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Information Technology Use Patterns and Its Relationships with Firm and Sector Characteristics

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Abstract

The aim of this study is to explore the existence of different patterns of information technology use in the firms operating Turkish manufacturing sector and the relationship between these patterns and various firm (number of employee, ownership structure, annual sales and export figure) and sectoral(sector type and competition intensity) characteristics. Data are collected from 123 firms in ISO 1000 list operating in different sectors using a standard survey form. Three different information technology use patterns(Low users, Followers and High users) are identified as a result of cluster analysis. Results suggest that there is no relationship between information technology use patterns and number of employees;conversely it reveals that there is a significant relationship between sector type, competition intensity, ownership structure, annual sales and export figures. In final section, the implications of the results are discussed; limitations of the study are noted and additional research is suggested.

Keywords:

Information technology use, taxonomy, firm characteristics, sector characteristics

Öz

Bu çalışmanın amacı Türk imalat sanayinde faaliyet gösteren firmalarda farklı bilişim teknolojileri kullanım modellerinin varlığını ve modeller ile firma (çalışan sayısı, sahiplik yapısı, yıllık satış ve ihracat rakamları) ve endüstri (sektör sınıfı ve rekabet yoğunluğu) özellikleri arasındaki ilişkiyi araştırmaktır. Çalışmada veri standart bir anket formu yardımıyla farklı sektörlerde faaliyet gösteren 123 firmadan toplanmıştır. Kümeleme analizi sonucu üç farklı bilişim teknolojisi kullanım modeli (düşük kullanıcılar, takipçiler ve yüksek kullanıcılar) belirlenmiştir. Ayrıca analizler, bilişim teknolojisi kullanım modelleri ile çalışan sayısı arasında bir ilişki bulunmadığını buna karşın sektör türü, rekabet yoğunluğu, sahiplik yapısı, yıllık satış ve ihracat rakamları arasında bir ilişki bulunduğunu göstermiştir. Son bölümde,sonuçların teorik ve pratik uygulamaları yanı sıra çalışmanın sınırları belirtilmiş ve gelecek çalışmalar için öneriler sunulmuştur.

Anahtar Kelimeler:

Bilişim teknolojileri kullanımı, sınıflama, firma özellikleri, sektör özellikleri

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Mosenthal (1985) differed taxonomy from other classification definitions by stating that taxonomy portrays nearly a full specification of a phenomenon while other definitions depict only partial specifications of this phenomenon. Therefore, it is useful for analyzing the proposed work, system or phenomenon as it is much easier to yield information from classified structures with a comprehensive specification.Grimshaw (1992) and Glass and Vessey (1995) stated that taxonomy is associated with biology initially however it has been seen that development of information technology taxonomy is needed as it improves research by providing an organized structure of knowledge in a relevant subject and thus gaining better understanding of practice.

Information technology has been classified in terms of various factors in the literature. Some studies classified information technology broadly. Vessey et al. (2005) developed a unified classification system for computer science, software engineering, and information systems based on topic, approach, method, unit of analysis, and reference discipline factors to make knowledge sharing between these three subjects more effective. Dwivedi et al. (2009) made a keyword classification of information technologies by reviewing information technology publications from 1990 to 2007. Shaikh and Karjaluoto (2015) classified information technology based on historical development. Nickerson et al. (2013) developed a useful taxonomy to be used for information technology. Addas and Pinsonneault (2015) developed taxonomy for information technology interruptions to understand how these interruptions affect employees' performances.

