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Knowledge Sharing Strategies and Innovation: The Impact of Business Group Affiliation in an Emerging Economy*

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ABSTRACT

Business groups provide a setting where affiliated firms, connected with various ties, share knowledge and enhance their innovative capabilities. The relations between knowledge sharing and innovation have been investigated in various contexts; however, whether firms connected with a business group utilize knowledge more than independent firms do in fostering innovations has been addressed to a lesser extent. Therefore, using survey data from 128 Turkish business group affiliated and independent manufacturing firms, this study examines the impact of explorative knowledge and exploitative knowledge sharing strategies on firms' innovative activities and the moderating effect of business group affiliation in this relation. The findings indicate that while explorative and exploitative knowledge sharing enhance innovation, firms affiliated with business groups benefit less from both types of knowledge sharing than independent firms in terms of innovation. This study contributes to the business groups and knowledge research by examining whether groups create value for affiliated firms when firms operate in an emerging economy. The results of this study have policy and strategy implications in emerging economies and in the context of business groups.

Keywords: Business Group Affiliation; Knowledge Sharing; Explorative Knowledge Sharing; Exploitative Knowledge Sharing; Innovation.

JEL Classification Codes: L21, L25, O30.

INTRODUCTION

In emerging economies, business groups have strong effects on countries' development (Chang & Choi, 1988; Holmes, Hoskisson, Kim, Wan & Holcomb, 2018; Khanna & Palepu, 1997). Due to the lack of efficient markets and institutions in such economies, they contribute to the operations of affiliated firms by providing an internal labor and capital market for resources, such as knowledge and technology (Belenzon & Berkovitz, 2010; Hobdari, Gammeltoft, Li & Meyer, 2017; Mahmood & Mitchell, 2004). Particularly, business group affiliates can have advantages over unaffiliated firms in knowledge exchanges with other affiliates and group reputation enables affiliates to collaborate with firms outside group boundaries easier than independent ones to get access to knowledge. Then, this knowledge leads to increase in innovation capabilities (Hsieh, Yeh & Chen, 2010; Komera, Lukose & Sasidharan, 2018).

Knowledge exchanges with other firms, specifically, knowledge exploration and knowledge exploitation relate to innovative activities (Chesbrough, 2003; Choi & McNamara, 2018; Faems, Looy & Debackere, 2005; Katila & Ahuja, 2002; Laursen & Salter, 2006; March, 1991; Rosenkopf & Nerkar, 2001; von Hippel, 1988). However, transferring this knowledge is difficult due to the tacit characteristic (Kogut & Zander, 1992; Szulanski, 1996). In this case, while all firms form relations among themselves to get access to knowledge and innovate, the ties that have been established between group affiliates generate opportunities for these firms to get knowledge easier than unaffiliated ones (Lamin, 2013; Lamin & Dunlap, 2011). Prior studies have addressed knowledge sharing strategies and innovation relations in different settings, such as alliances (Jiang & Li, 2009; Rothaermel, 2001), joint ventures (Chen, Lin, Lin & Hsiao, 2020; Yao, Yang, Fisher, Ma & Fang, 2013), clusters (Lai, Hsu, Lin, Chen & Lin, 2014; Mitchell, Boyle, Burgess & McNeil, 2014; Zhang & Li, 2010) and multinational corporations (Subramaniam, 2006; Tsai, 2001). Researchers have also investigated affiliation impact on innovation (Belenzon & Berkovitz, 2010; Chang, Chung & Mahmood, 2006) and performance consequences of knowledge sharing in business groups (Kang & Lee, 2017; Lee, Choo & Yoon, 2016; Lee & MacMillan, 2008; Lee, MacMillan & Choe, 2010; Lee, Yang & Park, 2020); however, whether business group affiliates benefit from knowledge sharing differently from independent firms in their innovation activities in an emerging economy needs further investigation (Lee, Park, Ghauri & Park, 2014). Therefore, this paper explores the impact of knowledge sharing on firms' innovative activities and whether business group affiliation has a moderating effect in this relation through an empirical analysis of unique survey data from both affiliated and

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independent manufacturing firms operating in an emerging economy, namely Turkey. Although there are various conceptualizations of knowledge (i.e., tacit, explicit), this paper specifically focuses on explorative and exploitative knowledge sharing as these types of knowledge relate to innovative activities (Benner & Tushman, 2003; Chiang & Hung, 2010).

