Journal of Engineering and Technology Management 47 (2018) 53–67

Contents lists available at ScienceDirect

Journal of Engineering and Technology Management

journal homepage: www.elsevier.com/locate/jengtecman

New approach to Rogers' innovation characteristics and comparative implementation study

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ARTICLE INFO

JEL Classification:
O32
M15

Keywords:
Innovation characteristics
ERP applications
Organizational characteristics
Factor analysis

ABSTRACT

This study aims to develop a research model that analyzes the effects of the innovation and organizational characteristics in literature on ERP application users' rates of adoption. Innovation characteristics model in literature is extended and new research model, which includes both innovation and organizational characteristics, is developed and both models are tested on 403 users with factor analysis. Moreover, the sample is divided into 10 categories to observe how characteristics differentiate in both models in each category. Results indicate that categorizations of the sample have distinctive impacts for both models and create dynamic structure which flexes the rigidity in literature.

1. Introduction

With the advancement of information technology, producers, distributors and retailers have started to perform many of their business tasks electronically. Basically, all the companies that try to increase their efficiency have started to establish electronic work models in order to compete and improve their position. They have increasingly tended to resort to ERP applications to increase their effectiveness. As ERP software markets are featured as high potential margin and intense competition, these systems have gained much attention from both practitioners and researchers (Kao and Hsu, 2011). With the increase in ERP applications use, continuous research in development and improvement has been underway and companies have started to concentrate on innovation management. Therefore, innovation has been an important focus for the attention of academic circles and policy makers in industries (Koc, 2011). Innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Rate of adoption is the relative speed with which an innovation is adopted by members of a social system (Rogers, 1995). According to diffusion of innovation theory, five different attributes of innovations are described. Each of these is somewhat empirically interrelated with the other four, but they are conceptually distinct (Rogers, 1995). The way people in a social system perceive the five attributes of an innovation determines its rate of adoption. The five attributes are Relative Advantage, Compatibility, Complexity, Trialability, and Observability (Rogers, 1995; Do, 2008).

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers, 1995). The sub-dimensions of this attribute include economic profitability, savings of time and effort, low initial cost, social prestige. Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 1995). The sub-dimensions of this attribute include socio-cultural values and beliefs, past experiences, needs of potential adopters and name (Do, 2008). Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. The sub-dimensions of this attribute include ease of using and ease of understanding (Rogers, 1995).

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https://doi.org/10.1016/j.jengtecman.2017.12.004
Received 27 May 2016; Received in revised form 6 October 2017; Accepted 20 December 2017

Trialability is the degree to which an innovation may be experimented with on a limited basis (Rogers, 1995). The sub-dimensions are the ability of adopters to try an innovation on installment basis, re-invention, partial trying and the ease of trying (Do, 2008). Observability is the degree to which the results of an innovation are visible to others (Rogers, 1995). The sub-dimensions of this attribute are the difficulty in observing and in describing to others (Do, 2008).

Five different characteristics and their affect on innovation adoption rates in various fields have been searched in previous conducted studies since those are the determinants of innovation adoption rate according to Rogers.

Moore and Benbasat (1991) have reported on the development of an instrument designed to measure the various perceptions that an individual may have of adopting an information technology (IT) innovation, using five characteristics of Rogers' with two newly developed ones such as voluntariness and image characteristics. Agarwal and Prasad (1998) have reported the results of a field study examining adoption of information technology innovation represented by an expert systems application using relative advantage, ease of use and compatibility as perceptions in their research model. Results have shown that compatibility does not provide a definitive answer to the role of compatibility in determining intentions. Chong et al. (2001) have surveyed the perceptions and experience of Australian small- and medium sized enterprises (SMEs) in the adoption and implementation of Internet-based Electronic Commerce. Employing Rogers's model of innovation diffusion as the framework and considering Electronic Commerce (EC) as a form of new innovation, they have analyzed factors affecting EC implementation success. The findings have shown that only 3 characteristics (relative advantage, compatibility and complexity) to make a significant contribution to the implementation success of Internet-based EC adoption. Carter and Belanger (2004) use Moore and Benbasat's (1991) perceived characteristics of innovating constructs to identify factors that influence citizen adoption of e-Government initiatives. The findings have shown that relative advantage, perceived image, and perceived compatibility are significant elements of e-Government adoption. Lee and Kim (2007) have reported on the development of a model of Internet-based information systems (IIS) implementation in business-to-consumer electronic commerce based on IS implementation and technology innovation–implementation studies. Their research model suggests that eight factors, comprising the characteristics of IIS technology innovation (compatibility, relative advantage, complexity), organizational factors, and IS related factors affect the implementation success of IIS. Hashem and Tann (2007) have investigated the key determinants of the adoption of innovation of ISO 9000 Standards. Study has used all five characteristics of innovation as one of the determinant group of factor. The results show that characteristics of innovation, characteristics of the external environment and organizational characteristics are significantly associated with the adoption of ISO 9000 standards by manufacturing companies. Liao and Lu (2008) have developed a technology adoption model to predict the users' intention of adoption and their continued use behavior. The results have shown significant evidence in support of the hypothesis. The findings indicate that perceptions of relative advantage and compatibility are significantly related to users' intention to use e-learning. Lin (2008) has aimed to develop a research model to examine innovation characteristics and organizational learning capabilities as the determinants of e-business implementation success. After results from 163 information system manager have been collected, two innovation characteristics which are relative advantage and compatibility and four organizational learning capabilities: managerial commitment, system orientation, knowledge acquisition and knowledge dissemination have significant effects on e-business implementation success. Damanpour and Schneider (2009) have sought to develop direct and moderating hypotheses for the relationship between innovation characteristics, managerial characteristics, and innovation adoption in public organizations. The findings have suggested that both innovation characteristics and manager characteristics influence the adoption of innovation; however, they do not reveal significant moderating effects of manager characteristics on the relationship between innovation characteristics and innovation adoption. Dizgah et al. (2011), have aimed to investigate relationship between innovation characteristics and organizational learning capabilities in implementation success of the e-business. The research was conducted in 92 companies and findings are in the direction of previous researches. Rahimnia (2012) have investigated the effects of innovations on e-commerce in the form of a business frame and innovation considerations. In the study, innovation culture has been considered as an effective factor on innovation's components and then they are regarded according to Rogers's theory and e-commerce development has been considered. Hameed and Counsell (2014), have examined the association between innovation or technological characteristics and IT innovation adoption by using five of Rogers' innovation characteristics with an addition of cost characteristic. They have concluded that relative advantage, compatibility, cost, observability and trialability have significant relationships with IT adoption while complexity of the innovation has no impact on the decision to adopt IT in organizations. Lawson-Body et al. (2014), have researched that a veteran's intention to adopt e-Gov services is determined by the interaction between the digital divide and five innovation characteristics such as relative advantage, perceived compatibility, perceived complexity, subjective norms and perceived risk. Theere are also some studies that focus on new technology models with innovation determinants, rate of adoption and diffusion of innovation (Wu and Chiu, 2015; Ram et al., 2014; Hameed et al., 2012; Gerstlberger et al., 2016) (Table 1).

When the effects of technology on innovation are considered, it is an undeniable necessity to make the innovation characteristics table more flexible. To illustrate, if organizational structures and components of businesses do not support and motivate innovation, it becomes exceedingly difficult to gain success of innovative actions such as to generate new ideas, turn them into innovative solutions, products and services and for businesses to adopt new techniques and applications (Uzkurt, 2008). Hence, it is necessary to mention organizational characteristics that affect rate of innovation adoption. These characteristics are Centralization, Specialization, Autonomy, Commitment, Free Resources, Organizational Differentiation, Management Mentality, Communication, Technological Environment, Socio-cultural Environment, Economic Environment, Market Environment, Leader Strategy, Imitation Strategy, Defensive Strategy, Traditional Strategy, Market Orientation, Organizational Learning, Knowledge Management (Uzkurt, 2008). In recent years, there are plenty of studies that focus on various organizational characteristics with innovation characteristics (Díaz-García et al., 2013; Marvel et al., 2015; Shukla et al., 2015; Subramanian et al., 2015).

