Effects of institutional support on innovation and performance: Roles of dysfunctional competition

Abstract

Purpose This study aims to empirically investigate the effects of institutional support on product and process innovation and firm performance and describe how dysfunctional competition influences relevant outcomes.

Design/methodology/approach This study develops a research model based on institution-based view and tests it using structural equation modeling and empirical data collected from 300 manufacturers in China.

Findings The results show that institutional support positively affects product and process innovation and firm performance. Both product and process innovation improve firm performance. The findings reveal that dysfunctional competition significantly reduces the positive effects of institutional support on product and process innovation but leaves the effects of institutional support and product and process innovation on firm performance unaffected.

Originality/value This study contributes to innovation literature by providing insights into the impact of China's institutional environment on manufacturing firms' product and process innovation decisions. The findings also contribute to institution-based view literature by providing empirical evidence on the joint effects of institutional support and dysfunctional competition on product and process innovation and firm performance. This study can help manufacturers in China take advantage of institutional environment and adjust product and process innovation decisions accordingly.

Keywords: institutional support; dysfunctional competition; innovation; performance; China

1. Introduction

Chinese manufacturing firms have made remarkable achievements on both product and process innovation (Zhang *et al.*, 2015). For example, China now ranks the first worldwide in terms of the number of patent applications by residents and has had the fastest annual growth in the world for several years (World Intellectual Property Organization, 2015). The Chinese government plays a major role in promoting innovation by providing institutional support (Li and Zhang, 2007; Sheng *et al.*, 2013; Zhang *et al.*, 2015). For example, national investment in science and technology accounted for 4.4% of the government's annual financial expenditure in 2014 (National Bureau of Statistics, 2014). The Chinese government has also introduced policies to transform China into a knowledge-based economy and improve firms' independent innovation in the 15-year medium-to-long-term plan for the development of science and technology (2006–2020) (Parayil and D'Costa, 2009). Institutional support refers to the extent to which government and its agencies give support to firms in order to mitigate the negative effects of inadequate institutional infrastructure (Li and Atuahene-Gima, 2001). Support from the government and its agencies can provide firms with low-cost resources (Qian *et al.*, 2013) and reduce policy uncertainty (Peng *et al.*, 2009) and so promote innovation (Li and Atuahene-Gima, 2001; Qian *et al.*, 2013). However, empirical findings of the effectiveness of institutional support have been inclusive, and some studies show no positive relationship between institutional support and innovation (Sheng *et al.*, 2011; Shu *et al.*, 2015).

China's institutional environment is also characterized by legal inadequacy and enforcement inefficiency (Sheng *et al.*, 2013; Wang *et al.*, 2011; Wang *et al.*, 2015). Firms may suffer from patent and copyright violation, widespread copying of original inventions, and breaches of contract and other agreements (Zhao, 2006; Zhou and Poppo, 2010). This institutional environment leads to dysfunctional competition, which refers to the extent to which firms' competitive behavior is unfair or unlawful, such as copyright and patent infringement (Li and Atuahene-Gima, 2001). In this way, dysfunctional competition may negatively affect firms' capabilities to profit from new

products and processes (Li and Atuahene-Gima, 2001; Li and Zhang, 2007; Li and Li, 2009) and attenuate the effectiveness of institutional support (Guo *et al.*, 2014; Lu *et al.*, 2008). The institutional environment in China thus may have mixed effects on manufacturing firms' product and process innovation (Parayil and D'Costa, 2009; Zhou and Poppo, 2010; Qian *et al.*, 2013). However, there is limited empirical evidence on how the effects of institutional support on product and process innovation and firm performance are influenced by dysfunctional competition.

This study aims to empirically investigate the joint effects of institutional support and dysfunctional competition on product and process innovation and firm performance in China. It focuses on two research questions. First, how does institutional support affect product and process innovation and firm performance? Second, how does dysfunctional competition moderate these relationships? The findings of this study can benefit researchers, practitioners, and policy makers. In particular, it extends current knowledge of the impact of institutional environment on product and process innovation and firm performance, contributing to innovation and institution-based view literature. The findings can also help managers develop a better understanding of the institutional environment in China and adapt innovation strategies and practices accordingly. In addition, this study can offer guidelines to policy makers in the Chinese government to devise programs and regulations to promote innovation and development.

2. Theoretical background and hypotheses

2.1 Institutional support

Institutional support is a general reflection of financial and technical support from government and its agencies, which provide firms with critical resources that they may use for innovation and development (Li and Atuahene-Gima, 2001; Sheng *et al.*, 2013; Shu *et al.*, 2015). Support from the government and its agencies allows firms to interpret policies and program correctly, decreasing environmental uncertainty (Peng, 2003; Ma *et al.*, 2014; Zhang *et al.*, 2015). Researchers argue that institutional support plays an important role in Chinese firms' innovation strategies (Guo *et al.*, 2014; Qian

et al., 2013; Sheng *et al*., 2011; Shu *et al*., 2015). However, empirical studies have reported mixed findings on the effectiveness of institutional support. For example, Li and Atuahene-Gima (2001) find that institutional support positively influences product innovation and performance. Sheng *et al*. (2011) discover that institutional support reduces the effects of political ties on firm performance. Hence, there is a tangible need to identify the mechanisms through which institutional support affects innovation and firm performance.

2.2 Dysfunctional competition

Dysfunctional competition reflects managers' perception of legal protection against opportunistic or illegal activities in the market (Sheng *et al*., 2013; Li and Zhang, 2007). It can drive firms to take action to respond to challenges in institutional environment. Researchers argue that dysfunctional competition hampers firms' capability to fully reap the potential benefits of innovation and negatively influences their performance (Li and Atuahene-Gima, 2001; Li and Li, 2009). For example, Li and Zhang (2007) find that dysfunctional competition can reduce the positive effects of managers' functional experiences on the performance of new ventures. Sheng *et al.* (2013) report that dysfunctional competition influences the effects of the speed of new product development on firm performance. However, there is limited empirical evidence on how dysfunctional competition affects the effectiveness of institutional support.

