Impact of Psychological Safety on Supply Chain Operational Performance

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This study examines the relationship between psychological safety and operational performance in the context of supply chain partners, i.e., an inter-organizational setting. While collaboration among supply chain partners enables effective problem solving and generates innovation, such collaborations may result in superior performance improvements when a psychologically safe business environment is created along the supply chain. The analysis of this study is based on data collected from 241 manufacturing companies in China using a survey questionnaire. A confirmatory factor analysis (CFA) was conducted to assess the validity of the measures, and an ordinary least squares (OLS) regression was used to test the hypotheses. Study results indicate that there is a significant positive association between psychological safety and operational performance in the context of supply chain partners. The results further show the relationship to be moderated by the learning orientation and inter-functional coordination. While the effect of psychological safety on performance has been studied in intra-organizational settings, studies on the psychological safety - performance relationship in an inter-organizational setting are scant. This study contributes to the literature in psychological safety and supply chain management as it extends the relationship to the context of supply chain partners.

Keywords: Psychological Safety, Operational Performance, Supply Chain, Learning Orientation, Coordination

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1. Introduction

We contend that a psychologically safe collaborative environment between trading partners is important for operational performance. Such a relationship was established between Proctor and Gamble (P&G) and JLA (a small professional services firm) where JLA helped P&G control material inputs to a production process (Jacobs, 2013). Through its actions, P&G created an environment of mutual respect and openness to new business processes. The relationship proved profitable to both firms in that JLA earned a significant premium on its services while P&G avoided tens of millions of dollars in materials costs and learned new approaches to process management. In contrast, when a relationship is not as safe or open, research has shown that retailers delist the supplier's products at an elevated level (Davies, 1994) and suppliers are dropped at a higher rate (Polyviou et al., 2018).

The P&G – JLA example above illustrates two supply chain partners striving to maximize operational performance and profit. These two firms, in the presence of several different approaches,

chose a common strategy of improving performance through supply chain collaboration (Cousins & Menguc, 2006; Yu et al., 2019a). Paulraj et al. (2008) argue that the inter-organizational communication required to execute such collaborations is a relational competency and a critical factor for performance outcomes for supply chain partners. Jacobs et al. (2016) found that inter-organizational communication is a function of internal communication, and Bendoly (2009) found that increased psychological safety stimulates such internal communication. Thus, fostering such an environment for collaboration between supply chain partners, which may be stimulated by a culture of coordination, is essential for improving organizational capabilities, which in turn influences the operational performance of both supplier and customer organizations (Soosay et al., 2008; Yu et al., 2013). Specifically, integration acts to enable organizational learning (Yu et al., 2013). An orientation toward learning encourages the translating of experiences into guidelines for behavior, which may lead to improved performance; additionally, a culture of coordination may also bear on performance.

It is pertinent to note that supply chain collaborations need to address dynamic environments effectively to create value to all stakeholders. Rapid technological developments, in conjunction with on-going globalization, increasing focus on sustainability, and more frequent supply chain disruptions have contributed to this dynamism and call for creating more effective collaborations (Chen et al. 2017; Duong & Chong, 2020; Soosay & Hyland, 2015). This puts renewed focus on known drivers of successful collaborations such as trust among partners, information sharing, and integration of processes. One approach that enhances the role of these drivers to ensure positive collaboration between organizations is the creation of a psychologically safe environment. When the interfacing functions of supply chain partners interact to gain new knowledge or improve their organizational capabilities, new ideas and information from either party should be exchanged without fear of blame in the event of failure or inadvertent consequences (Jacobs et al., 2016). Ensuring such a psychologically safe collaboration environment is especially important in the presence of power asymmetry between supply chain partners. Power in the supply chain partnership is defined by Maloni and Benton (2000) as "the ability of a supply chain member to control the decision variables in the supply chain strategy of another member in a given chain at a different level of supply chain." If a customer's power in the supply chain partnership dominates that of the supplier's, members of the supplier organization may refrain from sharing new ideas for improvements and innovations with their customer, as they may fear blame from the members of the customer organization for the possible failure.

Given that an unbalanced power relationship can prevail between supply chain partners (Cai et al., 2013; Hogg & Terry, 2000; Maloni & Benton, 2000; Smith & Blanck, 2002), psychological safety can be a key driver for the exchange of ideas between firms. Psychological safety is defined by Edmondson (1999) as "a shared belief amongst individuals as to whether it is safe to engage in interpersonal risk-taking in the workplace." Psychological safety is a multilevel construct and its conceptualization is applied at the individual, team, and organizational levels. Indeed, studies suggest it is positively associated with individual-, team-, and organizational-level performance (Newman et al., 2017).

However, most studies on psychological safety conducted at the organizational level focus on intra-organizational phenomena. Lee et al. (2011) show that promotion of psychological safety can increase the performance of Manufacturing Process Innovation projects. The role of psychological safety in project management has been the focus of related extant work. In the context of supply chain implementation projects, Bendoly (2014) finds that psychological safety mediates the positive role of greater system level understanding on project performance. In the case of R&D projects, Chandrasekharan and Mishra (2012) find that psychological safety enhances project performance indirectly by reducing the employee turnover. In these prior studies, while the focus is on psychological safety they do not consider inter-organizational relationships. On the other hand, there are studies that address the importance of collaboration, communication, and interaction between supply chain partners (Cousins & Menguc, 2006; Paulraj et al., 2008; Yu et al., 2013; Yu et al., 2019a). However, the role of psychological safety is not considered in this stream of work. Therefore, overall, research involving psychological safety between supply chain partners or inter-organizational contexts that influence operational performance is scant.

Using survey data that captures the perceptions of supply chain partners regarding the effectiveness of their collaborative work, our study aims to fill such a gap in the literature by examining the following research questions: i) Does psychological safety influence the improvement of operational performance in a supply chain context?; ii) Do learning orientation and inter-functional coordination moderate the relationship between psychological safety and operational performance?

The remainder of this paper is composed as follows. In Section 2, we review extant literature on inter-organizational collaboration for enhancing operational performance, psychological safety, learning orientation, and inter-functional coordination. Section 3 describes the conceptual framework and hypotheses. In Section 4, we report our research method, including the data collection, instrument

design, and variables. Section 5 provides the analytical results, including tests of the hypotheses. Finally, we conclude with a discussion in Section 6.

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2. Literature Review

Our research questions are broadly related to streams of research related to the effect of psychological safety, learning orientation, and inter-functional coordination on organizational performance. In this section we review extant work along each of these dimensions in the context of our current study. In addition, as our focus is on a more specific metric of organizational performance, i.e., Operational Performance, we also provide an overview of related extant work.

2.1. Psychological Safety

Psychological safety is a critical factor for the continuous improvement of organizational performance. Such performance is realized through collaborations among organizational members. It helps facilitate an environment wherein employees can voice their new ideas for improvements, take actions for improvement without fear of negative consequences, share information, and thereby learn from other organizational members (Edmondson, 1999; Edmondson & Lei, 2014).