Some studies in the literature made a classification on a narrow base such as information technologies used for specific aims (e.g. assisting disabilities, manufacturing).Giaglis (2001) designed taxonomy for business process modelling and information systems modelling from the fit, depth and breadth perspectives to assist decision makers in choosing optimal technologies for their needs. Craighead and Laforge (2003) developed taxonomy to understand how manufacturing firms adopt information technology. Gower and Andrich (2014) created a taxonomy of information technology products used for assisting disability patients to standardize Assistive Technology products therefore make choosing suitable technologies for the specific needs easier for patients and health professionals. Heurix et al. (2015) researched privacy-enhancing technologies which aim protecting the individual's privacy on internet to create a universal taxonomy of privacy-enhancing technologies. Mrosek et al. (2015) created taxonomy for health information technology to address poor medication adherence by building a standard for health information technology.

Literature review on taxonomy of information technology has revealed that taxonomy development efforts mainly focus whether on classifying information technology in a broad sense to build a standard for information technology or classification of specific uses of these technologies. It has been seen that there is a lack of research on how information technology uses differ in terms of firms and sectors. Therefore, this study'sfirst objective is to fill this gap by classifying information technology.

Studies research relationship between information technology use and firm and sector characteristics have shown conflicting results. For example, while some researchers (Haller and Siedschlag, 2008; Youssef et al., 2011; Arduin et al., 2010; Gallego et al., 2013) found that there is a relationship between information technology use and firm size, some researchers (Bayo-Moriones and Lera-López, 2007; Bocquet et al., 2007; Hollenstein and Woerter, 2008) stated that there is no relationship between them. Similarly, findings about relationship between information technology use and ownership structure (Lai and Guynes, 1997; Gourlay and Pentecost, 2002; Akmanligil and Palvia, 2004; Haller and Siedschlag, 2008; Bayo- Moriones and Lera-López, 2007) and sector type (Love et al., 2005) conflict with each other. Because of theseconflictingfindings, Lao et al. (2013) claims that it is important to study impact of contextual factors on production management in detail. Therefore, second objective of this study is examining relationship between information technology use patterns and firm (number

of employees, ownership structure, annual sales and export figures) and sector (sector type and competition intensity) characteristics.

Research Methodology

This study is a part of larger research that examines the relationships among information technology, its benefits, and various performance indicators in firms located in Turkey.The research is cross-sectional and based on questionnaire survey methodology.

The survey questionnaire developed in this study is based on the literature review. Questions asked in the first part of the questionnaire are relevant to the firm characteristics like product type and competition intensity. Sector type, ownership structure and the numerical data such as annual sales and export are not included in questionnaire and taken from the ISO 1000 database because managers were struggling to remember numerical information or avoiding answering these types of questions.

The second part of the questionnaire is about information technology use. To measure this useseven itemsareasked to respondents. Most used information technology systems in the firms are intranet, extranet, electronic data interchange, office automation systems, decision support systems, executive support systems(also known as executive information system) and expert systems(Hicks, 1993; Laudon and Laudon, 1996; O'Brein, 1994; Öğüt, 2001). The use of these technologies in the firms are measured by using a five-point Likert-type scale ranging from 1 (no usage) to 5 (very high usage).

ISO 1000 list ispopulation of this study. Owning sufficient resources, infrastructure and financial sufficiency of these firms is the main reason for selecting them as main population of this study. 887 firms listed in the ISO 1000 database but publicly owned institutions and firms in the mining sector, energy sector and non-manufacturing areas are excluded from this study because of willing to avoid bureaucratic struggles; and firms requested to be anonymous are excluded. Questionnaires sent to top managers or top-level executives of Turkish manufacturing firms in ISO 1000 list.Despite all the efforts in the data collection process, a total of 123 completed responses returned which implies approximately 14% rate of return. Table 1 summarizes the sample characteristics according to sector type, size, ownership structure, competition intensity and exports figures.

