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PERCEIVED ENVIRONMENTAL UNCERTAINTY AND INNOVATION ADOPTION: EXPLORING THE TURKISH CONTEXT

Çiğdem KAYA[1]*
Göksel ATAMAN[2]
İbrahim H. ELBAŞI[3]

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ABSTRACT

Because innovation and environmental uncertainty are highly crucial concepts for organizations' survival, and managers are key decision makers in organizational operations, investigating the relationship between innovation and environmental uncertainty from managers' lenses is important. This study aims to explore how managers' adoption of radical and incremental innovation is affected by perceived environmental uncertainty (PEU). Data collected from 230 managers that work for companies that operate in various industries has been analyzed by using Multinomial logistic regression analysis. Results of the study indicate that government and policies factor is the effective factor on managers' decisions on innovation adoption, and in uncertain environments in terms of governmental and policy factor, managers choose to adopt both types of innovation since they want avoid to take risks of adopting solely one type of innovation.

Keywords: *Perceived Environmental Uncertainty (PEU); Radical Innovation Adoption; Incremental Innovation Adoption*

JEL Code: *M10, M19*

ALGILANAN ÇEVRESEL BELİRSİZLİK VE İNOVASYONU BENİMSEME: TÜRKİYE BAĞLAMINI KEŞFETME

ÖZ

İnovasyon ve çevresel belirsizlik kuruluşların hayatta kalması için son derece önemli kavramlar olduğundan ve yöneticiler örgütsel operasyonlarda kilit karar vericiler olduğundan, yöneticilerin merceklerinden inovasyon ve çevresel belirsizlik arasındaki ilişkiyi araştırmak önemlidir. Bu çalışma, yöneticilerin radikal ve artımsal inovasyonu benimsemelerinin çevresel belirsizlikten (PEU) nasıl etkilendiğini araştırmayı amaçlamaktadır. Çeşitli sektörlerde faaliyet gösteren şirketlerde çalışan 230 yöneticiden toplanan veriler, Multinomial lojistik regresyon analizi kullanılarak analiz edilmiştir. Sonuçlar, hükümet ve politikalar faktörünün yöneticilerin inovasyonun benimsenmesine ilişkin kararları üzerinde etkili bir faktör olduğunu ve belirsiz ortamlarda, 'devlet ve politika faktörü açısından', yöneticilerin yalnızca bir yenilik türünü benimsemenin riskini almaktan kaçındıkları için her iki yeniliği benimsemeyi tercih ettiklerini göstermektedir.

Anahtar Kelimeler: *Algılanan Çevresel Belirsizlik (PEU); Radikal İnovasyonu Benimseme; Artımsal İnovasyonu Benimseme*

JEL Kodu: *M10, M19*

[1] Dr. Instructor, Istanbul Arel University, cigdemkaya2810@gmail.com; *Corresponding Author https://orcid.org/0000-0001-8307-3501
[2] Prof. Dr., Marmara University, gataman@marmara.edu.tr https://orcid.org/0000-0003-3234-7490
[3] Director, Commercialization Center of Istanbul, ibrahim.elbasi@gmail.com https://orcid.org/0000-0003-4447-0517

1. INTRODUCTION

Environmental uncertainty has been studied broadly in the organizational theory literature (e.g. Milliken, 1987; Duncan, 1972; Thompson, 1967; Hannan and Freeman, 1977). Organizational theorists mainly stress that organizational adaptation to the environments is key to survive (Lawrence and Lorsch, 1967; Thompson, 1967; Milliken, 1987; Çetin, 2009). The essence of organizational adaptation is to cope with uncertainty. Alignment of technology, task environment, and organizational design and structure are vital to deal with such uncertainty (Thompson, 1967; Karpak, Kaya, and Eunni, 2010). Managers' perceptions of environmental uncertainty are crucial to understand in their efforts on the survival of their organizations.