The concept of psychological safety was first introduced by Schein and Bennis (1965). They argue that organizational members feel secure and alter their behavior for managing organizational change, as psychological safety creates a work environment that "encourages provisional tries and which tolerates without retaliation, renunciation, or guilt." The qualitative studies of Kahn (1990) reinstated a research focus on psychological safety. He describes psychological safety as a psychological condition that helps individuals better engage at work. Research on psychological safety has proliferated recently, as the importance of learning and performance improvement in organizations has increased (Edmondson & Lei, 2014).

The impact of psychological safety on performance has been studied across different levels of analysis, e.g., individual (Kahn, 1990), team (Edmondson, 1999), and organizational (Frazier et al., 2017). Studies across different levels of analysis consistently indicate that psychological safety is positively associated with performance measures (Edmondson & Lei, 2014; Frazier et al., 2017). Edmondson (1999) shows a positive relationship between team psychological safety and team performance at a manufacturing company in terms of work quality and customer satisfaction. Tucker (2007) investigates the conditions that enable frontline employees (i.e., nurses in hospitals) to initiate

improvements in their work system. She finds that psychological safety is positively associated with the engagement of frontline employees in process improvement activities. Her finding has an important implication because in healthcare settings, taking initiative for an improvement activity involves interpersonal risks stemming from the prevailing power asymmetry of a hospital organization between frontline employees (e.g., nurses) and clinicians with higher status (e.g., physicians) (Tucker, 2007). In an environment where nurses have relatively low organizational power, facilitating psychological safety for nurses can boost the likelihood of them sharing new improvement ideas with others. Baer and Frese (2003) examine and confirm the relationship between organizational level psychological safety and organizational performance in their survey-based study.

In other operations management literature related to project performance, Lee et al. (2011) suggest that psychological safety is positively associated with the process innovation performance (measured in terms of productivity, quality, responsiveness, and technology) of manufacturing improvement project teams. Chandrasekharan and Mishra (2012) study R&D projects and find that psychological safety enables better project outcomes by reducing employee turnover. In yet another work based in a project setting, Bendoly (2014) shows that psychological safety mediates the positive role of better system level understanding on superior project outcomes. Finally, in the context of frontline service operations psychological safety has been shown to improve operational efficiency and employee creativity (Yang et al., 2017).

Other recent work, while not invoking psychological safety as a variable in the analysis, refers to its potential role in the observed results. For example, Dreyfus et al. (2020) posit that better team communication in operating rooms leads to lower unplanned costs. Ried et al. (2020) find that trust between supplier and buyer decreases with information leakage. Zhang et al. (2017) find that social capital enhances both process innovation and mass customization capabilities of firms.

However, as summarized in Table 1, due to scant research on the relationship between psychological safety and operational performance in inter-organizational settings, a focus on such relationships in the supply chain inter-organizational context is warranted.

2.2. Inter-functional Coordination

Coordination among individuals, functions, or departments in an organization can play a critical role in improving operational performance. Narver and Slater (1990) define inter-functional coordination as "the coordinated utilization of company resources in creating superior value for target customers." They consider inter-functional coordination as one of the three components of the market orientation

of an organization (customer orientation and competitor orientation being other two components). They find that a market orientation considering all three components is strongly associated with business profitability. Boyer and Hult (2005) argue that coordination among multiple functions of an organization results in higher overall organizational level performance rather than a focus on improving performance of individual business functions. In particular, they suggest that the coordination and integration between marketing and operations functions can positively influence customers' intentions to purchase products again in the context of internet-ordering and home-delivery grocers. Moreover, Auh and Menguc (2005) find that inter-functional coordination significantly moderates the relationship between top management team diversity and innovativeness. More recently, Rudyanto et al. (2020) find that inter-functional coordination positively influences a company's operational performance in the travel industry context. Amoako et al. (2020) indicate that inter-functional coordination is positively associated with firm performance of small and medium enterprises (SMEs) in western Africa.

In a supply chain context, coordination within the firm has been studied in terms of the internal integration of functions. For example, Braunscheidel and Suresh (2009) find that companies possessing a higher level of internal integration among their functions manifest a high level of supply chain agility, i.e., a company's ability to respond to uncertain market conditions and supply chain disruptions. Wong et al. (2011) find that cross-functional collaboration within a firm (i.e., internal integration) is positively associated with a firm's supply chain operational performance, particularly product quality and operations cost. Internal integration is also found to increase firm profits by increasing process efficiencies (Swink & Schoenherr, 2015). It can also improve purchasing performance and thereby result in an enhanced firm performance as well (Foerstl et al., 2013). Munir et al. (2020) also find a positive association between internal integration and operational performance in a supply chain and show that the relationship is mediated by supply chain risk management. Wekke et al. (2020) examine the moderating effect of inter-functional coordination (i.e., internal integration) in the relationship between purchasing social responsibility and purchasing performance, and between organizational learning and purchasing performance in a food supply chain and find none. Mukhtar and Azhar (2020) conceptually suggest that inter-functional coordination within a firm can benefit the competitiveness of the whole supply chain.

2.3. Learning Orientation

The term *Learning Orientation* is often used in the literature to refer to a proclivity toward organizational learning. A learning orientation implicitly recognizes the benefit of responding and adapting to environmental changes and values the processes that generate such changes (Argyris & Shon, 1978). This notion leads to a perspective expressed by Levitt and March (1988) that organizational learning is a result of translating past experiences into guidelines for future behavior. In general, organizational learning leads to changes in organizational knowledge and affects the firm's competitive advantage (March, 1991). Investments in organizational learning activities that promote a learning orientation are key to enhancing knowledge and skills (Cohen & Levinthal, 1990; Leonard–Barton 1992), which through sustainable development and adapting to technological progress may lead to competitive advantage (Grant, 1996).

Organizational learning occurs through repetition within a narrow range of activities or through interaction with a diverse range of activities (Schilling et al., 2003). Learning orientations therefore benefit from investment across both domains. The traditional view of learning is based on knowledge gained by repetitive activity (Arrow, 1962; Yelle, 1979), while more recent studies have focused on the role of diverse interactions toward organizational learning. These include exposure to diverse systems, socialization mechanisms, and experimentation (Grant, 1996; Henderson & Clark 1999; Nonaka, 1994; Schilling et al., 2003; Tyre & Von Hippel, 1997). For example, a design engineer can benefit from discussions with peers focused on other systems, leading to a combination of diverse capabilities (Kogut & Zander, 1992).