Table 1. Sample characteristics

Characteristic	Indicator	Frequency	%
Sector	Food, beverages and tobacco	26	21.1
	Textile, wearing apparel and leather	24	19.5
	Forest products and furniture sector	6	4.9
	Paper and paper products, printing and publishing	6	4.9
	Chemicals and petroleum, coal, rubber and plastic prod.	20	16.3
	Non-metallic mineral products	11	8.9
	Basic metal industries	13	10.6
	Fabricated metal prd., machinery and transport equipment	17	13.8
Size	Small (50 and less employees)	5	4.1
	Medium (between 51-250 employees)	24	19.5
	Large (251 and more employees)	83	67.5
	Unknown	11	8.9
Ownership structure	Turkish ownership	105	85.3
	Joint venture	14	11.4
	Foreign ownership	4	3.3
Competition intensity	Low	6	0.05
	Average	14	0.11
	High	103	0.84
Exports (thousand $)	Mean	59.824	
Annual Sales (TL)	Mean	240.287.734	

As can be seen in Table 1, participating firms operate in 8 different sectors which are (i)food, beverages and tobacco (21.1%), (ii) textile, wearing apparel and leather (19,5%) and (iii)chemicals and petroleum and plastic products (16.3%). In terms of employment, 4.1% firms are small size, 19.5% are medium size and 67.5% are large-size. On the other hand, all firms are large size in terms of sales. In terms of ownerships, 85% of firms are Turkish owned, 11.4% of firms are Turkish and foreign joint venture, and 3.3% are foreign owned. In addition,84% firms operate in highly competitive

markets, 11% firms operate in average competitive markets and 5% operate in low competitive markets.

Analysis and Results

The analysis is performed in two stages: (i) to identify distinctive groups of Turkish firms with respect to their information technology use, for which cluster analysis is used, and (ii) to examine relationships between these groups and various firm (number of employee, ownership structure, annual sales and export figure) and sectoral (sector type and competition intensity) characteristics using analysis of variance (ANOVA) and Chi-square.

Cluster Analysis

Cluster analysis is often employed in the literature to identify classes or clusters of objects (Ketchen and Shook, 1996). It is commonly used method and offers effective solutions at categorizing firms into groups (Vorhies et al., 1999). It is a multivariate statistical technique that groups sets of objects based on the characteristics they possess, so that clusters exhibit high internal homogeneity and high external heterogeneity (Hair et al., 1998; Kurtuluş, 1996; Youssef, 1994). It mainly gathers similar objects together under the same cluster after comparing a number of indicators of objects (Fırat and Arıcıgil, 2000).Therefore, cluster analysis is used in this study to classify firms according to information technology use.

The key question in cluster analysis is how many sets or clusters will be developed. Different approaches are found in the literature. One of the approaches is the number of clusters will be found by finding the number of samples (n) participating in the study. The number of clusters according to this rule should be between n/30 and n/60 (Lehmann, 1979). When this rule is taken into account, two or three clusters will form in this study as sample is 123. In addition, the number of clusters can be determined by examining the hierarchical dendrogramand agglomeration coefficient. A large increase or a large percentage change in the agglomeration coefficient when performing a hierarchical cluster analysis indicates a fairly good cut-off point (Hair et al., 1998; Ketchen and Shook, 1996).

Firstly, hierarchical clustering is built by usingWard's Method which able to robustly minimize intra-cluster differences and maximize inter-cluster differences among the variables used for clustering (De Jong and Marsili, 2006; Frohlich and Dixon, 2001).Therefore, the hierarchical dendrogram(Figure 1) and agglomeration coefficient analysis (Table 2) are used in determining the number of clusters. Also, it is the most often used hierarchical method in strategy researches (Ketchen and Shook, 1996).

