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Re: **Paper ID 324** and Research Paper titled "**Managing innovation and knowledge transfer in Turkish manufacturing firms**

Dear Chair,
Please find the copy of our research paper titles "**Managing innovation and knowledge transfer in Turkish manufacturing firms".** Five author's credentials are below.

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Kind Regards,
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Managing innovation and knowledge transfer in Turkish manufacturing firms.

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ABSTRACT

It is often argued that the firms which implement knowledge transfer efficiently are more successful in innovation. It might be inferred then that firms that focus on radical innovations pay more attention to knowledge transfer. This research examines whether there is evidence that high performing firms implement KT more extensively than low performing firms, and also whether radical innovators implement KT more extensively than incremental innovators. Although there is a large body of literature on the subject for the Developed Countries, empirical evidence from Developing Countries is very limited. The data was collected from firms operating in Turkey. The results obtained from comparing radical and incremental innovators according to their KM and KT implementations showed that firms adopted radical innovation implemented KT more intensively. Eventually, it can be argued that those firms which aim at earning higher revenues and benefits from innovation need to implement KT and KM intensively.

***Keywords*:** Innovation, Knowledge Management (KM), Knowledge Transfer (KT), Turkey.

INTRODUCTION

A better understanding of both knowledge transfer and knowledge management should result in the better utilization of knowledge assets and new knowledge generation (Ceyhun and Caglayan, 1997). Knowledge transfer is acknowledged to be a major challenge for all firms. In an organisation, the typical activities that foster the sharing and creation of knowledge include hiring new staff with expertise, attending training programmes, setting up a research and development department, and interacting with internal and external parties (Brooking, 1999; Davenport and Prusak, 1998). Social interaction has been recognised as an important process through which new knowledge is created from the sharing of existing knowledge. There are many benefits they can enjoy by sharing existing or new knowledge. The organization can avoid expensive resources and move much faster with old learning resources across the different geographic markets. However some manufacturing firms cannot afford expensive technology and therefore, they have to share their knowledge with other organizations or survive with their existing technology (Yoong and Molina, 2003).

In the face of increased competition associated with globalisation, firms strive to have competitive advantages through increasing the value added of their products or introducing new products to the market. Increased competition with trends like the customization of products, markets getting more specific and elastic, technological integrations, globalization, cost pressures, continuously changing customer needs and expectations, are forcing firms to innovate constantly. In keeping with constantly changing external environmental conditions or attempts to steer markets expectations and trends make innovation a necessity rather than a choice. For these reasons, researchers recently focused on product innovation to explain and understand the nature of competition among firms (Lin and Chen, 2006; 155). Although the subject has recently attracted much attention in the literature, the number of studies that investigated

the relationship between knowledge management and innovation is limited (Abou-Zeid and Cheng, 2004; 262).

Most of the existing studies on the relationship between knowledge management and innovation are carried out for organisation in developed countries. However, not much interest has been paid to the subject at the organisational level in developing countries. For a number of reasons, such research on the relationship between knowledge management and innovation for developing countries seems to be important. Considering the fact that knowledge management could contribute considerably to the level of effectiveness and efficiency and hence to development in a country, it will be recognised that the subject is particularly important for continued existence and survival of firms in developing countries. In addition, the empirical findings on the subject obtained for developed countries may not be relevant for firms in developing countries because of the structural differences among developed and developing countries. These differences include environmental factors which are outside the control of the organisation but directly influence its activities; national culture which influences management practices; organisational culture which is crucial in organisational design; funding; intellectual capital and the operating environment. For these reasons, it is expected that the assumed relationship between knowledge management and innovation may not be exactly true for organisations in developing countries. To understand the nature of this relationship for developing countries, more research is required.

To this end, we conducted our study in Turkey employing cluster analysis and using data obtained from organisations. In this way, we will be able to see whether the differences in culture and infrastructure provision play an important role on the relationship between knowledge management with knowledge transfer and innovation or not. The rest of this paper is organised as follows.

Section two provides the existing literature on knowledge management. Section three introduces the methodology employed in the empirical part of the study and the data. Section four presents the findings of the study and discussion on results. Section five is conclusion.