Learning orientation has been largely studied at the organization level, but some studies investigating an inter-organizational context have focused on the learning orientation's indirect effect in promoting relationships among firms (Yu et al., 2013). In the context of supply chain management (SCM), a learning orientation leads to better internal integration, which then promotes more efficient integration with the other entities in the supply chain (Braunscheidel & Suresh, 2009; Yu et al., 2019b). As part of creating value for the customer, SCM also involves the flow of information, along with materials and funds, thereby highlighting the need for coordinating information flows (Warkentin et al., 2001). Coordination requires and results in shared knowledge; it also requires strong inter-organizational relationships to ensure gains for all trading partners (Alhashmi et al., 2006; Choi et al., 2004). In the context of learning orientations involving supply chain partnerships, external integration therefore acts to enable organizational learning (Yu et al., 2013). Learning orientation helps not only with managing existing functions and practices associated with SCM but also with the exploration of new technologies and processes that help in sustaining long term growth and profitability (Ojha et al.,

2018). Based on survey data from manufacturing firms in the UK, Kumar et al. (2020) find that learning orientation enhances the innovation performance of a firm indirectly by influencing the operations strategy and supply chain integration. It can also enhance the market responsiveness of a firm by enabling it to better leverage the resources and competencies of its supply chain partners (Iyer et al., 2019). While the extant work is more related to the positive impact of learning orientation on the various facets of operational performance of the firm, we enrich this discussion by studying the role of psychological safety as an enabler of learning orientation.

2.4. Operational Performance

Operational performance is a multidimensional construct that is often characterized by the competitive priorities from which firms choose to compete, e.g., cost, quality, flexibility, and delivery (Curkovic et al., 2000; Das & Narasimhan, 2001; Droge et al., 2012; Fawcett et al., 2000; Jacobs et al., 2007; Swink et al., 2007; Wong et al., 2011). A review of the literature reveals that it is common to aggregate aspects of these dimensions into a single construct (e.g., Chavez et al., 2015; Swink et al., 2005; Swink et al., 2007). These dimensions are aggregated because businesses must compete and excel across multiple dimensions to survive (Slack et al., 2016). This phenomenon is even more pronounced in developing countries such as China (Boon-Itt & Wong, 2016).

Cost may be the most commonly used measure of performance. It is generally considered that lower unit costs are evidence of a higher level of performance (Slack et al., 2009). It is the lower unit cost that enables a firm to execute price-based strategies ala Dell Computer in the early 2000s or margin maximization ala IBM. Low unit costs also enable the firm to adjust prices dynamically in response to market dynamics (Swink et al., 2005). While cost is an important dimension of performance, it should not be the sole focus of an organization (Beamon, 1999; Chan, 2003), and researchers should consider additional dimensions to develop a fuller understanding of an organization's operational performance (Jacobs & Swink, 2011).

Flexibility has been characterized as the ability to change the mix of products produced, adjust production volume, and modify or create new products readily (Gerwin, 1993; Schmenner & Tatikonda, 2005). It has further been described as the ability to change or deliver new products or experiences as the market evolves (Slack et al., 2009). Thus, through the use of modularity (Jacobs et al., 2011), rapid prototyping, commonality (Closs et al., 2008), or other such strategies, products can be introduced to the market quickly. This ability can be translated to market share gains and a closer alignment between latent needs and product embodiment (Tracey et al., 2005).

Delivery has been conceptualized as the ability to transmit to customers the products or services they desire in the quantity, form, and location desired (Ward et al., 1995). Often firms seek to attain these goals through a focus on lead time reduction (Jacobs et al., 2011) or increased customer integration (Flynn et al., 2010). Dependability, or the ability to establish a track record of on-time orders (Slack et al., 2009), is another important aspect of performance. It is often achieved through process improvements targeted at cycle time reduction (Holweg & Pil, 2005) and, in fact, may be a reflection of an organization's operational capability.

The extant SCM literature suggests a firm's effort in strategic collaboration with its supply chain partners leads to better operational performance (Bayraktar et al., 2009; Flynn et al., 2010; Munir et al., 2020; Rungtusanatham et al., 2003; Schoenherr & Swink, 2012; Wong et al., 2011). For example, Rungtusanatham et al. (2003) discuss the reasons firms benefit from linkages with suppliers and customers for improving operational performances. Drawing on the resource-based view of the firm, they argue that firms achieve higher operational performance through inter-firm relationships, in that a firm's supply chain linkages can be viewed as a resource that benefits the operational performance of a firm and as a capability for obtaining necessary resources. Wong et al. (2011) find a positive relationship between supply chain integration (i.e., strategic collaborations among cross-functional teams within a firm, a firm's strategic collaboration with its suppliers or its customers) and operational performance. They also find that the positive relationship was moderated by environmental uncertainty. Munir et al. (2020) also find a positive relationship between supply chain integration and operational performance. They argue that supply chain risk management mediates the relationship. They find that firms that effectively cope with business environment uncertainty achieve a higher level of operational performance from supply chain integration. Bayraktar et al. (2009) examine the relationship between SCM practices and operational performance based on data from small and medium size manufacturing firms. The SCM practices represent a set of approaches that integrate sourcing, procurement, and collaborative activities of supply chain partners. Their study results indicate that SCM practices are positively associated with operational performance. Truong et al. (2017) also find a positive relationship between the SCM practices and operational performance.

3. Hypotheses Development

As described in Figure 1, we conceptualize the relationships among psychological safety, learning orientation, inter-functional coordination, and operational performance. We propose a hypothesis describing the direct relationship between psychological safety and operational performance, as well as two hypotheses proposing a moderation of the Psychological Safety – Operations Performance relationship.

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3.1. Psychological Safety on Operational Performance in the Supply Chain

There are several reasons psychological safety and performance are related. One is that psychological safety is important to implementing improvement projects (Faraj & Yan, 2009). Improvement projects generally reduce cost through reducing waste or inventory or improve quality. In relation to quality improvement, Tucker et al. (2007) report that psychological safety increases engagement in quality improvement activities. Indeed, quality improvement has been regularly linked in the supply chain literature as a vehicle for improving performance. Additionally, improvement projects may reduce delivery or order cycle times, which can translate to market share gains (Droge et al., 2012) and/or better use of working capital.

There are underlying reasons that improvement projects are facilitated by psychological safety. One is that psychological safety facilitates sensemaking. Sensemaking offers a better understanding of the current predicament and stimulates more alternatives for resolving it. The sensemaking process results in an accurate and shared understanding (Stoverink et al., 2020). Psychological safety drives the frequency and volume of interactions involved in sensemaking (Bendoly, 2014). The result is reduced variation in understanding across actors; this reduction is associated with reducing barriers to solutions, and logically with improved performance. In fact, the ability to focus on a problem's resolution may be what is driving the increased employee satisfaction and retention associated with psychological safety (Faraj & Yan, 2009). It is logical that engaged employees will be more likely to cross organizational boundaries to gain needed information. Securing this additional and potentially critical information will lead to better solutions and ultimately, performance (Druskat & Wheeler (2003). Examples of such boundary spanning activities include procurement staff interacting with an internal engineering organization and with engineers from a customer to secure a component that meets various performance targets; shipping and receiving agents of the supplier and customer

respectively communicating about the timely delivery of materials; and the quality functions of a customer and supplier working together to correct a defect.