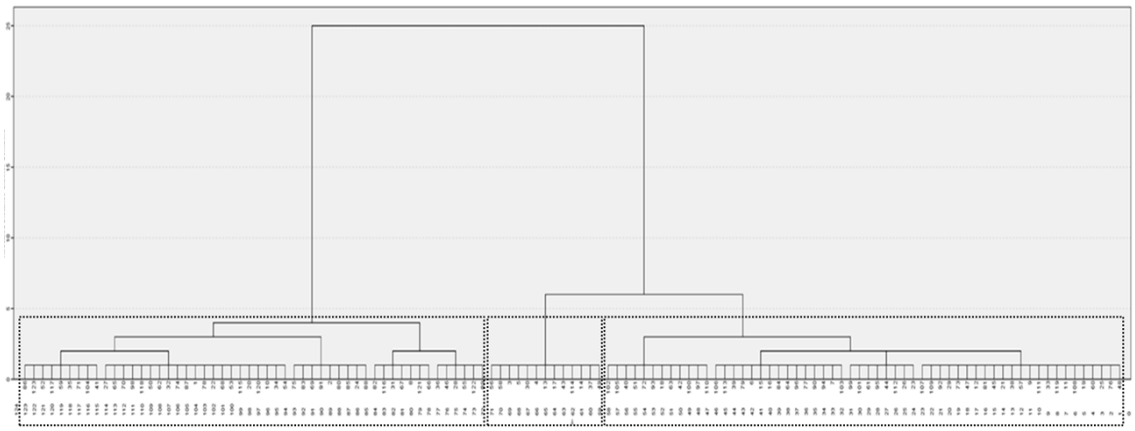

Figure 1.*Hierarchical Dendrogram*

It can be seen clearly from Figure 1 that firms can be classified in three groups, according to their use of information technology. The largest increase in agglomeration coefficient as shown in Table 2 are observed in the transition from three clusters to two clusters (703.9 - 607.2=96.6) and from two clusters to one cluster (1185.87-703.941 = 481.9). Also, the highest difference among percentage changes has been seen in three clusters. Figure 1 presents the hierarchical dendrogram showing the three clusters formed and implying three different clusters or groups of firms exist are differentiated by their use of information technology. As a result, the optimal cluster number was found to be three according to Lehmann (1979) rule, the dendrogramand agglomeration coefficient.

Table2.*Analysis of Agglomeration Coefficients*

Number of cluster	Agglomeration coefficients	Differences of coefficients	Percentage change in the coefficient	Differences between percentage change
10	333.47	19.3	05.8	-0.3
9	352.77	19.4	05.5	3.4
8	372.23	33.2	08.9	0.4
7	405.51	37.8	09.3	2.0
6	443.35	50.1	11.3	-0.6
5	493.45	52.9	10.7	0.5
4	546.35	60.9	11.2	4.7
3	607.28	96.6	15.9	52.6
2	703.94	481.9	68.5	
1	1185.87			

Result of hierarchical clustering analysis using Ward's method 52 firms are classified under the first cluster (low users), 58 firms under the second cluster (followers) and 13 firms under the third cluster (high users). Mean and standard deviation numbers of these clusters' aggregated variables (information technologies) are presented in Table 3. In order to see whether there is a difference between clusters ANOVA is used and to demonstrate how each cluster is different from other clusters Scheffepairwise comparison test was conducted. Analysis results are presented in Table 3.

Table 3.*Information Technology Use by Clusters: Results of ANOVA and Scheffe Test*

Information Technology	Overall	Low users (n=52)	Followers (n=58)	High users (n=13)	ANOVA
Office Automation Systems (OAS)	4.13[a]	[2, 3][b]			
Cluster mean		3.65	4.38	4.92	$F = 20.10$[c]
Std. Dev.		0.88	0.72	0.27	
Intranet (INT)	3.93	[2, 3]			
Cluster mean		3.08	4.45	5.00	$F = 47.63$
Std. Dev.		1.08	0.68	0.00	
Extranet (EXT)	3.48	[2, 3]	[1, 3]	[1, 2]	
Cluster mean		2.46	4.09	4.85	$F = 68.48$
Std. Dev.		0.99	0.77	0.37	
Electronic Data Interchange (EDI)	3.61	[2, 3]	[1, 3]	[1, 2]	
Cluster mean		2.85	3.98	5.00	$F = 44.44$
Std. Dev.		0.95	0.82	0.00	
Expert Systems (ES)	2.72	[2, 3]	[1, 3]	[1, 2]	
Cluster mean		1.81	3.07	4.85	$F = 74.82$
Std. Dev.		0.84	0.93	0.37	
Executive Support Systems (ESS)	3.02	[2, 3]	[1, 3]	[1, 2]	
Cluster mean		2.00	3.53	4.77	$F = 75.55$
Std. Dev.		0.79	0.95	0.43	
Decision Support Systems (DSS)	2.78	[2, 3]	[1, 3]	[1, 2]	
Cluster mean		1.83	3.21	4.69	$F = 60.93$
Std. Dev.		0.87	1.03	0.48	