Literature Review:

Product Innovation: Product innovation is a primary means to adapt to changing markets, technologies, and competition. Innovative organizations are more profitable, grow faster, create more jobs, and are more productive than their non-innovative competitors, even in mature industries (Capon, Farley, Lehmann & Hulbert 1992; Baldwin & Da Pont 1993). In the face of increased competition in the world markets, firms strive to achieve sustainable competitive advantages. In this respect, innovations seem to be the main tool for firms to achieve this goal. However, innovation may also be an important risk factor for firms because the results of development projects cannot be predicted beforehand and products obtained as a result of innovation may not be accepted in the market. Although there are such risks in innovation, firms have no choice but to innovate constantly and look for ways to change or at least improve offerings (product/service innovation) or create new processes to sustain their competitiveness (Tranfield et al., 2003; 28). The ability to generate streams of new products or services over time is therefore vital to many organizations. Organizational design plays a significant role in this ability, so understanding how to organize for innovation is a central problem in innovation management (Galbraith 1995; Tushman and O'Reilly 1997; Dougherty 2001).

Knowledge management: Knowledge management (KM) is the science that outlines the rules for organizational learning (McElroy, 2003b). KM is a management discipline that seeks to enhance knowledge processing. Knowledge processing is composed of social processes that account for the production and integration of knowledge in organizations (Firestone & McElroy, 2003).

Knowledge production is the creation of new knowledge. Barquin (2001) defines knowledge management as “the process through which an enterprise uses its collective intelligence to accomplish its strategic objectives” (p. 128). The socio-economic trends are mainly determined by the knowledge in this era. The value of knowledge depends on its capacity to be able to affect the market and its ability to penetrate into the products. With the development of information technology, many organizations are becoming more intent on knowledge than on labor. For such organizations, knowledge has become their most precious asset and their crucial competitive ability (Nonaka, 1991). Knowledge needs to be managed effectively to become a "value" for an firm. And to achieve this, knowledge should be gathered continuously and accurately from various sources, shared widely by all levels of the firm, used efficiently and protected. So long as the knowledge content of goods and services increases, the innovative capacity of firms increases in parallel with this. The main determinant of achieving sustainable competitive advantage is to acquire knowledge constantly, quickly, accurately and with the least cost and to convert this knowledge into value for a firm.

Knowledge Transfer: Knowledge transfer has received increasing interest among the modern business world, existing and new managers. Increasingly popular knowledge management efforts attempt to establish better utilization of knowledge assets and help new knowledge generation (Ceyhun and Caglayan, 1997). Knowledge transfer is acknowledged to be a major challenge for all firms. In an organisation, the typical activities that foster the sharing and creation of knowledge include hiring new staff with expertise, attending training programmes, setting up a Research and Development Department, and interacting with internal and external parties (Brooking, 1999; Davenport and Prusak, 1998). This is because social interaction has been recognised as an

importance process through which new knowledge is created from the sharing of existing knowledge. There are many benefits they can enjoy by sharing existing or new knowledge. Any knowledge transfer within an organization or between organizations can share the knowledge/resources without spending any money. The organization can avoid expensive resources and move much quicker with old learning resources across the different geographic markets. However these benefits are not easily achieved in absence of new knowledge transfer processes in the business.

Knowledge transfer is considered to be an important topic for both researchers and practitioners. However, very little research has been pursued to understand the factors affecting knowledge transfer within teams, an important social unit within organizations. (Joshi et al.2006). Nohria and Eccles explain that organisational capital has been viewed as comprising the elements of financial, human, and social capital, where the social capital of individuals aggregates to the social capital of the organisation (Nohria and Eccles, 1992). Social capital has been considered the constituent that bonds individuals to each other (Stephenson, 1998) and to the organisation (Baker, 2001). Bouty's investigation into the exchange of strategic resources across organisational boundaries found social capital to be the key success factor for organisational development performance (Bouty, 2000). Dess and Shaw (2001) conceptualise social capital as the network structure and social resources therein. Nahapiet and Ghoshal (1998) construe social capital as "the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by a social unit". Communication plays a crucial role in the process of knowledge transfer because: (i) communication leads to socialization which nurtures social relationships important for co-operation and consensus (Gupta et al, 2000); (ii) frequent communication facilitates interaction among individuals and between individuals and organizational databases which

helps in the creation of a shared meaning and context crucial for effective knowledge transfer (Szulanski, 1996). Cohen and Prusak's more recent text on social capital provides a more definitive explanation: Social capital consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible (Cohen and Prusak, 2001).