2.3 Product and process innovation

Innovation refers to new applications of knowledge, ideas, methods, and skills that can leverage a firm's competitiveness (Tellis *et al.*, 2009; Ho, 2011; Ruiz-Jiménez and Fuentes-Fuentes, 2013). The innovation subject can be either a product or a process (Gunday *et al*., 2011; Un and Asakawa, 2015). Product innovation refers to the new products introduced to meet market demands and increase profits (Damanpour, 2010). Process innovation can be defined as the new techniques and processes introduced into operations that help to promote efficiency or effectiveness, and lower the costs of production and delivery (Un and Asakawa, 2015; Gunday *et al*., 2011). There is empirical evidence that product and process innovation

are positively associated with firm performance and can bring firms sustainable competitive advantages (Schoenherr and Swink, 2015; Kostopoulos *et al*., 2011; Tellis *et al*., 2009; Ho, 2011). Researchers argue that product and process innovation have different objective and competitive impact (Un and Asakawa, 2015). However, the majority of existing empirical studies on the impact of institutional environment on innovation have focused only on product innovation (Guo *et al.*, 2014; Li and Atuahene-Gima, 2001; Wang *et al.*, 2011; Ma *et al.*, 2014). Hence, empirically investigating the joint effects of institutional support and dysfunctional competition on process innovation and comparing the findings with those of product innovation can contribute to innovation literature (Damanpour, 2010; Un and Asakawa, 2015).

2.4 Institution-based view

Institution-based view emphasizes dynamic interactions between institutions and organizations and views organizational behavior and strategic choices as the outcomes of these interactions (Peng, 2002; Peng *et al*., 2009). This view has been widely used to investigate how institutions affect firms' decisions and performance (Peng *et al.*, 2008; Peng *et al.*, 2009; Peng, 2013; Fuentelsaz *et al*., 2015) and so provides a theoretical foundation for this study. Institutions set legitimate requirements for and provide external resources supporting firms' operations (Fuentelsaz *et al*., 2015; Lu *et al*., 2008; Peng *et al*., 2009; Peng, 2013). Firms' strategic choices are made within institutional constraints (Peng, 2003). In particular, formal and informal institutions form a compensatory infrastructure that advises firms of which strategic choices are acceptable and supportable (Peng, 2002). Informal institutions play a bigger role when formal ones are unclear or fail (Peng *et al*., 2009). Institution-based view argues that institutions directly determine strategy formulation and implementation (Peng, 2002) and managers pursue their rational interests and make decisions within a given institutional framework (Peng, 2006). Given China's underdeveloped market mechanisms, institutions play a significant role in influencing Chinese firms' behavior and decisions (Guo *et al*., 2014; Sheng *et al*., 2015).

2.5 Hypotheses

Drawing on the institution-based view, it is here argued that institutional support

motivates Chinese firms to invest in product and process innovation because the Chinese government has designed policies and programs to signal firms that innovation is legitimate (Parayil and D'Costa, 2009; Peng, 2006). Firms with competitive advantages in new product and process development are rewarded by the government (Sheng *et al.*, 2013) and their success inspires other firms to model themselves after the innovators and make more investments in innovation (Peng, 2003). Institutional support also allows firms to access critical resources provided by the government, which helps them innovate and improve operations, which in turn improve performance (Li and Zhang, 2007). In addition, managers' decisions are constrained by institutional environment (Peng *et al.*, 2008). High levels of dysfunctional competition indicates that it is difficult for firms to protect their intellectual property rights and that their product and process innovation will be easily copied or imitated by competitors (Li and Atuahene-Gima, 2001). The innovators then are not able to fully capture the profits generated by their inventions. Hence, we argue that dysfunctional competition reduces the positive impact of product and process innovation on firm performance. Moreover, high levels of dysfunctional competition indicate that managers may be behaving opportunistically and misusing institutional support earmarked for innovation and development for personal interests. It also becomes difficult for government officials to devise effective policies and supportive programs (Peng, 2006). For this reason, we argue that dysfunctional competition attenuates the effects of institutional support on product and process innovation and firm performance. The conceptual model is shown in Figure 1.

Insert Figure 1 here

2.5.1 The effects of institutional support on product and process innovation

We argue that institutional support plays a significant role in promoting product and process innovation. China lacks market-supporting institutions, and the rules for market competition remain unpredictable and unclear (Wang *et al.*, 2011; Zhou and Poppo, 2010). Support from the government has become an important tool for firms to deal with market uncertainty (Li and Atuahene-Gima, 2001), and it has significantly

influence on Chinese manufacturers' long-term strategy and investment decisions (Peng *et al.*, 2008). Product innovation is a resource-consuming activity and poses many challenges to manufacturers because of the lack of financial and technical resources, poor management skills and capabilities, and uncertain business and institutional environments (Guo *et al*., 2014; Sheng *et al.*, 2013). Institutional support provides critical external resources that foster the development of new products and favorable policies and regulations that protect intellectual property rights, and rewards innovators by granting legitimacy (Ma *et al*., 2014; Li and Atuahene-Gima, 2001; Shu *et al*., 2015; Peng *et al*., 2009). Hence, institutional support motivates firms to invest in and improves their capabilities for product innovation (Lu *et al.*, 2008; Guo *et al.*, 2014; Shu *et al*., 2015).

