Res. Ass. Zehra Temizerler

Istanbul University

Faculty of Business Administration

Department of Marketing

Avcılar Campus 34320 Istanbul/TURKEY

Phone: +90 212 473 70 70 (18262)

E-mail: <zehrat@istanbul.edu.tr>

Res. Ass. Bahar Yaşin

Istanbul University

Faculty of Business Administration

Department of Marketing

Avcılar Campus 34320 Istanbul/TURKEY

Phone: +90 212 473 70 70 (18262)

E-mail: <bkarciga@istanbul.edu.tr>

THE ROLE OF CONSUMER INNOVATIVENESS IN THE ACCEPTANCE OF TECHNOLOGY BASED INNOVATIONS

Abstract

Acceptance of technology based innovations is attracting more and more attention in recent years. Researchers are particularly interested in innovation characteristics that affect acceptance of innovations. The diffusion of an innovation will vary in function of the characteristics of consumers as well as innovation characteristics.

The objective of the study is two-fold. First it identifies sub-groups (high and low innovators) of consumers according to their innovativeness. Second it examines the differences in perceptions of innovation characteristics and acceptance of Smartphone among high and low innovators. The data from 201 Turkish consumers is used to test the research hypotheses. Empirical results show that consumer innovativeness has a role in the acceptance of technology-based innovations.

Keywords: Consumer Innovativeness, Innovation Characteristics, Technology-based innovations.

Introduction

The marketing of new products is one of the most difficult challenges facing firms today. In the case of high technology market, diffusion of high-tech products to the whole market is more difficult. There is ample evidence pointing to specific ways in which high tech markets are different from consumer package goods markets. High tech markets are characterized as dynamic and technologically driven. They exist under rapidly changing technological conditions which lead to shorter life cycles and the need for rapid decisions (Rosen, Schroeder and Printon, 1998; Bridges, Coughlan, and Kalish, 1991). High tech companies exploit and create change rather than consolidate and defend existing conditions. In addition, the complexity of the high-tech products also impact market acceptance in different ways in high tech markets (Rosen, Schroeder and Printon, 1998). As high tech products are more complicated, high customer interest is of crucial importance.

Hundreds of new technological products appear in the market each year. But, most of these fail, causing significant financial losses to the companies that brought them to the market. Marketers well know that one key to successful new product introduction is selling the product to the minority of consumers (innovative consumers) who are the first buy in any given product market. These innovative consumers represent a key market segment, playing an essential role in success of a new product (Goldsmith and Flynn, 1992). Innovators provide important feedback to company regarding new product itself, suggesting improvement or pointing out fatal flaws early enough in the product lifecycle to avoid disaster later on. Finally, and perhaps most important, the earliest buyers help promote the product to later buyers, spreading word-of-mouth communication and legitimizing the product for other consumers. So, many marketers are anxious to identify, profile and influence these innovative consumer groups. In this research it is aimed to identify consumer groups according to their innovativeness level in high technological product market. In recent studies (Lewis, Agarwal and Sambamurthy, 2003) innovativeness reconceptualized as a direct determinant of some innovation characteristics like usefulness and ease of use. Lewis' et. al. (2003) determinant model recognizes that individual innovativeness is an innate propensity that exerts direct influence on the evaluation process of the perceived characteristics of a new product. This study also aims to analyze the role of consumer innovativeness on innovation characteristics perception of Smartphone which is one of the latest technological product in the Turkish high-tech products market. Smartphone is a small battery-powered computer, which can be used by many people to effectively store and retrieve information. It was considered as a new and

emerging innovation at the time of this study in Turkey. Therefore, Smartphone appears to be ideal product to evaluate the characteristics of technological based innovation.

CONCEPTUAL BACKGROUND

Consumer Innovativeness

Rogers (1995) defines innovativeness as the degree to which an individual is relatively earlier in adopting an innovation than other members of a system. Consumer innovativeness, or ‘‘consumption of newness,’’ is the tendency to buy new products more often and more quickly than other people (Midgley and Dowling, 1978). There is no real consensus on the meaning of innovativeness. It may be described as early purchase of a new product, as well as a tendency to be attracted by new products (Steenkamp et al., 1999).

There is also another notion related with innovative consumers called lead users which was developed by von Hippel (1986). Lead user is defined as users whose current strong needs will become general in a marketplace months or years in the future. In totality, the lead user is a user of a novel or enhanced product who faces needs that will be general in a marketplace, but faces them months or years before the bulk of that marketplace encounters them, and who is positioned to benefit significantly from obtaining a solution (von Hippel, 1986, 2005).