In this context, Knowledge Transfer (KT) involves deliberate efforts to manage the firm's knowledge through the processes of acquiring, converting, disseminating, applying and protecting it to enhance organizational performance and create value (Bose, 2002; 40-41). The success of KT is closely related to the firms' capabilities in acquisition, conversion, application and protection of knowledge. The nature and meaning of these capabilities can be explained as follows.

The activities of many firms are often based upon the skills and knowledge of the entrepreneur. Within the industrial sector in particular, many entrepreneurs are skilled craftsmen with a technological background. Their way of thinking and business perspective is mainly technology or product orientated (Fuller, 1994) and only a minority manage knowledge in a proactive and strategic manner to enhance their competitive advantage (Wickert and Herschel, 2001). Hansen (2002) argues that developing a knowledge network is especially useful for inquiring about opportunities. The joint consideration of related knowledge and lateral inter-unit relations of a knowledge network is illustrated in Figure A. which is the unit of analysis in this paper. Figure A illustrates a network of relations among all business units in a firm.

The figure below shows the related knowledge and lateral relation of knowledge transfer network for innovation.

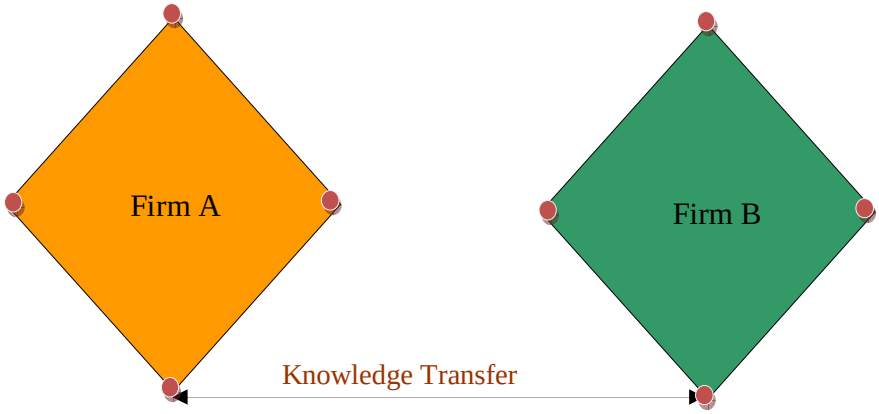

Figure 1: Network controlling business unit (Related Knowledge)

Figure 1 illustrates partitions in the business units in the firm into those that have relevant knowledge for the new product development. Firm A and Firm B form a bi-directional knowledge transfer network. In this type of knowledge transfer both the firms share the same type of knowledge from a same resource in a relative pattern. This knowledge network model seeks to advance understanding of knowledge sharing in firms. By integrating the concept of related knowledge network connect that enable knowledge sharing and direct relation (Chowdhury and Butel, 2007).

Figure 2 below illustrates a network of relations among all business units in a firm but does not partition the individual units into those that have relevant knowledge for the new product development. In this type of Knowledge transfer, Firm A and Firm C share the same knowledge but form different resources.

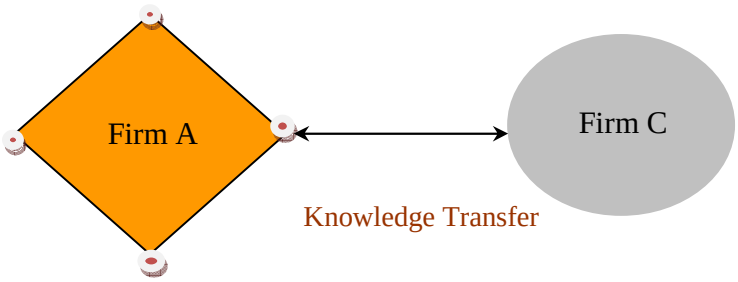

Figure 2: Network controlling business unit (Non Related Knowledge)

Each firm can access or share the knowledge from other resources that are explicit to each other. However, this approach enables to understanding of knowledge sharing effectiveness in firms . While this method is conceptually similar to one firm to another firm, it explicitly includes the ability to access resources through indirect as well as direct links for any firm (Chowdhury and butel, 2007).