Process innovation is a complex and risky activity that requires tacit knowledge and experienced employees (Un and Asakawa, 2015; Damanpour, 2010). The technical information and support provided by the government and imported advanced technologies allow Chinese manufacturers to learn skills and knowledge from foreign competitors (Morgan and Berthon, 2008), which can significantly improve process innovation (Shu *et al.*, 2015). Using financial support from the government, Chinese companies can adopt new facilities and equipment and hire global talent, which allow them to implement advanced processes designs used by foreign competitors and develop new processes to improve the efficiency and effectiveness of production and delivery operations (Qian *et al.*, 2013; Shu *et al.*, 2015). Thus, we propose the following hypotheses:

H1a: Institutional support is positively associated with product innovation.

H1b: Institutional support is positively associated with process innovation.

2.5.2 The effect of institutional support on firm performance

The Chinese government and its agencies actively participate in business planning and guide economic activities, giving them an important role in firms' operations and strategic decisions (Cai *et al*., 2010; Zhou and Poppo, 2010). Institutional support indicates that the government and its agencies favor specific firms (Peng, 2002; Guo *et al*., 2014), so the firms can receive external financial and

technical resources at little cost (Sheng *et al.*, 2011). These resources can help the firms learn technologies from advanced competitors, enabling the firms to optimize production and supply chain operations and improve performance (Cai *et al.*, 2010; Shu *et al*., 2015). Institutional support also allows firms to develop a better understanding of policies and predict their trends, which help them prepare for changes in business and institutional environments and adjust long-term strategies accordingly (Li and Atuahene-Gima, 2001; Shu *et al*., 2015). Institutional support also provides favorable policies and regulations, which enable firms to access to a wider range of strategic choices, such as entering new markets or obtaining exclusive licenses, which bring competitive advantages (Guo *et al*., 2014; Sheng *et al*., 2013). Thus, we propose the following hypothesis:

H2: Institutional support is positively associated with firm performance.

2.5.3 The effects of product and process innovation on firm performance

Researchers argue that product and process innovation provide first-mover advantages and superior profitability (Lu *et al.*, 2015; Tellis *et al.*, 2009; Gunday *et al.*, 2011; Walker, 2004). In particular, the novelty of new products allows firms to charge a premium over competitors' products, increasing revenue and profits (Kostopoulos *et al*., 2011; Gunday *et al*., 2011; Schoenherr and Swink, 2015). The new features, improvements, or benefits associated with new products can also improve customer satisfaction, attract new customers, and develop new market segments, improving sales and performance (Morgan and Berthon, 2008; Kuo, 2013). By introducing new elements to production materials, machinery, equipment, task specifications, and workflow mechanisms, process innovation reduces operational costs and improves quality, flexibility, speed, and delivery (Damanpour, 2010; Un and Asakawa, 2015). Process innovation also helps a firm improve the nature of the operation and supply chain processes, increasing productivity and firm performance. Thus, we propose the following hypotheses:

H3a: Product innovation is positively associated with firm performance.

H3b: Process innovation is positively associated with firm performance.

2.5.4 The moderating effects of dysfunctional competition

The institution-based view argues that managers' decisions are constrained by institutional environment (Peng, 2006). Managers take the influences of dysfunctional competition, which is a noteworthy feature of China's institutional environment, into account when they make strategic decisions (Sheng *et al*., 2013; Zhou and Poppo, 2010; Peng, 2013). High levels of dysfunctional competition indicate that firms frequently face unlawful or unfair competitive behavior in markets (Sheng *et al.*, 2013; Li and Li, 2009). Dysfunctional competition also increases market uncertainty and risks because opportunistic behavior is not severely punished, and so it counteracts institutional support (Peng *et al*., 2009; Lu *et al*., 2008). In particular, because it is difficult for firms to protect their intellectual property rights and profit from innovations (Li and Atuahene-Gima, 2001), they become unwilling to invest in new product and process development even if the government encourages them to do so (Cai *et al.*, 2010). They may behave opportunistically by using the support acquired from government in other areas rather than innovation. When dysfunctional competition is intense, it also prevents government officials from acquiring accurate market information (Shu *et al.*, 2015). This makes it harder for them to devise effective policies and programs to support firms' innovation and development. Hence, we argue that dysfunctional competition reduces the effects of institutional support on product and process innovation and firm performance. In addition, firms are faced with high risks of imitation and knowledge spillovers or leakage when dysfunctional competition is intense (Li and Zhang, 2007; Li and Li, 2009). The efficacy of legal mechanisms of protection is also low and hence innovators may not be able to become principal beneficiaries of product and process innovation (Guo *et al.*, 2014; Zhao, 2006). Hence, we argue that dysfunctional competition reduces the effects of product and process innovation on firm performance. Thus, we propose the following hypotheses:

H4a: Dysfunctional competition reduces the effect of institutional support on product innovation.

H4b: Dysfunctional competition reduces the effect of institutional support on process innovation.

H4c: Dysfunctional competition reduces the effect of institutional support on firm performance.

H4d: Dysfunctional competition reduces the effect of product innovation on firm performance.

H4e: Dysfunctional competition reduces the effect of process innovation on firm performance.

3. Research methods

3.1 Sample and data collection

The sample was selected from three economic zones (i.e. Pearl River Delta, Yangtze River Delta, and Circum-Bohai Economic Zone) in China (Flynn *et al*., 2010; Qi *et al.*, 2011). There are two reasons that the three regions are selected. First, the three economic zones are the most developed regions in China. There exists severe competitions and great governmental supports at the same time. Second, firms located in these three regions are inclined to compete through innovation (Zhang *et al.*, 2015). They can represent the most innovative companies in China. The high-tech industries in the three regions are targeted because innovation is strategically important in these industries.

