

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 the extent to which and how vertical stakeholder collaborations in NPD affect a firm's innovativeness and its eventual performance in technologically turbulent environments. The study also explores when and how do 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 their associated outcomes in NPD. The study contributes to the stakeholder literature by focusing on diverse types of formal mechanisms for bonding stakeholders rather than examining the role of single type of formal mechanism in stakeholder collaborations as in most of the extant empirical research. A survey data of 146 firms in Turkey evidences that vertical stakeholder collaborations can improve firm innovativeness under technological turbulence and enhance firm performance by enabling superior new product performance. The study findings also observe that while legal bonds decrease the likelihood of establishing vertical stakeholder collaborations in technological turbulence, such collaborations enhance firm innovativeness for those focal firms holding operational linkages with their vertically linked stakeholders.

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

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). As firms strive to gain competitive advantage and growth, stakeholder collaborations may support the improvement of their innovativeness in terms of their capability to introduce new products to the market (Alexiev, Volberda, & Van den Bosch, 2016). Specifically, vertical stakeholder collaborations benefit from 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, 2001).

From a stakeholder perspective, however, as vertically linked stakeholders are characterized by various goals, interests and expectations, the challenge of learning from them partners may limit a firm's innovativeness and new product performance (Mesquita, Anand and Brush, 2008). In technologically turbulent environments, which are characterized by increased levels of partner opportunism, uncertainty and ambiguity, stakeholder collaborations are more challenging but higher in importance for a firm's survival and competitiveness (Calantone et al., 2002). Stakeholder theory suggests that stakeholders can protect their legitimate interests in interactions within their environment through formal mechanisms used for bonding them (Freeman and Evan, 1990; Mitchell, Agle, & Wood, 1997). While several formal mechanisms exist to bond stakeholders (Jones, 1995), the stakeholder literature has paid less attention as to how the use of diverse types of formal mechanisms may affect stakeholder collaborations during NPD (Yang, Fang, Fang, & Chou,

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2014). This is despite the fact that these diverse mechanisms may enable different levels of mutual adaptation (i.e. investment) and integration for joint innovation practices between stakeholders, and thus may have varying forms of influences on their collaborative engagements (Mukherji and Francis, 2008). Indeed, such variations may partially explain the inconsistent findings about the effectiveness of formal mechanisms used for stakeholder collaborations (Cannon, Achrol and Gundlach, 2000; Lee and Cavusgil, 2006; Yang et al, 2014). This study focuses on two types of formal mechanisms for bonding stakeholders, including legal bonds and operational linkages, which enable different range of mutual adaptation and integration between vertically linked stakeholders (Cannon & Perreault, 1999; Mukherji & Francis, 2008).

Legal bonds constitute contractual agreements specifying the standards of behaviors, roles and obligations of collaboration partners to simulate hierarchy in exchange when vertical integration is impractical (Cannon & Perreault, 1999). Though operational linkages include routines of informal interactions, they are mainly based on formal and codified systems, procedures, and rules of interlinked structural ties between stakeholders (Cannon & Perreault, 1999; Cannon et al., 2000; Morris, Brunyee, & Page, 1998). The costs of more integrated forms of formal mechanisms for bonding stakeholders such as operational linkages are often more mutually binding, and difficult to manage and dissolve than legal bonds (Delmas & Tokat, 2005). Yet, less flexible and adaptive property of legal bonds may generate more constraints for interactions and joint learning, which are needed for improving a firm's innovativeness (Cannon & Perreault, 1999; Cannon et al., 2000; Yang et al., 2014).

Specifically, in technologically turbulent environments, stakeholders may need to be more adaptive and have greater room for manoeuvring to unforeseen technological disruptions and emerging technological states to be able learn and acquire value from stakeholder collaborations in NPD (Calantone et al., 2002; Eng & Ozdemir, 2014). Hence, in NPD the

main challenge is to deploy appropriate formal mechanisms to overcome the limitations and maximize the benefits of stakeholder collaborations by also considering the requirements of frequently changing technology (Cannon et al., 2000). Against this background, the key concerns of this study include: In technologically turbulent environments, how do vertical stakeholder collaborations in NPD affect a firm's innovativeness and its eventual performance? 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 and their associated outcomes in NPD? Drawing on the stakeholder and organizational learning theories, this study aims to make the following principal contributions to the literature.

First, the stakeholder literature suggests that diverse environmental conditions have varying influences on the role of stakeholder collaborations in a firm's innovativeness (Alexiev et al., 2016). There is a deficiency of empirical evidence on the extent to which a firm's innovativeness may be attributed 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, 2015) and this study aims to fill this void in the stakeholder literature. The previous empirical evidence has not confirmed the effectiveness of technological turbulence on a firm's external knowledge exploitation, which may stimulate innovativeness (Hung & Chou, 2013). Some studies show that technological turbulence diminishes the benefits of accessing to diverse knowledge through collaborations (Gao et al., 2015) whereas others observe its positive role in taking advantage of partner diversity (De Vaan, 2015). This study suggests that despite the uncertainties associated with technological turbulent environments (Silvestre, 2015; Yeung et al., 2013), in such settings vertically linked stakeholders are likely to align their multiple goals and interests to become more innovative and attain greater performance benefits. This study extends the existing views on the role of

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technological turbulence in a firm's knowledge exploitation and learning by considering the complementary advantages of vertical stakeholder collaborations in facilitating a firm's innovativeness and associated performance in NPD (e.g. De Vaan, 2015; Hung & Chou, 2013).