The Relation between Knowledge Management with knowledge transfer and Product Innovation: It seems that the success of innovative activities is closely related to the ability to use knowledge in an efficient way. As a matter of fact, firms need knowledge to complete their innovative activities successfully. Most of the time, gathering the currently available knowledge together or acquiring a new knowledge contributes to the creation of suitable environment for innovations. Realizing innovative activities successfully in a firm depends on constant and fast knowledge flow from the external and internal sources of firms. Knowledge coming from these sources leads to successful innovations by spreading it to a wide area though knowledge sharing mechanism operating within a firm.

As mentioned above knowledge management is related to the competencies, capabilities and learning processes that comprise a firm's knowledge assets (Simpson, 2002; 51). Innovation, however, requires the integration of many different areas of knowledge, technologies, new products, or production processes (Collinson, 2001; 77).

There are a numerous studies on the relationship between knowledge management and innovation (Braganza et al., 87; 1999). The importance of the subject stems from the fact that knowledge is a key resource for innovation which, in turn, is the major factor in economic and social development, and in determination of economic growth and competitiveness (Hamdouch and

Moulaert, 2006; 35; Simmie, 2003; 607). Most of the theoretical studies have shown that knowledge management is closely related to innovation and innovative firms usually have an effective knowledge management system (McAdam, 2000; 236-240). This point is investigated for the Turkish manufacturing industry with the hypothesis given below.

***Hypotheses** 1:* High performing firms (in innovation) implement KT more extensively than low performing firms (in innovation).

Considering the effects of innovation on markets, competencies and competitiveness, innovations are mainly divided into two categories, namely incremental and radical innovations (Hall and Andriani, 1999: 316; Tidd et al., 1997; 8-9). Incremental innovations involve the introduction of relatively minor changes to the existing products or gradual improvements of currently available processes and help to improve the existing capabilities of firms (Abou-Zeid and Cheng, 2004; 264). Although it may seem that incremental innovations add too little to the firms, studies on the subject suggest that the cumulative gains in efficiency from incremental innovations are often much greater over time than those which come from occasional radical changes (Tidd et al., 1997; 9). In today's highly competitive environment with rapid technological change, firms cannot rely on incremental innovations alone. Firms need to undertake radical innovations as well to sustain their long-term competitiveness (Lettl, 2007; 53). Radical innovations, can be defined as those innovations that involve producing fundamental changes in the activities of an firm and produce completely new products. Because radical innovations are related to completely new products for customers and for industry, they arise as a result of intensive development efforts (Tidd et al., 1997; 9). For this reason, it is expected that those firms that undertake radical innovations and hence earn higher profits focus more on

knowledge management. To test the relevance of this expectation, the second hypothesis is determined as;

Hypotheses 2*: Radical innovator firms implement KT more extensively than incremental innovator*

METHOD

This section introduces the data and provides information on the methodology employed to test the hypothesis of the study subject to empirical analysis. The data employed in this study is a cross-section data and collected from medium and large scale industry firms operating in Nigde ,Ankara, Konya and Kayseri provinces of Turkey using a standard survey forms in the last quarter of the year 2006.

Sample

To investigate the impact of knowledge management and knowledge transfer on innovation performance, we first determined the population of the study considering knowledge management with knowledge transfer implementation potential of firms. Within this context, medium and large scale firms which have both institutional and sufficient resources (both human and financial) are chosen to be a population of the study. Because there exists no database that includes medium and large firms which implement knowledge management and knowledge transfer, judgement sampling method is considered as the most appropriate sampling method for the research. In this method, samples are determined by the researchers considering their contributions to the research (Kinnear-Taylor, 1991). In addition, the data set involves firms related to different sectors of the industry as much as possible to make sure that the findings of the study can be generalized to the overall industry. To this end, the medium and large firms located in the industrialized provinces (Ankara, Konya and Kayseri) around Nigde in the Central Anatolia region are included in the data set. Researchers visited the industrial parks in the four provinces and

handed a survey form to those firms accepted to participate and asked them to fill in the forms. As a result, we obtained suitable survey forms which are eligible to consider in four provinces, namely Ankara, Konya, Kayseri and Nigde. Table 1 provides information about the size, ownership, markets they operate and product variety of the participating firms.