According to previous studies, which consider innovation characteristics effects in adoption rate, reveal following gaps in

Table 1
Summary of Literature Review.

Author(s)	Summary
Moore and Benbasat (1991)	Used all main characteristics of Rogers with an additional two more characteristics such as voluntariness and image to investigate the adoption rate of IT innovation.
Agarwal and Prasad (1998)	Used relative advantage, ease of use and compatibility characteristics with an additional three characteristics to search antecedents and consequents of user perceptions in information technology adoption.
Chong et al. (2001)	Used all main characteristics of Rogers for their research model as an independent variable to measure up the implementation success of internet-based electronic commerce in SME's.
Carter and Belanger (2004)	Used the characteristics from the study of Moore and Benbasat (1991) to identify factors that influence citizen adoption of e-Government initiatives.
Lee and Kim (2007)	Used 3 main characteristics of Rogers with an additional five more characteristics to investigate the Internet-based information systems (IIS) implementation success rate.
Hashem and Tann (2007)	Used all main characteristics of Rogers with external environment and oranizational characteristics adoption of innovation of ISO 9000 standards.
Liao and Lu (2008)	Used all characteristics in their research model to built a technology adoption model.
Lin (2008)	Used 3 main innovation characteristics of Rogers and 4 learning capabilities characteristics to investigate the e-business implementation success.
Damanpour and Schneider (2009)	Used complexity characteristic with innovation cost and impact as the determinants of innovation adoption in public organizations with managerial characteristics.
Dizgah et al. (2011)	Used all main characteristics of Rogers and organizational learning capabilities in their research model to investigate the implementation success of the e-business.
Rahimnia (2012)	Used all main characteristics o Rogers and innovation culture has been considered as an effective factor on innovation's components
Hameed and Counsell (2014)	Investigated IT innovation adoption by using five of Rogers' innovation characteristics with an addition of cost characteristic
Lawson-Body et al. (2014)	Researched veteran's intention to adopt e-Gov services by using all five main characteristics of Rogers.

literature. First, it is clear that most of the studies have sought to examine some of the characteristics and analyze their adoption rates, and factors that influence innovation have not been handled with a holistic approach. Second, literature review proves that only main characteristics have been considered. Studies that are encountered in literature are strictly dependent on Rogers' innovation characteristics. Third, in previous studies, the results were reached without any differentiation among the samples, and without including categorical measurements, the employees of an institution of the whole of the institutions were considered as completely same type of employee structure.

With this study, gaps in Rogers' diffussion theory were handled and these research questions were derived: i. "What are the impacts of organizational characteristics such as leadership, strategy, market orientation, organizational learning and communication on Roger's diffusion theory", ii. "What are the impacts of employees' characteristics such as age, gender, department, education and experience on Roger's diffusion theory?"

The main purpose of the study is to develop an enhanced model that investigates the impacts of Roger's innovation characteristics with newly added organizational and participants' characteristics on the adoption rate of ERP users in Turkish context. As one of the "10 Big Emerging Markets (BEM)" and G20 member, Turkey has become one of the most important hubs of commerce in the world by using her geopolitical and strategic advantage of being situated bridge-like between Europe and Asia. Because of the importance of Turkey in world economy, many well-known international companies were headquartered here and this diversity of the economy has been strengthening the empirical validation of data sampling in Turkey. This study aims to provide unique theoretical and practical contribution to innovation diffusion theory by enhancing characteristic table and applying of those characteristics to selected companies by category wise. Hereby, it is intended to make contributions to the literatures on goals, motivation, and variety by creating a new innovation model with new characteristics.

First phase of the study examines the effects of Roger's five main characteristics with involving its sub-characteristics, which were not handled in the literature before, on the companies in Turkey that use ERP applications. The analysis will then be evaluated again given depth by realizing them individually on the basis of the category that was put forward by us considering the structure in businesses.This holistic structure of Roger's characteristics were regrouped in order to find out the relations among sub-categories.

Second phase of the study investigates effects of Rogers' main and sub-characteristics together with organizational characteristics on businesses using ERP applications. It is also investigated how innovation characteristics dealt with organizational characteristics, which were compiled from the previous studies, show mobility and how their effect is influenced by this combination is determined.

This study is significant and original for many reasons: First, combination of main and sub-characteristics of innovation in first phase of the study enable to provide a valid attempt to compare significant data results with previous literature in a different context and perspective. Second, compounded both innovation and organizational characteristics as a unique research model has a dynamic structure in the second phase of the study that leads to handle companies holistically on the contrary of previous studies. Third, this study considers effects of organizational differences by dividing the sample into 10 categories for both models to observe different reactions among categories on the adoption rate of innovation.

Table 2
Company Characteristics.

Company Industry	Firm Age	Firm Size (White Collar)	Sample Size	Respondent Ratio
Automotive Company	49	283	242	86%
Steel Plant Company	13	66	27	41%
Furniture Company	19	50	33	66%
Metropolitan Municipality	30	150	101	67%
Total		549	403	73%

2. Methodology

2.1. Data collection and sample characteristics

In this study, which fundamentally examines the effects of innovation characteristics and organizational characteristics on ERP application users, 442 users have been interviewed face to face and they were asked 39 questions about the characteristics and 11 questions about descriptive statistics. First five of the questions concerning the characteristics represent Rogers' main characteristics and they have been adopted from the survey prepared by FEN Lin (2008). All questions have been measured using a five-point Likert-type scale (ranging from 1 = strongly disagree to 5 = strongly agree). When questionnaires are evaluated, 403 out of 442 of them were seen to be eligible to continue to study. Before analysis of the study conforming factor analysis has been used to assess the admissibility of the questionnaire and innovation characteristics' Croanbach's Alpha coefficient has been calculated as 0.870.

Study has been conducted with ERP application users in all departments of an Automotive Company, a Steel Plant Company, Furniture Company and a Metropolitan Municipality. Company characteristics and respondent ratios are given in Table 2. Total number of 403 users has been categorized to perform a parametric factorial analysis in the next section of this study. Whole sample has been categorized as Software Type, Gender, Age, Education, Major, Total Work Experience, Experience in Current Company, Sector, Department, and Frequency of usage. In Software category, 190 of the sample is SAP user and 213 of them are other software type of users. 100 women and 303 men form the gender category. 209 out of 403 users are below age of 35 and 194 out of 403 users are over age of 35. 256 of the users have an associate's degree and less; 147 of them have a bachelor's degree and more. 102 out of 403 users have engineering or fundamental sciences major, 128 users have graduated from technical faculties and 173 users have a business related majors. 138 users have less than 5 years of experience while 265 of the users have more than 5 years of experience. Also 211 out of 403 users have been working in the same company less than 5 years and 192 of the users have been working in the same company more than 5 years. In whole sample, 302 users are in the private sector while 101 of them are in public sector. 212 of the users are working in the departments of production, design, and logistics or planning; 191 of the users are working in other utility departments. 172 of the users have been using ERP application in every hour while 231 of the users have a frequency of more than 1 h. Those sample sizes can bee seen also in Table 5.

In the present study, the effects of Rogers' main and sub-characteristics on the rate of innovation adoption by ERP application users will be observed. Later on, integrated structure between main and sub-characteristics will be untied and how sub-characteristics are grouped under different categories and under different characteristics will be determined with factor analysis. According to the model that will be developed originally in this study, organizational characteristics will be dealt with as a dynamic structure with innovation sub-characteristics and changes in these groupings will be observed.