The contribution of this paper to the business group and knowledge literatures is two-fold. The main one relates to how business group affiliation affects firms' knowledge sharing strategies and innovation relations. As Carney, Gedajlovic, Heugens, van Essen and van Oosterhout (2011) and Lamin (2013) raise, research on business groups has provided limited evidence on whether affiliated firms' strategies differ from independent firms' implementations. In line with this view, the investigation of whether firms under control of a group contribute to knowledge sharing in terms of innovative activities more than independent ones do is essential. Moreover, when all firms exist in an emerging economy, including a sample of independent firms allows us to see the contingent value of knowledge exchanges in different settings (Yiu, Bruton & Lu, 2005). Secondly, this study extends the knowledge and innovation research by examining knowledge exchanges in an emerging economy. Firms' knowledge sharing and innovation relationships in emerging economies may differ from developed economy firms' behavior (Hoskisson, Eden, Lau & Wright, 2000; Meyer & Peng, 2016). Moreover, the role of knowledge exploration and exploitation in innovation may be affected by the context (i.e., business group), especially when firms engage in knowledge search beyond their boundaries (Wilden, Hohberger, Devinney & Lavie, 2018). This research advances the business group and knowledge research by exploring the impact of interfirm knowledge exchanges on innovation and considering the business group affiliation from the emerging economy perspective.

The remainder of this paper is organized as follows. In the second section, business group affiliation, knowledge sharing strategies and innovation relations are reviewed and hypotheses regarding the relationships are proposed. In section three, the research methodology is explained and in section four, the results are presented. In section five, findings are discussed. In the sixth section, implications, limitations and further research avenues are considered.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Business Groups and Knowledge Sharing

Business groups are the prevalent type of organization in emerging economies (Carney, van Essen, Estrin & Shapiro, 2018; Colli & Colpan, 2016; Leff, 1978). Groups are described as a collection of legally independent firms, which are under control of a core firm (Granovetter, 1995; Khanna & Rivkin, 2006). They have emerged in response to inefficient markets and institutions in emerging economies for generating their own internal labor, product and capital markets (Khanna & Palepu, 1997, 2000). Groups are conceived of as a network type of organization (Chang, 2006; Cuervo-Cazurra, 2006; Mahmood, Zhu & Zajac, 2011). Group firms are legally independent; however, they are interdependent through various ties such as crossholdings, interfirm loans, director interlocks and social bonds (Goto, 1982; Strachan, 1976). These formal and informal interfirm ties provide affiliates with an advantage of sharing tangible and intangible resources, such as human resources, research and development (R&D) capabilities, technology and knowledge that may not be achieved through other interfirm relations (Chang & Hong, 2000; Chittoor, Kale & Puranam, 2015; Luo & Chung, 2005). Among these resources, particularly, knowledge, which is regarded as one of the most important resources of a firm, is shared among affiliates to build capabilities and innovate (Grant, 1996).

Affiliation with a group is regarded advantageous for firms in the inefficient environments of emerging economies, as group structure facilitates resource sharing, knowledge transfer and learning between members (Borda, Geleilate, Newburry & Kundu, 2017; Chang & Hong, 2000; Kim, Kim & Hoskisson, 2010; Lee et al., 2016; Lee & MacMillan, 2008; Manikandan & Ramachandran, 2015; Wang, Yi, Kafouros & Yan, 2015). For instance, Lee et al. (2016), reveal that Korean business group firms benefit from knowledge spillovers more than unaffiliated firms do. Group firms not only engage in knowledge exchanges with other members, but also have connections with partners outside group boundaries (Bhaumik, Estrin & Mickiewicz, 2017; Wright, Filatotchev, Hoskisson & Peng, 2005). Group reputation, recognition and political ties allow firms to collaborate with foreign ones and exploit knowledge from their relationships (Bucheli, Salvaj & Kim, 2019; Gao, Zuzul, Jones & Khanna, 2017; Gaur, Kumar & Singh, 2014; Mahmood, Chung & Mitchell, 2017; Mukherjee, Makarius & Stevens, 2018).