Second, the existing empirical studies have mainly focused on how a single type of formal mechanism, predominantly contractual agreements, individually and/or in combination with relational mechanisms such as trust-based relations affect stakeholder collaborations (e.g. Cannon et al., 2000; Jones, Harrison, & Felps, 2018). This study contributes to stakeholder research by examining how both legal bonds and operational linkages, as diverse types of formal mechanisms for bonding stakeholders, may affect collaborative stakeholder engagements in NPD (e.g. Felis, Rahman, & Sabac, 2018). Operational linkages are important to consider because they are the types of formal mechanisms which enable vertically linked stakeholders to engage in more integrated interorganizational routines and systems, and may be more effective in enhancing the costs of partner opportunism (Cannon & Perreault, 1999). For example, limited adaptation and integration property of legal bonds may restrain the ability of vertically linked stakeholders to implement proactive strategies for innovation, which may discourage collaborations in technologically turbulent environments. On the other hand, more adaptive and integrated property of operational linkages may provide vertically linked stakeholders with greater opportunities for collaboration in NPD (Ozdemir et al., 2017). It is useful to understand how both legal bonds and operational linkages affect vertical stakeholder collaborations develop effective strategies in NPD. Failing to understand the relative value of these mechanisms may prevent firms to take advantage of collaborative NPD engagements with vertically linked stakeholders.

The next section of this paper reviews background theory of the study and formulates relevant hypotheses for the study. This is followed by the research methodology section, which describes the data collection exercise and relevant constructs of the study. The data analysis section presents the results from measurement validation and hypothesis testing. Finally, the paper concludes with the key findings, and its implications for theory, practice and research.

2. Theory and Hypotheses

2.1. Stakeholder theory and NPD

Stakeholder theory offers a framework for managing the relationships with a wide array of actors who are bound together by the jointness of their interests and expectations (Freeman, 1984; Parmar et al., 2010). Stakeholders are described as “any group or individual who can affect or is affected by the achievement of the organization’s objectives” (Freeman, 1984, p. 46). From a stakeholder perspective, business is viewed as a set of relationships among groups that have a stake in the activities that make up the business (Freeman, 1984; Jones, 1995; Walsh, 2005). It is about how a firm’s internal and/or external stakeholders interact jointly to create and trade value (Parmar et al., 2010).

As NPD activity increasingly involves stakeholders, a stakeholder perspective addresses to the interests of collaboration in the firm’s value creation or innovation. Firms that take into account multiple stakeholders in their NPD are shown to achieve better results (Driessen & Hillebrand, 2012; Harrison, Bosse, & Phillips, 2010; Martin, Reinhardt, & Gurtner, 2016; Talke & Hultink, 2010). Collaborations with stakeholders for developing new products 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

(Rindfleisch & Moorman, 2003; Sivadas & Dwyer 2000; Thomas, 2013; Xu, Wu, & Cavusgil, 2013). Within the context of NPD, past studies often focus on the role of suppliers, customers and/or competitors as the most important stakeholders in the development and/or launch of new products (Kazadi, Lievens, & Mahr, 2016; Mena & Chabowski, 2015; Rindfleisch & Moorman, 2003). Studies show that suppliers serve as ideal sources for achieving superior operational outcomes through speed, quality, design, and price improvements (Belberdos, Carree, Diederer, Lokshin, & Veugelers, 2004; Lhuillery & Pfister, 2009; Nieto & Santamaria, 2007; Talke & Hultink, 2010; Thomas, 2013). Similarly, research institutions and/or universities improve a firm's R&D activities by providing access to unique knowledge and know-how absent within the firm (Bercovitz & Feldman, 2007; Hess & Rothaermel, 2011; Hoang & Rothaermel, 2010; Lane & Lubatkin, 1998). Moreover, scholars suggest that firms should use stakeholder theory to integrate a broader set of relationships involving customers, retailers, and distributors into a model of marketing interactions, resulting in more options for the firm to create value (Parmar et al., 2010; Polonsky, Suchard, & Scott, 1999). 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 create innovative solutions.

Accordingly, this study considers a firm's NPD collaborations with a wide set of vertical stakeholders including customers, suppliers, retailers, governments, research institutions, and/or industrial associations, which hold different positions in the value chain. Due their different roles and activities in the value chain, vertical stakeholders possess complementary resources, which may give rise to efficient and effective collaborations for NPD purposes (Hess & Rothaermel, 2011; Rindfleisch & Moorman, 2003; Vanhaverbeke, Gilsing, Beerkens, & Duysters, 2009). At the same time, it may be challenging to exchange knowledge and engage in learning with vertical stakeholders due to their differences in goals,

interests, and expectations with other firms (Bercovitz & Feldman, 2007).

Past empirical research has widely established the notion that firms, who serve the interests of multiple stakeholders, can achieve greater innovation (Harrison et al., 2010) and higher financial performance (Choi & Wang, 2009; Post, Preston, & Sachs, 2002; Sisodia, Wolfe, & Sheth, 2007). Firms involving in vertical stakeholder collaborations are sometimes engaged in competition for resources and knowledge, but at the same time they are also engaged in cooperation to jointly learn and create value. It becomes challenging for firms, especially in technologically turbulent environments, to decide how they should manage their relationships with stakeholders to facilitate the development of competitive resources, and achieve success. Many stakeholder theorists suggested that the benefits of managing for stakeholders include a stronger commitment by stakeholders to the firm and a greater potential for value creation and competitive advantage (Parmar et al., 2010; Tantalo & Priem, 2016). There is a gap in the literature providing guidance with regard to how firms should manage their relationships with stakeholders while balancing competing stakeholder interests.