2.2. Existing research model

First phase of the study includes Rogers' innovation characteristics model which is formed with its sub-characteristics (Fig. 1).

The purpose of this part is to check Rogers's innovation characteristics model's coherence in the gathered sample. In addition, same model will be tested to reveal how characteristics will be grouped under the categories of Software Type, Gender, Age, Education, Major, Total Work Experience, Experience in Current Company, Sector, Department, and Frequency of usage.

Rogers' innovation diffusion theory is undoubtedly one of the fundamental reference sources in the field of innovation management. Wolfe (1994) stated that the contradictory nature of innovation studies has been mostly attributed to a failure to recognize innovation antecedents and can be perceived very differently according to the specific organizational conditions involved. Lyytinen and Damsgaard (2001) defended that a number of problems exist in innovation diffusion theory and supported them with examples from the literature. Primarily, Lyytinen and Damsgaard stated that technologies should not be evaluated as a separate package and all technological innovations should not be evaluated with the same characteristics. They compared a television production and an electronic data transfer application and they emphasized that two very different technological structures' characteristics should not be analyzed with the same measurements. To illustrate, compatibility characteristics were presented to be able to exhibit a changeable form on different stages and structures. In the same study, authors have justified that groups, organizations and industries construct the meaning of the technology differently; Local culture, economic structure and the supporting infrastructure shape these constructs (Lyytinen and Damsgaard, 2001). In other words, importance of categorization in structures was defended and it was claimed that characteristics mentioned in Rogers' model do not mean the same on every stage and state.

Owing to the unpredictability of previous findings on factors influencing the adoption of in organizations, it has become almost

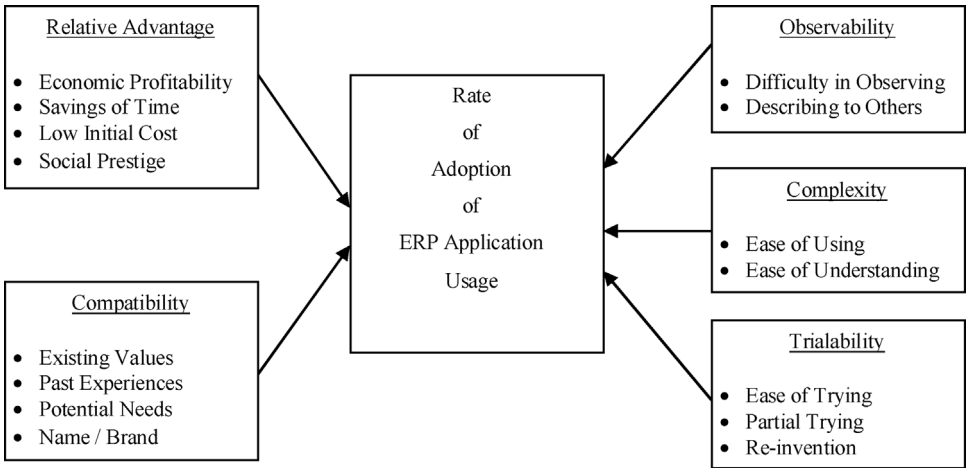

Fig. 1. Existing Model.

impossible to define a set of attributes for innovation adoption. However, it is fundamental to identify factors that enable or inhibit its implementation processes (Hameed and Counsell, 2014). For this reason, the sample has been divided into different categories in this study and dynamicity that characteristics exhibit were attempted to be analyzed and by adding new characteristics to the ones in the existing model, the model was need to be developed and it was analyzed categorically. It was tried to present how the characteristics that were used in both models affect and their effects were tried to be shown with factor analysis and finally propositions were supported with results.

2.3. Proposed research model

In this part of the study, characteristics in the existing model and organizational characteristics have been handled. According to the proposed research model, organizational characteristics have been dealt with as a dynamic structure which is evaluated together with innovation sub-characteristics. Changes in these groupings will be observed with factor analysis. In this model that includes all characteristics; different innovation characteristics tables' consistency will also be checked. First of all, under the categories of Software Type, Gender, Age, Education, Major, Total Work Experience, Experience in Current Company, Sector, Department, and Frequency of usage, it will be compared which characteristic affects ERP application usage more. It will be seen which characteristics will be in the same group and under the selected category heading, needs of the business that use ERP applications will have been

Table 3
Sampling Adequacy Test Results For Factorial Analysis.

Parameter Group	Parameter Name	KMO Value
Whole	Whole Sample Data	0.834
Software Type	i. SAP Users	0.639
	ii. Other Users	0.847
Usage Frequency	i. Intense User	0.725
	ii. Average User	0.844
Gender	i. Women	0.767
	ii. Men	0.807
Age	i. Over 35	0.801
	ii. Under 35	0.807
Education	i. Associate's Degree and Less	0.723
	ii. Bachelor's Degree and More	0.872
Major	i. Engineering Majors	0.691
	ii. Technical Majors	0.629
	iii. Business Related Majors	0.863
Total Experience	i. More than 5 Years	0.845
	ii. Less than 5 Years	0.712
Current Work Place Experience	i. More than 5 Years	0.740
	ii. Less than 5 Years	0.836
Sector	i. Private	0.713
	ii. Public	0.781
Department	i. Production/Design/Logistics/Planning Departments	0.697
	ii. Other Departments	0.821
Frequency of Usage	i. Intense User	0.725
	ii. Average User	0.844

determined.

Primarily, appropriateness of factor analysis for all parameters were tested and presented in Table 3. In order to test if factor analysis is appropriate for the data set, Kaiser-Meyer-Olkin (KMO) sample proficiency scale was used. This scale is an index that compares the size of observed correlation coefficients and partial correlation coefficients and 0.5 and above are of Acceptable value. If KMO value is above 0.90, it is rendered as “Perfect”; between 0.80–0.90, “Very Good”; 0.70–0.80, “Good”; 0.60–0.70 “Medium” (Sharma and Kumar, 2006). When KMO values for all factor analysis in samples are considered, there was no inconvenience in continuing factor analysis for all parameter groups.

3. Results and discussion

In this study, a research model that deals with innovation characteristics and organizational characteristics together in innovation diffusion theory has been developed. Over the selected sample, initially innovation characteristics have been handled with different sub-dimensions from the available ones in literature. Sub-characteristics have also been tested considering the already used sample as in the case of main characteristics. Furthermore, the sample has been divided into different categories and, yet again different from a number of studies in the literature, an attempt to determine which innovation characteristics are important under these categories. In the further stages of the study, in addition to the existing model, organizational characteristics have been added and accepting that each characteristic are independent, a new research model has been proposed. With this research model, the same sample has been tested under different categories and it has been tried to determine which innovation characteristics were attached more importance by ERP application users. With the existing model, proposed model and categorical distinctions, the rates of ERP users’ application adoption has been given a dynamic structure.

In this two-stage study, before factor analysis interpretations, sub limits have been gathered from literature depending on the size of sample as there are sample differences between categories. According to research, in a data set that includes samples as many as 50, at least 0.75 factor loading value is required to be met. Depending on sample size, comparative loading values have been presented in Table 4. In Table 4, significance is based on a 0.05 significance level, a power level of 80 percent, and standard errors assumed to be twice those of conventional correlation coefficients.

According to Table 5, minimum factor loading values to evaluate the categories in data sets are required to be as in below. For instance, the sample of users who have Engineering Major need 0.55 factor loading. Values below 0.55 should not be considered.