Business Groups and Innovative Activities

In emerging economies, when external institutions and markets do not perform well, a group contributes to innovation of affiliated firms through providing an internal labor and capital market for resources, such as trained workforce, knowledge, technology and finance (Hobday & Colpan, 2010; Mahmood & Mitchell, 2004). These internal markets also have an essential role in facilitating knowledge exchange between affiliates and learning through knowledge exchanges allows for innovation (Belenzon & Berkovitz, 2010; Chang et al., 2006; Lee, Lee & Gaur, 2017), which is defined as the generating new things or doing things in a new way (Schumpeter, 1947). For instance, Hsieh et al. (2010) find that group firms innovate more than unaffiliated ones in Taiwan. Choi, Lee and Williams (2011), investigating Chinese firms, reveal a positive influence of affiliation on innovativeness. Wang et al. (2015), examining Chinese firms, demonstrate a positive impact of affiliation on innovative performance.

Groups may also have negative impacts, such as low levels of innovation (Pattnaik, Lu & Gaur, 2018). However, despite these mixed impacts of affiliation, groups may have wider facilities for their affiliated firms by providing them resources for innovation, which may be less available to unaffiliated firms. Nevertheless, this should not cause the misunderstanding that unaffiliated firms are closed entities. They also have relations with peers, such as suppliers, buyers or competitors; therefore, their knowledge utilization with partners affects their innovative activities as well.

Knowledge Sharing Strategies, Innovation and the Moderating Effect of Business Group Affiliation

Interfirm knowledge sharing refers to the interactions between firms to transfer and combine knowledge (Dyer & Singh, 1998). In emerging economies, firms operate under conditions where product, labor and capital markets are inefficient (Khanna & Palepu, 1997; Meyer & Peng, 2016), and R&D activities and internal knowledge creation are usually low (Wang & Libaers, 2016). Therefore, in such economies, firms search for knowledge externally and integrate this knowledge into their current processes in order to innovate. Firms' external relations with other ones provide them with knowledge that is essential and necessary to innovate (Chesbrough, 2003). Specifically, exploration and exploitation of knowledge with suppliers, buyers and other firms enhance innovation (Chiang & Hung, 2010). In organizational learning, while exploration refers to search, risk taking, experimentation, variation, discovery, flexibility, play and innovation; exploitation includes refinement, production, choice, efficiency, selection, implementation and execution (March, 1991). Firms' interorganizational learning includes both knowledge exploration and exploitation from partners to support innovative activities (Chen et al., 2020; Holmqvist, 2004). Explorative and exploitative knowledge sharing can be defined as the interfirm exchange of novel and existing knowledge, respectively, on products, technologies and processes (Arikan, 2009).

New knowledge exploration and existing knowledge exploitation with other firms are important for innovative activities (Benner & Tushman, 2003). In other words, product and process innovations require exploration of new competencies through the acquisition of new knowledge and skills and exploitation of existing ones through extension of present knowledge (Atuahene-Gima, 2005; Im & Rai, 2008). In emerging economies, where capital, labor and product markets are weak, interfirm relationships provide firms with access to knowledge; therefore, they utilize explorative and exploitative knowledge sharing in their innovative activities (Khan, Lew & Marinova, 2019; Khan, Lew & Sinkovics, 2015; Khan, Rao-Nicholson & Tarba, 2018). Based on these arguments:

Hypothesis 1a: The more explorative knowledge sharing, the higher level of firm innovation.

Hypothesis 1b: The more exploitative knowledge sharing, the higher level of firm innovation.