The questionnaire was originally developed in English based on existing literature. The translation-back-translation method was used to produce a conceptually equivalent Chinese version (Flynn *et al*., 2010). To ensure content validity, the questionnaire was pilot-tested using a sample of 15 manufacturing firms in China through face-to-face discussion. The wording of some questions was modified to ensure that the items were understandable and relevant to practices used in China (Flynn et al., 2010). One key informant per firm method was adopted to fill out a questionnaire. The informants included senior managers such as general managers and directors, research and development (R&D) managers, operations and manufacturing managers, and supply chain and purchasing managers.

A professional market research firm was hired to collect the data (Cai et al., 2010). The researchers designed the sampling framework and data collection instruction that

direct the professional interviewers of the market research firm in data collection. The professional interviewers were also trained to ensure the reliable and complete response. Before large sample data collection, the professional market research firm selected 10 companies in each regions to test the survey. The questionnaire, sampling framework, and data collection instruction are also amended based on the feedbacks. From the target regions, 2379 manufacturing firms were randomly selected using the directory provided by the National Bureau of Statistics of the People's Republic of China, which is an agency within the state council charged with the collection and publication of statistics related to the economy of China at national and local levels. The market research firm first contacted the target manufacturers by telephone to confirm that the informant would be able to answer the survey questions and to solicit his or her participation in the study. Among the target sample, 2061 manufacturing firms either could not be contacted due to incorrect contact information or declined to participate in the survey. Then professional interviewers from the market research firm were sent to visit the remaining 318 manufacturers and collect data using a face-to-face interviews. Finally, 300 responses were received, resulting in a response rate of 12.6%. Table 1 shows the profiles of the responding firms.

Insert Table 1 here

3.2 Measures

Institutional support, dysfunctional competition, product and process innovation, and firm performance were assessed using multiple items on a 7-point Likert-type scale. The scales were adopted or adapted from previous studies and are listed in Table 2. Institutional support was measured using four items to gauge the favorable policies and programs, technical and financial resources, and permission for business actions obtained from the government and its agencies (Li and Atuahene-Gima, 2001). Dysfunctional competition was measured using four items to capture the managers' perceptions of opportunistic, unfair, and unlawful activities in their principal industry (Li and Atuahene-Gima, 2001). Product innovation was measured using three items covering the speed and frequency of new product development, and process

innovation was measured using four items covering the speed and frequency of new process development. These were adapted from Parasuraman (2000) and Tellis *et al.* (2009). Firm performance was measured using four items covering profit, market share, and sales. These were adapted from Qi *et al.* (2011) and Gunday *et al*. (2011).

R&D investment and new process investment served as control variables because direct investment can improve product and process innovation (Shu *et al*., 2015). This study also controlled for the number of employees and ownership because large and state-owned firms may have more advantages in accessing resources and institutional support than smaller, private operations (Li and Atuahene-Gima, 2001; Sheng *et al*., 2013).

Insert Table 2 here

3.3 Common method variance assessment

Because there was a single respondent from each firm, common method variance (CMV) was a potential issue. According to Podsakoff *et al.* (2003), appropriate arrangement of items in a questionnaire can reduce CMV. The constructs were arranged in different sections of the questionnaire. Different instructions were used for different scales (Table 2). Such questionnaire design can reduce respondents' potential consistency in self-reporting (Podsakoff *et al.*, 2003). We conducted a Harman's single-factor test including all items using exploratory factor analysis (Podsakoff *et al.*, 2003). There was no evidence of CMV because no single factor accounted for most of the covariance. In addition, the correlation matrix (Table 3) shows that the strongest correlation was 0.557. The lack of excessively strong correlations also indicates that CMV is not a serious concern (Pavlou *et al.*, 2007).

4. Analysis and results

Partial least squares (PLS)-based structural equation modeling is used to test this the research model because of the sample size (Peng and Lai, 2012). SmartPLS software (3.2.1 version) is used to assess the measurement and structural models

(Ringle et al., 2015). A bootstrapping estimation procedure is used to examine the significance of the scale factor loadings in the measurement model and that of the path coefficients in the structural model (Peng and Lai, 2012; Wang *et al.*, 2010).

4.1 Measurement model

We employ Cronbach's alpha and composite reliability to assess the reliability of all the constructs. The values of Cronbach's alpha and composite reliability range from 0.773 to 0.855 and from 0.858 to 0.902, respectively (Table 2). These values are all above the recommended threshold value of 0.70 (Nunnally and Bernstein, 1994), suggesting that all constructs are reliable.

Confirmative factor analysis (CFA) and average variance extracted (AVE) are used to assess the convergent and discriminant validity. All of the AVE values range from 0.604 to 0.697 (Table 2), which are above the recommended value of 0.50. The CFA analysis shows that the loadings of all items but one are above 0.7 (ranging from 0.662 to 0.873). Both tests indicate adequate convergent validity for all constructs (Fornell and Larcker, 1981; Henseler *et al.*, 2009).

Discriminant validity is assessed by comparing the square root of each construct's AVE to its correlation coefficients with other constructs. A square root higher than the correlation with other constructs suggests a satisfied discriminant validity (Fornell and Larcker, 1981). Table 3 shows the mean and standard deviations of the constructs and their correlations. Comparison of all the correlations and square roots of the AVEs on the diagonal indicates adequate discriminant validity of all constructs.