Psychological safety and performance have been linked in the literature but never at the supply chain level. For example, Kahn (1990), Singh et al. (2013), Li and Tan (2013), and Li and Yan (2009) show a positive relationship between psychological safety at the individual level and performance. At the team level, Brueller and Carmeli (2011), Edmondson (1999), Faraj and Yan (2009), and Schaubroeck et al. (2011) show a direct link between psychological safety and performance. Direct links are also reported at the organizational level by Baer and Frese (2003), Bendoly (2014), Chandrasekaran and Mishra (2012), and Frazier et al. (2017). While it is logical that the relationship could extend to the supply chain level given that organizational behavior is comprised of individual and team behavior, it is by no means certain. Nevertheless, we hypothesize that:

H1: Psychological safety is positively associated with supply chain operational performance.

3.2. Moderation Effect of Inter-functional Coordination

A firm with a high level of inter-functional coordination is one where its internal functions or departments interact effectively to develop and implement organizational strategies more cohesively (Flynn et al., 2010). As such, a firm with a high level of inter-functional coordination may achieve a high level of operational performance within a supply chain (Flynn et al., 2010). In addition, inter-functional coordination is associated with increased amounts and types of information (Muntaka et al., 2015).

As inter-functional coordination involves the coming together of employees across the organization, it also therefore results in the integration of distant pieces of knowledge possessed by these employees thereby enabling the merging of prior unrelated knowledge. Since value creation is embedded in the chain of events following the hatching of an idea and leading to a useful product, service, or process (Hansen & Birkinshaw, 2007), it is logical that greater numbers of ideas are desirable (Closs et al., 2008). Environments that are supportive and nonthreatening are more likely to result in greater numbers of ideas, and possibly even better ideas (Baer & Frese, 2003). Thus, in a firm with a high level of psychological safety, ideas are generated freely and possibly in greater quantity without fear of blame in the event of inadvertent consequences. Such a firm, in turn, may achieve a high level of operational performance (Edmondson, 1999; Tucker, 2007).

The innovation literature may be a useful illustration as it addresses concepts of ideation and implementation. A key factor found therein is that innovation relies heavily on external partners (Ro et al., 2007), and that valuing innovation causes a firm to be more open to input from partners and collaborating to solve problems (Khazanchi et al., 2007). This result may be attributable to an innovation supportive culture facilitating the alignment of behaviors (Jassawalla & Sashittal, 2002). The principle revealed here is that there is an interaction between practices and values (Detert et al., 2000). This principle is supported by a study of advanced manufacturing techniques, which found that such an interaction was associated with better solutions, and ultimately, firm performance (Khazanchi et al., 2007).

We argue that those generated ideas can then be more easily shared throughout the firm when the level of inter-functional coordination of the firm is high. Also, the ideas can be more effectively implemented as the different functions or departments across the organization effectively coordinate and collaborate when inter-functional coordination is high. In addition, since studies suggest that inter-functional coordination is positively associated with the coordination and integration with supply chain partners (Amoako et al., 2020; Gimenez & Ventura 2005; Munir et al., 2020; Wong et al., 2011,), we can also argue that the generated ideas in an inter-organizational supply chain business environment with high psychological safety can be shared and implemented more effectively by the supply chain partners in a collaborative manner when inter-functional coordination is high. Thus, the relationship psychological safety and operational performance in supply chain contexts is likely to be stronger when the firms value inter-functional coordination. Given the logical ties between elements of psychological safety and inter-functional coordination elaborated upon above, we hypothesize that:

H2: Inter-functional coordination positively moderates the relationship between psychological safety and supply chain operational performance.

3.3. Moderation Effect of Learning Orientation

Higher levels of organizational knowledge positively impact organizational outcomes (Moorman & Miner, 1998). Learning Orientation, through its component dimensions of commitment to learning, shared vision, open-mindedness and intra-organizational knowledge sharing, helps in increasing the organizational knowledge base and results in a positive effect on the firm's performance (Calantone et al. 2002). While section 3.1 highlights the positive relationship between Psychological Safety and

Operational Performance, we contend that this relationship is stronger with a strong learning orientation.

Learning orientation, by its knowledge enhancing role, identifies opportunities for challenging prior assumptions about the market. Psychological safety, coupled with this aspect of learning orientation strengthens the firm's ability to challenge prior assumptions about the market, leading to structural changes that result in better overall performance. In the process, employees are encouraged to question the conventional routines behind organizational actions and think more "outside the box" (Sinkula et. al., 1997). Thus, learning orientation may enhance the effectiveness of such thinking.

Psychological safety promotes a climate of openness where errors are not hidden and opportunities for unplanned interactions may exist among employees across organizational units (Nevis et. al., 1995). Learning orientation, in parallel, helps redefine individual units within an organization, e.g., redefining production systems as learning systems. Any unplanned interactions that originate from a climate of openness are made more productive in the presence of such learning systems, thereby increasing levels of organizational knowledge (Moorman & Miner, 1998), and ultimately leading to a superior operational performance.

A learning orientation also encourages better internal integration of organizational processes and external integration involving customers (Braunscheidel & Suresh, 2009). Recent work by Kumar et. al. (2020) integrating innovation performance highlights the role of learning orientation in enabling better supply chain integration. In such an environment, open-mindedness in the form of questioning current processes and collaborating with supply chain partners is rendered more productive through a learning orientation. We suggest it will result in better supply chain performance.

A climate of openness will also enable employees to explore new technologies and processes to sustain long term growth and profitability. Inculcating a learning orientation should then make this exploration more productive and effective (Ojha et al., 2018) since a learning orientation has been found to enhance the market responsiveness of firms (Iyer et al., 2019). The mechanism has been ascribed to the effective use of the resources and capabilities of the supply chain partners. However, we suggest that a necessary requirement is the open-mindedness, fostered by a learning orientation, among the supply chain partners. If so, a learning orientation is instrumental to using new technology to drive growth.

Overall, if the members of an organization or a network of organizations feel safe to share their knowledge and opinions, it is more likely that these members will share the necessary knowledge and information among themselves, which we expect will influence operational performance. A

stronger learning orientation is expected to make a positive contribution by increasing the effectiveness of knowledge sharing. While it has yet to be established, we argue that this notion can be generalized to a supply chain setting; furthermore, we posit that a work environment where members have a positive attitude toward learning and knowledge sharing complements the role of psychological safety in generating superior operational performance.

As a result, logic suggests it can be seen that learning orientation increases the effectiveness of psychological safety in improving the firm's operational performance. As such, we hypothesize that:

H3: Learning orientation positively moderates the relationship between psychological safety and supply chain operational performance.

4. Research Method

The present study uses a survey employing measures from the literature to gather information about operations and supply chain related concepts from managers of Chinese firms. The data from the survey were analyzed using moderated regression. Details concerning the instrument design, implementation, and subsequent analysis follow.