Affiliated firms benefit from knowledge sharing similar to the firms in various networked settings, such as clusters, industrial districts and multinationals (Connell, Kriz & Thorpe, 2014; Lee & Gaur, 2013). For instance, in a cluster context, Bell (2005) raises that firms in an industrial cluster have better access to knowledge than ones outside and reveals that Canadian firms operating in a cluster innovate better than their peers outside. Lai et al. (2014) demonstrate that knowledge management in the form of acquisition, creation and dissemination affects the innovative activities of cluster firms in Taiwan. Similarly, affiliates share technologies in order to integrate novel knowledge (Lee et al., 2010). Then, this technology sharing contributes to the development of products (Skold & Karlsson, 2012). For instance, Mursitama (2006) finds that sharing managerial and technological capabilities contributes to firms' productivity in Indonesian business groups.

Affiliated firms also create new knowledge for their innovation activities with firms outside their boundaries. For instance, Kang and Lee (2017), investigating how sharing explorative and exploitative knowledge between subsidiaries of Korean chaebol multinational enterprises and affiliated firms affects a subsidiary's performance, find a positive interaction effect of the two types of knowledge sharing on financial performance. On the other hand, Lee et al. (2010), investigating the influence of explorative technological knowledge exchange between affiliated firms and the transfer of such knowledge to affiliates' foreign subsidiaries on the subsidiary performance, find that an affiliated firm's such knowledge exchange with another one has a negative impact on the performance of its subsidiaries in Korean chaebols. While there are potential benefits and drawbacks of affiliation, knowledge flows among firms that are affiliated with a group may have a greater impact on innovation than for among ones with distant relationships (Lee et al., 2016). Based on these arguments:

Hypothesis 2a: The relationship between explorative knowledge sharing and innovation is positively moderated by business group affiliation.

In groups, utilizing existing knowledge creates a base for the use of novel knowledge, because this external knowledge utilization is based on prior knowledge in firms (Cohen & Levinthal, 1990). Affiliates' internal networks provide them with the ability to combine new knowledge with existing capabilities (Singh, Kryscynski, Li & Gopal, 2016). As such, affiliated firms may have superior absorptive capacity, which enables the integration of new knowledge from peers. Then, this absorptive capacity enhances product and process innovations (Castellacci, 2015). For instance, Lee et al. (2010) find a favorable impact of sharing exploitative technological knowledge between affiliates of Korean chaebols and transferring this knowledge to affiliates' foreign subsidiaries upon the

subsidiary performance. These opportunities may be less available to independent firms. Accordingly:

Hypothesis 2b: The relationship between exploitative knowledge sharing and innovation is positively moderated by business group affiliation.

RESEARCH METHODOLOGY

Data

This research is carried out in the context of Turkish business group affiliated and unaffiliated (independent) firms. Turkey is an emerging market, which is dominated by family-owned business groups structured under the control of holding companies (Bugra, 1994; Colpan, 2010; Colpan & Jones, 2016; Karaevli & Yurtoglu, 2018). Because affiliated firms are legally independent and have their own governance systems, they are comparable with independent firms in terms of the knowledge and innovation relations (Belenzon & Berkovitz, 2010). Hence, for the present study, the sampling frame is drawn from Turkey's 1000 largest manufacturing firms by using records of the Istanbul Chamber of Industry (ICI). The unit of analysis is the firm and the data is collected through an administered online survey. (The approval of Ethics Committee is obtained.) The targeted respondents are middle/ senior managers and senior executives who are knowledgeable about their firms' knowledge sharing strategies and innovation activities. Respondents are assured of anonymity to increase the likelihood of reliable responses and mitigate common method variance (CMV) (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). A pilot survey is initially issued to test question clarity and ensure the content and face validity of the measures being captured.