Insert Table 3 here

4.2 Structural model and hypotheses testing

The assessment of PLS models involves estimation of the path loadings and R^2 values (Wang *et al.*, 2010). Path loadings indicate the strength of the relationships between independent and dependent variables, and R^2 values indicate predictive power by showing the amount of variance explained by the independent variables (Peng and Lai, 2012). Results of the structural model using the pooled sample are

shown in Figure 2. Since the objective of PLS is to maximize variance explained, therefore R^2 as a prediction oriented measure is used to evaluate PLS models. The model explains 29.3% of variance in firm performance, 11.4% of variance in product innovation, and 19.4% of the variance in process innovation. The standardized root mean square residual (SRMR) is used to measure the goodness of model fit. It assesses the average magnitude of the discrepancies between observed and expected correlations as an absolute measure of model fit criterion (Henseler *et al.*, 2014). Our results show that SRMR values of total sample, low dysfunctional competition sample, and high dysfunctional competition sample were 0.039, 0.045, and 0.051, respectively. All SRMR values are less than 0.08 indicating a satisfactory model fit. Following Wetzels et al. (2009), the global goodness of fit (GoF) is also calculated. Out results show that GoF of total sample, low dysfunctional competition sample, and high dysfunctional competition sample are 0.371, 0.483, and 0.295, respectively, which indicates a satisfactory model.

The results show that institutional support has significant effects on product innovation (b=0.300, P<0.001), process innovation (b=0.433, P<0.001), and firm performance (b=0.215, P<0.001). Product innovation (b=0.199, P<0.05) and process innovation (b=0.209, P<0.01) are found to positively affect firm performance. These findings provide support for H1a, H1b, H2, H3a, and H3b. The results also show that firm size and type of ownership significantly influence firm performance and that the effects of R&D investment and new process investment on product and process innovation are insignificant.

Insert Figure 2 here

Following Koufteros *et al*. (2005), two groups are formed based on the mean score on dysfunctional competition. Firms scoring below the mean score are classified as belonging to the low group and those scoring above are placed in the high group. There are 162 manufacturing firms in the group with high levels of dysfunctional

competition and 138 in the low group. A non-parametric approach, PLS based multi-group analysis (PLS-MGA), is used here to investigate the moderating effects of dysfunctional competition (Henseler *et al.*, 2009). The bootstrap estimates of the structural model based on two sub-samples are shown in Figure 3. Results of the comparison are shown in Table 4. The findings show that, at the 5% probability of error level, the effects of institutional support on product (△=0.375, *P*=0.000) and process (△=0.162, *P*=0.043) innovation are significantly larger in the low dysfunctional competition group, and the effects of institutional support, product innovation, and process innovation on firm performance are not statistically different in the two groups. In this way, the results indicate that dysfunctional competition negatively moderates the effects of institutional support on product and process innovation but does not influence the effects of institutional support, product innovation, and process innovation on firm performance. Therefore, the findings support H4a and H4b, but not H4c, H4d, or H4e.

Insert Figure 3 and Table 4 here

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5. Discussion and conclusions

5.1 Theoretical contributions

This study contributes to both innovation and institution-based view literature. First, the results indicate that institutional support positively affects product and process innovation and firm performance. These findings are consistent with existing empirical evidence regarding the performance outcomes of institutional support (e.g. Cai *et al.*, 2010; Li and Atuahene-Gima, 2001; Guo *et al.*, 2014; Shu *et al.*, 2015) and confirm the importance of the government and its agencies in promoting innovation and business development in China. This may explain why Chinese manufacturers are investing more in innovation despite the underdeveloped institutional environment (Zhou and Poppo, 2010; Zhang *et al.*, 2015). PLS analysis further reveals that institutional support improves firm performance indirectly via product and process innovation (indirect effect= 0.150, *P*=0.000). These findings provide insights into the

complex relationships among institutional support, innovation, and performance. By revealing that support from the government can improve firm performance both directly and indirectly by promoting product and process innovation, this study clarifies the mechanisms through which institutional support provides firms with competitive advantages and how Chinese government officials influence their operations and decisions. It also explains how institutions matter (Li and Atuahene-Gima, 2001; Shu *et al.*, 2015; Qian *et al.*, 2013; Sheng *et al.*, 2011), so contributing to the institution-based view literature (Peng *et al.*, 2009).

Second, we find that both product and process innovation enhance firm performance, which is consistent with existing empirical findings (Walker, 2004; Kostopoulos *et al.*, 2011; Gunday *et al.*, 2011; Ho, 2011). These results contribute to the innovation literature by confirming the positive roles played by product and process innovation in improving firm performance in China. They provide a possible explanation for the rapid growth in the number of patent applications filed in China (World Intellectual Property Organization, 2015). In addition, although researchers argue that product and process innovation have different features (Un and Asakawa, 2015; Damanpour, 2010) and there is some empirical evidence that they influence performance outcomes in different ways (Gunday *et al.*, 2011; Shu *et al.*, 2015), this study provides empirical evidence that product and process innovation play similar roles in improving firm performance in China and that the Chinese government can promote product and process innovation using similar methods, contributing to the innovation literature.

Third, this study reveals the contingent effects of dysfunctional competition on the effectiveness of institutional support. In particular, results show that dysfunctional competition attenuates the impact of institutional support on product and process innovation. This provides one possible explanation for the inconsistent empirical findings on the performance outcomes of institutional support (Cai *et al.*, 2010; Sheng *et al.*, 2011; Shu *et al.*, 2015). The results improve current understanding of how dysfunctional competition affects manufacturers' innovation decisions, contributing to the innovation literature (Qian *et al.*, 2013; Guo *et al.*, 2014). The results also show

that China's institutional environment has both positive and negative influences on product and process innovation and that researchers must consider the effects of different institutional forces collectively when investigating the roles of institutional environment in China (Li and Li, 2009; Li and Zhang, 2007). In addition, the findings enrich the institution-based view literature by clarifying under what circumstances institutions matter (Peng, 2002; Peng *et al.*, 2009).