To develop a framework for explaining how firms can create value, it is important to understand how a firm's relationships with stakeholders are characterized. Mitchell, Agle, & Wood (1997) identified stakeholder attributes of legitimacy, power, and/or urgency that shape the dynamics of the stakeholder-firm relationships. Suchman (1995) 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" (p.574). A stakeholder may have a legitimate claim on the firm, but unless it has power to impose its will in the relationship or a perception that its claim is urgent, it will not achieve salience for the firm (Mitchell, Agle, & Wood, 1997). A party to the relationship has power to the extent it has the ability to bring about the outcomes it desires (Salancik & Pfeffer, 1974). Power is said to accrue to those who control resources needed by the firm

(Pfeffer, 1981). Finally, urgency represents the degree to which stakeholder claims call for immediate attention (Mitchell, Agle, & Wood, 1997). Urgency can be determined based on the 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 critical if their assets that are specifically tied to a firm cannot be used in a different way without loss of value (Hill & Jones, 1992; Williamson, 1985).

To address the concerns arising from legitimacy, power, and urgency inherent in stakeholders, this study suggests that firms should utilize two formal mechanisms in their collaborations for joint NPD: (1) *legal bonds* (Jensen & Meckling, 1976) and (2) *operational linkages* in the form of activities, procedures, and goals. This renders legitimacy of their actions perceived to be desirable, proper, or appropriate in the context of their NPD collaboration (Suchman, 1995). Firms need to give simultaneous attention to 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 for NPD (Barringer & Harrison, 2000). Particularly under high technological turbulence, the urgency of meeting the legitimate interests of these stakeholders is essential to be able to exploit the benefits of NPD collaborations. As vertically linked stakeholders have more imbalanced power relations, they may have higher levels of mutual dependence for learning new knowledge and capabilities (Rindfleisch & Moorman, 2003).

According to the knowledge transfer studies, learning new capabilities such as firm innovativeness can be achieved by acquiring, sharing, and integrating new and distinctive knowledge through collaborations with multiple vertically linked stakeholders which own non-redundant knowledge and capabilities (Easterby-Smith, Lyles, & Tsang, 2008; van Wijk, Jansen, & Lyles, 2008). The absorptive capacity studies complement this view by suggesting that besides acquiring and assimilating such knowledge, transformation and exploitation of

that knowledge is necessary to develop new and inimitable capabilities, which eventually generate better innovation performance (Lichtenthaler & Lichtenthaler, 2009; Zahra & George, 2002). One limitation of these studies, however, is that they lack a stakeholder perspective, which points at conflicting goals, interests and expectations of diverse types of multiple stakeholders that may represent barriers for exchanging value as well as learning new knowledge and capabilities (Hoskisson et al., 2017).

Importantly, vertical stakeholder collaborations in NPD are continuously at risk of knowledge spillovers, either voluntarily or involuntarily. In such collaborations, the main matter of concern constitutes the self-interest of the participating firms to internalize and appropriate the core proprietary knowledge and capabilities of the other party beyond the scope of collaboration (Yang et al., 2014). Though concerns about involuntary outward spillovers of core proprietary knowledge are higher in collaborations with horizontally connected stakeholders such as competitors, uncertainties regarding the self-interests of the vertically linked partners still exist due to their involvement with several competitive firms (Ozdemir et al., 2017; Thomas, 2013). In addition, since various vertically linked multiple stakeholders (e.g., suppliers, customers, universities, research institutes) often have a greater variety and degree of conflicting interests, they may be more difficult to manage and collaborate to attain value (Madsen & Ulhøi, 2001). However, the previous empirical work is inconclusive about the role of legal bonds in stakeholder collaborations; reporting negative or positive (Weber & Mayer, 2011) as well as insignificant effects (Lee & Cavusgil, 2006), particularly in turbulent environments. As such, the role of legal bonds can be examined in the context of the relation between high technological turbulence and collaborations with numerous vertically linked stakeholders. On the other hand, operational linkages between stakeholders can enhance the value attained through vertical stakeholder collaborations during NPD. More specifically, integrated activities, routines and processes facilitate sharing

and flow of knowledge and experiences between stakeholders (Cannon & Perreault, 1999; Hunter & Perreault, 2007). Despite the importance of operational linkages in NPD, the previous studies have mostly examined their role in supply chain management and operations management (Flynn et al., 2010). Thus, there is a need to understand to what extent operational linkages affect vertical stakeholder collaborations and NPD outcomes including firm innovativeness, which necessitates learning new firm-level skills.