In a recent research, creative consumer term which defines consumers as an individual or group who adapts, modifies, or transforms a proprietary offering, such as a product or service is identified by Berthon, Pitt, McCarthy and Kates (2007). These different terms defined in relation to innovativeness concept are related but somewhat different each other. In this study, Goldsmith and Hofacker’s (1991) innovativeness approach is taken into account.

There are two conceptually distinct dimensions of innovativeness that are often measured global innovativeness and context-specific innovativeness according to Goldsmith and Hofacker’s approach. The former is a personality dimension that cuts across the span of human behavior, while the latter refers to innovative attitudes and behaviors within a certain category (Flynn & Goldsmith, 1993). Hence, measures for both these constructs are conceptually and empirically distinct (Foxall & Szmigin, 1999) and should not be substituted for each other.

Innate Innovativeness

Global innovativeness is defined as the degree to which an individual makes innovative decisions independently of the communicated experience of others (Midgley & Dowling, 1978). That is, it is an individual's predisposition to behave in a given way regardless of the stimuli that activates the behavior (Foxall & Szmigin, 1999). In this conceptualization, innovativeness is viewed as an enduring personality trait possessed to a greater or lesser degree by all individuals. It is believed to be a continuous variable normally distributed within a population and generalizable across products (Hirschman, 1980). This concept represents an innate phenemenon and is widely used in psychology to identify innovative characteristics of individuals (Kirton, 1976). According to this persective, innovativeness is considered a generalized personality trait (Goldsmith and Hofacker, 1991; Goldsmith, Freiden and Eastman, 1995).

So it has been called "innovative predisposition" (Midgley and Dowling, 1993) or "innate innovativeness" (Hirschman, 1980). Goldsmith and his colleagues (Goldsmith and Hofacker 1991; Goldsmith et al. 1995) consider this generalized personality trait as global innovativeness and distinguished it from domain-specific innovativeness that can be applied to a specific product category.

Global innovativeness can be subsumed within the openness-to-experience dimension, since the propensity to be innovative would require a predisposition to be open to new experiences. This dimension manifests a host of behaviors, including meeting new people, and seeking out and accepting new information about innovations. Hence, innovators tend to have more social participation, are more cosmopolite, have greater exposure to mass media, and seek more information about an innovation (Rogers, 1995) than later adopters.

This conceptualization of innovativeness is thought to represent a highly abstract and generalized personality trait (Im., Bayus and Mason, 2003). Hurt, Joseph and Cook (1977) views innovativeness as a generalized personality trait reflecting "a willingness to change." Other researchers consider innate consumer innovativeness to be the openness of information processing, which is defined in terms of an individual's receptivity to new experiences and novel stimuli (Goldsmith, 1984; Leavitt and Walton, 1975).

Innate innovativeness concept has also been utilized in the marketing literature (Midgley and Dowling, 1978; Flynn and Goldsmith, 1993). Midgley and Dowling (1978) suggested that the concept of innovativeness involves communication independence, determined by the degree

to which a consumer's decision process is independent of others' personal influence in the social system. Hirschman (1980) and Manning et al. (1995) equated an innovative trait with consumer novelty seeking, which is defined as an inherent desire to seek out novelty and creativity. More recently, Steenkamp, Hofstede, and Wedel (1999) viewed consumer innovativeness as "the predisposition to buy new and different products and brands rather than remain with previous choices and consumption patterns."

A limitation of a general approach to innovativeness is that consumer innovativeness may be more domain or product specific, and less of an individual personality characteristic. Kotler (1984) posits that there is not a general innovativeness personality trait. Individuals may be innovative for one product class but not innovative for another.

Domain-Specific Innovativeness

As the name suggests, domain-spesific (or actualized) innovativeness reflects the tendency to learn about and adopt innovations within a spesific domain of interest, and, therefore, taps an innovations more spesific to an area of interest (Citrin et. al., 2000). Gatignon and Robertson (1985) found little overlap in innovativeness across domains or product categories finding innovation to be more product category or domain specific. In support of this, domain-specific measures of innovativeness have yielded more useful predictions of the adoption of innovations by consumers (Goldsmith and Hofacker, 1991; Hirschman, 1980). Goldsmith and Hofacker's (1991) Domain-Specific Innovativeness Scale, consists of six highly particular statements, which can be adapted to any domain of interest. These statements indirectly measure the respondent's involvement, knowledge, and experience within a particular category. Measures of domain specific innovativeness assume that the propensity to innovate is a behavioral response to a specific context, which is for the most part determined by an individual's interest, experience, exposure, and knowledge of a product category.