TABLE 1:

Profile of the respondent firms (N=)

Respondent characteristics	Definitions	Frequency	Percent
Firm size	Number of total employees		
Medium	<=500	106	75,2
Large	>500	35	24,8
Ownership	Turkish owned	128	90,8
	Foreign owned	5	3,5
	Joint venture	8	5,7
Market	Only local	38	27,0
	Only international	3	2,1
	Market	100	70.9
Product variety	Low	17	12,0
	Normal	31	22,0
	High	93	66,0

Measures

A field survey was used to investigate the research questions and to test the hypotheses. In determination of the scales conducive to the aim of the study, the empirical studies in the related literature and previous studies on the subject are considered. The survey instruments were pre-tested through direct interviews with knowledge management and innovation practitioners in 12 companies and with five academicians. The pre-tests showed that the practitioners and academician found some factors were not clearly described and some terms could not be easily or fully comprehended. Thus, some items were modified, and others were added to these, scales based on the pilot test responses.

Information about the employed scales in the study is presented below;

Knowledge Management Capabilities*:* It has been stressed in the literature that there are different stages in knowledge management. For example, the stages of knowledge management are defined by Leonard (1995) as acquisition, cooperation, integration and experimentation; by Pretorius and Steyn (2005: 43) as creation of the knowledge, coding, diffusion and application; by Bharadwaj and Saxena (2005: 67) as creation of the knowledge, sharing, application and evaluation; by Darroch and McNaughton (2003: 575) as acquisition, diffusion of knowledge and response to knowledge; by Seng et al., (2002: 143-144) as acquisition of knowledge, storing, processing, sharing and application of the knowledge. Gold et. al. (2001), however, defines and measures the knowledge management processes as acquisition, conversion, application and protection. In this study, the items related to four scales (acquisition, conversion, application and protection) developed by Gold et. al. (2001) are employed. However, some of the items, which are vague and participants found difficult to understand were dropped later according to pre-test results. Respondents gave the extent to which they agree or disagree with each statement concerning the variables. Five-point Likert type scales were used except in those items for utilization and diversity.

Innovation performance*:* Innovation performance was measured from a non-financial perspective. In the measurement of innovative performance, a five point scale was constructed making use of the scales developed and employed by Storey and Easingwood (1999), Lynn et. al. (2000) and Akgün and Lynn (2002). The following items were included in the performance measure: innovations, (1) profit expectations; (2) market share expectations; (3) sales expectations;(4)customer expectations; (5)senior management's expectations. The performance items were measured using a five point Likert-type scale. Respondents answered the extent to which they agree or disagree with each statement.

Degree of knowledge transfer *:* The level of knowledge transfer of firms is measured based on the level of perception of respondents. Respondents were requested to mark whether the knowledge carried out or exchanged by their firms, in general, can be characterized as radical- introduction of completely a new product as a result of intensive development efforts- or as incremental- introduction of relatively minor changes to the existing products or processes.

Questions of the survey are prepared in accordance with the literature and while the knowledge management and knowledge transfer process is measured in four dimensions, namely acquiring, converting, implementing and protecting the knowledge, the success of innovation is measured in only one dimension and the product innovation is measured with two items as being incremental and radical. The findings of the study obtained using suitable survey returns can be summarized as follows.

Data Analysis and Results

Validity and Reliability of Measures

Content validity was established through the adoption of constructs that have been used in former studies and through a pilot test with practitioners and academicians. Table 2 summarizes the number of items and the results of the reliability and validity tests for the KM and innovation performance variables.

A reliability assessment was conducted using Cronbach's coefficient alpha to ensure that the items for each factor were internally related. All scales show adequate reliability as their alphas exceed 0.80. Factor analysis checks used discriminant validity. Because multi-item constructs measure each variable, factor analysis with varimax was employed to check unidimensionality among the items, and the results indicated that there is no factor loading values which are lower than 0.5. In addition, convergent validity tests were performed to see if all the items measuring a construct clustered together and formed a single construct. The item-to-total correlation, between each item and the sum of the remaining items, was used for convergent validity. Since the item-to total correlation scores for all items is higher than 0.40, it is concluded that convergent validity is satisfied.