3.1. Implementation of factorial analysis for the existing model

Depending on variation of the application type used, the fact that innovation characteristics tend to group differently is a striking detail considering the findings in Appendix A. For SAP users Ease of Understanding, Describing to Others, Difficulty in Observing, Ease of Trying are the most important characteristics which effect users’ rate of adoption while Past Experiences, Potential Needs, Existing Values, Social Prestige, Low Initial Cost, Savings of Time, Name/Brand, Economic Profitability are the most important characteristics as a group for other application users. The implication out of this result is that rigid structure of Rogers’ innovation characteristics deviate based on category and under different conditions, different evaluations are required or instead, if businesses in sample use SAP, potential needs of users and applications should be described and service in this direction should be continued.

When the data set is analyzed according to category of gender; Men and Women are at the different level for Rate of Adoption of ERP Application Usage. For Men, While Difficulty in Observing, Describing to Others, Ease of Understanding and Ease of Trying of application are more crucial for adoption; for women Potential Needs, Past Experiences, Name/Brand, Savings of Time, Existing Values are the most important characteristics for rate of adoption. These findings under gender category point out that gender creates a different level effect on rate of adoption in ERP application usage.

If data set is grouped considering education levels, characteristics can be observed to group differently. For instance, relative advantage characteristics and complexity are found in the same group. In this situation, for users to adopt applications to be used according to their education levels, it could be concluded that education levels should be considered and transaction usage requiring complexity should vary depending on users.

Table 4
Guidelines for Identifying Significant Factor Loadings Based on Sample Size (Hair et al., 1998).

Factor Loading	Sample size needed for significance
0.30	350
0.35	250
0.40	200
0.45	150
0.50	120
0.55	100
0.60	85
0.65	70
0.70	60
0.75	50

Table 5
Guidelines for Identifying Significant Factor Loadings Based on Study' Sample.

Categories		Percentage of Sample	Sample Size	Minimum Factor Loading Need
Whole	Whole Sample	100,00%	403	0.30
Software Type	SAP Users	47,15%	190	0.45
	Other Users	52,85%	213	0.40
Gender	Women	24,81%	100	0.55
	Men	75,19%	303	0.35
Age	Under 35 Age	51,86%	209	0.40
	Over 35 Age	48,14%	194	0.45
Education	Associate's Degree and Less	63,52%	256	0.35
	Bachelor's Degree and More	36,48%	147	0.50
Major	Engineering Major	25,31%	102	0.55
	Technical Major	31,76%	128	0.55
	Business Major	42,93%	173	0.45
Total Experience	Less than 5 of Experience in Total	34,24%	138	0.50
	More than 5 of Experience in Total	65,76%	265	0.35
Current Work Place Experience	Less than 5 of Experience in Current Place	52,36%	211	0.40
	More than 5 of Experience in Current Place	47,64%	192	0.45
Sector	Private Sector	74,94%	302	0.35
	Public Sector	25,06%	101	0.55
Department	Production/Design/Logistics/Planning Departments	52,61%	212	0.40
	Other Departments	47,39%	191	0.45
Frequency of Usage	Intense Users	42,68%	172	0.45
	Average Users	57,32%	231	0.40

When user types are grouped according to education category in Appendix B, for a user who has engineering education, the existing value characteristic and an application's trialability does not matter while for a user who has technical education, low initial cost and complexity is not important. Concurrently, for a user with business major, characteristics of difficulty in observing and describing to others are not in the grouping. In other words, among users with different educational backgrounds, the fact there is a tendency towards attaching importance to different characteristics is an undeniable reality. The same sample, when grouped according to the categories of total experience and current work experience, the results are again striking. The different approach of users who have worked in the same business more than 5 years from users who have worked in the same business less than 5 years can be explained with their different characteristics groupings. For instance, for a user who has worked in the same business for more than 5 years, complexity of application is in the same group with relative advantage and compatibility; however, the situation is not valid for a user who has worked in the same business for less than 5 years. For them, complexity of application is in the same group with ease of trying, trialability, describing to others and re-invention, which requires them to be evaluated with a different approach. Especially, judging by factor groups of users with less than 5 years of experience, it has been determined that on every main characteristic described by Rogers, at least one sub-characteristic group with a different sub-characteristic. Similar situations also vary depending on users' total work experience.

According to findings gathered from the two tables, in which categories are placed in the implementation of the existing model, Rogers' existing model, which he handled it integrated and later divided into main and sub-characteristics, has been observed not to present a steady form in case of category differentiation. Departing from this situation, discriminating based on main characteristics and holding sub-characteristics stable at least partially lose its functionality in case categories vary and it could furthermore be stated that it shows tendency towards placing itself in different groups. To conclude, instead of differentiating between main and sub-characteristics, forming groups based on categories can help factor loadings distribute more successfully. Apart from literature, existing model analysis provide that dividing sample into categories creates a versitality instead of handling an organization as a unit.

3.2. Implementation of factorial analysis for the proposed research model

Upon gathering the results regarding the existing model, as stated in previous parts, all the characteristics that influence adoption of ERP application usage constitutes the proposed model of the present study. Shown in Fig. 2, the new model handles both Rogers' innovation characteristics and organizational

characteristics in the same framework. When the available data set is measured by being divided into categories together all these characteristics, the results have been attempted to be interpreted in tables again. Results and groupings for the proposed research model have been presented in detail in Appendix C and Appendix D.

After the sample are divided into all categories, results exhibit how all characteristics form groups in the proposed model with factor analysis. Differences before and after organizational characteristics are included in the model can also be seen in different groups formed by organizational characteristics.

Considering the whole data, interactional groups, formed by organizational characteristics, are observed to have differentiated and organizational characteristics that were added into Rogers' innovation characteristics have been blended. Presenting organizational characteristics to users have caused differences and variations in characteristics have been observed.