2.2. Mediating role of vertical stakeholder collaborations between technological turbulence and firm innovativeness

Technological turbulence can be related to stakeholder collaborations and firm innovativeness. Technologically turbulent environments are characterized by the frequent and unpredictable changes in technologies of products and their rates of obsolescence (Calantone, Garcia, & Dröge, 2003; Kandemir, Cavusgil, & Yaprak, 2006; Song & Montoya-Weiss, 2001). Accordingly, the occurrence of new technologies in high 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 innovations and forces firms to introduce new or modified products quickly to minimize the threat of product obsolescence (Alexiev et al., 2012; 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. These innovations mostly in complex nature may make it difficult for firms to internally develop the knowledge and capabilities that are necessary to successfully explore them (Cassiman & Veugelers, 2006; Powell, Koput, & Smith-Doerr, 1996). Indeed, high

levels of exploratory learning were shown to facilitate innovation in turbulent environments (Lichtenthaler, 2009). Collaborative partnering with diverse stakeholders provides an efficient and effective arrangement for addressing the inherent uncertainties associated with novel products (de Vaan, 2015). Firms may learn from stakeholders about the latest technological developments in the marketplace (Rindflesich & Moorman, 2001). Accordingly, this study suggests that firms may prefer to initiate collaborations with vertical stakeholders in such turbulent environments as these collaborations allow firms to gain access to complementary technological knowledge and resources without risks of internal development to quickly identify new market opportunities and fasten the launch of new products (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. The mutual dependence for non-redundant and complementary knowledge of the vertical stakeholders in the innovation process may stimulate their knowledge sharing practices and joint learning for innovation and new technologies (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). The intensive communication and interaction between greater number of vertically linked stakeholders constitute driving forces to develop proactive strategies for innovation (Sobrero & Roberts, 2002). When firms enhance the extent of their interaction, they increasingly become familiar with each other, which in turn stimulate the level of their mutual trust and value creation (Tantalo & Priem, 2016). The increased level of trust diminishes the concerns of transferring and sharing innovative knowledge that have the potential to create 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 endeavours and easily adapt to changing market conditions in a proactive way (Calantone, Garcia, & Droge, 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 where firms can have more opportunities to quickly access to novel and unique knowledge rather than individual firms that have to develop knowledge on their own (Gulati, 2007). Thus, we hypothesize that:

Hypothesis 1: Vertical stakeholder collaboration mediates the relationship between technological turbulence and firm innovativeness.

2.3. Mediating role of firm innovativeness between 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 that could share and perform related activities such as suppliers, wholesalers and retailers in diverse industries serving certain product-markets. For example, Cetindamar, Catay and Basmaci (2005) analysed Turkish firms and showed that firms develop collaborations with different partners in their supply chain to achieve better innovation outcomes. The collaborations with vertical stakeholders can give focal firms access to a variety of new and alternative knowledge domains, and increase their

potential to find novel combinations of solutions embedded in new products (March, 1991; Rindfleisch & Moorman, 2003; Vanhaverbeke, Gilsing, Beerkens, & Duysters, 2009; Phelps, 2010; Jiang, Tao, & Santoro, 2010; Quintana-Garcia & Benavides-Velasco, 2008; Lau, Tang, & Yam 2010; Park, Chen, & Gallagher, 2002). Some studies showed that collaborations with customers positively influence new product performance (Freel, 2003; Faems, van Looy, & Debackere, 2005; Miotti & Sachwald, 2003). As such, customers may provide benefits to focal firms in their NPD activities by offering help in identifying market opportunities and gaining new ideas about product solutions (Gupta, Wilemon, & Atuahene-Gima, 2000; Tsai, 2009). Some other studies showed 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 their new scientific knowledge (Caloghirou, Kastelli, & Tsakanikas, 2004; Hemmert, 2004).

This study suggests that vertical stakeholder collaborations of a firm may 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 “out of the box” and become more innovative (Vasudeva & Anand, 2011). These firms with vertically linked partners holding 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; Wang, 2008; Morgan & Berthon, 2008). Given the cyclical process of acquiring and acting on new knowledge in generative learning, firms with vertical stakeholders involve in this type of learning and can enhance their problem solving capacity for innovation resulting in better

new product performance (Morgan & Berthon, 2008). As such, Gumusluoglu and Ilsev's (2009) study conducted in a Turkish context suggests that external support for innovation is a key determinant for innovativeness of software development firms. Thus, it is hypothesized that:

Hypothesis 2: Firm innovativeness mediates the relationship between vertical stakeholder collaboration and new product performance.

2.4. Mediating role of new product performance between firm innovativeness and firm performance

The previous studies suggest that innovation capability is a highly significant determinant of firm performance (Calantone et al., 2002). However, the effect of firm innovativeness on firm performance is contingent on attaining improved new product performance. Previous studies suggest that a firm's innovativeness is a significant predictor of its new product performance (e.g. Cavusgil, Calantone, & Zhao, 2003). However, it is widely agreed that excessive knowledge exploration and orientation for innovativeness may negatively affect firm performance (March, 1991). The previous studies have shown that firms need to have efficient product development processes including faster product development cycle time with cross-functional team integration and successful new product introductions to enhance firm performance (Ittner & Larcker, 1997). More specifically, it has been observed that half of the market and profit success of firms with successful product development practices can be attributed to the gains from their new product introductions (Griffin, 1997). Thus, in order to attain improved firm performance, innovative firms need to enhance their new product performance. Consequently, it can be hypothesized that:

Hypothesis 3: New product performance mediates the relationship between firm innovativeness and firm performance.