[a] Mean score based on 5-point Likert scale, ''1'' represents ''no usage'' and ''5'' represents ''very high usage".
[b]Numbers in brackets indicate the group numbers from which this group was significantly different at the from $p < 0.05$ level according to the Scheffe pairwise comparison procedure.
[c] $p < .001$

ANOVA results demonstrated that there statistical difference (p<0.01 level) among the three clustersfor the use of all seven information technologies. Also Scheffe test results have shown that at p<.01 level means are different for each cluster from the other two clusters by 81 percent, only 19 percent is not different from other clusters. These results imply that each cluster is different from others. Information technology use levels of these three clusters can be seen more clearly in Figure 2.

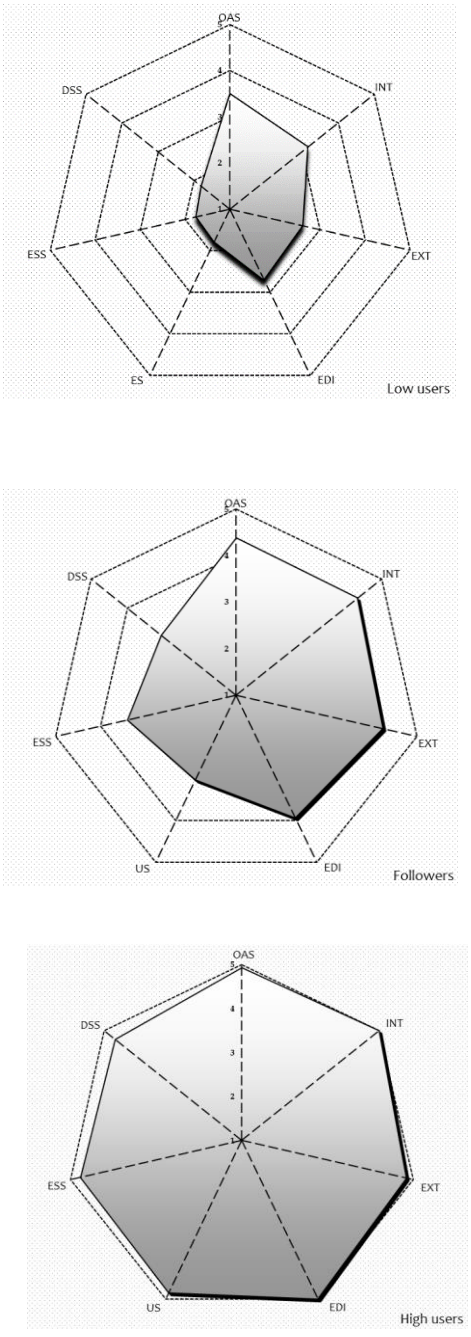

Figure 2.*Information Technology Use by Cluster Analysis*

Labeling Clusters

Three clusters identified according to information technology use have been labeled as low users (cluster 1) followers (cluster 2) and high users (cluster 3) according to technology use means and differences from the other two clusters.