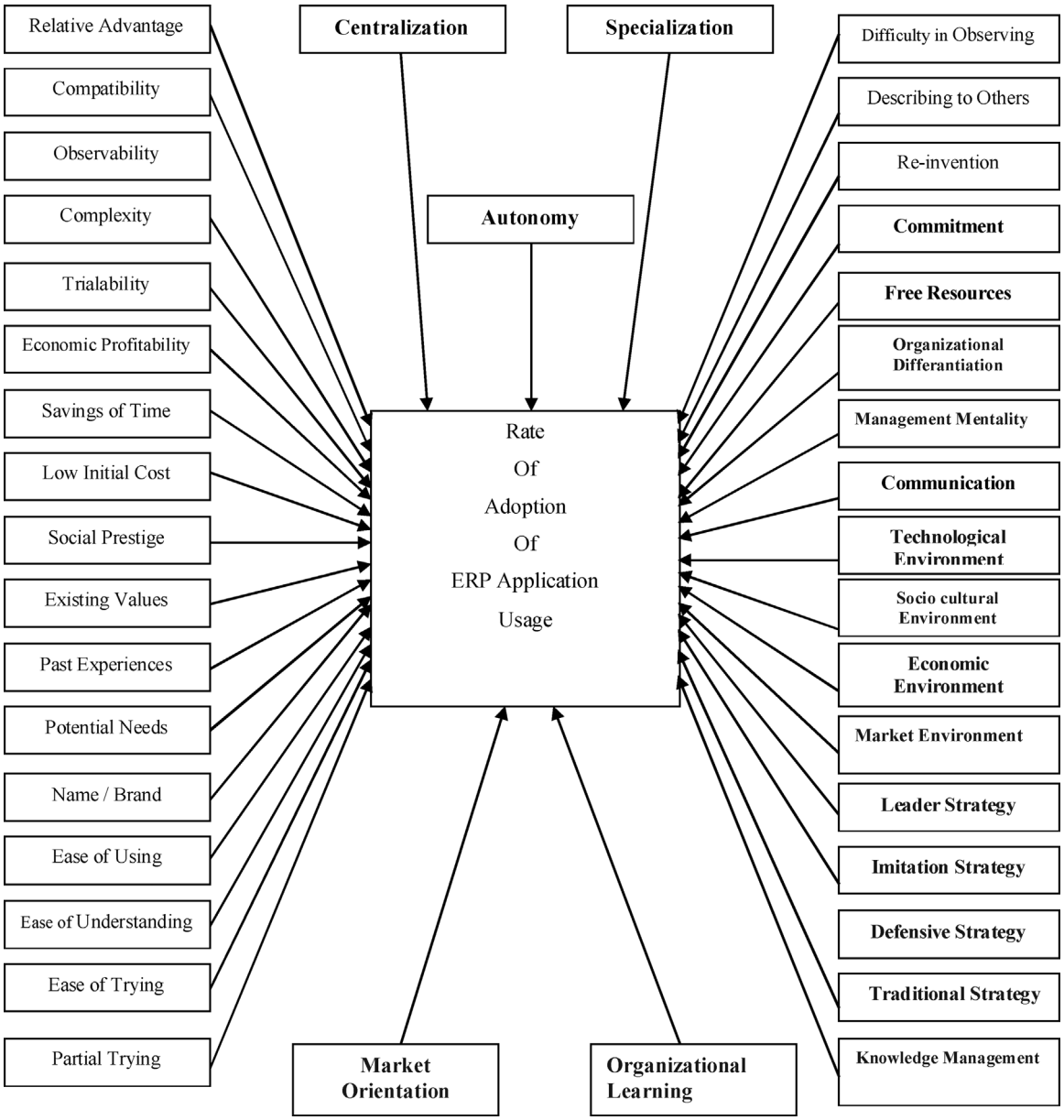

Fig. 2. Proposed Model.

When proposed model analyzed by category wise, depending on variation of the application type used; SAP users are affected by the characteristics of Compatibility, Social Prestige, Name/Brand, Market Environment, Imitation Strategy, Knowledge Management. Other type of application users states that Social Prestige, Name/Brand, Leader Strategy, Current Values, Low Initial Cost, Savings of Time, Past Experiences, Potential Needs characteristics are crucial for their adoption of their application.

When the data set is analyzed by gender; Men and Women are affected by different characteristics which creates a different level rate of adoption. While Savings of Time, Knowledge Management, Re-Invention, Compatibility, Difficulty in Observing, Describing to Others, Economic Profitability are the most important characteristics as one group for Men; Knowledge Management, Free Resources, Technological Environment, Observability, Trialability, Low Initial Cost, Market Orientation characteristics are cruical for Womens' rate of adoption of application usage.

When user types are grouped according to age category, Difficulty in Observing, Describing to Others, Ease of Understanding, Compatibility, Ease of Using, Specialization characteristics effects the users', who are under 35 years of age, rate of adoption of application. While Compatibility, Knowledge Management, Organizational Differantiation, Market Orientation, Social Prestige, Leader Strategy, Current Values, Socio cultural Environment, Market Environment are the most important characteristics for users who are over 35 years of age.

Under the categories of Education, Major, all characteristics mentioned in the proposed model have been shown how they vary using factor analysis. The characteristics of Communication, Technological Environment, Specialization, Autonomy and Defensive Strategy have been observed to blend with innovation characteristics and scatter into groups. It is also possible to state that these characteristics, which have high factor values in groups, influence the rates of the application adoption in the related category to a high extent. In Appendix D, where the categories of Total Experience and Current Work Experience are evaluated, it is a striking point that in Total Experience category, especially the characteristics of Organizational Differentiation, Management Mentality and Leader Strategy exist in the same group with Economic Profitability. Total work experience of the application in use includes higher factor values than management mentality for users with less than 5 years of experience.

The literature claims that only selected (main characteristics of Rogers) characteristics have had impacts on the adoption of innovation. When organizational characteristics are added to the existing model, results have changed drastically. For instance; While Ease of Understanding, Describing to Others, Difficulty in Observing, Ease of Trying of the application are the most effective characteristics for SAP users' rate of adoption; Compatibility, Social Prestige, Name/Brand, Market Environment, Imitation Strategy, Knowledge Management of the application have become more important for same users when organizational characteristics included.

4. Conclusion

The effect that developing and changing technology has on businesses trying to improve their performance and competitive position in the market is undeniable, which calls for immediate research in innovation management. Especially, the requirement that ERP applications keep up with the times is indisputable; however, for users to adopt ERP applications with the same rate, a number of characteristics need to be considered. Furthermore, knowing the affects of different user profiles on innovation adoption, managers can orient their employees and control the change in the company.

In the present study, in order to measure adoption rates of ERP applications and to see the characteristics that affect the rate of adoption, two research models were employed, the first of which is one that was formed based on Rogers' innovation diffusion theory. The model, consisting of five main and a total of fifteen sub-characteristics based on main characteristics, examines the effects of these characteristics on innovation in businesses that use ERP applications. 403 users have been interviewed and an attempt to determine which characteristics affect the rates of ERP applications adoption by these users has been made. Furthermore, sample of the study has been divided into categories and the way characteristics are grouped categorically based on type and structure of user has been investigated and the rigid structure in the base mode has been analyzed.

In the second part of the study, the first model in the core of Rogers' innovation diffusion theory has been improved and by combing it with organizational characteristics in literature, a new research model has been presented. In the newly developed model, it has been presented and discussed how thirty nine characteristics affect users' rate of ERP applications adoption and how they are grouped into categories. In the second model, it has been observed that the suggested organizational characteristics blend with organizational characteristics in the first model and a number of characteristics stand out compared to the ones in the first model.

Different data set and categorization of the sample, effects the movements of characteristics and provide that measurements for adoption rate studies should be more flexible. Each category has its own unique set of characteristics which effects rate of adoption of the users. As Wolfe (1994), Lyytinen and Damsgaard (2001) and Hameed and Counsell (2014); this study agrees the point of organizations can not be handled as a unit as well. Hence, Rogers model do not mean the same on every stage and state because every organization has their own structure. In addition to that, answers for research questions which are derived in previous part of this study are; i. Organizational characteristics have an impact to Roger's diffusion theory since they have change the set of characteristics which affect the rate of adoption, ii. employees' characteristics are very crucial for organizations, because when user profiles change, characteristic groupings change dynamically, and it can be defended that different characteristics are responsible for users' adoption of applications.

To conclude, it has been witnessed that different characteristics group in different categories of two different models and changes have been dynamically observed. Unlike many studies in literature in which only a few basic characteristics have been measured, in the present study, all the characteristics in Rogers' innovation diffusion theory have been approached and later on, combing them with organizational characteristics in a new model, the factors that affect the rate of adoption by ERP applications users. In addition, in both models, users were analyzed categorically and results were discussed comparatively.

This study provides theoretical contribution to innovation diffusion theory by suggesting two different models with categorizations. As a practical contribution; organizations could use those sets of characteristics which are presented in our Appendix according to their profiles. Team or department performances on rate of adoption of application usage can be increased by using our set of characteristics and improve on those.

Our study has limitations that should be considered in interpreting its results. First, eventhough we have included many characteristics in our two models, adding more of managerial or organizational characteristics would likely change the set of characteristics under categorizations. Second, our model can be applied for other contexts from all over the world since the structure of the models are based on the various literatures; but our sample is validated in Turkish context. Culture issues such as norms and values could affect the set of characteristics. Also, having sample from other countries would likely affect the results. Future research could contain sample from other countries, so it would allow us to compare results by country-wise.

Acknowledgement

We would like to express our thanks to the Scientific Research Project Department of Cukurova University (FDK-2014-2666) that provide us fund to conduct the study.

Appendix A. Factorial Analysis Results for Existing Model (Categories of Whole Data, Software Types, Gender, Age and Education Level).