To improve response, all firms are initially contacted by both telephone and email. From the initial sampling frame, a total 661 firms agreed to receive the questionnaire. Following the initial issue of the survey, reminder emails were sent out after four and then six weeks. There was a total of 131 responses, with 128 having complete data for the current study, with a response rate of 19%, similar to previous studies (Jiang & Li, 2009; Ray & Chaudhuri, 2018). The number of usable responses for business group affiliated and unaffiliated firms is equal (N=64) across several industries (textile (25%), food (15%), fabricated metal product (17%), basic metal (15%), chemicals (9%), wood products (6%), coal mining (5%), paper products (4%) and non-metallic products (4%); see Appendix, Table A1 for industry breakdown and business group affiliation information). To test for nonresponse bias, a t-test is conducted on the mean differences between the early and late respondents with regard to innovation and knowledge sharing variables (Armstrong & Overton, 1977). The results do not reveal any significant differences between the two groups of respondents; therefore, nonresponse is not a problem.

Variables

Dependent variable: *Innovation* is captured as a construct variable based on survey items measuring the extent of a firm's innovation relating to introductions of product and processes following Tomlinson (2010) and Molina-Morales and Martinez-Fernandez (2009), with the items 'introduction of new product lines', 'changes/ improvements to existing product lines', 'introduction of new equipment/ technology in the production process', 'introduction of new input materials in the production process', 'introduction of organizational changes/ improvements made in the production process'. The respondents are asked to assess their firms' innovative activities on a Likert scale (1= Not at all to 5= A great extent). A measure for innovation is calculated based on the average of the items.

Independent Variables: *Business group affiliation* information is obtained from each firm's web page. The question, 'Is your firm affiliated with a Turkish holding/ business group?' was retained in the questionnaire to make a comparison between the initial information and the respondents' answers. A dummy variable is used with 1 representing affiliated firms with a business group and 0 representing unaffiliated firms. *Knowledge sharing* is captured as a construct variable based on survey items adapted from the studies of Lee et al. (2010) and He and Wong (2004). The type of *explorative knowledge sharing* strategy is measured with the items 'development of new products, extending product range and entering new technology fields'. The type of *exploitative knowledge sharing* strategy is measured with the items 'improving existing product quality, improving production flexibility and reducing production costs'. The respondents are asked to assess their knowledge sharing activities with suppliers and buyers on a Likert scale (1= Strongly disagree to 5= Strongly agree). The measures for both types of knowledge sharing are calculated based on the average of the relevant items.

Control Variables: Several control variables are included in order to ensure the robustness of the research. *Firm size* is measured as the number of employees (i.e., less than 50, 50-99, …, 5000-9999, 10,000 or more). *Firm size* variable gets values from 1 to 10 and higher value represents larger firms. *Firm age* is measured by the number of years since the founding date of the firm. A survey indicator of *R&D* expenditures is included to capture the extent of firm's absorptive capacity (0-20%, 21-40%, 41-60%, 61-80%, 81-100%). *R&D* variable gets values from 1 to 5 and higher value represents firms with more R&D activities. An *industry* classification dummy is included by splitting the sample into two groups, such as medium technology (chemical and petroleum, metals, machinery and equipment) and low technology industries (food and beverages, coal mining, wood and furniture, textile, paper) (ISIC Rev.3, 2011) based on information in the ICI firm lists (see Appendix, Table A1 for industry breakdown).

Table 1. Descriptive Statistics and Correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8
1.Innovation	3.28	0.81	1							
2 Explorat. KS	3.48	0.78	0.23*	1						
3. Exploit. KS	3.53	0.82	0.19*	0.82*	1					
4.Affiliation	0.5	0.50	0.07	-0.12	-0.10	1				
5.Firm size	5.97	1.70	0.20*	0.21*	0.17*	0.09	1			
6.Firm age	33.44	16.52	0.09	0.18*	0.13	0.05	0.24*	1		
7.Industry	0.45	0.50	-0.03	0.07	0.12	-0.03	-0.13	0.06	1	
8.R&D	1.57	0.89	0.19*	-0.14	-0.09	-0.08	0.03	-0.05	-0.09	1