Fourth, the results show that dysfunctional competition does not moderate the effects of institutional support, product innovation, and process innovation on firm performance. This is an interesting finding as it suggests that although dysfunctional competition reduces the positive effects of institutional support on innovation, firms can still benefit from institutional support and from product and process innovation. The characteristics of innovation in China might be the reason for this seemingly contradictory findings. Although the Chinese government seeks to promote independent innovation (Parayil and D'Costa, 2009), Chinese manufacturers tend to develop products and processes by imitating and adapting existing technologies to unique local requirements (Wang *et al.*, 2011; Zhang *et al.*, 2015). In this way, product and process innovation rely on refining, broadening, enhancing, and exploiting current knowledge and skills. Dysfunctional competition encourages knowledge spillovers and firms are less likely to be punished for copying and reverse engineering existing products and processes than they are in developed countries (Li and Atuahene-Gima, 2001; Guo *et al.*, 2014). Chinese manufacturers may profit from the innovations that are developed by adapting and localizing competitors' product and process designs when dysfunctional competition is intense (Zhang *et al.*, 2015). In addition, manufacturing firms may decide to use government support in areas that are less likely influenced by dysfunctional competition, such as expanding production capacity or investing abroad, instead of on innovation. Hence, they can benefit from institutional support even when dysfunctional competition is intense. Therefore, this study contributes to the institution-based view literature by showing that dysfunctional competition affects innovation and firm performance in different ways in China.

5.2 Managerial implications

The findings of this study can provide guidelines to help manufacturing firms take advantage of China's institutional environment and gain competitive advantages. First, we suggest managers build personal ties with political leaders and officials in industrial bureaus and regulatory and supporting organizations. Firms should actively seek support from the government and its agencies and understand that they are particularly important resources that they can use to deal with China's institutional voids. Managers should use institutional support in product and process innovation and to improve operations. Second, we suggest firms invest in product and process innovation simultaneously because both of them can provide competitive advantages. In particular, it is suggested that firms learn new product and process designs produced by advanced competitors. They should also attend conferences and exhibitions to keep up with the product and process innovation in the industry. Managers should invest in improving the speed and frequency of new product and process development. Third, managers should be aware that dysfunctional competition influences innovation and firm performance in different ways. They should carefully evaluate the legal and competitive environment. When dysfunctional competition is intense, firms should reduce their efforts to acquire institutional support for product and process innovation. However, we suggest Chinese manufacturers invest in product and process innovation and use institutional support to improve operations even when dysfunctional competition is intense.

This study also has valuable implications for policy makers. Promoting innovation and development has become a major issue for the Chinese government and its agencies and the findings reveal that institutional support is a useful way for government officials to influence firms' decisions and operations. In particular, we suggest government officials devise policies and programs that reward product and process innovation. Technical and financial resources should be provided to support innovation and operations in manufacturing firms. Officials should also help firms obtain licenses to import technology and other equipment. In addition, officials should be aware that the effects of institutional support on product and process innovation are

reduced by dysfunctional competition. Hence, government and its agencies should reduce dysfunctional competition to allow firms to fully reap the benefits of institutional support. In particular, we suggest policy makers to develop laws regulating market competition to protect intellectual property rights and improve the enforcement of existing laws to punish unfair and unlawful practices, such as illegal copying of new products and counterfeiting of products and trademarks.

5.3 Limitations and future research directions

This study has several limitations that open up avenues for future research. First, it focuses on two characteristics of China's institutional environment. Researchers argue that other institutional forces, such as legal enforceability (Zhou and Poppo, 2010), legal protection (Cai *et al.*, 2010), and regulatory legitimacy (Guo *et al.*, 2014), also influence Chinese firms' operations and strategies. Future studies may investigate the joint effects of different kinds of institutional forces on firms' innovation decisions. Second, institutional support consists of many factors, such as R&D investment, professional services, and loans, which may influence innovation and operations in different ways. Future studies can investigate the effects of different types of institutional support on firm performance. Third, our results provide insight into how institutions matter in China. Researchers argue that the effects of institutional forces may be influenced by cultural environment (Li and Atuahene-Gima, 2001; Cai *et al.*, 2010). Future studies can generalize and validate these findings into other countries with different institutional and cultural environments. Fourth, this study measures firm performance using a Likert-type scale, which is based on managers' perceptions and may be influenced by respondents' personal opinions. Future studies can measure firm performance using objective measures and ratio scales, such as market share.

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Table 1: Firm profiles

Variables		Num.	Percentage
Annual sale (USD)	Fewer than 1 million	1	0.3
	1 to 5 million	12	4.0
	5 to 10 million	27	9.0
	10 to 20 million	59	19.7
	20 to 50 million	88	29.3
	50 to 100 million	51	17.0
	100 to 250 million	36	12.0
	More than 250 million	26	8.7
Number of employees	Fewer than 200	67	22.3
	201 to 300	56	18.7
	301 to 500	69	23.0
	501 to 1000	52	17.3
	1000 or more	56	18.7
Ownership	State-owned	96	32.0
	Privately owned	102	34.0
	Joint venture	46	15.3
	Foreign investment	56	18.7
Industry	Biology and pharmaceuticals	18	6.0
	Computers and telecommunication equipment	34	11.3
	Chemicals	51	17.0
	Medical equipment	28	9.3
	Electronics and electrical equipment	54	18.0
	Industrial machinery	49	16.3
	Transportation equipment	35	11.7
	New materials	31	10.3
Total		300	100.0

Table 2: Factor loadings of scale items (CFA factor loading)

Measurement	Loading
Dysfunctional competition (Cronbach's α=0.787; C.R.=0.858; AVE=0.604)*	
Please indicate the extent to which your principal industry has experienced the following in the last 3 years: (1=not at all, 7=to a great extent)	
1. Unlawful competitive practices such as illegal copying of new products.	0.825**
2. Counterfeiting of your company's own products and trademarks by other companies.	0.857**
3. Ineffective market competitive laws to protect your company's intellectual property.	