Categories																	
Characteristics	Existing Model Groups	Whole Data		Software Type				Gender				Age				Education			
				SAP		Other		Women		Men		Under 35		Over 35		Associate and Less		Bachelors and More	
		F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G	F.L.	F.G
Relative Advantage	1	0.448	2	0.709	7	0.674	3	0.760	5	0.521	5	0.753	6	0.488	3	0.814	6	0.597	4
Economic Profitability	1	0.597	1	0.621	4	0.567	1	0.740	2	0.404	3	0.761	1	0.611	1	0.603	1	0.748	1
Savings of Time	1	0.560	1	0.719	4	0.585	1	0.645	1	0.482	3	0.592	1	0.665	1	0.464	1	0.693	1
Low Initial Cost	1	0.550	1	0.712	2	0.610	1	0.776	2	0.724	3	0.726	1	0.538	1	0.550	3	0.684	1
Social Prestige	1	0.670	1	0.583	2	0.672	1	0.386	5	0.667	2	0.468	5	0.704	1	0.491	3	0.643	1
Compatibility	2	0.720	5	0.470	3	0.693	4	0.790	6	0.699	5	0.586	6	0.782	6	0.543	4	0.769	5
Existing Values	2	0.677	1	0.863	6	0.690	1	0.567	1	0.802	2	0.588	3	0.671	1	0.778	5	0.699	1
Past Experiences	2	0.671	1	0.524	4	0.739	1	0.706	1	0.640	2	0.715	3	0.659	1	0.662	2	0.621	1
Potential Needs	2	0.672	1	0.623	7	0.719	1	0.716	1	0.448	2	0.680	1	0.717	1	0.777	2	0.686	1
Name/Brand	2	0.513	2	0.832	3	0.577	1	0.685	1	0.579	4	0.366	2	0.648	3	0.762	4	0.640	1
Observability	3	0.683	4	0.614	5	0.657	5	NA	NA	0.620	3	0.651	4	0.601	4	0.642	3	0.597	1
Ease of Using	3	0.828	2	0.785	3	0.741	3	0.891	3	0.769	4	0.853	2	0.796	3	0.805	4	0.866	2
Ease of Understanding	3	0.673	2	0.807	1	0.739	3	0.791	3	0.682	1	0.753	2	0.557	2	0.504	6	0.799	2
Complexity	4	0.571	3	0.697	5	0.570	5	NA	NA	0.390	4	0.533	5	0.692	5	0.387	1	0.686	4
Ease of Trying	4	0.643	3	0.626	1	0.739	2	0.710	4	0.627	1	0.533	4	0.654	5	0.589	1	0.783	3
Partial Trying	4	0.542	4	0.772	2	0.466	2	NA	NA	0.532	3	0.702	5	0.673	4	0.677	3	0.516	1
Trialability	5	0.642	4	0.566	5	0.590	5	0.749	4	0.623	3	0.787	4	0.744	4	0.494	3	0.833	3
Difficulty in Observing	5	0.522	3	0.699	1	0.521	4	0.585	2	0.752	1	0.610	2	0.754	2	0.748	1	0.578	2
Describing to Others	5	0.541	3	0.725	1	0.514	4	0.685	2	0.727	1	0.565	2	0.769	2	0.757	1	NA	NA
Re-invention	5	0.503	3	0.511	6	0.675	2	0.614	4	0.558	2	0.715	3	0.550	5	0.611	5	0.576	3

F.L: Factor Loading.
F.G: Factor Group.
NA: Not Available since the factor loading value is less than reference point.

Appendix B. Factorial Analysis Results for Existing Model (Categories of Education, Major, Total Experience, Current Work Place Experience, Sector, Department and Frequency of Usage)

Categories																						
Characteristics	Major						Total Experience				Current Work Place Experience				Sector				Department				Frequency of Usage			
	Engineering		Technical		Business		Less than 5		More than 5		Less than 5		More than 5		Private		Public		PDLP		Other		Intense		Average	
	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.
Relative Advantage	0.589	6	0.908	8	0.848	6	0.783	7	0.373	4	0.743	5	0.529	5	0.591	2	0.847	5	0.569	2	0.478	2	0.567	6	NA	NA
Economic Profitability	0.801	1	0.618	5	0.500	1	0.773	3	0.639	1	0.768	1	0.651	3	0.808	1	0.838	2	0.760	1	0.680	4	0.794	1	0.671	2
Savings of Time	0.593	1	0.832	5	0.553	3	NA	NA	0.588	1	0.606	1	0.613	3	0.598	1	0.606	2	0.637	1	0.478	1	0.581	1	0.526	1
Low Initial Cost	0.675	1	NA	NA	0.641	1	0.734	3	0.658	1	0.533	1	0.648	3	0.624	1	0.727	2	0.595	1	0.549	4	0.637	1	0.619	2
Social Prestige	0.733	4	0.652	1	0.791	1	NA	NA	0.747	1	0.644	3	0.619	2	0.622	4	0.613	1	0.490	1	0.661	1	0.820	4	0.621	2
Compatibility	0.740	6	0.694	1	0.679	5	0.586	6	0.754	5	0.434	5	0.569	5	0.443	6	NA	NA	0.613	4	0.620	4	0.706	6	0.435	1
Existing Values	NA	NA	0.798	3	0.700	1	0.739	2	0.648	1	0.475	1	0.761	2	0.756	4	0.758	1	0.820	5	0.754	1	0.797	4	0.499	1
Past Experiences	0.720	1	0.846	6	0.635	1	0.732	2	0.632	1	0.594	1	0.567	2	0.565	1	NA	NA	0.677	1	0.731	1	0.563	1	0.600	2
Potential Needs	0.690	1	0.803	7	0.680	1	0.546	2	0.665	1	0.735	1	0.645	2	0.555	1	0.488	2	0.571	1	0.603	1	NA	NA	0.770	2
Name/Brand	0.738	7	0.741	1	0.678	1	0.650	6	0.649	2	0.480	1	0.645	4	0.808	6	0.765	1	0.764	4	0.663	1	0.637	3	0.623	1
Observability	0.761	4	0.621	4	0.714	3	0.610	4	0.590	4	0.641	3	0.836	6	0.533	5	0.639	5	0.722	3	0.580	5	0.792	5	0.761	3
Ease of Using	0.852	3	0.831	1	0.817	2	0.784	1	0.853	2	0.844	2	0.842	4	0.665	6	0.735	1	0.746	4	0.798	2	0.709	3	0.838	1
Ease of Understanding	0.728	3	0.746	2	0.820	2	0.793	1	0.618	2	0.799	2	0.574	1	0.776	2	0.780	1	0.751	2	0.796	2	0.802	2	0.687	1
Complexity	0.815	5	NA	NA	0.825	4	NA	NA	0.562	3	0.556	4	0.506	5	0.547	5	0.750	6	0.599	6	0.706	5	NA	NA	0.643	4
Ease of Trying	0.611	5	0.648	2	0.598	4	0.634	4	0.707	3	0.711	4	0.546	1	0.478	5	NA	NA	0.539	2	0.707	3	0.564	2	0.553	4
Partial Trying	0.588	7	0.741	3	0.580	5	0.859	5	0.659	4	0.695	3	0.654	3	0.771	3	0.790	3	0.620	5	0.500	3	0.701	3	0.658	3
Trialability	NA	NA	0.799	4	0.671	3	0.708	4	0.608	4	0.507	4	0.710	6	0.721	5	0.782	4	0.771	3	0.657	3	0.603	1	0.600	3
Difficulty in Observing	0.796	2	0.698	2	NA	NA	0.644	1	0.576	3	0.539	2	0.789	1	0.634	2	0.591	2	0.613	2	0.591	2	0.726	2	0.642	1
Describing to Others	0.759	2	0.706	2	NA	NA	0.530	1	0.457	3	0.605	4	0.633	1	0.595	2	0.616	2	0.593	2	0.525	2	0.686	2	0.618	1
Re-invention	NA	NA	0.692	3	0.618	4	NA	NA	0.461	1	0.464	4	NA	NA	0.511	4	NA	NA	0.570	5	0.640	3	0.583	1	0.653	4

F.L: Factor Loading.
F.G: Factor Group.
NA: Not Available since the factor loading value is less than reference point.
PDLP: Production/Design/Logistics/Planning.