Innovation, as a source of competitive advantage and thus survival, is also a very important concept in coping with environmental change and being effective (Damanpour and Schneider, 2006). Organizational processes that enable the generation or adoption of innovation are widely investigated by scholars to understand the grounds of some organizations' ability to generate or adopt innovation more than other organizations' ability to do so (Germain, 1996; Tidd, 2001; Damanpour and Schneider, 2006). In addition to organizational processes such as organizational structure and management traits, another external factor that might affect innovation is the context in which the organization operates (Germain, 1996). From the contextual variables, size and environmental uncertainty are the most common variables; size means an organization's operational scale and environmental uncertainty means external dynamism and unpredictability (Duncan, 1972). Internal factors take the phase of adoption, radicalness of innovation, risk, compatibility, cost, and technological versus managerial innovation nature in hand (Germain, 1996). Because innovation and environmental uncertainty are highly crucial concepts for organizations' survival, and managers are key decision makers in organizational operations, investigating the relationship between innovation and environmental uncertainty from managers' lenses is important. Turkish context is also very valuable to study this relationship since Turkey is a country that has her borders with Middle East countries where political fluctuations, economic crisis, governmental issues and war have been experiencing. This makes the current study different than other studies that worked on this relationship. There are limited number of works studied the relationship between innovation and environmental uncertainty; therefore, current research makes very important contributions to this line of research by examining such a different context. In order for survival, innovation adoption of firms is highly crucial, thus, it necessitates understanding the concept from Turkish context.

Due to the above reasons, the goal of current research is to examine the relation between managers' adoption of radical and incremental innovation and the perceived uncertainty of the environment on the Turkish managers.

2. LITERATURE REVIEW

In this section, literature review on managers' perceptions of environmental uncertainty and their decisions on the adoption of radical and incremental innovations are presented.

2.1. Perceived Environmental Uncertainty

World of organizations have become more and more complex because of rapid changes in the environment that bring uncertainty (Christiansen, 1997; Hamel, 2000; Kim and Mauborgne, 2005). Coping with uncertainty is the significant problem for managers and marketers (Thompson, 1967). Milliken (1987) described uncertainty by means of the perceived inability of an individual to forecast something precisely due to lack of satisfactory information or capability to distinguish between related and unrelated data. As Daft and Weick (1984) emphasized, the decision makers in the organizations not only accumulate information from the environment but also interpret and analyze data prior to creating organizational reactions. If the origin of uncertainty is the organization's environments, then it is called environmental uncertainty, by indicating that the unpredictable thing is in the organizational environment (Milliken, 1987). However, Milliken (1987) and Duncan (1972) emphasize that this is a broad definition of the concept and may not be useful. Therefore, Miles and Snow (1978) and Duncan (1972) advocate that particular constituents of the environments such as consumers, rivals, suppliers, and governments etc. are to be studied to conceptualize the environmental uncertainty.

Uncertainty in the organizational environment has been examined as environmental uncertainty or perceived environmental uncertainty (PEU). PEU has been found to have influenced on various marketing, accounting, information technology, operations management, organization studies and strategic management variables (McCabe, 1990). Three types of environmental uncertainty were suggested by Milliken (1987). First, state uncertainty arises when administrators see organizational environment to be difficult to predict and is also referred to as perceived environmental uncertainty. Top managers might be indeterminate about the actions that suppliers, competitors, consumers, the government, shareholders, etc. might take, and about the landscape of the changes in sociocultural tendencies, demographic changes, and chief new advances in technology (Milliken, 1987). The definition of the type of uncertainty

is compatible with Miles and Snow's (1978) definition of perceived environmental uncertainty that the perceptions of managers on environmental uncertainty are settled by the foreseeability of the situations in the environment of the organization. Second type of uncertainty, as Milliken (1987) suggests is effect uncertainty. It relates to the inadequacy of an individual to foresee the effect of environmental incidents or variations on their organization. The last type, response uncertainty, denotes to the absence of information about response alternatives and/or an incapability to forecast the probable outcomes of a response preference.

Miller (1997) has stated that two comprehensive common environmental uncertainty types encompassed political and governmental policy, and macroeconomic in the investigation that is asked to managers to measure their perceptions on environmental uncertainty. For the industry level, on the other hand, input, technological uncertainties, competitiveness, and product market are included in the survey. Measuring perceived environmental uncertainty might be useful to link it to strategic decision that managers make.

2.2. Adoption of Radical and Incremental Innovations

Innovation has taken widespread attention among scholars from different perspectives and is described as "*the creation or adoption of new ideas. For the organizational level, it is defined as the adoption of a new product, service, process, technology, policy, structure or administrative system*" (Damanpour and Schneider, 2006, p. 216).