0.833

0.662

4. Increased unfair competitive practices by other companies in the industry.	0.776
Institutional support (Cronbach's α=0.855;C.R.=0.902; AVE=0.697)	
Please indicate the extent to which in the last three years government and its agencies have: (1=not at all, 7=to a great extent)	
1. Implemented policies and programs that have been beneficial to your company's operations.	0.824
2. Provided needed technology information and technical support to your company.	0.871
3. Played a significant role in providing financial support for your company.	0.862
4. Helped your company to obtain licenses to import technology, manufacturing and other equipment.	0.778
Product innovation (Cronbach's α=0.773; C.R.=0.868; AVE=0.687)	
Please indicate your degree of agreement with the following statements describing your company's product innovation: (1=strongly disagree, 7=strongly agree)	
1. We are the first within the industry to introduce new products.	0.832
2. We keep up with the latest product developments.	0.823
3. We frequently introduce products that are radically different from established products in the industry.	0.832
Process innovation (Cronbach's α=0.845; C.R.=0.896; AVE=0.684)	
Please indicate your degree of agreement with the following statements describing your company's manufacturing process innovation: (1=strongly disagree, 7=strongly agree)	
1. We are learning more about the newest processes than our competitors.	0.872
2. We are the first within the industry to deploy new processes.	0.845
3. We keep up with the latest process developments.	0.836
4. We frequently introduce processes that are radically different from existing processes in the industry.	0.751
Firm performance (Cronbach's α=0.843; C.R.=0.895; AVE=0.681)	
Please indicate your firm's overall performance compared with major competitors over the past year on: (1=far worse, 7=far better)	
1. Total sales of product and service	0.873
2. Profit	0.783
3. Market share	0.863
4. Market share growth	0.775

R&D investment*: Over the last two years, what was your average research and development (R&D) budget as a percentage of total company sales?*

New process investment*: Over the last two years, what was your average investment in new process technologies and equipment as a percentage of total company sales?*

Firm size*: The total number of employees.*

Ownership*: The ownership of your company*

Note: *C.R.= composite reliability, AVE= average variance extracted; ** for all factor loadings, $P<0.05$

Table 3. Mean, standard deviation, and correlations

Constructs	Mean	SD	1	2	3	4	5
Institutional support (1)	4.526	1.428	**0.835**				
Dysfunction competition (2)	4.205	1.286	0.013	**0.777**			
Product innovation (3)	5.300	1.005	0.300***	0.249***	**0.829**		
Process innovation (4)	5.098	1.013	0.428***	0.119	0.557***	**0.827**	
Firm performance (5)	4.769	1.035	0.389***	0.042	0.396***	0.431***	**0.825**

Note: * P<0.05, ** P<0.01, *** P<0.001. Square root of average variance extracted for each construct included in the model is given in bold along the diagonal in the table.

Table 4: Statistical comparison of path coefficients between low and high levels of dysfunctional competition

	Low		High		Low vs. High	
	Path coefficient	SE	Path coefficient	SE	ABS	P-value
Institutional support→ product innovation	0.475	0.067	0.101	0.084	**0.375**	**0.000*** **
Institutional support→ process innovation	0.507	0.061	0.345	0.076	**0.162**	**0.043***
Institutional support→ firm performance	0.227	0.072	0.226	0.073	0.001	0.496
Product innovation →firm performance	0.203	0.103	0.168	0.084	0.035	0.398
Process innovation →firm performance	0.254	0.099	0.146	0.094	0.108	0.216

Note: * P<0.05, ** P<0.01, *** P<0.001. ABS means the absolute value of difference.