TABLE 2: RELIABILITY AND VALIDITY TEST RESULTS FOR MEASURES

Measures	Item	Reliability (Cronbach's alpha)	Convergent validity (Correlation of item with total score-item)	Discriminant validity (Correlation of item with total score-item)
Innovation performance	5	0,835	0,552; 0,737; 0,718; 0,629 0,566	0,703; 0,843; 0,839; 0,778 0,715
KT variables				

Acquisition process	9	0,882	0,661; 0,652; 0,546; 0,631 0,718; 0,631; 0,576; 0,608 0,6842	0,756; 0,746; 0,638; 0,718 0,798; 0,722; 0,654; 0,674 0,750
Conversion process	8	0,903	0,726; 0,712; 0,582; 0,616 0,783; 0,720; 0,749; 0,682	0,794; 0,780; 0,670; 0,699 0,834; 0,785; 0,813; 0,746
Application process	8	0,905	0,714; 0,789; 0,689; 0,770 0,740; 0,709; 0,544;0,664	0,775; 0,846; 0,771; 0,838 0,814; 0,783; 0,626; 0,736
Protection process	10	0,912	0,768; 0,712; 0,780; 0,729 0,757; 0,700; 0,571; 0,541 0,611; 0,614	0,812; 0,775; 0,840; 0,794 0,809; 0,746; 0,652; 0,619 0,669; 0,683

Level of firms' performance:

In this study, we employed cluster analysis to test the hypothesis of research. Cluster analysis is a multivariate statistical technique which groups firms so that their membership is homogeneous with respect to certain characteristics (Kurtuluş, 1996; Youssef, 1994). It is a technique that is frequently employed in the empirical literature because it provides efficient solutions.

A cluster analysis is performed in order to group firms into homogeneous categories with respect to five indicators of innovation performance. We did the cluster analysis on five performance variables "innovations (1) met profit expectations; (2) met market share expectations; (3) met sales expectations; (4) met customer expectations; (5) met senior management's expectations. Innovation performance measured using a Likert-type scale (10 strongly disagree, 5= strongly agree).

One of the most important questions in cluster analysis is to determine the number of clusters. On this point, there are a number of different approaches employed in practice in the literature. For example, to determine the number of clusters, Lehmann (1979) suggested that the number of clusters should be between n/30 and n/60, where n represents the sample size. Thus, the number of clusters from our data should be between two and five (141/60 and 141/30). In addition, the number of clusters can be determined by evaluating a hierarchical dendogram and agglomeration schedule table. In our empirical analysis, as a first step, we performed hierarchical cluster analysis by using the Ward method. Ward's method was used because it effectively minimizes intra-cluster differences and maximizes inter-cluster differences among the variables used for clustering (Zahra and Covin, 1993). Then, using hierarchical cluster analysis we generated a hierarchical dendogram and an agglomeration schedule table. We found that the sample should be grouped into two main clusters.

The agglomeration coefficient shows (Table 3) rather large increases from five to four clusters (295,5-266,6 =28,9), four to three clusters (348,9 - 295,5 = 53,3), three to two cluster (409,4 - 348,9 = 60,5) and two to one cluster (635,0 – 409,4 = 225,5). Based on the change in agglomeration coefficients, the appropriate number of clusters was found to be two. Briefly, the hierarchical cluster technique provided clear evidence of two groups of firms with a lack of any intermediate group(s). An examination of agglomeration schedule also revealed that two groups emerged as the optimum number of clusters.

As a second phase, to fine-tune the results from the hierarchical procedure, the k-means cluster algorithm was used (Hair et al., 1995) to obtain a two cluster solution. The analysis produced a solution according to which 83 firms belonged to cluster one and 45 to cluster two (13 questionnaires containing missing variables were excluded).

TABLE 3: ANALYSIS OF AGGLOMERATION COEFFICIENTS

Number of cluster	Agglomeration coefficients	Differences in coefficient
10	171,4	13,0
9	184,4	18,4
8	202,9	18,9
7	221,8	19,4
6	241,3	25,3
5	266,6	28,9
4	295,5	53,3
3	348,9	60,5
2	409,4	225,5
1	635,0	

The next step in cluster analysis is validation of clusters (Hair et al., 1995). To this end, the means and standard deviations of the clustering variables for each of the two clusters are presented in Table 4 Independent-samples t test was used to evaluate the equality of variable means across the clusters and thus assess the distinctiveness of each derived cluster. The t-tests confirm that these means differ significantly. It is concluded that Cluster 1 represents high performing firms in innovation whereas Cluster 2 represents low performing firms in innovation.