Innovation adoption essentially denotes that the innovation is novel to the adopters, and it aims to obtain foreseen advantages from variations that the innovation may convey to the organization. Decision for innovation adoption might be based directly on the managers' choices or forced by environmental conditions. For example, a manager might adopt innovation because otherwise it leads to internal inefficiency, or because it is forced by environmental change. For both change triggers, innovation adoption make sure adaptive behavior to the internal and external environment and this adaptive behavior that resulted in change in an organization sustain or increase an organization's performance levels and efficiency (Damanpour and Schneider, 2006).

Innovation adoption has widely been worked in the literature as incremental innovation adoption and radical innovation adoption (e.g. Kuan and Chau, 2001; Moore and Benbasat, 1991; Tornatzky and Klein, 1982; Damanpour and Schneider, 2006; De Lancer Julnes and Holzer, 2001; Germain, 1996). Radical innovation means producing major variations in the firm's organizational structure, technologies, processes, products, and organizational methods,

and incremental innovation means the refinement and reinforcement of current organizational structure, technologies, processes, products, and organizational methods (Fores and Camison, 2016). While radical innovation implies a nonlinear, paradigmatic change with major differences from present knowledge or practice, incremental innovation is a linear, cumulative change with minor developments or modest modifications in present knowledge or practice (Orlikowski, 1991). However, there is an issue regarding these concepts whether these two are "*two ends of a continuum or orthogonal to each other*" (Gupta, Smith, and Shalley, 2006, p. 693). Dewar and Dutton (1986) have noted if these two are behaved as continuum, then the intermediate values of this continuum are problematic to explained (p. 693), we, therefore, behaved these two concepts as orthogonal.

Jansen, van den Bosch, and Volberda (2006) underline two types of innovation: exploratory and exploitative innovation. *Exploratory innovation means* radical innovation and is adopted to meet emergent customers or markets' needs by creating new knowledge, offering new designs, forming new markets, etc. On the contrary, *exploitative innovation* means incremental innovation and is adopted to meet existing customers or markets' needs by extending existing knowledge and skills, improving established designs, expanding existing products and services, etc. Ambidexterity concept suggested by Tushman and O'Reilly (1996) is used to explain how organizations can achieve to survive and effectively respond to numerous environmental conditions. Organizational ambidexterity is the ability of firms to follow exploratory innovation and exploitative innovation concurrently and it is vital to the survival of the firms (Jansen, van den Bosch, and Volberda, 2005). Ambidextrous organizations are good at take advantage of existing products to provide exploitative innovation, and at discovering new favorable circumstances to encourage more radical innovation (Andriopoulos and Lewis, 2009: 696). Exploring and exploiting simultaneously in highly uncertain environments provide firms dynamic capabilities to prosper and survive (Benner and Tushman, 2003; Gibson and Birkinshaw, 2004; Jansen, van den Bosch, and Volberda, 2005).

Ettlie (1983) has asserted that environmental uncertainty arouses organizational strategy or policy change by eventually leading to innovation and has concluded that environmental uncertainty is positively related with organizational innovation. Perceived environmental uncertainty for a firm considerably stimulates an aggressive technology policy for innovations to cope with an uncertain environment. This aggressive technology policy encourages adoption of radical innovation and partly supports the adoption of incremental innovation. Similarly, Elhamma (2015) has found out organizations more likely adopt administrative innovations

when they face environmental uncertainty than organizations do that when they operate in certain environment. Innovation, thus, is a very essential concept in handling with environmental change and being effective (Damanpour and Schneider, 2006).

Organizational processes that enable the generation or adoption of innovation are widely investigated by scholars to understand the grounds of some organizations' ability to generate or adopt innovation more than other organizations' ability to do so (Germain, 1996; Tidd, 2001; Damanpour and Schneider, 2006).