4.1. Questionnaire Design

Several approaches were adopted in this study that have been recommended in prior studies (e.g., Flynn et al., 2010; Wong et al., 2011; Yu et al., 2019b) to assure content validity and reliability. A review of the literature was performed, along with an evaluation of existing theoretical constructs. This review was used to establish the content validity of the measurement scales. The survey instrument was developed in English and then translated into Chinese. To ensure conceptual equivalence and validity, an independent translator back translated the Chinese version to English, and we then checked the back translation for consistency with the original English version. As a result, some measurement items were reworded to improve translation accuracy. Additionally, due to unique characteristics of the Chinese manufacturing industry, minor modifications of the scales were required (Zhao et al., 2006). This was to assure relevance to business practices and cultural differences in China.

A pilot test was conducted with practitioners and academics prior to distributing the final questionnaire to further establish content validity. Four academics reviewed the instrument, followed

by a pilot of the instrument with manufacturing managers. Their feedback was used to modify or eliminate redundant and ambiguous items, or if necessary, add new items.

Table 2 summarizes the demographic characteristics of the survey respondents. These respondents generally held high-level managerial positions, including CEO/president, vice president, director, or manager. Most had been in their current position for more than five years. Thus, it is reasonable to expect that the respondents were familiar with their firms' business practices and had sufficient knowledge to complete the questionnaire. Table 2 also provides evidence that heterogeneous groups of people and firms (industry type, numbers of employees, annual sales) were included, thus providing additional confidence for using the data in our analysis.

---------- Insert Table 2 ----------

4.2. Measures and Control Variables

Table 3 presents the measures used in this study. The four items for Psychological Safety were drawn from related constructs published by Hult et al. (2002) and Liu et al. (2012). The four items in the Learning Orientation construct were adapted from Hult et al. (2002). The four items in Inter-functional Coordination were adapted from Im et al. (2004). Finally, the five items in operational Performance were adapted from Wong et al. (2011). All items were measured using a seven-point Likert scale, ranging from 1 "strongly disagree" to 7 "strongly agree." Following previous empirical studies (Chavez et al., 2017), operational performance was measured by asking respondents to compare their firm's recent performance to leading competitors within the same industry over the last three years on a seven-point scale (1 = much worse than your major competitors and 7 = much better than your major competitors).

---------- Insert Table 3 ----------

We account for firm size (number of employees), firm age (years since founding), firm location, and industry type as control variables, as they may affect the dependent variable (i.e., operational performance) of our regression model. We control for firm size and firm age, as they are found to be correlated with firm performance in certain contexts (Hansen, 1992; Swamidass & Kotha, 1998; Rossi, 2016). We also control for the geographical area in which a firm is located and the industry to which the firm belongs, given that operational performance could be associated with those factors.

4.3. Sampling and Data Collection

A survey questionnaire was used to gather primary research data from manufacturing firms across major geographical areas of China. A total of seven regions were selected: Pearl River Delta, Yangtze River Delta, Bohai Sea Economic Area, Northeast China, Central China, Southwest China, and Northwest China. The selected regions represent varying stages of economic development in China (Zhao et al., 2006). To obtain a representative sample, we randomly selected 1,000 manufacturing firms from directories provided by the Provincial Economic and Information Technology Commissions in the seven regions (Li et al., 2010). Prior to sending out the questionnaire, we contacted the selected firms by e-mail or telephone to secure key informant contact details and assess willingness to participate in the research. We then sent the questionnaires to 890 firms that had agreed to take part. Follow-up e-mails and telephone calls were used to enhance response rate. After several reminders, 257 questionnaires were received, and 16 were discarded due to missing data. This left 241 useable questionnaires. The effective response rate was 27.1%.

4.4. Respondents and Non-response Bias

Non-response bias was assessed by comparing the demographics of the early respondents with those of the late respondents using two-tailed t-tests (Gefen et al., 2011; Hair et al., 2018). This analysis revealed no significant differences across the demographics, thus suggesting that non-response bias is not a significant problem in this study.

4.5. Validity

As shown in Table 3, all items had statistically significant ($p < 0.001$) factor loadings greater than or near 0.5, except for two items in psychological safety. However, we decided to retain those two items to measure psychological safety for two reasons. First, the two items describe psychological safety (i.e., a shared belief amongst individuals as to whether it is safe to engage in interpersonal risk-taking in the workplace; Edmondson, 1999) in a precise manner and are similar to the measures used in some seminal work (e.g., Edmondson 1999 and Tucker 2007).

The CFA results revealed that the standardized coefficients exceeded twice their standard errors for all items, and the standardized coefficients were large and significant for all variables. Additionally, with regard to the average variance extracted (AVE), none fell below the recommended minimum

value of 0.50. Based on these results, we concluded the constructs and scales had convergent validity (Hair et al., 2010; O'Leary-Kelly & Vokurka, 1998).

4.6. Bias

Because common method bias (CMB) is possible in self-reported questionnaires, we used several approaches to assess it. First, Harman's single-factor test was used. Specifically, a confirmatory factor analysis (CFA) was applied to Harman's single-factor model (Podsakoff et al., 2012). The CFA results indicate that the overall model fit (χ^2/df (1089.965/119) = 9.159, CFI = 0.569, IFI = 0.572, RMSEA = 0.184 and SRMR = 0.122) is unacceptable (Hair et al., 2010; Hu & Bentler, 1999) and significantly worse than those of the measurement model (see Table 3). Second, two measurement models were tested and compared: one model with traits only (multiple factors) and the other with the traits plus a method factor (Podsakoff et al., 2012). The results indicate that the model with a method factor only marginally improved the model fit indices (CFI by 0.040 and IFI by 0.039). Third, a five-item scale measuring demand uncertainty (Chen & Paulraj, 2004) (Cronbach's alpha = 0.741) as a marker variable, which is theoretically unrelated to at least one scale in the analysis (Lindell & Whitney, 2001), was employed. The lowest positive correlation (r = 0.051) between the method variance marker and other variables (see Table 4) was chosen to adjust the correlations among the theoretical constructs and determine the statistical significance of the adjusted correlations (Lindell & Whitney, 2001). Table 4 indicates that all of the significant correlations remain statistically significant after applying the adjustment, suggesting that CMB is unlikely to be a serious concern in the present study. Therefore, based on these results, we conclude that common method bias is unlikely to affect the validity of the research results.

Discriminant validity was assessed by comparing the square root of the AVE for each construct with the correlations with all other constructs in the model (Fornell & Larcker, 1981). As shown in Table 4, the square root of every AVE for each construct is much larger than any correlation among any pair of latent constructs. Thus, the result provides evidence of discriminant validity (Fornell & Larcker, 1981).

---------- Insert Table 4 ----------

5. Analysis Results

Table 5 describes the results of an ordinary least squares (OLS) regression analysis considering three different models. Model 1 only includes the control variables. In model 2, we add the primary independent variable of interest (i.e., psychological safety) and the moderators (i.e., learning orientation and inter-functional coordination). In model 3, we add three interaction terms (i.e., interactions between psychological safety and learning orientation and between psychological safety and inter-functional coordination) in order to test Hypotheses 2 and 3. Our three hypotheses are tested primarily based on model 3. To gain further insights into the moderating effect, we plotted the relationship between psychological safety and operational performance to demonstrate how learning orientation and inter-functional coordination moderate the relationship (Aiken & West, 1991). The results are illustrated in Figures 2 and 3.