The actualized innovativeness concept has received in-depth empirical attention within the diffusion of innovation framework (Rogers, 1995), and has been of particular interest in innovation diffusion research generally, and information technology (Agarwal and Prasad, 1998) and marketing research (Midgley and Dowling, 1978; Flynn and Goldsmith, 1993) specifically.

Consequently, it is extremely important for producers of high tech products to gather the necessary demographics and psychographics for each product introduction in order to insure that they successfully reach the innovators who are key to a particular product's success.

Innovation Characteristics

Over the past two decades, much research effort has been directed toward identifying salient perceptions of the technology attributes, called innovation characteristics that influence technology acceptance decisions (Yi and Fiedler, 2006). Rogers (1995) identifies five characteristics of an innovation which are generalized in their relation to the degree of adoption of that innovation in a social system. These characteristics are called relative advantage, compatibility, complexity, observability and trialability. It is particularly important to understand a potential adopter's perceptions of these factors that influence adoption. (Rogers, 1995; Van Slyke, Belanger and Communale, 2004). In the literature innovation characteristics are defined as below:

The relative advantage of an innovation is the degree to which an innovation is perceived as being better than the idea it supersedes.

The compatibility of an innovation is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.

As regards the complexity of an innovation, which is the conceptual opposite of ease of use (Moore and Benbasat, 1991) is defined as the degree to which an innovation is perceived as relatively difficult to understand and use.

The trialability of an innovation means the case with which the product can be used without undue user commitment.

Rogers' (1995) original conceptualization of the perceived innovation characteristics included observability, which represents perceptions of the degree to which the results of using an innovation are visible. Perceived observability has received equivocal support in empirical studies. A potential explanation for observability offered by Moore and Benbasat (1991), who propose that observability is better conceptualized as two separate constructs-visibility and result demonstrability. Visibility refers to the degree to which the use of an innovation is apparent (Moore and Benbasat, 1991). In contrast result demonstrability refers to the degree to which the outcomes of the use of innovation are apparent. This distinction has been supported empirically (Moore and Benbasat, 1991).

Technological Innovativeness and Innovation Characteristics

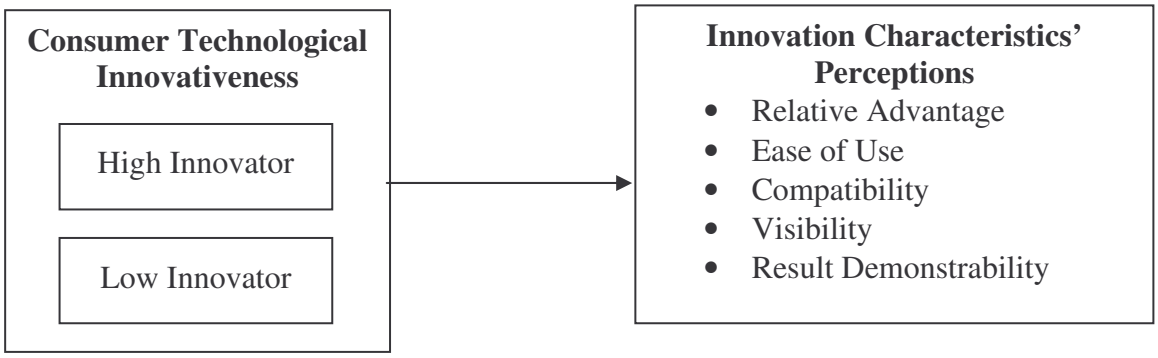
Rogers (1995) posits that in the persuasion phase of the innovation-decision process, consumers' perception of innovation characteristics influence the decision to adopt or reject an innovation. According to Rogers (1995) besides the role of innovation characteristics on adoption, individuals' readiness (innovativeness) also impacts to adopt or reject an innovation.