2.5. Moderating effects of legal bonds and operational linkages

The legal bonds between firms are mostly suggested to reduce risks of collaboration, facilitate knowledge transfer, and enhance effectiveness of stakeholder collaborations in NPD (Lee & Cavusgil, 2006). This neoclassical approach to cooperation reflects risk averse behaviour of partners especially in industries perceived as technologically turbulent. Since firms utilizing legal bonds attempt to cope with uncertainty of technological turbulence, legal bonds would dissuade risky stakeholder collaboration. Yet, the previous studies report inconsistent findings about the role of legal bonds in stakeholder collaborations under high technological turbulence (e.g. Weber & Mayer, 2011; Lee & Cavusgil, 2006). Negative findings can be attributed to the fact that increasing tendency for knowledge protection through means such as legal bonds may undermine interactions, joint learning, and subsequently performance of stakeholders in NPD (Yang et al., 2014). Particularly, in the context of turbulent business environments, where firms have to face pressures to focus on learning new knowledge and capabilities and deal with unforeseen conditions that may reduce the potential for value capture from stakeholder collaborations (Hoskisson et al., 2017; Kazadi et al., 2016), legal obligations may limit and stifle their ability to adapt the process of knowledge exchange with various stakeholders to the requirements of changing environmental conditions. This may in turn discourage firms to engage in vertical stakeholder collaborations. Thus, it can be hypothesized:

Hypothesis 4: 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 the notion 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. 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; that is, they have something at risk, the prospect of gaining greater or lesser benefits or experiencing greater or lesser harms, as a result of the firm's operations (Post, Preston, & Sachs, 2002). Operational linkages or the coordination of systems, procedures and processes, 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 would exchange resources (e.g., technical and operational knowledge) to implement processes in their NPD. The extant literature mainly concentrates on trust-based relationships rather than operational linkages, which can enhance stakeholder commitment in terms of joint investment and utilisation of resources with a potentially greater impact on stakeholder performance. The previous studies have focused narrowly on the role of operational linkages in collaborative engagements during supply chain management (Prahinski & Benton, 2004), and thereby lacks empirical evidence of the extent to which they may affect the performance of collaborations with multiple stakeholders in NPD. In particular, operational linkages between partners in vertical collaboration would support complementary resources and thus, increase firm innovativeness. This leads to:

Hypothesis 5: Operational linkages positively moderate the relationship between vertical stakeholder collaboration and firm innovativeness.

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3. Research Methodology

3.1. Sample and data collection

We randomly derived a list of 800 high- and medium-high-technology manufacturing firms in Turkey from the Turkish Statistical Institute during the year 2012 (OECD, 2013). The use of random selection strategy is in line with the previous studies on stakeholder research, which has given equal chance of being selected to the firms within their sampling frames in order 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 identify a relevant respondent from the senior management or executive team with the most active involvement in NPD projects, and knowledge and experience in NPD. The screening procedure, which required multiple vertical collaborations for NPD purposes, demonstrated that 548 firms were eligible for the study. This sampling frame consists 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 since firms in these industries have been particularly susceptible to changes in the underlying technologies of their products. Moreover, between 2006 and 2016, the R&D investments and expenditure as a percentage of Turkey's GDP has been amongst the lowest in Europe (Eurostat, 2017). This may be partially because, Turkey has a higher uncertainty-avoidance culture index than several other industrialized economies, which may limited risk taking innovation endeavors (Hofstede, 2001; Ozdemir et al., 2017). While the government support for innovation is limited, there is also a lack of funding for innovation because venture capital and business angel sectors are

underdeveloped (OECD, 2017; Ozdemir et al., 2017; World Bank, 2009). As a result, it becomes crucial for Turkish firms to develop collaborations with vertical stakeholders to access to 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 having a sustained manufacturing sector driven by innovation and R&D is essential for the growth of Turkish economy (TUBITAK, 2011).

A structured Internet-based questionnaire was developed using empirically validated scale items and whenever appropriate anchored using a 7-point Likert scale such as 1=very strongly disagree, 7=very strongly agree (please see Table 2 for details of scale items). The questionnaire was originally designed in English and then parallel-translated into Turkish by two independent translators. Then the parallel translations were 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 adopted a quantitative research method in this study because the main objective of this study is to test certain casual, mediational and moderation effects, and reach generalizable findings (Johnson & Christensen, 2010).

From each respondent firm a single respondent has completed the questionnaire. 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 accounts and finance managers (4%). The respondents of the questionnaire needed to have active involvement in NPD projects involving diverse types of stakeholders, and knowledge and experience of NPD within their respective firms. We sent a personalized message to each target respondent seeking their participation in the research and

assuring participants anonymity. We offered respondents an executive summary of the findings as an incentive for their participation. Two months after the initial emails, a reminder was sent to the non-respondents. We found no statistically significant differences between early and late respondents by computing the t-test results using the study variables (Armstrong & Overton, 1977). 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.

3.2. Measurement

Measurement scales for the study consisted of both established and original scales. All the constructs were measured using reflective scales, which treat measures as a combination of a latent variable and error (Fornell & Bookstein, 1982). We followed the scale development and testing procedures suggested by Churchill (1979) by first reviewing the literature and generating a relevant pool of items, which were subsequently reviewed by five academics that have conducted research on collaborative NPD and stakeholder relationships. On the basis of their review, some of the items were dropped and a small number of them were modified. We identified a few senior managers from the Turkish Statistical Institute directory, explained to them about the study and requested their collaboration. We emailed the managers in advance of the purpose of the study and the interview protocol based on the questionnaire. We conducted interviews with ten managers following a semi-structured format and each interview lasting an average of one hour. In our interview, we have 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. In sum, this measurement development process guided the constructs in the model.