---------- Insert Table 5 ----------

First, psychological safety is significantly and positively associated with operational performance ($\beta = 0.433$, p-value < 0.001), indicating support for Hypothesis 1. This finding extends the positive association between psychological safety and performance to the context of inter-organizational supply chain partners.

Second, Hypothesis 2 is supported. The interaction between psychological safety and inter-functional coordination is significant ($\beta = 0.188$, p-value < 0.01). As indicated in Figure 2, in organizations with a high level of inter-functional coordination, the impact of psychological safety on operational performance is higher (i.e., a steeper slope) than in organizations with a low level of inter-functional coordination.

---------- Insert Figure 2 ----------

Lastly, the interaction between psychological safety and learning orientation is significant ($\beta = -0.192$, p-value < 0.01). Although the sign of the coefficient turns out to be negative as opposed the positive direction of the moderating effect of learning orientation proposed in Hypothesis 3, we find that there is a significant moderating effect of learning orientation on the relationship between psychological safety and operational performance. Specifically, the negative sign of the coefficient indicates that when the level of learning orientation is high, the relationship between psychological

safety and operational performance is relatively weak. When the level of learning orientation is low, the relationship between psychological safety and operational performance is relatively strong. In other words, as indicated in Figure 3, organizations tend to perform better when learning orientation is high, even if the level of psychological safety is low.

6. Discussion

6.1. Theoretical Implications

This study makes important contributions to the literature on psychological safety. First, we demonstrate that psychological safety is positively associated with operational performance in the context of inter-organizational supply chain partners. The prior research on psychological safety and performance has been conducted within an organization. Such studies show that psychological safety is positively related with various performance measures at the individual, team, and organizational levels (Singh et al., 2013; Li & Tan 2013; Li & Yan, 2009; Schaubroeck et al., 2011; Brueller & Carmeli, 2011; Edmondson, 1999; Baer & Frese 2003). We contribute to the literature on the relationship between psychological safety and performance by demonstrating the relationship is valid at a different and higher level, specifically inter-organizational supply chain partnerships. Since our performance construct includes measures relating to new product introduction time, production lead times, and customer service, this suggests ensuring a psychologically safe environment could boost the sharing of new ideas and knowledge between partners. This further suggests that increases in psychological safety might mitigate the negative ramifications of power asymmetry in these relationships.

Second, we demonstrate that the level of such a positive association between psychological safety and operational performance between supply chain partners is enhanced when organizations create a culture of strong coordination among inter-functional teams. This finding suggests that teams can be effectively constructed that extend beyond organizational boundaries. The implication is an expansion of the interpretation of the 'teams' literature. Specifically, the extant research has focused largely on inter-functional coordination of teams and its effect on performance, we extend the notion of coordination to the supply chain level. Similar to the synchronization of organizational units or teams to achieve a firm's operational goals, the performance of a supply chain also relies upon the synchronization of units and teams across the various supply chain partners. Hence strong coordination among these entities and teams, which is enabled by psychological safety, promotes decision making that is aligned and as such more effective. In essence, the role of coordination translates to an inter-firm team setting, which is the essence of a supply chain. While organizations

that establish a strong coordination culture (where different functions support and collaborate among one another) are more effective in solving operational issues, we find that such organizations are likely to create a supportive team like environment with their supply chain partners and as a result achieve a higher level of operational performance. This finding is a contribution to both the 'teams' literature and another contribution to the psychological safety literature.

Third, this study indicates that the level of association between psychological safety and operational performance among supply chain partners also depends on the organization's orientation toward learning. An interesting finding is that the interaction between learning orientation and psychological safety is negative. The interpretation of this finding is that while learning orientation and psychological safety independently have a positive association with operational performance, in the presence of both, the positive association with operational performance is weaker when one of the two is at a higher level. Specifically, as illustrated in figure 3, the complementary role of a higher learning orientation is larger when the psychological safety is at a low level. The complementary role decreases as the psychological safety increases, indicating diminishing returns. Lastly, there could be a contingency effect. Specifically, in an environment with a low level of learning orientation, ensuring psychological safety becomes more important for operational performance. In other words, ensuring a psychologically safe relationship among supply chain partners is more essential in improving operational performance when learning orientation is absent or low in their organizations. This suggests that there may be a threshold effect. There may be a point which additional levels of either LO or PS provide no additional benefit. Resolving which of the potential explanations is correct, or if there is a threshold level, what that level might be, is a point of future study.

6.2. Managerial Implications

In a global business environment, where firms are increasingly becoming intertwined with supply chain relationships, the results from our study have several relevant managerial implications. One implication pertains to information sharing. While information sharing is known to enhance supply chain performance, the results from this study specify the mechanisms that enable gains from information sharing. Specifically, while a technology infrastructure can help coordinate codifiable information across the supply chain, the sharing of knowledge that is not codifiable relies upon interactions among people. Our results show that inculcating a high degree of psychological safety is effective in achieving this. Healthcare provides an example. Our results suggest that provider

organizations and payer organizations could work together more effectively for the benefit of patients by increasing the level of psychological safety.

Supply chain performance also involves the capability to resolve conflicts among the partners. Learning orientation in the form of open mindedness to new ideas and perspectives is effective in building an environment that is conducive to amicable conflict resolution. Coordination in the form of noncodified knowledge embedded in people-to-people networks can be leveraged to preemptively dissipate factors that can lead to conflicts. Dedicated personnel from each partner in the supply chain that have deep network connections can be designated as focal points to ensure the potential that disagreements will be detected early on so that each partner will have sufficient time to develop work-around strategies.

The findings of our study include an interaction effect between psychological safety and inter-functional coordination. This has implications for innovation processes in the new product development process by supply chain partners. Specifically, innovation is increasingly a supply-chain phenomenon driven by inter-functional coordination (more managerially, collaboration across functions) and not the product of a single entity (Blackhurst et al., 2015). In fact, the role of psychological safety may be even more critical in the case of new product introduction by supply chain partners. Since innovation involves risk taking, supply chain partners must support each other in working for a common cause. Knowledge regarding any failed strategies or errors in new product development must be shared freely and tolerated. Interfirm team building opportunities should be encouraged to strengthen the social networks so that the resulting coordination will further enhance the effectiveness of new product development. The coordination that develops due to these measures can also decrease the time to market as design of production systems can be pulled forward and as such enhance supply chain performance.

Finally, we call attention to the moderating effect of IFC on the PS-performance relationship. Managers should understand that pursuing PS is useful to improving performance, but they should be mindful of the fact that they can see greater gains in some environments than others. Specifically environments with a high level of IFC.

