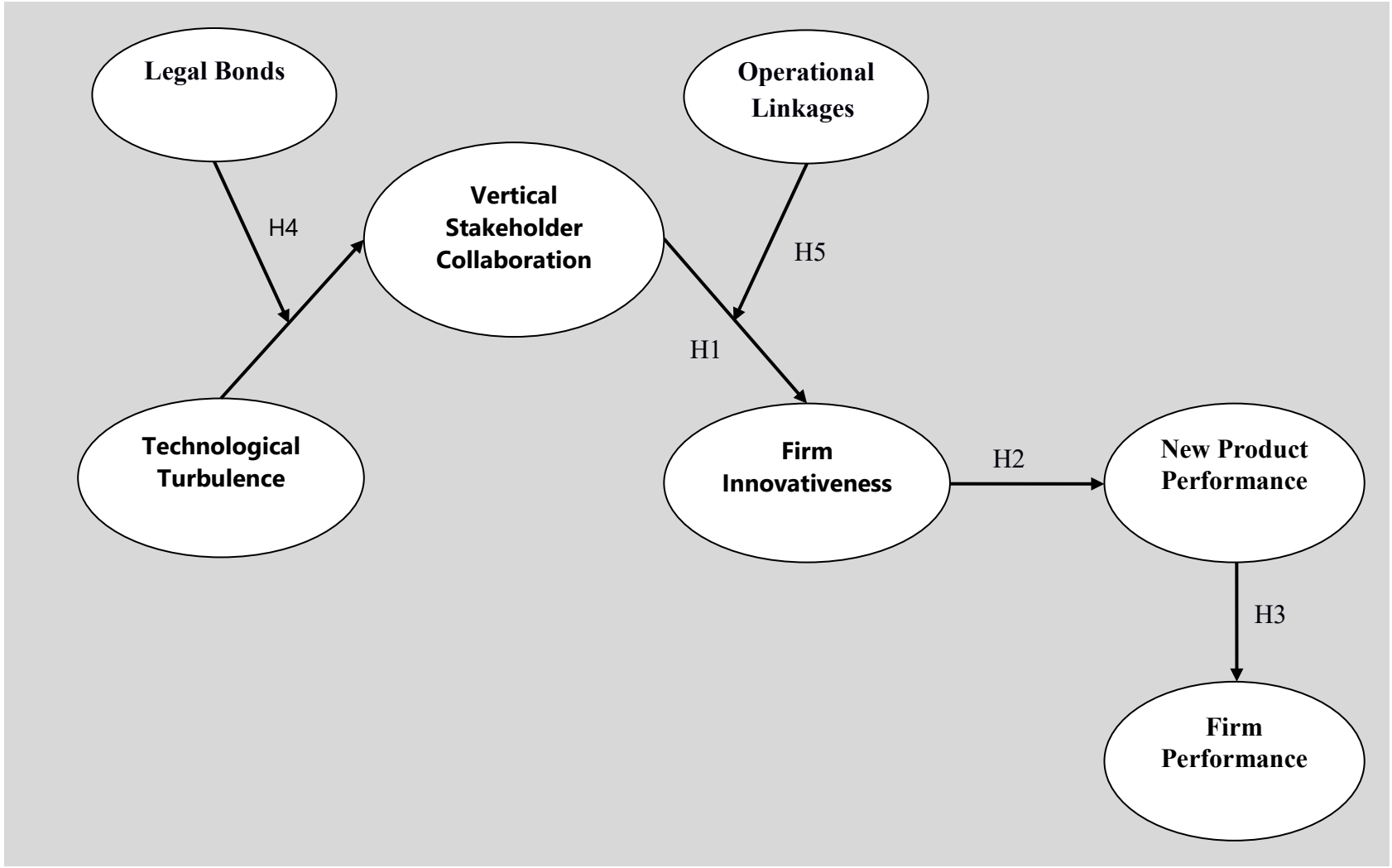

Table 1. Results of the CFA

Scale items	Standardized loadings	t-values[a]
Technological Turbulence (Jaworski & Kohli, 1993)		
(AVE = 67.2%; HSV = 13%; CR =0.86)		
The technology in our markets is changing rapidly.	0.65	7.19
Technological changes provide big opportunities in our industry.	0.99	12.67
A large number of new products in this industry have been made possible through technological breakthroughs in our industry.	0.79	9.18
Vertical Stakeholder Collaboration (Rindfleisch & Moorman, 2001, 2003)		
(AVE = 49,4%; HSV = 18%; CR =0.85)		
Suppliers[b]		
Clients or customers[b]		
Universities/higher education institutions	0.69	7.73
Distributors	0.67	7.53
Retailers	0.58	6.24
Technology intermediaries	0.72	8.22
Industrial associations	0.84	10.22
Development bodies/government research organizations	0.70	7.88
Firm Innovativeness (Calantone et al., 2002; Menguc & Auh, 2006)		
(AVE = 77%; HSV = 16%; CR =0.91)		
We actively seek innovative ideas.	0.83	10.44
Our company frequently tries out new ideas.	0.96	13.01
Our company seeks out new ways to do things.	0.84	10.48
Our company is often the first to market with new products and services.[b]		
Innovation in our company is perceived as too risky and is resisted.[b]		
Employees are penalized for new ideas that do not work.[b]		
New Product Performance (Atuahene-Gima & Ko, 2001; Moorman, 1995)		
(AVE = 82%; HSV = 31%; CR =0.95)		
New products/services at my firm generally achieved its market share objectives for the last 3 years.	0.96	13.57
New products/services at my firm generally achieved its sales and customer use objectives for the last 3 years.	0.93	12.68
New products/services at my firm generally achieved its sales growth objectives for the last 3 years.	0.93	12.74
New products/services at my firm generally achieved its profit objectives for the last 3 years.	0.80	10.00

Firm Performance (Kirca et al., 2005)		
(AVE = 71.5%; HSV = 31%; CR =0.93)		
Overall firm performance of the business in the past 3 years[b]		