To validate the cluster solution, we obtained the mean values of another performance measure–the rate of growth –for both clusters. For both samples, the rate of growth of scores was higher in Cluster 1 than that in Cluster 2 (see Table 4). In addition, we ran a t-test to see whether the mean values of the rate of growth in both clusters significantly differed. The results were significant (t-

value=3.865, p-value= 0.000). Furthermore, the univariate F-ratios presented in Table 5 shows that group means for performance variables are significantly different.

TABLE 4: Cluster means and standard deviations for the five innovation performance variables.

Innovation performance items	Cluster 1: high performers *(n = 83)*	Cluster 2: low performers *(n = 45)*	*t - test*
Innovations...			
met profit expectations			
Mean	4,00	2,97	*t* = 7,376
S.D.	0,68	0,78	***P < 0.001***
met market share expectations			
Mean	4,14	2,93	*t* = 10,54
S.D.	0,47	0,68	***P < 0.001***
met overall sales expectations			
Mean	4,20	3,06	*t* = 8,453
S.D.	0,46	0,83	***P < 0.001***
met customer expectations			
Mean	4,31	3,48	*t* = 6,613
S.D.	0,56	0,72	***P < 0.001***
met senior management exp.			
Mean	4,14	3,02	*t* = 7,598
S.D.	0,58	0,89	***P < 0.001***
Total			

Mean	4,16	3,09	t =
S.D.	0,37	0,41	14,747
			P < 0.001
growth rate			
Mean	4,14	3,55	t = 3,865
S.D.	0,73	0,86	***P < 0.001***

TABLE 5: ANOVA: Interpretation of cluster

Innovation performance variables	cluster mean square	df	error mean square	df	*ANOVA*
profit expectations	30,491	1	0,516	126	$F = 59{,}126^{*}$
market share expectations	42,810	1	0,310	126	$F = 138{,}07^{*}$
overall sales expectations	37,799	1	0,383	126	$F = 98{,}570^{*}$
customer expectations	19,830	1	0,390	126	$F = 50{,}887^{*}$
senior management expectations	36,757	1	0,502	126	$F = 73{,}232^{*}$

$^{*}p < 0.001$

(1) Hypotheses testing - High performing firms implement KM more extensively than low performing firms.

One of the aims of the study was to investigate whether knowledge management implementations increases innovation performance. Table 6 provides mean and standard deviation of scores obtained from the question of how knowledge management implementations affected new product development capability of your firm.

TABLE 6: THE EFFECTS OF KNOWLEDGE TRANSFER IMPLEMENTATIONS ON NEW PRODUCT DEVELOPMENT CAPABILITIES

Variables	Mean	S.D.
KT increased the number of new products	3,968	0,995
KT increased the acceptance level of new products in the market	3,912	0,929
KT increased the speed of new product development	4,000	0,967
KT increased the convenience of new products to customers	4,015	0,899
KT increased the level of innovativeness of new products	3,976	0,916
KT reduced the costs of new product development	3,622	1,061

Note: *(i)* n=126, *(ii)* five point Likert-type scale, (1) strongly disagree.... (5) Strongly agree

An examination of Table 6 reveals that knowledge transfer implementations have highly positively affected the firms' new product development capabilities. We also tested the accuracy of this observation (hypothesis 1) employing the statistical analysis to determine the differences among the clusters identified according the innovation performance of firms in terms of knowledge transfer implementation levels.

To test the hypothesis, average scores for each KT process factor (four dimension of KM process) were calculated to run multiple t-tests. The hypothesis leads us to expect that high performing firms implement KT practices more extensively than low performing firms. Group means for both clusters on KT practices and the results of the multiple t-tests are presented in Table 7 As seen from the table; high performing firms have implemented KT practices to a greater extent than low performing firms. Overall, the t-test results support the hypothesis.

TABLE 7: Results of t-tests for comparing high performer and low performer firms

KM variables	Cluster 1: high performers *(n = 83)*	Cluster 2: low performers *(n = 45)*	*t - test*
Acquisition			
Mean	4,10	3,73	*t* = 3,254
S.D.	0,73	0,55	***P < 0.01***
Conversion			
Mean	4,03	3,56	*t* = 3,598
S.D.	0,70	0,72	***P < 0.001***
Application			
Mean	4,19	3,88	*t* = 2,131
S.D.	0,89	0,63	***P < 0.05***
Protection			
Mean	3,80	3,45	*t* = 2,345
S.D.	0,87	0,77	***P < 0.05***
Total			
Mean	4,03	3,66	*t* = 3,351

S.D.	0,67	0,54	***P < 0.01***

(2) Hypotheses testing - Radical innovator firms implement KM more extensively than incremental innovator.