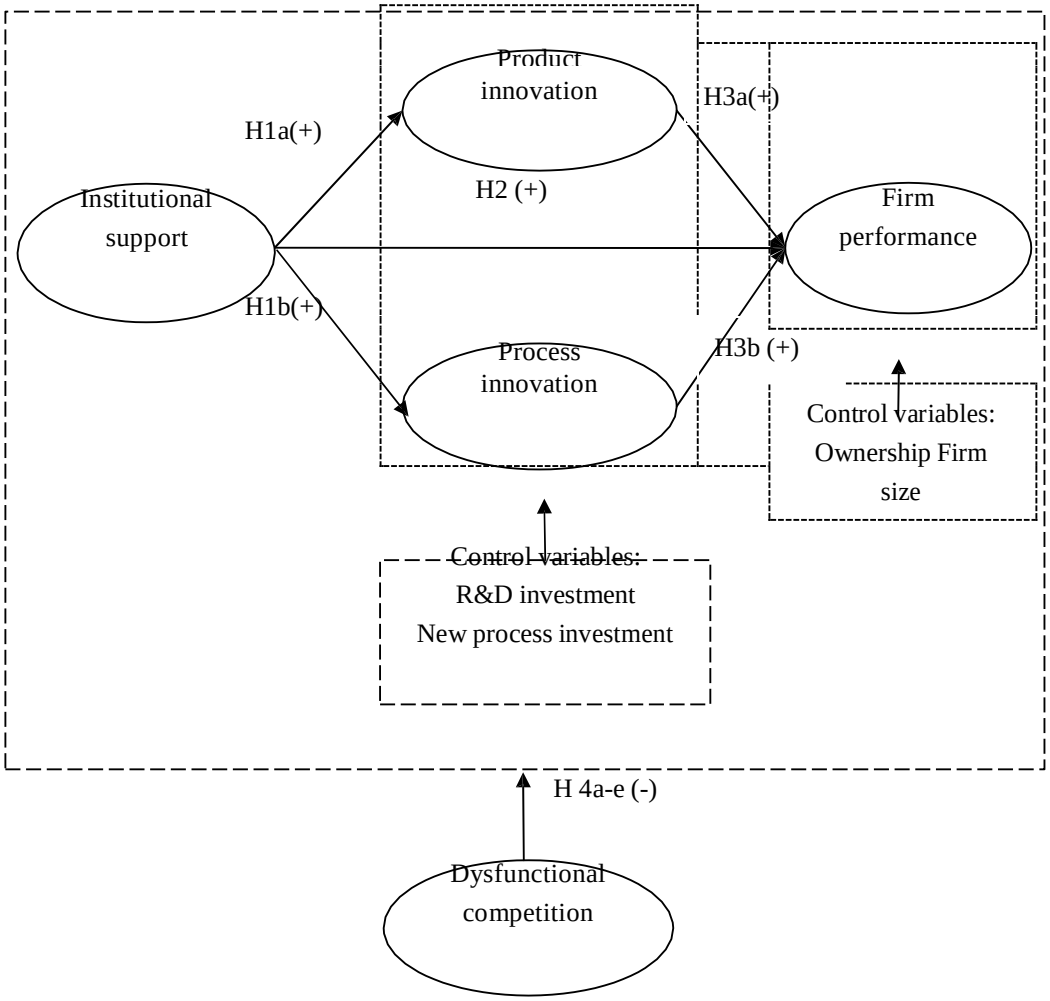
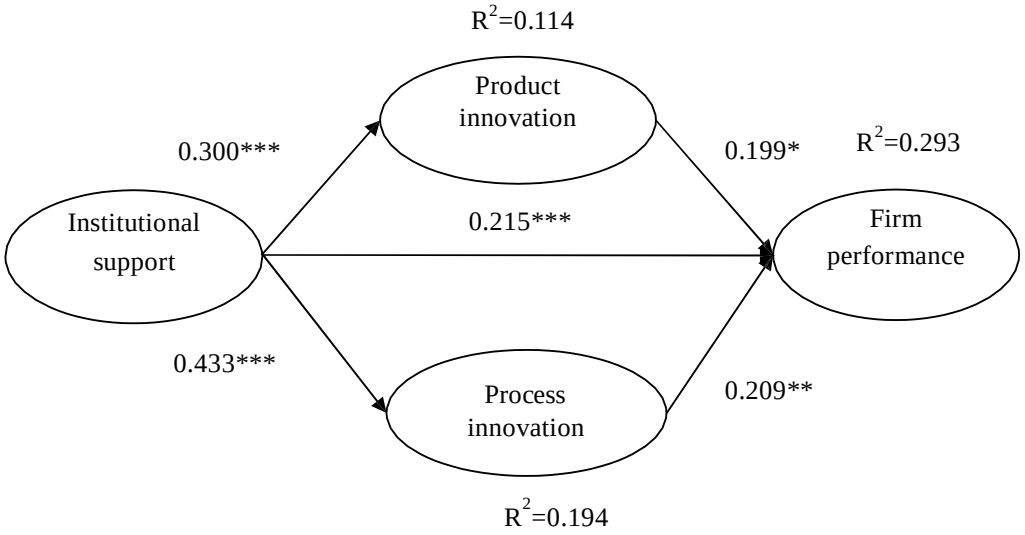
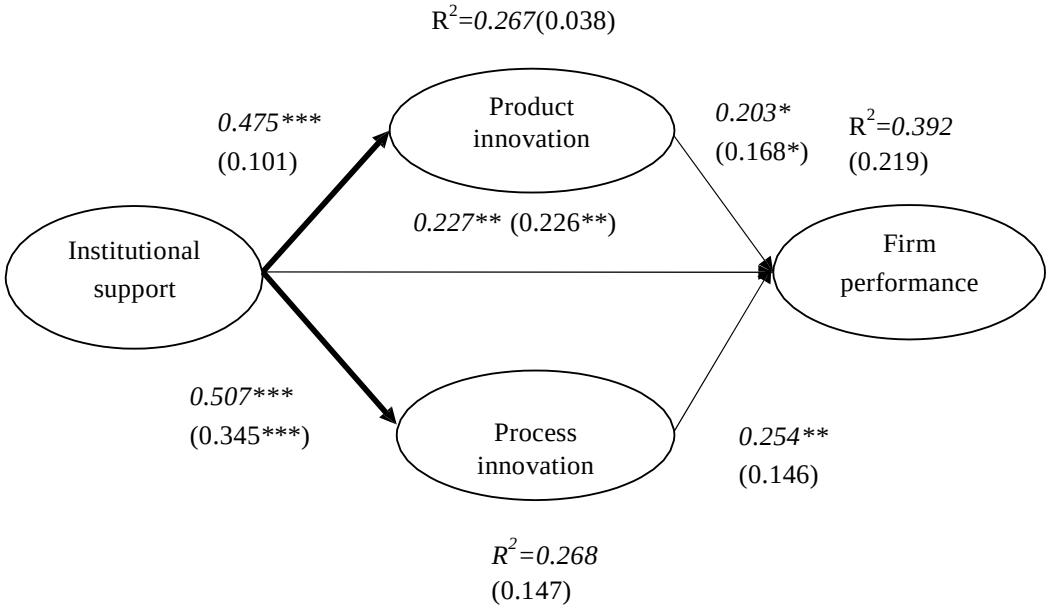


Figure 1: Conceptual model



Note: * $P<0.05$;** $P<0.01$; *** $P<0.001$

Figure 2: Structural model with parameter estimates (pooled sample)



Note: * P<0.05;** P<0.01; *** P<0.001. The results in the group subject to low (high) levels of dysfunctional competition are shown in italic (parentheses). The bold lines indicate that the path coefficients are significantly different between the two groups at a confidence level of 0.05.

Figure 3: The moderating effects of dysfunctional competition