2.3. Hypotheses Development

Germain (1996) has found that an uncertain environment is positively related to radical innovation and unrelated to incremental innovation when they are tested separately. On the other side, Ettlie (1983) has concluded that managers are encouraged to adopt radical innovation when they perceive the environment as uncertain, and incremental innovation is partly adopted by those managers in that kind of environment. As stated by Koberg, Detienne, and Heppard (2003), top managers tend to undertake radical changes in uncertain environments since highly fluctuated environments cause to the product cycles to be short, require firms to innovate quickly to survive. When the policymakers perceive the external environment as dynamic, their frequency of adopting radical innovation is more than the frequency of adopting incremental innovation, but eventually, they adopt both radical and incremental innovations as they perceived the environment as dynamic (Koberg, Detienne, and Heppard, 2003). So, uncertain environments may favor both types of innovation. Koberg, Detienne, and Heppard (2003, p. 24) have reported that the conditions favoring radical innovations diverged from the ones that are in favor of the incremental innovation, and that dissimilar cultural features such as individualism versus collectivism influence incremental innovations and radical innovations in different ways. In Hofstede's work (1983), uncertainty avoidance indicates a society's tolerance for ambiguity. National cultures such as Turkey's national culture have strong uncertainty avoidance that is what is different is dangerous (Sargut, 1994), and people in countries with high uncertainty avoidance avoid to take risks (Smit, 2015). Hence, when the managers in Turkey perceive the environment as uncertain, then they may adopt both types of innovation rather than adopting solely radical innovation to be able to mitigate risks.

We, therefore, hypothesize that;

H_1: The more increase in the perceptions of managers on environmental uncertainty, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1A}: The more increase in the perceptions of managers on environmental uncertainty related to government and policies factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1B}: The more increase in the perceptions of managers on environmental uncertainty related to product market and demand factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1C}: The more increase in the perceptions of managers on environmental uncertainty related to competition factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1D}: The more increase in the perceptions of managers on environmental uncertainty related to technology in your industry factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1E}: The more increase in the perceptions of managers on environmental uncertainty related to economy factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{1F}: The more increase in the perceptions of managers on environmental uncertainty related to resources and services used by your company factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

Elhamma (2015) has studied on the association between managerial innovations and perceived environmental uncertainty. In this paper, Elhamma has focused on a completely new method in the management accounting as managerial innovation, and concluded that the use of the new method is resulted an increase in profitability in an uncertain environment, and that there is no difference in profitability between firms adopting or not adopting the new method in a stable environment. In the other words, there is no difference in firm profitability based on whether the managers adopt radical innovation in a stable environment, and there is an increase in profits based on adopting radical innovations in the environments that perceived as uncertain. Since there is no difference in the profits about adopting radical or incremental innovations,

managers, then, may adopt solely incremental innovations in the environments they perceive as stable because incremental innovations related to systematic cost reduction, routinization, and standardization (Koza and Lewin, 1998). We, therefore, hypothesized that;

H_2: The more decrease in the perceptions of managers on environmental uncertainty, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

H_{2A}: The more decrease in the perceptions of managers on environmental uncertainty related to government and policies factor, the more increase in both the adoption of radical and incremental innovations than the adoption solely of radical innovations.

H_{2B}: The more decrease in the perceptions of managers on environmental uncertainty related to economy factor, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

H_{2C}: The more decrease in the perceptions of managers on environmental uncertainty related to resources and services used by your company factor, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

H_{2D}: The more decrease in the perceptions of managers on environmental uncertainty related to product market and demand factor, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

H_{2E}: The more decrease in the perceptions of managers on environmental uncertainty related to competition factor, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

H_{2F}: The more decrease in the perceptions of managers on environmental uncertainty related to technology in your industry factor, the more increase in the adoption of incremental innovations than the adoption of solely radical innovations and the adoption of both types of innovations.

There has been little focused work on an examination of the direct influence of perceived environmental uncertainty on innovation adoption. There is also an argument in the literature on the most proper survey scale to adopt for PEU research (Miller, 1993; Buchko, 1994). In this study, thus, we tested reliability of the PEU scale.

3. METHODOLOGY

This study explores how managers' adoption of radical and incremental innovation is influenced by the perceived uncertainty of the environment. With this purpose, the questionnaire was distributed to managers working in Istanbul, Turkey. These participants were working for companies that function in various industries such as energy, health, education, food, and construction. We used convenience sampling in this research. In total 230 managers filled out the paper questionnaire. 33,9 % of the sample was female and 66,1 % was male. 52,6 % of the participants had a university degree, 36,5 % had a master degree, 5,2 % had a PhD degree.

The survey included three sections: The first section provided personal and organizational information. The second section gave the PEU questionnaire, and the third section provided innovation adoption questionnaire.