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

Firm innovativeness can be described as a firm level capability, which demonstrates a firm's proactiveness in exploring new opportunities rather than exploiting current strengths (Hult, Hurley, & Knight, 2004; Menguc & Auh, 2006). The scale of this construct was derived from Calantone et al. (2002) and Menguc and Auh (2006). To operationalize this construct, we used 6 items to assess the extent of information seeking for innovative ideas, frequency of trying out new ideas and seeking new ways to do things.

Technological turbulence construct measured the speed and rate of technological change or progress in a particular industry (Jaworski & Kohli, 1993). The items of this construct were drawn 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 number of new products that are based on technological breakthroughs.

Operational linkages construct measured the extent to which the systems, procedures and routines between a focal firm and its vertically linked stakeholders have been linked to facilitate operations to facilitate the flow of knowledge and information (Cannon & Perreault, 1999). The two measurement items were adopted from Cannon and Perreault (1999) and Cannon et al. (2000).

Legal bonds construct was measured using three items and measured the extent to which detailed and binding contractual agreements specifying the obligations and roles of

collaborating partners were used between a focal firm and its vertically linked stakeholders during their collaborative NPD engagements (Cannon & Perreault, 1999). The measurement items of this construct were drawn from Cannon and Perreault (1999) and Cannon et al. (2000).

New product performance was measured using 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.

Firm performance was measured using six items adopted from Kirca, Jayachandran and Bearden (2005) and assessed the extent to which the firms are satisfied with their financial performance including overall firm performance of the business and relative to major competitors, firm's sales growth, growth in return on investment (ROI), firm's profitability, and firm's ROI or internal rate of return (IRR).

4. Data Analysis

4.1. Results from the Measurement Model

The psychometric properties of measures were evaluated using a confirmatory factor analysis (CFA) (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. The CFA was fitted 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 on its latent construct. The chi-square test for our theoretical variables was statistically significant ($\chi^2_{(278)} = 434.16, p < 0.05$). However, the Bentler–Bonett non-normed fit index (NNFI), the comparative fit index (CFI), Bollen’s incremental fit index (IFI), and the root mean square error of approximation (RMSEA) indicated a good fit with the hypothesized measurement model (NNFI = 0.92, CFI = 0.93, IFI = 0.93, and RMSEA = 0.07) (Hu & Bentler, 1999) (Table 1). 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 between 0.83 and 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 for the individual constructs (Fornell & Larcker, 1981). These results showed that the average variance extracted 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 in the measurement model 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. Hypothesis Testing Results

As illustrated in Table 1, 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 were entered as control variables into the model. Table 2 provides the results of the hypothesis testing, along with parameter estimates, their corresponding t-values, and the fit statistics. Though the chi-square test was statistically significant ($\chi^2_{(224)} = 385.12$, $p < 0.05$), the scores achieved for the fit measures showed 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 1 –

– 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 found to be positive and significant ($\beta = 0.25$; $p < 0.05$). Firm innovativeness had a significant 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 ($\beta = 0.50$; $p < 0.01$). The effects of control variables are shown in Table 2.

Hypothesis 1 proposes that vertical stakeholder collaboration mediates the relationship between technological turbulence and firm innovativeness. As indicated above, 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 direct effect of technological turbulence on a firm's innovativeness. We tested this specification through a chi-square difference test (Cannon & Homburg, 2001). The one-degree-of-freedom test compared 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.

Hypotheses 2 proposes that firm innovativeness mediates the relationship between vertical stakeholder collaboration and new product performance. As detailed above, vertical stakeholder collaboration was shown to be 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.

Hypothesis 3 suggests that new product performance mediates the relationship between firm innovativeness and firm performance. As explained above, 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.

Hypothesis 4 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 ($\beta = -0.16; p < 0.05$; 1-tailed test), supporting Hypothesis 4.

Finally, Hypothesis 5 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 ($\beta = 0.18; p < 0.05$; 1-tailed test). Hypothesis 5 was supported.

5. Discussions

The findings of this study show the effect of technological turbulence on firm innovativeness is mediated by vertical stakeholder collaboration. Compared to some other environmental conditions, in the context of technologically turbulent environments, firms would have greater requirement to improve innovativeness skills to be able to develop new products using emerging technologies and succeed in NPD (Calantone et al., 2002). This is because, in such environments, firm 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 greater level of technological newness (Hung & Chou, 2013; Kandemir et al., 2006). In this sense, our finding suggests that vertical stakeholder collaborations help improvement of such capabilities by providing firms access

to valuable non-redundant partner specific knowledge and resources, which are particularly vital in technological turbulent environments. In particular, in technologically turbulent environments, 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 numerous vertically linked stakeholder collaborations can expand knowledge base of the cooperating firms through interorganizational learning (Jiang et al., 2010). In a study by Dusyters and Lokshin (2011), they show that firms considered as innovators have numerous and different types of stakeholder relationships as opposed to imitators and non-innovators. It is also consistent with prior research positing the positive role of knowledge transfer in innovativeness of firms (van Wijk et al., 2008). Our finding also support one of the main tenets of the stakeholder theory that a focal firm's environment (i.e. technological turbulence) will affect its decision for vertical stakeholder collaborations, and its responses (i.e. development of firm innovativeness) will be influenced by vertically linked stakeholders in their collaborations for NPD (Freeman, 1984). Though it may be challenging to exchange knowledge and engage in learning with vertical stakeholders due to their various goals, interests, and expectations (Bercovitz & Feldman, 2007), their mutual reliance for knowledge in technologically turbulent environments may legitimize the urgency of addressing to their collaborators' needs related to NPD.