Table 8 shows descriptive statistics of KM implementation levels and comparison of firms which implement high and low knowledge management according to innovation performance.

TABLE 8: RESULTS OF T-TESTS FOR COMPARING RADICAL INNOVATOR AND INCREMENTAL FIRMS

KM variables	Incremental innovator (n = 97)	Radical innovator (n = 31)	*t - test*
Acquisition			
Mean	3,85	4,37	*t* = 3,914
S.D.	0,70	0,41	***P < 0.001***
Conversion			
Mean	3,74	4,28	*t* = 3,709
S.D.	0,75	0,54	***P < 0.0001***
Application			
Mean	3,95	4,40	*t* = 2,958
S.D.	0,80	0,51	***P < 0.01***
Protection			
Mean	3,56	4,04	*t* = 2,790
S.D.	0,87	0,66	***P < 0.01***
Total			

Mean	3,77	4,27	t = 3,892
S.D.	0,68	0,34	***P < 0.001***

An examination of Table 8 provides important insight into innovation performance of firms. The results indicate that while 31 firms focused on radical innovation, 97 firms are incremental innovators. In other words, it is apparent that 24 percent of the firms spent intensive efforts to develop a completely new product and 74 percent of the firms concentrated on altering already available products in the market or adding available products to their portfolios. Thus, it can be argued that while a large number of firms participated to the study focused on product innovation which has low costs and low returns, relatively small percentage of firms aimed at radical product innovation which leads to higher costs and higher revenues. However, the number of firms which declared that they care about radical innovation is not negligible.

Another hypothesis which is tested in this study is that whether there is a relationship between the type of product innovation that firms concentrated on and the level of knowledge management with knowledge transfer implementations. This hypothesis is tested using t-test. An examination of Table 8 indicates that the level of knowledge management implementation is high in those firms which focused on radical innovation. However, those firms which concentrate on incremental innovation implemented knowledge management only at a lower rate. The t-test results show that there are statistically significant differences among these two groups. Therefore, the second hypothesis of this study that “Radical innovator firms implement KM more extensively than incremental innovators” is accepted.

CONCLUSION

Today, firms compete based on the ability to respond to dynamic environments and to quickly develop innovative new products. However, to what extent is knowledge management (KM) and knowledge transfer (KT) a source of competitive advantage for firms in developing country specifically Turkey ? This study empirically investigates the relationship between the extent of knowledge management and transfer implementation and innovation performance in manufacturing firms. Cluster analysis was carried out based on five innovation performance variables, *met profit expectations, met market share expectations, met sales expectations, met customer expectations, met senior management's expectations*. Two distinct groups, one low performing and one high performing, emerged as a result of cluster analysis. The results show that high performing firms have implemented KM and KT more extensively than low performing firms. Thus, Knowledge Transfer (KT) can be a source of competitive advantage for firms.

In today's fast growing business strategies, every business organization would prefer to have a medium through which resources can be shared either within the organization or between two or more organizations. Effective Knowledge Transfer implementation helps firms with free flow of information, ideas and resources. But, this often may not be easy as there might be a communication gap between various entities in or between Turkish manufacturing firms . The main challenge faced by most businesses is to manage the flow of information among different entities. Firms may not be able to handle complex knowledge transfer and management procedures with the changes and challenges in the dynamic business environment. Therefore, firms need a clear understanding on what to be shared, when to be shared or accessed and with whom the resources has to be shared. This study has made an attempt to identify and examine several important factors and developed

In addition, this study investigated whether there is a relationship between the type/level of innovation and the level of KT and KM implementations. Firms are divided into two groups according to their innovation operations as radical and incremental innovators. The results obtained from comparing radical and incremental innovators according to their KM and KT implementations showed that firms that adopted radical innovation implemented KT more intensively. Taken these findings together, it can be argued that those firms which aim at earning higher revenues and benefits from innovation need to implement KT and KM intensively.

Turkish firms would like to access knowledge and to manage the knowledge resource to improve their competitiveness. This research demonstrates the importance of Knowledge transfer and Knowledge management. Further research should now be done exploring the constraints and opportunities for KT in Turkish manufacturing firms.

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