Overall firm performance relative to major competitors in the past 3 years (or market share)	0.72	8.54
Firm's sales growth in the past 3 years	0.81	10.09
Firm's profitability in the past 3 years	0.86	11.07
ROI or IRR in the past 3 years	0.93	12.68
Growth in ROI in the past 3 years	0.90	11.94
Legal Bonds (Cannon, Achrol, & Gundlach, 2000; Cannon & Perreault, 1999)		
(AVE = 83.9%; HSV = 59%; CR =0.94)		
We have specific, well detailed arrangements with our partners.	0.79	9.90
We have formal agreements with our partners that detail obligations of both parties.	0.99	14.21
We have detailed contractual agreements with our partners.	0.96	13.48
Operational Linkages (Cannon, Achrol, & Gundlach, 2000; Cannon & Perreault, 1999)		
(AVE = 71.1%; HSV = 59%; CR =0.83)		
Our business activities are closely linked with our partner firms.	0.82	9.60
Some of our operations are closely connected to our partner firms.	0.87	10.44

Model Fit Statistics: $\chi^2 = 434.16$ ($df = 278$, $p < 0.05$); NNFI = 0.92; CFI = 0.93; IFI = 0.93; RMSEA = 0.07; 90% confidence interval of RMSEA = (0.06, 0.08)

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[a]T-values from the unstandardized solution. [b]Items deleted from scale.
Notes: HSV = highest shared variance with other constructs; CR = composite reliability.

Table 2. Results of Hypotheses Testing

		Vertical stakeholder collaboration	Firm innovativeness	New product performance	Firm performance
Technological turbulence	0.31^{**} (2.99)				
Vertical stakeholder collaboration		0.25^{*} (2.47)			
Firm innovativeness			0.39^{**} (4.31)		
New product performance				0.50^{**} (5.67)	
Age			$-0.08^{n.s.}$ (-0.93)	$-0.14^{n.s.}$ (-1.90)	
Firm size			$0.04^{n.s.}$ (0.52)	0.23^{**} (3.03)	

Model fit statistics: $\chi^2 = 385.12$ ($df = 224$, $p < 0.05$); NNFI = 0.90; CFI = 0.92; IFI = 0.92; RMSEA = 0.08; 90% confidence interval of RMSEA = (0.06, 0.09)

$^{**}p < 0.01$; $^{*}p < 0.05$; $^{n.s.}$: not significant (two-tailed test); Notes: t-values are in parentheses.