6.3. Conclusions and Directions for Future Research

Partner firms in a supply chain advance their technology and operational performance as they collaborate for a common goal of developing new products or processes (Koufteros et al., 2002). Such collaboration can be reinforced when a psychologically safe environment is established. With this

study, we make meaningful contributions to the psychological safety literature, as well as the supply chain management literature. First, we found that the positive influence of psychological safety on the operational performance exists among inter-organizational supply chain. Given that the extant literature reports a positive association between psychological safety and performance at the individual, team, and organizational levels, our study extends this positive association to inter-organizational settings.

Second, we found two moderating effects that influence the strength of the association between psychological safety and operational performance. Our findings indicate that the positive association between psychological safety and operational performance is enhanced when the level of coordination within firms is high, but not when the level of learning orientation in firms is high. Understanding the nature of this particular relationship, and which of the potential explanations offered in section 6.1 are correct, is recommended as an area for future study.

While our study contributes to the academic literature and provides insights to supply chain practitioners, a few limitations are identified. First, the positive association between psychological safety and operational performance focuses on the supply chain context, where power between the supplier organization and customer organization is not balanced. We recommend additional studies on the impact of psychological safety on performance in different inter-organizational settings, such as strategic alliances. Second, the data for this study were collected from Chinese manufacturing companies. To generalize our findings, future studies should be carried out in other countries or regions.

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Table 1: Summary of Extant Work relating Psychological Safety to Firm Level Performance Outcomes

Study	Context	Impact of Increased Psychological Safety
Edmondson (1999)	Team Performance	Increases the term performance
Baer and Frese (2003)	Effect of Process Innovations on Firm Performance	Psychological safety positively moderates the relation between process innovations and firm performance
Tucker (2007)	Improving the performance of frontline employees	Psychological safety reduces operational failures and improves frontline systems
Lee et.al. (2011)	Technical Performance of Manufacturing Process Innovation projects	Team psychological safety improves the project outcomes
Chandrasekharan and Mishra (2012)	New Product Development projects in High Technology Companies	Psychological Safety indirectly influences project performance by decreasing team turnover
Bendoly et.al. (2014)	Effect of the understanding of project dynamics on project performance	Psychological Safety mediates the relationship between a better understanding of project dynamics and project performance
Yang et. al. (2017)	Operational efficiency and employee creativity in frontline service operations	Psychological safety improves operational efficiency and employee creativity
Knoppen and Saenz (2017)	Efficiency and agility in buyer-supplier teams	Psychological safety enhances innovation, efficiency and agility

Note: the scope of the work has been predominantly intra-organizational.

Table 2: Demographic Characteristics of Respondents (n = 241)

	Percent (%)		Percent (%)
Industries		**Respondent location (geographical regions)**	
Automobile	30.7	Pearl River Delta	8.7
Chemicals and petrochemicals	10.4	Yangtze River Delta	8.7
Electronics and electrical	12.4	Bohai Sea Economic Area	20.7
Fabricated metal product	6.2	Northeast China	1.7
Food, beverage and alcohol	13.7	Central China	14.9
Rubber and plastics	2.5	Southwest China	38.6
Textiles and apparel	4.6	Northwest China	6.6
Others	19.5	**Job titles**	
Number of employees		President / Chief executive officer (CEO)	5.4
1 – 100	19.1	Vice President	7.1
101 – 200	15.4	Director	4.6
201 – 500	13.3	Manager	49.4
501 – 1000	8.7	Other senior executive	33.6
1001 – 3000	17.8	**Firm ownership**	
> 3000	25.7	State-owned manufacturer	30.7
Annual sales (in million Yuan)		Private Chinese manufacturer	45.2
Below 10	10.0	Wholly foreign-owned manufacturer	10.4
10 – 50	15.8	Joint venture manufacturer	13.7
50 – 100	10.4	**Firm age (years)**	
100 – 500	17.0	≤10	26.6
500 – 1000	12.9	11 – 20	39.8
Above 1000	34.0	21 – 30	9.1
Years in current position		> 30	24.5
≤ 5	45.2		
6-10	24.5		
> 10	30.3		

Table 3: Measurement Items and CFA Results

Measurement Items	Factor loadings	t-values	Cronbach's alpha	Composite reliability	AVE
1. Psychosocial safety			0.72	0.77	0.50
People are not penalized for new supply chain ideas that do not work.	0.33	–			
Our supply chain partners do not discriminate but treats us impartially.	0.45	4.29			
The representatives from our supply chain partners respect each other.	0.93	5.16			
The representatives from our supply chain partners are friendly to each other.	0.91	5.16			
2. Learning orientation			0.81	0.81	0.53
The sense around here is that employee learning is an investment, not an expense in the supply chain.	0.75	–			
The basic values of this supply chain process include learning as a key to improvement.	0.86	11.59			
Once we quit learning in the supply chain we endanger our future.	0.63	9.10			
We agree that our ability to learn is the key to improvement in the supply chain process.	0.64	9.25			
3. Inter-functional coordination			0.85	0.85	0.60
We freely communicate information about our successful and unsuccessful customer experiences across all business functions.	0.63	–			
All of our business functions (e.g., marketing, manufacturing, R&D, finance) are integrated in serving the needs of our target markets.	0.72	9.22			
All of our managers understand how everyone in our business can contribute to creating customer value.	0.88	10.54			
All functional departments work hard to thoroughly and jointly solve problems.	0.83	10.26			
4. Operational performance			0.90	0.90	0.65
Quickly introduce new products into the market.	0.72	–			
An outstanding on-time delivery record to our major customer.	0.88	13.35			
The lead time for fulfilling customers' orders is short.	0.89	13.52			
Provide a high level of customer service to our major customer.	0.84	12.67			
Produce products with low costs.	0.68	10.25			
Model fit statistics: χ^2 = 307.443; df = 113; χ^2/df = 2.721; RMSEA = 0.085; CFI = 0.914; IFI = 0.915; SRMR = 0.067					

Table 4: Descriptive Statistics

	Mean	S.D.	PS	LO	IFC	OP
Psychological safety (PS)	5.070	0.871	**0.706**[a]	0.272**	0.542**	0.504**
Learning orientation (LO)	5.214	1.080	0.309**	**0.725**	0.390**	0.309**
Inter-functional coordination (IFC)	5.065	1.077	0.565**	0.421**	**0.772**	0.425**
Operational performance (OP)	5.267	1.051	0.529**	0.344**	0.454**	**0.807**
Method variance marker (Demand Uncertainty)	3.832	1.139	0.105	-0.005	0.051	-0.025

Note: [a] Square root of AVE is on the diagonal; unadjusted correlations appear below the diagonal; adjusted correlations for potential common method variance appear above the diagonal.