Cluster 1: Low Users

This cluster includes 52 firms and, represents about 42% of the sample.It is the cluster involving firms which have the lowest mean for the use of information technology.Although information technology use means vary between 1.81 and 3.65,means of all technologies (excluding office automation systems) is around 3 which represents median level on the scale or lower. Also, means forall information technology uses are lower than the mean of the sample. In addition, this cluster is ranked statistically last among three clusters according to Scheffe test in terms of the use of information technology. For these reasons, this cluster is labeled as low users.

Cluster 2: Followers

This cluster is the biggest cluster as it involves 58 firms which is 47% of the sample. Information technology use means of firms in this cluster is over the sample mean. Also, means of all information technologies are well above the overall mean 3 when considering five point Likert scale. Cluster 2 has higher means for all technologies than cluster 1 and this difference is statistically significant. However, information technology use means of cluster 2 are lower than cluster 3 and difference between these clusters (excluding office automation systems) statistically significant. This cluster is named as followers because cluster 2 mean is close to cluster 3 mean even though being means statistically different and cluster 2 mean is relatively higher than sample mean.

Cluster 3: High Users

Cluster 3 has been named as high users. This cluster has the highest mean in use of all information technologies.According to ANOVA and Scheffe pair wise comparison test, this cluster comparison test (excluding office automation systems of cluster 3) is statistically different than other clusters. Mean of

cluster 3 for the use of all information technologies uses is extremely high. When it is considered that point 5 represents the highest use level at five point Likert scale, decision support systems are used the lowest with a mean of 4.69.Therefore, it can be stated that firms in cluster 3 give a great importance and make serious investments to information technology. There are only 13 firms in the cluster 3 identified as High users, and represents approximately 10.5 % of the sample.

Patterns of Information Technology Use and Contextual Factors

Information Technology Use Patterns and Contextual Factors at the Firm-Level

ANOVA and Chi-square test have been used in exploring the relationship between three different patterns of information technology use developed by cluster analysisand various firm (number of employee, ownership structure, annual sales and export figure) characteristics. Results are presented in Table 4.

Table 4.*Patterns of Information Technology Use and Contextual Factors at the Firm-Level*

Contextual factors at the firm-level	Indicator	Low users	Followers	High users	Total
Ownership[a]	Turkish ownership	47	50	8	105
	Foreign ownership	4	7	3	14
	Joint venture	1	1	2	4
	Total	52	58	7	123
Firm size according to number of employees[b]	Small	3	2	0	5
	Medium	11	11	2	24
	Large	32	41	10	83
	Total	46	54	12	112
Annual sales (TL)[c]		[3]	[3]	[1, 2]*	
	Cluster mean	229.496.791	184.641.779	531.718.074	
	Std. Dev.	468.088.763	207.999.136	633.645.770	
	Total	52	58	7	123
Export (thousand $)[d]		[3]	[3]	[1, 2]	
	Cluster mean	49.697	34.996	211.102	
	Std. Dev.	144.096	48.899	403.456	
	Total	52	58	7	123

* Numbers in brackets indicate the group numbers from which this group was significantly different.
[a] χ^2= 9.814; p = 0.044
[b] χ^2= 1.620; p = 0.805
[c] F = 1.185; p = 0.017
[d] F = 6.452; p = 0.002

Firms participating to this study have three types of ownership structures.Firms are named according to the capital ownership. If 100% of capital belongs to the foreign firms, these firms are named as foreign firms.If 100% of capital belongs to the domestic firms they are named as Turkish owned firms. If between 1% and 99% of the firm's capital belongs to the foreign partner, it is named as joint venture firms.There is a relationship between three types of ownership structures and information technology use patterns based on Chi-square test (χ2=9814, p=0.044). This finding supports several studies in the literature declaring information technology uses are different fordomestic, joint venture and foreign owned firms (Haller and Siedschlag, 2011); big firms need information technology for effective business task processing(Akmanligil and Palvia, 2004; Galliano et al. 2001); parent firm pressurize smaller partner firm to use information technology for improving tasks (Bayo-Moriones and Lera-López, 2007); support of parent firms to smaller partners for adaption to information technology (Laiand Guynes, 1997;Premkumar and Roberts 1999;Westphal et al., 1997).