Appendix C. Factorial Analysis Results for Proposed Model (Categories of Whole Data, Software Type, Gender, Age and Education)

Categories																		
Characteristics	Whole Data		Software Type				Gender				Age				Education			
			SAP		Other		Women		Men		Under 35		Over 35		Associate and Less		Bachelors and More	
	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.
Relative Advantage	0.536	2	0.643	11	0.480	4	NA	NA	0.618	3	0.758	10	0.648	10	0.788	11	NA	NA
Compatibility	0.667	10	0.588	1	0.612	5	NA	NA	0.613	4	0.439	1	0.498	1	0.621	7	0.769	10
Observability	0.641	4	0.530	8	0.668	7	NA	NA	0.710	1	0.683	9	0.505	3	0.703	5	0.684	1
Complexity	0.550	7	0.445	9	0.582	9	0.768	11	0.756	9	0.552	4	0.634	6	0.689	10	0.675	9
Trialability	0.615	4	0.465	5	0.632	7	0.807	8	0.667	1	0.588	8	0.676	8	0.497	5	0.783	6
Economic Profitability	0.549	1	0.690	6	0.596	5	NA	NA	0.540	2	0.606	3	0.550	2	0.540	3	0.655	1
Savings of Time	0.628	1	0.563	9	0.479	1	NA	NA	0.420	2	0.453	3	0.605	2	0.497	3	0.693	1
Low Initial Cost	0.610	1	0.613	8	0.466	1	0.765	9	0.541	1	0.658	3	0.520	3	0.558	2	0.634	1
Social Prestige	0.560	1	0.748	1	0.718	1	0.656	3	0.567	4	0.550	6	0.676	1	0.787	2	0.651	1
Current Values	0.669	2	0.737	4	0.718	1	0.601	3	0.457	5	0.516	6	0.451	1	0.611	6	0.664	1
Past Experiences	0.483	1	NA	NA	0.645	1	NA	NA	0.489	5	0.474	2	0.587	2	0.612	1	0.578	1
Potential Needs	0.725	2	0.656	11	0.529	1	NA	NA	0.612	5	0.574	3	0.712	2	0.601	1	0.619	1
Name/Brand	0.551	8	0.507	1	0.570	1	0.682	3	0.708	6	0.489	5	0.539	4	0.724	4	0.578	1
Ease of Using	0.610	5	0.526	2	0.777	3	0.862	4	0.614	6	0.807	1	0.569	4	0.685	4	0.809	4
Ease of Understanding	0.578	2	0.729	3	0.770	3	0.786	4	0.680	3	0.713	1	0.537	10	0.490	11	0.681	4
Ease of Trying	0.428	8	0.622	7	0.553	2	0.602	8	0.594	7	0.548	8	NA	NA	0.535	3	0.619	6
Partial Trying	0.722	7	0.527	8	0.478	2	0.790	2	0.573	8	0.756	7	0.586	3	0.653	6	NA	NA
Re-Invention	0.529	1	0.586	4	0.604	2	NA	NA	0.447	7	NA	NA	NA	NA	0.496	9	NA	NA
Difficulty in Observing	0.568	6	0.775	3	0.579	5	0.716	1	0.688	3	0.603	1	0.813	5	0.692	3	0.537	2
Describing to Others	0.350	6	0.749	3	0.512	5	0.759	1	0.597	3	0.560	1	0.765	5	0.750	3	NA	NA
Centralization	0.642	2	0.619	7	0.556	8	NA	NA	0.611	9	0.377	2	0.754	6	0.532	10	NA	NA
Specialization	0.702	8	0.751	4	0.495	3	NA	NA	0.716	8	0.638	1	0.811	7	0.768	6	NA	NA
Autonomy	0.746	3	0.617	2	0.697	10	0.849	12	0.701	2	0.632	8	0.849	9	0.573	1	0.738	7
Commitment	0.436	8	0.473	6	0.542	7	NA	NA	0.421	2	0.595	4	0.574	8	0.486	7	0.718	2
Free Resources	0.596	4	0.731	8	0.569	4	NA	NA	0.630	1	0.485	7	0.750	3	0.489	6	0.628	2
Organizational Differantiation	0.589	3	0.658	6	0.693	4	0.742	5	0.657	2	0.662	4	NA	NA	0.611	1	0.664	2
Management Mentality	0.469	5	0.670	6	0.705	4	0.630	5	0.705	2	0.534	4	0.464	2	0.679	1	0.650	2
Communication	0.535	6	0.763	9	NA	NA	0.782	7	0.564	5	0.725	2	0.677	2	0.514	1	0.651	9
Technological Environment	0.547	1	0.762	5	0.453	6	0.699	6	0.509	1	0.712	5	0.616	3	0.617	5	NA	NA
Socio cultural Environment	0.401	3	0.873	10	0.432	2	0.616	2	0.744	10	0.680	7	0.507	1	0.772	9	0.602	3
Economic Environment	0.687	3	0.733	7	0.698	9	0.644	6	0.682	7	0.610	2	0.570	4	0.422	3	0.632	3
Market Environment	0.773	9	0.637	1	0.579	2	0.594	7	0.576	4	0.342	7	0.671	1	0.540	2	0.700	3
Leader Strategy	0.654	1	0.476	2	0.524	1	0.572	3	0.540	4	0.735	6	0.472	1	0.513	7	0.538	1
Imitation Strategy	0.710	5	0.553	1	0.603	5	NA	NA	0.543	8	0.629	3	NA	NA	0.654	2	NA	NA
Defensive Strategy	0.583	6	0.465	7	0.849	8	0.790	10	0.673	10	0.556	2	0.625	6	0.768	8	0.806	8
Traditional Strategy	0.432	1	0.456	7	0.654	6	NA	NA	0.685	6	0.418	9	0.676	4	0.696	4	0.805	5

Market Orientation	0.518	9	0.759	5	0.696	6	NA	NA	0.488	1	0.683	5	0.524	1	0.476	2	0.534	5
Organizational Learning	0.366	9	0.765	2	0.728	2	0.700	2	0.521	6	0.534	6	0.675	4	0.612	4	0.670	4
Knowledge Management	0.438	1	0.717	1	0.446	2	NA	NA	0.502	1	NA	NA	0.693	1	0.672	2	NA	NA

F.L: Factor Loading.
F.G: Factor Group.
NA: Not Available since the factor loading value is less than reference point.