N=128 *p< 0.1 (2-tailed) KS: Knowledge sharing

Validation of the Measures

For the variables, a principal component factor analysis (PCF) with orthogonal (varimax) rotation is employed in Stata (V14.2). According to the results, all the factor loadings are significant ($p<0.001$), with several cross loadings on both types of knowledge sharing. In order to assess convergent and discriminant validity, a confirmatory factor analysis (CFA) is conducted using maximum likelihood estimation technique with a standardized solution. The results indicate that all the factor loadings are above 0.5 and significant ($p<0.001$). The average variances extracted (AVE) for innovation, explorative and exploitative knowledge sharing are 0.53, 0.63 and 0.62, respectively. In addition, the composite reliabilities for the same variables are 0.85, 0.91 and 0.91, respectively. The AVE values are above the acceptable level of 0.5 and the composite reliabilities of the variables are above the acceptable level of 0.6-0.7 (Bagozzi & Yi, 1988). Thus, these results show that the convergent validity is achieved. In addition, the Cronbach's alpha values for the innovation, explorative and exploitative knowledge sharing variables are 0.86, 0.91 and 0.91, all exceed the minimum 0.7 acceptable threshold (Hair, Black, Babin & Anderson, 2010), thereby satisfying the criteria for internal consistency and reliability. To test for discriminant validity, the variance extracted estimates for the constructs are compared with the square of their respective correlation coefficient (Anderson & Gerbing, 1988; Fornell & Larcker, 1981). The discriminant validity is achieved between knowledge sharing and innovation variables, but the two types of knowledge sharing constructs have strong correlation; however, they are well defined and reliable with composite reliabilities are higher than 0.8. Also, removing one of these variables to reduce multicollinearity, may bias the results because these variables represent knowledge sharing strategies based on the familiarity of knowledge. Therefore, these two variables are kept in the analysis.

In order to examine the common method variance (CMV), Harman's one factor (single factor) test is used (Podsakoff et al., 2003). Initially, the test is conducted in which all measures (both knowledge sharing variables and innovation) are loaded into a principal component factor analysis, where two factors emerge, with the largest factors accounting for 46.63% of the total variance. According to the results, one general factor does not emerge in the model; however, since the total variance explained is high, a further examination is conducted with confirmatory factor analysis. The model, which includes all items loading on single factor, is compared with the (original) model that have items loading on relevant variables. When the original and single factor models are compared, the one factor model show poorer fit with the data. Thus, it is unlikely that common methods bias is a problem in the data.

EMPIRICAL RESULTS

Table 1 provides details of the descriptive statistics and correlations. As can be seen, 50% of the firms belong to a business group. The average innovation conducted by firms is 3.28; while the average explorative and exploitative knowledge sharing activities are 3.48 and 3.53, respectively. Average age of the firms in the sample is 33 years. 66% of the firms have more than 500 employees. 45% of the firms operate in medium technology industries. 15% of the firms conduct R&D over 40%. According to the correlations, knowledge sharing, R&D and firm size are positively correlated with innovation.

Table 2 presents the results of the hierarchical moderated regression analysis. The model is tested using the OLS estimator in Stata (V14.2). Prior to the creation of interaction terms, independent variables (except group affiliation) are mean centered to reduce the potential problem of multicollinearity (Aiken & West, 1991). The mean VIF values are all within the limits of tolerance (i.e., less than 10). In the first model, the dependent variable - innovation - is regressed on the control variables. In the second model, independent variables group affiliation and explorative knowledge sharing are added. The third model introduces exploitative knowledge sharing variable. Interaction terms between group affiliation and the explorative, exploitative knowledge sharing are added in models four and five, respectively. When a full model (model six) is included with all the main effects and interaction terms, the individual variable

VIF values range from 1.05 to 6.32, with a maximum value of 6.32 for explorative knowledge sharing and one of 6.16 for exploitative knowledge sharing, which may be problematic in a small sample size study (Cohen, Cohen, West & Aiken, 2003; Hair et al., 2010). Consequently, explorative knowledge and exploitative knowledge sharing variables are retained; main effects and interaction terms are entered separately into the different models and because of the multicollinearity concerns explained above, the results related to the models with separate knowledge sharing variables and interaction terms are interpreted.