When the results (χ2=1.620; p=0.805) of Chi-square test are analyzed, it is understood that there is no relationship between two variables, firm size in terms of employee and information technology use patterns.This finding contradicts with the common opinions in the literature(Arduin et al., 2010; Haller and Siedschlag, 2011; Gallego et al., 2013; Youssef et

al., 2011). This finding may be emerged because information technology variables in the study have become commonly used by firms. Also, this result may be regarded as normal when it is considered that the study sample consists of large industrial firms of Turkey, these firms have sufficient financial resources, work with larger suppliers and have geographically dispersed business units.

Being only large scale firms in terms of sales are involved in the study sample requires investigating relationship between sales and information technology use patterns. The results of ANOVA (F=1.185; p=0.017) carried out for this purpose revealed that there is a statistically significant difference in sales compared according to information technology uses. Similarly, whether there is any change in exports or not according to information technology use is analyzed and results (F=6.452; p=0.002) indicated that there is a statistically significant difference.

Sales and export figures of high userscluster are reasonably higher than low usersandfollowers. However, it is interesting that there is no statistically significant difference between followers and low usersin terms of sales and export figures.Even though these results do not present causal relationship between sales and export figures, it may be importantin terms of showing the importance of using all information technology elements at high level.

Information Technology Use Patterns and Contextual Factors at the Sector -Level

Results of ANOVA which iscarried out in order to examine relationship between sector characteristics (sector operated in and intensity of competition) and information technology use patterns are presented in Table 5.

Table 5.*Patterns of Information Technology Use and Contextual Factors at the Sector-Level*

Contextual factors at the sector-level	Indicator	Low users	Followers	High users	Total
Competition intensity[a]	Low	6	0	0	6
	Average	11	3	0	14
	High	35	55	13	103
	Total	52	58	13	123
Sector[b]	Food, beverages and tobacco	17	9	1	27
	Textile, wearing apparel and leather	12	11	1	24
	Forest products and furniture industry	3	2	1	6
	Paper and printing and publishing	2	4	0	6
	Chem., pet., coal, rubber & plastic prod.	10	9	1	20
	Non-metallic mineral products	3	5	2	10
	Basic metal industries	3	9	1	13
	Fabr. metalprd., mach., transport eqp.	2	9	6	17
	Total	52	58	13	123

[a] $\chi^2 = 18.938$; $p = 0.001$
[b] $\chi^2 = 26.460$; $p = 0.023$

Results presented in Table 5 shows that information technology use patterns are affected by sectoral characteristics. All firms feeling competition low in the market are categorized under low users. Similarly, approximately 80% of firms feeling normal competition are placed in low userscluster. However, all firms in high userscluster feel high competition. Calculated $\chi 2$ value (18.938; $p<.01$) has shown that there is a clear relationship between competition intensity and information technology use patterns.

$\chi 2$ value (26.460; $p<0.05$) represents there is a relationship between sector which firm operates in and information technology use patterns. When Table 5 analyzed, it can be seen that approximately 50% firms in high userscluster are operating in fabricated metal production, machinery and transport equipment sectors. It can be said that firms in low usersand followersclusters distributed to sectors in balance, relatively. While this finding supports similar opinions in the literature (Love et al., 2005), it suggests that sectoral characteristics significantly affect information technology use when it is considered in conjunction with competition intensity.

Conclusions and Implications

The aim of this study is to explore the existence of different patterns of information technology use in the firms operating Turkish manufacturing sector and the relationship between these patterns and various firm (number of employee, ownership structure, annual sales and export figure) and sectoral (sector type and competition intensity) characteristics. Results of this study have contributed to the literature concerning information technology use patterns and the relationship between the patterns and various contextual factors at the firm-level and sector-level. Our taxonomy reveals three distinct information technology clusters/groups representing differing information technology use strategies. These groups that represent a distinct strategic type or pattern with regard to the information technology usage are labeled as low users, followersand high users.