We used the questionnaire developed by Miller (1997) to measure PEU. The questionnaire has 35 items. This questionnaire is consisted of six dimensions that measure the PEU. The dimensions are "*government and politics*", "*economy*", "*resources and services used by your company*", "*product market and demand*", "*competition*", and "*technology in your industry*" (Miller, 1997:13-14). Respondents were asked to assess the extent to which each item is accurate according to their perceptions and about their company. A 7-point Likert response scale is employed, ranging from predictable (1) to unpredictable (7).

Innovation adoption is measured by asking participants which innovation type they adopt and include them in their processes by giving the detailed definitions of the radical or incremental innovation. Participants could select either one of them or both of them based on their adoption of these innovation types.

We translated PEU scale from English to Turkish. We back-translated the items to control the soundness of the translation. The meanings of the back-translated items matched well with the meanings of the original English items. Addition to this effort, two bilingual academicians examined the translation of the scale. We, then, did corrections based on their recommendations. Innovation adoption questions were already prepared in Turkish. Because verifying the reliability and validity of the questionnaire is necessary, we pretested the Turkish version of the questionnaire with randomly selected 30 participants. According to this study, we found the Turkish version of the scale as reliable (α: .950).

Dependent variables in this research are in categorical structure with three categories

about innovation adoption; therefore, linear regression analysis that is employed to analyze the association between continuous variables cannot be used. We analyzed our data by multinomial logistic regression model that is the most generalized logistic regression model used for modelling choices that include more than two categories (Duquenne and Vlontzos, 2012; Cameron and Trivedi, 2010). Multinomial logistic regression analysis is a method for explaining the cause and effect associations between dependent and independent variables in cases dependent variables are obtained by a classification scale and include three or more than three categories (Hosmer et al, 2013).

4. FINDINGS

Exploratory factor analysis was employed to observe the structure of the factors of the Perceived Environmental Uncertainty (PEU) scale. Factors with Eigenvalues 1.00 or more were included in total variance explained. Three items with a factor loading less than .500 and loading to more than one factor were excluded from the analysis in consequence of factor analysis with 35 items. The items that remain were loaded on six factors explaining the 67,409 % of the total variance. PEU scale reliability was found as $\alpha = .936$.

Table 1 Results Of The Factor Analysis Of PEU Scale

		Factor Loadings	Cronbach Alpha
Factor 1: Government and Policies	**Variance:13,812**		**.876**
12. Tax policies		**.711**	
13. Monetary policy		**.817**	
14. Prices controlled by the government		**.794**	
15. National laws affecting international business		**.721**	
16. Legal regulations affecting the business sector		**.732**	
17. Tariffs on imported goods		**.530**	
18. Enforcement of existing laws		**.588**	
19. Public service provision		**.581**	
Factor 2: Product market and demand	**Variance:11,982**		**. 887**
31. Client preferences		**.744**	
32. Product demand		**.782**	
33. Availability of substitute products		**.714**	
34. Availability of complementary ~ products		**.654**	
Factor 3: Competition	**Variance: 11,300**		**. 870**
35. Changes in competitors' prices		**.649**	
36. Changes in the markets served by competitors		**.627**	
37. Changes in competitors' strategies		**.713**	
38. Entry of new firms into the market		**.781**	
39. Domestic competitors		**.712**	
40. Foreign competitors		**.603**	
Factor 4: Technology in your industry	**Variance:10,261**		**. 919**
41. Product changes		**.724**	
42. Changes in product quality		**.729**	
43. New product introductions		**.673**	
44. Changes in the production process		**.740**	
Factor 5: Economy	**Variance:10,068**		**. 903**
20. Inflation rate		**.786**	
21. Exchange rate with dollar		**.884**	
22. Interest rate		**.871**	
23. Results of economic restructuring		**.688**	
Factor 6: Resources and services used by your company	**Variance: 9,986**		**. 836**
24. Availability of trained labor		**.593**	
25. Labor and union problems		**.545**	
26. Quality of inputs, raw materials, and components		**.633**	
27. Availability of inputs, raw materials, and components		**.623**	
29. Transportation system within the country		**.572**	
30. Transportation system to foreign countries		**.558**	
Kaiser-Meyer-Olkin Value: .894 df: 528 Bartlett Significance Value: .000 Chi-Square Value: 5291.224			

These six factors were in compliance with Miller's six-factor model and named as government and policies, product market and demand, competition, resources and services used by your company, technology in your industry, and economy as specified in the literature. We tested all the factors for reliability and found Cronbach's Alpha coefficient as .876 for government and policies factor, .887 for product market and demand factor, .870 for competition factor, .919 for technology in your industry factor, .903 for economy factor, and .836 for resources and services used by your company factor. The results are shown in Table 1.