Stakeholder theory views firms as 'nexus of contracts' (Hoskisson et al., 2017) in the sense that the legal bonds as formal mechanisms bonding stakeholders are suggested to strengthen business relationships, discourage opportunistic behaviour, allocate risk and reward, and preserve options (Bagley, 2008). As opposed to this perspective, our study further shows that in technologically turbulent settings, legal bonds weaken a firm's relationships with its vertically linked stakeholders. In other words, our study observes that legal bonds negatively moderate the effect of technological turbulence on a firm's vertical

collaborations. Our finding suggests that in technologically turbulent settings, legal bonds may restrict a firm's willingness to collaborate with vertically linked stakeholders mainly due to the limiting influence of knowledge protection on joint learning for innovation (Yang et al., 2014).

In addition, our study reveals that the influence of vertical stakeholder collaboration on new product performance is mediated by firm innovativeness. Some studies on alliances, and merger and acquisitions suggest that due to the varying motivations of firms, stakeholder collaborations may influence knowledge transfer and innovativeness negatively (De Man & Duysters, 2005). Indeed, recent studies have found that firm innovativeness is associated with a higher level of unexpected product failure costs (Mackelprang, Habermann, & Swink, 2015). As opposed to these studies, our finding postulate that vertical stakeholder collaborations help a focal firm to achieve improved new product performance through the development of innovativeness skills.

This study further observed that operational linkages as a type of formal mechanism bonding vertical stakeholders positively moderate the effect of vertical stakeholder collaborations on firm innovativeness. With operational linkages, activities and processes, firms facilitate sharing and flow of knowledge and experiences between stakeholders (Cannon & Perreault, 1999; Hunter & Perreault, 2007). From a stakeholder perspective, the importance of operational linkages is based on not only their role as facilitators of knowledge sharing and exchange but also as mechanisms for reducing conflicting goals and interests (Cannon & Perreault, 1999). In NPD, operational linkages between stakeholders ensures the consistency and continuity of their communication and interactions, and have more mutually binding consequences on performance in NPD than arm's length relationships or relations driven by mutual trust. Thus, based on stakeholder view logic, it can be suggested that

operational linkages can enhance the power, legitimacy and urgency of the 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 the studies which have pointed out 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 markets share (Hult et al., 2004; Kyrgidou & Spyropoulou, 2013). Similarly, our findings confirm the view that firms with greater degree of innovativeness can improve their performance in NPD due to their stronger inner motivation and tendency to create highly distinctive new products with the competitive edge (Calantone et al., 2003).

5.1. Theoretical Implications

The literature on stakeholder collaborations displays inconsistent findings on the role of diverse environmental conditions (e.g. market heterogeneity, competitive intensity, environmental turbulence) in the relationship between stakeholder collaborations and innovativeness of firms by observing either some mediation effect or no mediation effect (Alexiev et al., 2016). Our research contributes to the previous studies which have not confirmed the effect of technological turbulence on the exploitation of external knowledge (Hung & Chou, 2013; Jaworski & Kohli, 1993), which stimulates firm innovativeness.

In addition, our study addresses to the inconsistent findings on the role of contracts or legal bonds in uncertain environments characterized by high technological turbulence. While some studies observe that legal bonds work in environmental uncertainty (Krishnan et al., 2016), others report their insignificant effect on the performance of collaborations between stakeholders (Lee & Cavusgil, 2006). The previous studies have overlooked how the outcomes of NPD may be affected by operational linkages in terms of linked procedures and

routines, but mainly concentrate on relational mechanisms such as trust-based relations in interorganizational collaborations (e.g. Jones et al., 2018). The previous studies have rather focused on operational linkages in the context of supplier and/or supply chain relationships and performance (e.g. Flynn et al., 2010; Saccani, Visintin, & Rapaccini, 2014). Nonetheless, these studies have not observed how operational linkages may complement firm innovativeness to achieve superior new product outcomes in supply chain relationships, which predominantly investigate operational performance outcomes (Flynn et al., 2010). This study has contributed to the previous literature examining operational linkages concept in the context of stakeholder relationships during NPD. In this way, our study has also contributed 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, Fang, Fang, & Chou, 2014).

On the one hand, previous research has associated firm innovativeness with performance in NPD (Rubera & Kirca, 2005). On the other hand, some studies on alliances, and merger and acquisitions suggest that due to the varying motivations of firms, stakeholder collaborations may influence knowledge transfer and innovativeness negatively (De Man & Duysters, 2005). We build on the extant literature by suggesting that since vertically linked stakeholders have a breadth of knowledge and capabilities, which are often beyond the knowledge-base of their collaborating partners, they not only help the improvement of innovativeness skills beyond the territory of knowledge and capabilities of their collaborators but also support them to eventually reduce unexpected product failures through improved new product performance (e.g. De Man & Duysters, 2005; Rubera & Kirca, 2005).