In model 1, firm size ($\beta = 0.090$, $p<0.05$) and R&D ($\beta = 0.170$, $p<0.05$) have positive and significant effects on innovation, thus indicating that larger firms and firms with high level of R&D are more likely to innovate. Hypothesis 1a proposes a positive impact of explorative knowledge sharing strategy on innovation. In model 2, the coefficient of explorative knowledge sharing is positive and significant ($\beta = 0.251$, $p<0.01$). Hypothesis 1a is supported. Hypothesis 1b predicts a positive impact of exploitative knowledge sharing strategy on innovation. In model 3, the coefficient of exploitative knowledge sharing is positive and significant ($\beta = 0.183$, $p<0.05$). Hypothesis 1b is supported.

Hypothesis 2a suggests that explorative knowledge sharing has a greater impact on innovation for group affiliated firms than for independent ones. In model 4, the coefficient of the interaction term between explorative knowledge sharing and innovation is negative and significant ($\beta = -0.463$, $p<0.05$), which means that hypothesis 2a is not supported. Hypothesis 2b suggests that exploitative knowledge sharing has a greater impact on innovation for group affiliated firms than for independent ones. In model 5, the coefficient of the interaction term between exploitative knowledge sharing and innovation is negative and significant ($\beta = -0.416$, $p<0.05$), meaning that hypothesis 2b is

Table 2. Results of the Regression Analysis

Dependent variable: Innovation						
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Control variables						
Firm size	0.090** (0.043)	0.063 (0.043)	0.071 (0.044)	0.054 (0.043)	0.065 (0.043)	0.054 (0.043)
Firm age	0.002 (0.004)	0.001 (0.004)	0.002 (0.004)	0.002 (0.004)	0.003 (0.004)	0.002 (0.004)
Industry	0.019 (0.144)	-0.005 (0.141)	-0.015 (0.143)	-0.002 (0.138)	-0.009 (0.141)	0.004 (0.140)
R&D	0.170** (0.079)	0.206*** (0.079)	0.190** (0.079)	0.196** (0.077)	0.184** (0.078)	0.197** (0.078)
Independent variables						
Affiliation		0.166 (0.140)	0.142 (0.141)	0.151 (0.137)	0.130 (0.139)	0.150 (0.138)
Explorative KS		**0.251*** (0.094)**		0.406*** (0.111)		0.421* (0.219)
Exploitative KS			**0.183** (0.089)**		0.322*** (0.106)	-0.017 (0.206)
Explorative KS X Affiliation				**-0.463** (0.186)**		-0.404 (0.308)
Exploitative KS X Affiliation					**-0.416** (0.179)**	-0.080 (0.291)
_cons	2.381*** (0.313)	1.590*** (0.418)	1.787*** (0.413)	1.079** (0.459)	1.295*** (0.457)	1.078** (0.468)
R^2	0.077	0.133	0.113	0.175	0.151	0.177
Adj R^2	0.047	0.090	0.069	0.127	0.102	0.114
F	2.581**	3.091***	2.565**	3.642***	3.053***	2.816***
VIF (mean)	1.05	1.08	1.07	1.22	1.21	2.91
N = 128						

Unstandardized regression coefficients. Standard errors in parentheses. KS: Knowledge sharing
* p<0.1; ** p<0.05; *** p<0.01. Two tailed tests. VIF: Variance inflation factor

not supported. The findings show that explorative knowledge and exploitative knowledge sharing have stronger effects on innovation for independent firms than for affiliated ones.

DISCUSSION

In line with the findings in similar studies, firms' explorative and exploitative knowledge sharing with each other have positive effects on innovation (Chiang & Hung, 2010; Faems et al., 2005); although other studies show a nonlinear relationship between knowledge exploitation and innovation (Chen et al., 2020), knowledge exploration and innovation (Bernal, Maicas & Vargas, 2019). However, knowledge sharing with partners is important in an emerging economy, that is, both types of knowledge exchanges of firms enhance innovative activities (Khan et al., 2019).