** $p \leq 0.01$.

Table 5: Results of Regression Analysis

	Model 1	Model 2	Model 3
Control Variables			
Firm size	0.061 (0.652[a], 2.233[b])	0.095 (1.228, 2.251)	0.086 (1.139, 2.263)
Firm age	-0.085 (-1.053, 1.661)	-0.124 (-1.866, 1.668)†	-0.123 (-1.883, 1.675)†
Industry-Automobiles	0.220 (2.813, 1.566)**	0.230 (3.490, 1.634)***	0.228 (3.541, 1.635)***
Industry-Food, beverage & alcohol	0.136 (1.725, 1.588)†	0.015 (0.230, 1.665)	-0.001 (-0.011, 1.680)
Industry-Electronic & electrical	0.089 (1.210, 1.393)	0.037 (0.597, 1.423)	0.017 (0.290, 1.434)
Industry-Chemicals & petrochemicals	-0.006 (-0.088, 1.255)	-0.008 (-0.140, 1.263)	-0.017 (-0.294, 1.265)
Region-Bohai Sea Economic Area	-0.217 (-2.514, 1.909)*	-0.059 (-0.809, 2.027)	-0.055 (-0.765, 2.029)
Region-Central China	-0.137 (-1.826, 1.456)†	-0.060 (-0.950, 1.481)	-0.053 (-0.857, 1.500)
Region-Southwest China	-0.205 (-2.559, 1.641)*	-0.142 (-2.132, 1.673)*	-0.170 (-2.588, 1.704)**
Ownership-State	-0.078 (-0.768, 2.654)	0.105 (1.218, 2.776)	0.059 (0.693, 2.843)
Ownership-Private	0.035 (0.330, 2.964)	0.185 (2.055, 3.053)*	0.158 (1.795, 3.076)†
Ownership-Foreign	-0.003 (-0.037, 1.792)	0.089 (1.276, 1.829)	0.082 (1.201, 1.840)
Independent Variable			
Psychological safety (PS)		0.415 (6.386, 1.587)***	0.433 (6.796, 1.605)***
Moderators (Direct Effect)			
Inter-functional coordination (IFC)		0.162 (2.395, 1.717)*	0.083 (1.199, 1.905)
Learning orientation (LO)		0.106 (1.790, 1.312)†	0.185 (2.959, 1.543)**
Interaction Effect			
PS × IFC			0.188 (3.046, 1.511)**
PS × LO			-0.192 (-3.211, 1.420)**
R^2	0.112	0.403	0.436
Adjust R^2	0.066	0.363	0.393
F-value	2.408**	10.112***	10.160***

*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; † $p \leq 0.10$.

Note: The numbers in parentheses are [a] t values and [b] variance inflation factor (VIF); dependent variable is operational performance; omitted categories in the regression are baseline categories.

Figure 1. Conceptual Framework

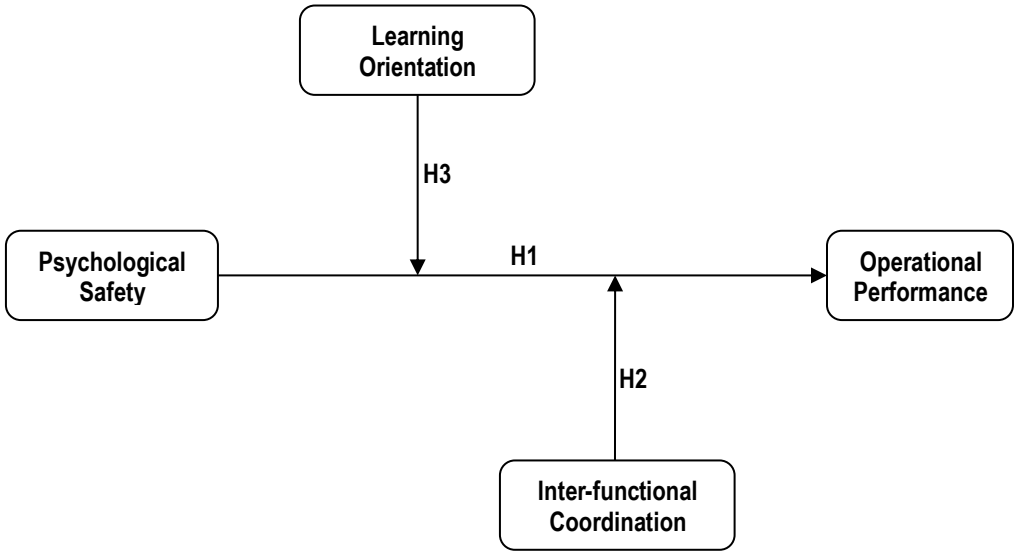

Figure 2: Moderating Effect of Inter-functional Coordination on the Relationship between Psychological Safety and Operational Performance

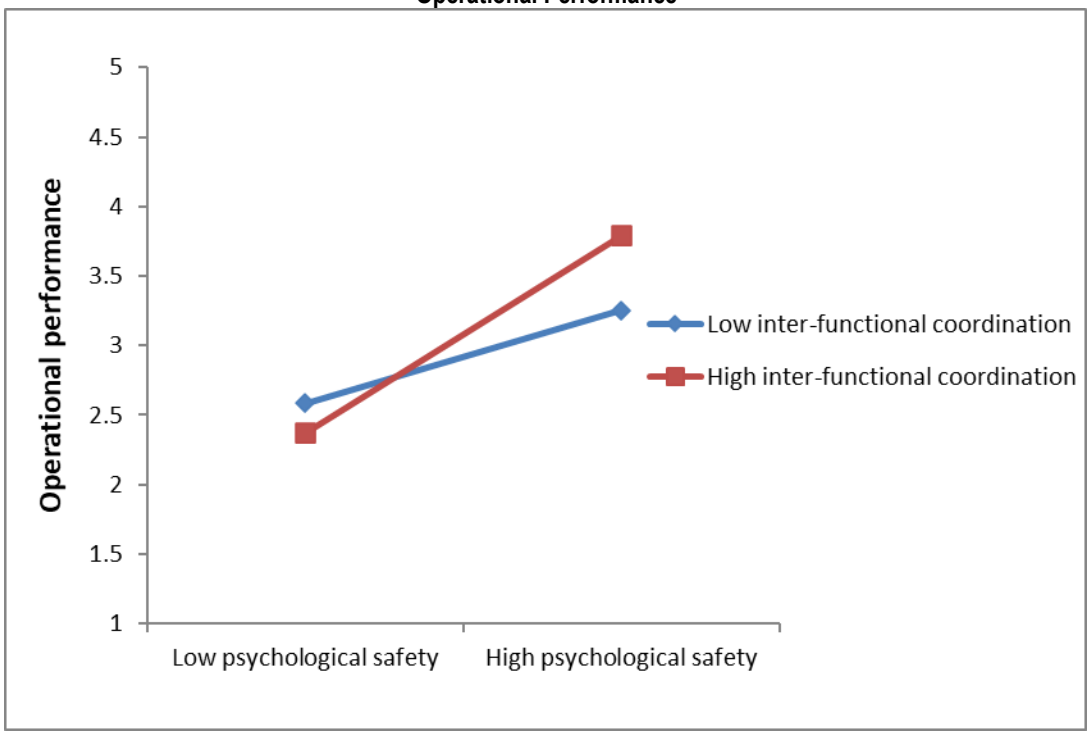

Figure 3: Moderating Effect of Learning Orientation on the Relationship between Psychological Safety and Operational Performance