Finally, previous research has studied how firm innovativeness may affect new product performance (e.g. Story, Boso, & Cadogan, 2015) and firm performance (e.g. Tsai & Yang,

2013; Rhee et al., 2010) separately. Thus, the literature lacks empirical evidence on whether firm innovativeness can enhance overall firm performance only through improved new product performance. For instance, firm innovativeness has been observed to influence other types of performance outcomes such as export performance (Boso, Story, Cadogan, Micevski, & Kadić-Maglajlić, 2013), which may be also effective in enhancing the overall firm performance. Our findings advance these studies by showing the importance of firm innovativeness in fully utilizing the benefits of NPD on firm performance through superior new product performance.

5.2. Managerial implications

This study offers several important implications for practitioners dealing with such aspects in their businesses today. First, in technologically turbulent environments, it is vital that managers 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 supporting 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 of the fact that in technologically turbulent environments, forming legal bonds with vertically linked stakeholders may become a barrier for incentivising interorganizational collaborations. This is because, technological turbulent environments require firms to have the flexibility to adapt their NPD processes to the requirements of technological changes in the environment. Legal bonds include standards of rules and behaviors (Cannon and Perreault, 1999). Thus, they would bring rigidity to the

process of vertical stakeholder collaborations and limit the adaptability to environmental changes. Managers need to avoid using formal mechanisms such as legal bonds in an inflexible way to be able to exploit the benefit of operating within technology turbulent environments in vertical stakeholder collaborations. Managers may consider finding ways to overcome the limitations imposed by legal bonds on joint innovation practices. For instance, they may attempt to develop trust-based and long-term relationships with their partners to give them the incentive to act independent from the norms and rules imposed by legal bonds to achieve certain collaborative NPD objectives in technological turbulent environments.

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

Finally, it is also vital for managers to understand that during collaboration with vertically linked stakeholders the initial aim needs to be developing the 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 exploitation of current strengths (Hult, Hurley, & Knight, 2004; Menguc & Auh, 2006). If the firm co-develops new offerings that provide a distinctive advantage over the realm of their current offerings, they would be better able to exploit the benefits of vertical stakeholder collaborations in terms of generating improved performance

on the market. If a firm fails to develop innovativeness via vertical stakeholder collaborations, it become less likely for the firm to achieve new product performance as well as at a broader level, the firm would fail to meet the goals set for the overall firm performance.

5.3. Limitations and future research directions

This study has a number of limitations, which can generate fruitful future research avenues.

First, this study has not considered how relative power of stakeholders 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 relations. For example, drawing on the power-dependence relations of stakeholders operating at the upstream and downstream positions in the value chain, studies could examine whether diverse types of vertical stakeholders may have varying effects on knowledge sharing and exchange, and learning of new firm-level capabilities. Similarly, future studies can also focus on the dark side of stakeholder relationships in the context of power-dependence relations. In particular, there could be an investigation into the conflicts between stakeholders, which may arise due to the ethical issues, and exploration of power and dependence relations in reducing the negative effects of such conflicts on the development of innovation related capabilities and NPD performance.

Second, this study only focused on a limited number of mediating variables associated with stakeholder collaborations and learning. Future studies can more deeply conceptualize additional mediating variables such as partner selection process, absorptive capacity, coordination flexibility and knowledge integration mechanisms to examine the relationship between stakeholder collaborations and NPD outcomes (Monczka et al., 1998). Previous

studies have shown that knowledge integration mechanisms can contribute to the effectiveness of a firm's market knowledge on its product innovation performance (De Luca & Atuahene-Gima, 2007). In this sense, further research could examine the extent to which knowledge integration mechanisms can mediate the effect of non-redundant knowledge obtained from the 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, having a flexibility to coordinate dynamic external knowledge within a firm can significantly contribute to the development of firm innovativeness (Zhou & Wu, 2010). In addition, 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 explore and 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 provide a means for exploring new opportunities for innovation (e.g. Rindfleisch & Moorman, 2001; Rindfleisch & Moorman, 2003). Some other studies also suggest that firms ally with their vertical partners in order to achieve cost benefits in NPD (Hoegl & Wagner, 2005). Further research could examine to what extent and how collaborating in vertical stakeholder relationships during NPD is related to cost leadership strategy (e.g. Morgan & Berthon, 2008).

The cross-sectional data of this study means that it is not possible to observe the effect of time or any other contingency factor, which might have contributed to the development of firm innovativeness. Although the sample of firms 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 technological industries only accounted for 10.6% of Turkey's gross domestic product (OECD, 2013). This requires readers to exercise caution in generalizing the findings of this study to other countries. Our findings may be generalized to the developing economies, which are characterized by limited financial resources for innovation, in which vertical stakeholder collaborations may constitute a key source for innovation during NPD endeavors. Thus, future work could design a longitudinal research to examine the effect of stakeholder collaborations over time in other emerging and/or developed countries considering the institutional factors.

5.4. Conclusion

This study has drawn onto stakeholder and organizational learning theories to investigate the role of vertical stakeholder collaborations within technologically turbulent environments in a firm's innovativeness and its eventual performance. The study also examined when and how do 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 their associated outcomes in NPD.

The study has shown that vertical stakeholder collaborations generate firm innovativeness in technologically turbulent environments. The findings also show that while vertical stakeholder collaborations positively influence new product performance, this influence is also contingent on the development of their firm innovativeness in collaborative engagements with vertically linked stakeholders. Developing effective firm innovativeness is found to be important for not only new product performance but also overall firm performance. Our 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 evidenced the important role of operational linkages as another formal mechanism in addition to legal bonds for bonding stakeholders in improving a firm's innovativeness during vertical stakeholder collaborations undertaken for NPD purpose.

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