For the specific case of business groups, the findings related to group affiliation impact are similar to the results in some studies, which consider business groups, such as, Lee et al. (2010) find a negative impact of exploratory technological knowledge exchange on the performance of Korean business groups' foreign subsidiaries. Kang and Lee (2017) suggest that while exploratory knowledge sharing between Korean chaebol subsidiaries and affiliated firms negatively affects subsidiary performance, exploitative knowledge sharing has a significant and positive impact. Lee et al. (2014) suggest a balancing between sharing explorative, exploitative knowledge and performance of Korean chaebol affiliates. Chittoor, Sarkar, Ray and Aulakh (2009) argue that since affiliated firms benefit from internal markets within their group, accessing international financial and technological resources is more important for unaffiliated firms than for those affiliated with groups. Unaffiliated firms may lack access to group advantages; therefore, such firms need to be more efficient in knowledge sharing in order to innovate. Affiliates' network can be beneficial in integrating similar knowledge; however, the use of existing knowledge does not lead to increased innovation and new capabilities (Kang & Lee, 2017; Mahmood, Chung & Mitchell, 2013).

This paper contributes to the literature on business groups and knowledge by examining the impact of knowledge sharing strategies on innovative activities and the moderating impact of affiliation in such relationship in an emerging economy. It has been argued that the benefit of knowledge sharing may differ depending on the contexts in which firms operate (Inkpen & Tsang, 2005). Knowledge sharing impact within business groups are examined to a lesser extent; however, whether business group affiliates differ from independent firms regarding innovation and knowledge sharing relations is not fully captured. In addressing this gap, this research includes a sample of affiliated and unaffiliated firms in order to enhance the understanding of the impact of organizational setting in an emerging economy (Meyer & Peng, 2016; Su, Li, Yang & Li, 2011; Wilden et al., 2018). This study also enhances the existing literature by investigating the impact of knowledge sharing on innovation in emerging economy firms.

CONCLUSION

The results of this study have policy and strategy implications for firms in emerging economies and business groups. Since emerging economies lack well-functioning institutions, managers should be aware that explorative and exploitative knowledge exchanges are necessary for innovations. However, in a networked setting, affiliates' exploratory knowledge exchanges or the exploitation of existing knowledge may not help creating novel products and processes. Therefore, policy makers in groups should be more effective in utilizing knowledge from their internal and external environments to overcome the possible negative effects of their embedded group relations (Granovetter, 1985; Uzzi, 1997). However, groups continue to dominate the economic activities in developing economies and in some countries, they restructure themselves to become more efficient (Almeida & Wolfenzon, 2006; Carney et al., 2018; Hobdari et al., 2017; Khanna & Palepu, 1999; Khanna & Yafeh, 2007).

This study has a number of limitations which can trigger several avenues for further research. In this study, knowledge sharing is conceptualized as explorative and exploitative learning, which is extensively applied to research in developed economies. Future research can consider other knowledge conceptualizations, such as R&D, marketing know-how and management systems (Colpan, 2010; Gupta & Govindarajan, 2000). Future research can also include connections in various types of groups, such as horizontal or vertical (Holmes et al., 2018; Yiu, Lu, Bruton & Hoskisson, 2007). This study is based on Turkish firms which may limit the generalizability of the findings to other emerging economies (Singh & Gaur, 2009, 2013). Therefore, the relations can be explored in other emerging economies. A qualitative approach could be used to examine interfirm interactions deeper to uncover the effect of business group affiliation on such relations.

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Appendix

Table A1 Firm Industry and Business Group Affiliation

Industry	Observation	Proportion (%)	Split sample
Textile	32	25	Lowtech
Food	19	15	Lowtech
Fabricated metal product	22	17	Medtech
Basic metal	19	15	Medtech
Chemicals	12	9	Medtech
Wood products	8	6	Lowtech
Coal mining	6	5	Lowtech
Paper products	5	4	Lowtech
Non-metallic products	5	4	Medtech
Total	**128**	**100**	
Business group affiliation	Unaffiliated: 64 (N=128)		Affiliated: 64