Consumers' perceptions of innovation characteristics are expected to be influenced by their technological innovativeness. Although prior research has tested the influence of numerous individual factor on technology acceptance outcomes (Agarwal and Prasad, 1999), personal innovativeness is a construct that have received consistent support as an important predictor. Agarwal and Prasad (1999) point out that in order to predict individual behaviour toward an innovation, the construct must be domain specific. They treat personal innovativeness in the domain of information technology which means the association with more positive beliefs about technology use. Drawing upon Rogers' theory of diffusion of innovations, they argue that individuals' beliefs about new technologies were effected by their technological innovativeness. So in this study, we argue that based on Rogers' innovation diffusion theory consumers' technological innovatiness is a factor that determines the consumers' perception of innovation characteristics.

Research Model

In this research, consumer innovativeness and perceptions of innovation characteristics of a technological product named Smartphone are investigated. Goldsmith and Hofacker (1991) defined innovativeness as tendency to learn about and adopt innovations within a specific domain of interest. In order to measure consumer innovativeness Domain Specific Innovativeness scale by Goldsmith and Hofacker (1991) was taken into account. Innovation diffusion theory of Rogers (1995) was used to measure the perceived innovation characteristics due to its prior use and robustness of its constructs. Prior research has identified the perceptions of relative advantage, ease of use, compatibility, visibility and result demonstrability as key innovation characteristics that impact user acceptance of technology. Relative advantage, ease of use, compatibility, visibility and result demonstrability of innovation characteristics were analyzed in this study.

Figure 1: Research Model



In this research identifying consumer groups according to their technological innovativeness level and analyzing the role of technological innovativeness on the perception of innovation characteristics of Smartphone is aimed as seen in Figure 1.

In this study, the first research hypothesis is related with determining consumer groups based on their technological innovativeness.

H_1: There are different consumer segments according to consumer technological innovativeness.

Five dimensions of innovation characteristics as relative advantage, ease of use, compatibility, visibility and result demonstrability are operationalized in order to differentiate innovativeness based segments.

H_2: Consumer technological innovativeness based segments' perceptions will differ in terms of innovation characteristics.

The first factor of innovation characteristics tested in the study was visibility. Visibility is the ability of the user to show the product in use. Thus, it is hypothesized that consumer technological innovativeness based segments' perceptions differ in terms of visibility characteristic of Smartphone.

H_{2a}: Consumer technological innovativeness based segments' perceptions will differ in terms of visibility characteristic of innovation.

The relative advantage assumes that Smartphone produces improvement in performance, productivity, effectiveness, time saving. In the study, it is hypothesized that consumer technological innovativeness based segments' perceptions differ in terms of relative advantage characteristic of Smartphone.

H_{2b}: Consumer technological innovativeness based segments' perceptions will differ in terms of relative advantage characteristic of innovation.

Ease of use is the degree to which potential adopter perceives the complexity of the innovation. Ease of use or complexity measures the individual user's perception of how difficult it is to use the features of Smartphone. Thus, it is hypothesized that consumer technological innovativeness based segments' perceptions differ in terms of ease of use characteristic of Smartphone.

H_{2c}: Consumer technological innovativeness based segments' perceptions will differ in terms of ease of use characteristic of innovation.

Compatibility is conformity of the product to the individual's experiences, needs and values. The compatibility of Smartphone is defined as the degree to which it is considered consistent with existing values, beliefs, and needs of the user. It is hypothesized that consumer technological innovativeness based segments' perceptions differ in terms of compatibility characteristic of Smartphone.

H_{2d}: Consumer technological innovativeness based segments' perceptions will differ in terms of compatibillity characteristic of innovation.

Result demonstrability measured the degree to which the results of using Smartphone are perceived to be tangible, which is hypothesized that consumer technological innovativeness based segments' perceptions differ in terms of it.

H_{2e}: Consumer technological innovativeness based segments' perceptions will differ in terms of result demonstrability characteristic of innovation.

Personal characteristics, like socio-demographics, have also been widely used to profile innovators. Household income, education, and age are the most widely adopted identifiers for innovators (Im et. al., 2003). Consumer innovators are generally thought to have higher levels of income and education, and are younger (Yi, Fiedler, Park, 2006). Therefore, the following hypotheses are established:

H_3: Consumer innovativeness based segments will differ in terms of demographics.

H_{3a}: Consumer innovativeness based segments will differ in terms of gender.

H_{3b}: Consumer innovativeness based segments will differ in terms of income level.

H_{3c}: Consumer innovativeness based segments will differ in terms of age.