We also provide Pearson correlation among PEU and demographic variables in Table 2.

Table 2: Pearson Correlation Among PEU And Demographic Variables

Correlations							
		ECONOMY	PRODUCT MARKET AND DEMAND	COMPETITION	TECHNOLOGY IN YOUR INDUSTRY	GOVERNMENT AND POLICIES	RESOURCES AND SERVICES USED BY YOUR COMPANY
TITLE OF THE MANAGER	Pearson Corr.	-,052	-,067	**-,134(*)**	-,047	-,022	-,091
	Sig. (2-tailed)	,432	,308	**,043**	,481	,742	,171
	N	230	230	230	230	230	230
SECTOR	Pearson Corr.	**,142(*)**	,102	-,033	,030	,089	,110
	Sig. (2-tailed)	**,032**	,124	,622	,654	,178	,095
	N	230	230	230	230	230	230
DEPARTMENT	Pearson Corr.	,087	-,060	,039	-,006	,029	-,090
	Sig. (2-tailed)	,187	,364	,559	,933	,662	,176
	N	230	230	230	230	230	230
GENDER	Pearson Corr.	-,047	,031	,122	,059	-,090	,015
	Sig. (2-tailed)	,476	,641	,064	,372	,173	,819
	N	230	230	230	230	230	230
EDUCATION	Pearson Corr.	,031	,030	,007	,078	-,020	-,014
	Sig. (2-tailed)	,642	,650	,912	,241	,761	,833
	N	230	230	230	230	230	230
NUMBER OF EMPLOYEES	Pearson Corr.	,030	,019	-,077	-,106	,094	,056
	Sig. (2-tailed)	,650	,773	,243	,110	,154	,402
	N	230	230	230	230	230	230
ORGANIZATIONAL AGE	Pearson Corr.	**,156(*)**	,019	-,032	-,089	,082	,085
	Sig. (2-tailed)	**,018**	,775	,633	,180	,217	,199
	N	230	230	230	230	230	230
FREQUENCY OF INNOVATION	Pearson Corr.	,051	,008	-,103	,054	-,032	,071
	Sig. (2-tailed)	,439	,901	,118	,414	,629	,287
	N	230	230	230	230	230	230
TYPE OF INNOVATION	Pearson Corr.	,004	,033	-,005	-,023	,117	,084
	Sig. (2-tailed)	,955	,623	,935	,724	,075	,205
	N	230	230	230	230	230	230

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

According to Pearson correlation among PEU and demographic variables, there is a positive relationship between organizational age and economy factor of PEU, a negative relationship between title of the manager and competition factor of PEU, and a positive relationship between sector and economy factor of PEU at 0.05 significance level. These findings indicate that as the organizational age increases, managers' perception of economic uncertainty increases, and the perception of uncertainty about competition issues increases as managers' titles lowers. And, as the sectors of managers go from sectors such as education and health to the information technology sector, managers' perception of economic uncertainty is increasing.

The relationship between PEU and Innovation Adoption was tested using Multinomial Logistic Regression. Table 3 shows the outcomes of the Multinomial Logistic Regression analysis. The outcomes indicated that only the Government and Policies factor of the PEU contributed to innovation adoption.