Firms in low userscluster have the lowest mean for the use of information technology. Mean of this cluster for information technology use is lower than the mean of the sample.Furthermore, this cluster is ranked statistically last among three clusters. Followers cluster is the biggest cluster and this cluster's mean is over the sample mean. Information technology use of followersis higher than low usersand lower than high users.High users have the highest mean in all information technology uses. Firms in this cluster give a great importance to information technology but it is a small cluster consisted of only thirteen firms. The common feature of all these clusters is that each cluster gives priority to using automation and communication relevant information technologies (OAS, INT and EXT), then to the planning and decision making relevant information technologies (ES, ESS, DSS). It can be said that firms initially use information technologies giving priority to communication technologies at low level then increase the use of information technology gradually.

The findings show that there is a statistically significant relationship between information technology use patterns and contextual factors at sectoral level (competition intensity and sector operated in). In this study, especially most of the firms operating in competition intensive sectors (such as fabricated metal production, machinery and transport equipment, and like non -metallic mineral products) which have a shorter product life cycles or offer customers more options fall in followers and high userscluster which use information technologies intensively.

Uncertainty or lack of information createdby dynamism in the sector has several potential threats especially on planning and control activities. Our findings suggest that information technology is used intensively against threats from uncertainty in dynamic sectors or lack of knowledge. In this sense, these findings support opinions in the literature (Eisenhardt and Martin, 2000) stating that firms in dynamic sectors need different capabilities and equipment than static sectors. Therefore, it can be suggested to the managers that they can use information technologies to reduce uncertainty in the market or sector and make these uncertainties relatively more predictable and certain.

Results suggest that there is no relationship between information technology use patterns and number of employees. This finding contradicts with some studies (Arduin et al., 2010; Gallego et al., 2013; Haller and Siedschlag, 2011; Youssef et al., 2011) in the literature. This finding may be emerged because becoming information technologies have become commonly used in the market and firms form study sample are among large industrial firms of Turkey have sufficient financial resources. Indeed, it has been found that there is a statistically significant difference between sales and information technology use patterns.Firm size related findings supportstudies in the literature (Amoako-Gyampah, 2003; Lee and Xia, 2006; Sohal et al., 2001) which suggest that large firms with sufficient financial resources use information technology more than small size firms. This finding indicates that firms with sufficient resources invest in information technologies regardless of the number of employees.

Another finding of this study is information technology use patterns differ according to ownership structure and coincides with other studies about the relationship between information technology use and ownership structure (Bayo-Moriones and Lera-Lopez,

2007; Lai and Guynes, 1997). When the findings are analyzed in detail, it has been seen that while proportion of Turkish owned firms was only 7.5%, the proportion of foreign owned firms was 21% and joint venture was 50% in high userscluster. High proportion of joint venture supports opinion of Amoako-Gyampah (2003) stating that these kind of firms (joint venture) access easily to other resources with the help of sufficient financial resources. We believe that this finding is important to show Turkish-owned firms the need to increase the use of information technology.Another reason increasing the importance of information technology use is there is a statistically significant relationship between information technology use patterns and export figures because there is a significant difference between export figures of high userscluster and the other two clusters.

Finally, three clusters/groups have been emerged in the study regarding the use of information technology and it was determined that they differ from each other in terms of competition intensity, sector, ownership structure, sales and export figures. However, causality regarding differences between these clusters is not analyzed in this study. Therefore, future studies may investigate causality between these clusters. Relationship between information technology use patterns and variables (competition intensity, sector, ownership structure, sales and export figures) has been analyzed without taking into account sectoral distinction. Future studies may conduct this study in terms of sectors and compare the results with this study.

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