Measurement

The scale consisting six items for consumer innovativeness was derived from Goldsmith and Hofacker (1991). Goldsmith and Hofacker's scale measures domain-specific innovativeness, which is a ''tendency to learn about and adopt innovations within a specific domain of interest.'' Goldsmith and Hofacker perceive this construct as intermediary between innate innovativeness and innovative behavior, which is empirically validated by Goldsmith et al. (1991). Four of the six items in this scale describe social innovativeness, as the interviewee is compared with others. This scale proved to be unidimensional and highly reliable.

Items used to measure perceived innovation characteristics were adapted from Moore and Benbasat (1991). A total of 26 items were used as five point Likert-type scaled questions with end points rating from strongly disagree to strongly agree. The survey consisted mostly of items previously validated in the literature. Pilot testing was implemented prior to administrating the questionnaire.

In order to test the research model, a survey was administered to consumers living in Istanbul. A total of 201 surveys were completed on a voluntary basis. As seen in Table 1, respondents were from both gender (with 54.2 % being male while 45.8 % being female), and had an age of 18-25 and 26-33, mostly civil servant, worker and student. The sample was represented by high income level and 70.6 percent of them had university and over grade.

Table 1: Demographic Characteristics of Respondents

Age	**n**	**%**	**Income**	**n**	**%**
25 and below	101	50.2	2000 YTL and below	63	31.3
26-33	75	37.3	2001 YTL – 4000 YTL	68	33.8
34-41	16	8	4001 YTL and over	70	34.8
42-49	6	3	Total	201	100.0
50 and over	3	1.5	**Education**	**n**	**%**
Total	201	100.0	Primary School	3	1.5
Occupation	**n**	**%**	Secondary School	3	1.5
Self employed	7	3.5	High School	53	26.4
Merchant	3	1.5	University	79	39.3
Worker	38	18.9	MS/Doctorate	63	31.3
Civil Cervant	64	31.8	Total	201	100.0
Retired	1	0.5	**Gender**	**n**	**%**
Housewife	3	1.5	Male	109	54.2
Student	85	42.3	Female	92	45.8
Total	201	100.0	Total	201	100.0

Hypothesis Testing

The reliability of each construct scale was assessed by computing Cronbach's coefficient alpha. The consumer innovativeness scale adapted from Goldsmith and Hofacker (1991) established good reliability (α=0.91).

Innovation characteristics scale reliabilities range from 0.78 to 0.88. Cronbach's alpha measures are 0.85 for visibility, 0.88 for relative advantage, 0.78 for ease of use, 0.87 for compatibility and 0.87 for result demonstrability. Reliability of overall innovation characteristics scale is 0.86, indicating that this scale also exhibit an acceptable level of reliability (α=0.70) (Nunnally, 1978:10). Thus, both consumer innovativeness and innovation characteristics scales are highly reliable.

In order to assess the dimensionality of the consumer innovativeness scale, an exploratory factor analysis with Varimax rotation with Kaiser Normalization was performed. The items formed one factor that explained 70.92 percent variance in the scale.

In order to test the dimensionality of the innovation characteristics scale an exploratory principal components factor analysis was used. The scale items loaded onto five factors that collectively explained 73.4 percent of the variance. The items included in each factor and the factor loadings were reported in Table 2. Factor 1 referred to simply as "visibility", includes five statements. The factor loadings of these five items, ranged from 0.52 to 0.83. Factor 2, referred to as ''relative advantage'', includes four items, loadings ranged from 0.80 to 0.85. Factor 3, referred to as "ease of use" includes three items ranged from 0.77 to 0.86. Factor 4, referred to as "compatibility" includes three items, loadings ranged from 0.63 to 0.86. Factor 5, referred to as "result demonstrability" includes two items, loadings ranged from 0.82 to 0.89.

Table 2: Innovation Characteristics Factor Loadings

	Factors*				
	1	**2**	**3**	**4**	**5**
Performance		,846			
Effectiveness		,806			
Simplify		,840			
Beneficial		,802			
Clear and Understandable			,772		
Easy to Remember Functions			,863		
Easy to Use			,844		
Compatible with All Aspects				,627	
Fits the Way of Working				,782	
Fits Working Style				,856	
Seen Many Others Using	,837				
Many People Use	,702				
No Difficulty Telling About the Results					,818
Easy to Tell the Consequences					,892
Many Others Use	,894				
Usage in the Future	,518				
Friends Usage	,798				

* Factor 1: Visibility, Factor 2: Relative Advantage, Factor 3: Ease of Use, Factor 4: Compatibility, Factor 5: Result Demonstrability

Technological Innovativeness Based Consumer Segments

To define consumer groups based on their technological innovativeness cluster analysis was applied. Distance was measured by the Euclidean square and the aggregation procedure was the non-hierarchical K-means. For identifying consumer segments, two, three and four group cluster analysis was applied to data. Results showed that two group cluster analysis was the most appropriate one. F Test confirmed the existence of two homogeneous groups as seen in Table 3.