Appendix D. Factorial Analysis Results for Proposed Model (Categories of Major, Total Experience, Current Work Place Experience, Sector, Department and Frequency of Usage)

Categories																								
Characteristics	Major						Total Experience				Current Work Place Experience				Sector				Department				Frequency of Usage			
	Engineering		Technical		Business		Less than 5		More than 5		Less than 5		More than 5		Private		Public		PDLP		Other		Intense		Average	
	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.	F.L.	F.G.
Relative Advantage	NA	NA	0.778	11	0.694	10	0.809	12	0.731	10	0.525	2	0.778	11	0.554	2	0.824	9	0.692	10	0.746	10	NA	NA	0.729	10
Compatibility	0.863	7	NA	NA	0.655	8	0.800	13	0.431	1	0.741	10	0.546	4	0.766	4	0.771	8	0.403	3	0.612	5	0.783	11	0.455	1
Observability	NA	NA	NA	NA	0.632	6	0.665	5	0.553	6	0.628	1	0.595	10	0.465	7	0.455	11	0.623	1	0.699	6	NA	NA	0.584	6
Complexity	0.744	6	0.555	6	0.693	7	0.688	9	0.620	7	0.650	9	0.531	7	0.668	9	0.771	10	NA	NA	0.803	11	0.736	7	0.654	7
Trialability	0.741	3	0.698	3	0.752	6	0.577	5	0.690	6	0.503	8	0.728	10	0.382	4	0.725	11	0.713	1	0.794	8	NA	NA	0.664	6
Economic Profitability	0.558	1	0.576	7	0.463	2	0.653	2	0.556	1	0.476	7	0.594	1	0.651	1	0.720	3	0.677	2	0.554	5	0.735	1	0.480	4
Savings of Time	0.554	1	0.824	7	0.453	2	NA	NA	0.593	1	0.468	1	0.694	1	0.603	1	0.532	3	0.596	2	0.476	6	0.529	1	0.429	1
Low Initial Cost	0.680	11	NA	NA	0.572	3	NA	NA	0.532	6	0.512	1	0.682	2	0.611	3	0.650	3	0.624	4	NA	NA	0.693	1	0.745	4
Social Prestige	0.456	4	0.588	1	0.745	3	NA	NA	0.769	2	0.443	1	0.627	2	0.484	8	0.470	2	0.402	1	0.520	1	0.722	2	0.586	8
Current Values	0.563	2	0.727	2	0.642	3	NA	NA	0.561	2	0.515	4	0.639	9	0.535	8	0.536	6	0.507	8	0.637	1	0.802	2	0.546	8
Past Experiences	0.699	1	0.751	10	0.456	3	NA	NA	0.398	4	0.514	3	0.629	1	0.644	1	0.620	6	0.700	2	0.621	1	0.521	1	NA	NA
Potential Needs	0.745	1	0.829	12	NA	NA	NA	NA	0.510	3	0.454	1	0.528	1	0.709	3	0.415	6	0.446	10	0.513	5	0.629	8	NA	NA
Name/Brand	NA	NA	0.747	1	0.546	3	NA	NA	0.587	5	0.478	1	0.663	3	0.785	6	0.371	8	0.788	3	0.673	1	0.747	5	0.649	1
Ease of Using	0.593	2	0.748	1	0.781	1	0.818	3	0.806	5	0.773	2	0.728	3	0.565	2	0.792	1	0.676	3	0.777	2	0.549	4	0.831	1
Ease of Understanding	0.646	2	0.584	4	0.761	1	0.814	3	0.511	1	0.761	2	NA	NA	0.767	2	0.759	1	0.833	7	0.762	2	0.703	4	0.653	1
Ease of Trying	0.641	3	0.671	8	0.554	7	0.574	5	0.470	8	NA	NA	0.568	8	0.613	10	0.538	4	0.483	6	0.530	3	0.527	6	0.463	7
Partial Trying	0.757	10	0.767	2	0.740	5	0.548	7	0.595	9	0.705	6	0.549	9	0.775	5	0.694	4	0.713	4	0.555	3	0.690	3	0.651	2
Re-Invention	NA	NA	0.742	9	0.483	7	0.656	9	0.361	8	0.458	9	NA	NA	0.762	8	0.691	4	0.548	8	0.517	3	NA	NA	0.533	7
Difficulty in Observing	0.726	2	0.862	4	0.482	1	0.573	3	0.717	1	0.675	2	0.730	6	0.651	2	0.636	3	0.507	7	0.680	2	0.730	4	0.591	1
Describing to Others	0.752	2	0.747	4	0.562	1	0.521	3	0.710	1	0.629	2	0.721	6	0.547	2	0.597	3	0.412	2	0.663	2	0.687	4	0.545	1

Centralization	0.677	3	0.641	5	0.610	9	0.791	8	0.690	7	0.723	8	0.637	7	0.666	9	0.650	8	0.521	6	NA	NA	0.480	7	0.816	9
Specialization	0.715	12	0.761	2	0.520	1	0.526	9	0.734	9	0.499	2	0.740	9	0.443	8	0.657	1	0.717	4	0.562	2	0.540	2	0.595	1
Autonomy	0.629	4	0.715	6	0.613	7	NA	NA	0.788	4	0.705	5	0.687	5	0.641	7	0.646	10	0.674	5	0.534	4	0.520	3	0.728	3
Commitment	NA	NA	0.606	2	0.506	6	NA	NA	0.366	6	NA	NA	0.518	10	0.453	1	0.640	1	0.431	2	0.695	9	0.505	2	0.514	6
Free Resources	0.857	5	0.605	2	0.623	2	0.830	10	0.466	6	0.433	6	NA	NA	0.734	5	0.573	3	0.528	1	0.535	4	0.596	5	0.416	2
Organizational Differantiation	NA	NA	0.601	6	0.681	2	0.711	2	0.441	4	0.589	5	0.488	1	0.640	1	0.520	9	0.519	2	0.664	4	0.672	1	0.646	3
Management Mentality	0.562	3	0.618	6	0.719	2	0.801	2	0.606	4	0.683	5	0.495	1	0.624	1	0.485	9	0.498	2	0.784	4	0.697	1	0.703	3
Communication	0.692	6	NA	NA	0.582	4	0.663	4	0.494	4	0.694	3	0.526	1	0.419	9	0.468	11	0.723	9	NA	NA	0.629	7	0.575	5
Technological Environment	0.633	1	0.689	3	NA	NA	0.614	1	0.735	3	0.607	1	0.615	4	0.427	6	0.593	5	0.749	1	0.610	1	0.626	5	0.610	2
Socio cultural Environment	0.829	9	0.660	5	0.537	5	0.812	7	0.680	8	0.677	6	0.574	7	0.858	12	0.680	2	0.691	6	0.721	3	0.517	6	0.666	2
Economic Environment	NA	NA	0.476	8	0.531	6	0.652	6	0.593	8	0.696	3	0.757	8	0.759	10	0.590	2	0.552	8	0.605	3	0.771	6	0.733	5
Market Environment	NA	NA	0.589	1	0.522	4	NA	NA	0.520	2	0.515	6	0.454	4	0.489	4	0.795	2	0.635	1	0.514	1	0.498	2	0.657	2
Leader Strategy	0.668	4	NA	NA	0.467	3	NA	NA	0.587	2	0.581	4	0.643	5	0.488	7	0.669	2	0.715	5	0.566	1	0.643	2	0.473	3
Imitation Strategy	0.702	1	NA	NA	0.553	8	0.807	11	0.440	9	0.705	7	0.670	2	0.768	11	0.533	7	0.536	6	0.488	5	0.766	10	0.711	4
Defensive Strategy	NA	NA	0.805	5	0.797	9	0.760	4	0.726	7	0.422	8	0.724	7	0.535	11	0.767	7	0.731	6	0.816	7	0.793	9	0.588	5
Traditional Strategy	0.808	8	0.727	1	0.646	4	0.569	6	0.574	5	0.530	3	0.744	3	0.703	6	0.664	5	0.738	3	0.470	10	0.750	8	0.526	1
Market Orientation	0.657	1	0.731	3	0.664	4	0.778	1	0.632	3	0.624	1	0.767	4	0.481	4	0.761	5	0.776	1	0.712	1	NA	NA	0.649	2
Organizational Learning	0.796	4	0.621	1	0.794	5	NA	NA	0.654	5	0.673	4	0.574	5	0.708	7	0.526	1	0.776	5	0.666	3	0.774	3	NA	NA
Knowledge Management	0.608	5	0.586	3	0.506	4	0.667	1	0.478	2	0.587	1	0.587	2	0.531	3	0.430	1	0.734	1	NA	NA	0.683	2	0.503	4

F.L: Factor Loading.
F.G: Factor Group.
NA: Not Available since the factor loading value is less than reference point.
PDLP: Production/Design/Logistics/Planning.

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