Table 3: Results of the Multinomial Logistic Regression Analysis between PEU and Innovation Adoption

Parameter Estimates

Dependent(a)		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
Incremental	Intercept	1,455	,680	4,576	1	,032			
	Resources and services used by your company	,224	,207	1,171	1	,279	1,251	,834	1,876
	Technology in your industry	,116	,188	,380	1	,537	1,123	,777	1,622
	Government and policies	-,213	,161	1,745	1	,187	,808	,590	1,108
	Competition	-,174	,194	,803	1	,370	,840	,574	1,229
	Economy	-,153	,140	1,203	1	,273	,858	,652	1,128
	Product market and demand	-,070	,199	,125	1	,724	,932	,631	1,376
Radical	Intercept	,785	,730	1,155	1	,283			
	Resources and services used by your company	,359	,227	2,499	1	,114	1,432	,917	2,236
	Technology in your industry	,212	,206	1,059	1	,303	1,236	,826	1,849
	Government and policies	-,475	,183	6,753	1	**,009**	**,622**	,435	,890
	Competition	,157	,207	,577	1	,448	1,171	,780	1,758
	Economy	-,101	,153	,436	1	,509	,904	,670	1,220
	Product market and demand	-,328	,230	2,032	1	,154	,721	,459	1,131

a The reference category is: both incremental and radical innovation adoption.

According to multinomial logistic regression analysis, hypothesis H1A stating *"The more increase in the perceptions of managers on environmental uncertainty related to government and policies factor, the more increase in both the adoption of radical and incremental of innovations than the adoption solely of radical innovations."* was only supported. This means that managers adopting radical innovation are affected 0,622 times less by government and policies factor of PEU than managers adopting both types of innovations.

5. DISCUSSION

In this paper, the interaction between Perceived Environmental Uncertainty (PEU) and Radical and Incremental Innovation Adoption is investigated. Based on this research we found out the more managers' perceptions on environmental uncertainty about government and policies, the more their likelihood on adoption of both types of innovations compared to their

likelihood on adoption of radical innovation. This means when the predictability of environmental uncertainty about government and policies decreases in one unit, managers prefer adopting both types of innovations 0,622 times more than managers who prefer adopting radical innovation. In other words, as the uncertainty becomes unpredictable, the probability of managers to prefer both types of innovation and is 0.622 times higher than the probability of managers to prefer solely one type of innovation. This result suggests that government and policies factor of the perceived environmental uncertainty favors the frequency of incremental and radical innovation (Koberg, Detienne, and Heppard, 2003).

Our results suggest that environmental factors seem to restrain or promote strategists' innovative efforts. According to our findings, both radical innovation and incremental innovation adoption increased as perceived environmental uncertainty increased. The results are incompatible with Gilsing, Vanhaverbeke, and Pieters's (2014) finding that companies' ability to acquire new cliques beyond their scope in their network and their access to new technological knowledge affect their innovative performance for the period of technologic turbulence. This means that radical innovation increases firm performance during technological turbulence. Gilsing, Vanhaverbeke, and Pieters's (2014) finding may be the result of the studying only the periods of technological uncertainty, either/or not to investigate the combine effect of radical and incremental innovation on firm performance during uncertainty periods. Our findings are coherent with Tushman and Romanelli's (1985) proposition about potent organizations' tendency to undertake reorientations or radical changes in the environments with high uncertainty, with Kartaltepe Behram and Özdemirci's (2014) finding that innovativeness and proactiveness emerge in hostile and dynamic conditions and negatively affected by munificence and with Van Wijk, et. al.'s (2012) finding that a balance between bridging diverse ties and maintaining strong ties for the creation of innovations is required and this provides adapting to diverse and competitive conditions. Lavie, Kang, and Rosenkopf (2011) found that firms that balance exploration and exploitation acquire profits and market value. This can also be explained by organizational ambidexterity approach (Jansen, van den Bosch, and Volberda, 2005; Andriopoulos and Lewis, 2009; Gibson and Birkinshaw, 2004; Lavie and Rosenkopf, 2006) that is discussed in literature review section by stating that exploring and exploiting simultaneously in highly uncertain environments provide firms dynamic capabilities to prosper and survive (Benner and Tushman, 2003; Gibson and Birkinshaw, 2004; Jansen, van den Bosch, and Volberda, 2005).

Although the second hypothesis and its sub-hypotheses stating that the more decrease in the perceptions of managers on environmental uncertainty, the more increase in the adoption of incremental of innovations than the adoption of solely radical innovations and the adoption of both types of innovations were not supported, managers' adoption of incremental innovation is believed to increase as the environmental uncertainty decrease (Koza and Lewin, 1998; Koberg, Detienne and Heppard, 2003). Elhamma's (2015) study on the association between managerial innovations and perceived environmental uncertainty exhibited there is no difference in firm profitability based on whether the managers adopt radical innovation in a stable environment, and there is an increase in profits based on adopting radical innovations in the environments that perceived as uncertain. Hence, managers may adopt merely incremental innovations in the environments they perceive as stable because incremental innovations related to systematic cost reduction, routinization, and standardization (Koza and Lewin, 1998). This means that the more decrease in uncertainty, the more increase in incremental innovation adoption, on the other hand, the more increase in uncertainty, the more increase in both types of innovation adoption. This interpretation is consistent with Koberg, Detienne, and Heppard's (2003) finding that environmental dynamism will be an important predictor of radical innovation, rather than increasing innovation.

As our results have indicated, government and policies factor is the effective factor on managers' decisions on innovation adoption. Since Austin (1990) names governments as "mega-forces" forming industry architecture and underlying forces in developing countries, this result is understandable especially in countries such as Turkey that has very complicated environment because of the war surrounded around her and the problematic political issues in the country. In addition to these findings, current study provides a first empirical test of Miller (1993) PEU scale in Turkey with a high reliability.

5.1. Managerial Implications

Our results possess some implications for managers who pursue innovativeness in uncertain environments. Some studies have shown that an uncertain environment is positively related to radical innovation and unrelated to incremental innovation (e.g. Germain, 1996), however, this is not true for Turkish context since political and policy changes are exposed to national social influences and, therefore, should differ from one country to another (Miller, 1993). Managers, thus, might be uncertain about what actions might be taken or about the likelihood or landscape of changes in an environment (i.e. the major new developments in technology) (Milliken, 1987). Therefore, managers may benefit from our results knowing that

the highly uncertain environments in terms of political policy changes require adopting both types of innovation to be able to achieve surviving and cope with uncertainty in the environment by encouraging essential changes in the firm's organizational structure, technologies, processes, products, and organizational methods, and the improvement of existing organizational structure, technologies, processes, products, and organizational methods (Fores and Camison, 2016).

5.2. Limitations

While this inquiry contributes significantly to the literature, it has some research limitations. We examine the relationship between perceived environmental uncertainty and innovation adoption from managers' lenses in this paper. Understanding this relationship can provide organizations many aspects to be able to cope with changes and thus survive. Because culture is one of the environmental uncertainty variables, it is important to investigate such relationship by adding national culture dimensions such as uncertainty avoidance. This is the first limitation of our study. Future works may include national culture especially **"**uncertainty avoidance" variable in studying this relationship.

The second limitation of the study is that we applied this research on organizations that operate in various industries. However, each industry has its own dynamics and environmental conditions. Therefore, future research may investigate this relationship in specific industries, and may compare the managers' perceptions about uncertainty and innovation adoption in those industries. Third, we examined only the effects of environmental factors on the managers' decisions about innovation adoption. Future research may include organizational factors such as the age and size of the firm and structure of the firm and managerial characteristics such as managers' demographics (Koberg, Detienne, and Heppard, 2003) in addition to environmental factors to see if they have an effect on the managers' decisions.

Fourth, environmental uncertainty has effects on organizational structures and therefore causes uncertainty on the employee and employer expectations and employment structures (İyigün and Çetin, 2012) by affecting the organization's innovative efforts. Future research may examine employment structure to see its effects on the innovation adoption efforts and decisions. Fifth, we collected data from organizations located in Istanbul. It would be very useful to collect data from various cities in Turkey to be able to generalize the findings. We used cross-sectional design, and collected data by questionnaire method. Longitudinal research design may be used in future research to investigate this relationship. Additionally, using qualitative data collection methods such as interview and case studies by future studies can be

useful to understand this relationship.

6. CONCLUSION

In this paper, we have focused on the association between managers' perceptions about environmental uncertainty and their adoption of innovation. According to our findings, in highly uncertain environments in terms of governmental and policy factor, managers choose to adopt both types of innovation since they want avoid to take risks of adopting solely one type of innovation. Our findings indicated that the adoption of innovation is not related to other factors of environmental uncertainty such as resources and services used by the company, competition, economy, product and market demand, and technology in the industry but only related to government and policies. This might be because we did our research during the time that some crucial issues have been realizing in the Middle East, and also after 15 July coup attempt. That is why the only significant factor in our analysis is government and policies factor.

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