Table 3: F test

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Consumer Innovativeness	120,922	1	,250	199	483,736	,000

Final cluster centers which show the mean scores for the two groups were as in Table 4.

Table 4: Final Cluster Centers

	Cluster	
	Low Innovators	High Innovators
Consumer Innovativeness	2,05	3,62

Table 5 gives the distribution of these two groups as 58 % for low innovators group and 42 % for high innovators group.

Table 5: Number of Cases in each Cluster

Cluster	Low Innovators	117	58 %
	High Innovators	84	42 %
Valid		201	100%

Segment 1 – Low Innovators

This segment consists of 58 % of consumers of the total sample. The consumers in this segment share low innovativeness scores. They do not place much agreement on items related to consumer technological innovativeness. For instance, these consumers do not think themselves as the first among their friends to own new technological products and don't interest enough to learn and experience the new technological innovations.

Segment 2 – High Innovators

This segment has small number of consumers in the entire sample. Consumers in this category display great agreement on items related to consumer technological innovativeness. The main characteristics of this group are strong willingness to own new technological products and being the first among their friends to know and buy new technological products. These consumers have high innovativeness scores and they are more likely to be interested in technological innovations than the previous segment.

High Innovators vs. Low Innovators

In order to verify the perceptual differences of innovation characteristics of Smartphone between high and low innovator consumer groups, t-test was performed. t test compared mean scores on innovation characteristics between high and low innovators. The criterion variable was the innovation characteristics of the Smartphone and the predictive ones were the high and low innovator consumer groups from the cluster analysis.

Table 6: t-test for Equality of Means

	Mean		Std. Deviation		t	df	p
	Low Innovators	High Innovators	Low Innovators	High Innovators			
Visibility	2.9026	3.1571	0.83071	0.83483	-2.138	199	0.034
Relative Advantage	3.6966	3.8631	0.8684	0.70327	-1.449	199	0.149
Ease of Use	3.1852	3.7222	0.76994	0.69196	-5.086	199	0.000
Compatibility	2.9288	3.369	0.73348	0.76751	-4.117	199	0.000
Result Demonstrability	2.9829	3.4405	0.87821	0.77772	-3.819	199	0.000

Table 6 shows the differences between the high innovator consumers and low innovator consumers' perception of innovation characteristics. The mean differences between the two goups' perceptions related to visibility, ease of use, compatibility and result demonstrablity characteristics' of Smartphone were statistically significant. But mean differences between the two goups' perceptions related to relative advantage characteristic of Smartphone is insignificant. High innovator consumer groups agreement on the visibility, ease of use, compatibility and result demonstrablity characteristics' of Smartphone are higher than low innovator consumer groups.

Demographic Characteristics of Two Segments

To further validate two clusters, it is tested whether the clusters differ in terms of demographics. Chi Square test compared the demographic differences between high and low innovators consumer groups. The Chi Square tests showed that there are differences between the clusters by gender at the 0.05 significance level. In order to meet the assumptions of Chi-Square test, age intervals of "26-33" and "34-41" were aggregated and "26-41" age category was formed. In addition, age intervals of "42-49" and "50 and over" were also transformed to "42 and over" age category. The differences between the cluster by age and income were significant at 0.10 significance level as shown in Table 7.

Table 7 shows the differences between high innovator consumers and low innovator consumers for gender, age and income. These findings suggests that high innovators and low innovators are easily distinguished as consumer segments by demographic characteristics. High innovator segment is mostly consisting male, young and high income consumers while

low innovator segment is mostly consisting female, middle-aged and middle and low income consumers.

Table 7: Chi-Square Results

	Low Innovators (%)	High Innovators (%)	χ^2	p
Gender				
Male	44.44	67.86	10.7982	0.001
Female	55.56	32.14		
Age				
25 and below	43.59	59.52		
26-41	50.43	38.10	5.5298	0.063
42 and over	5.98	2.38		
Income				
2000 YTL and below	35.04	26.19		
2001 YTL - 4000 YTL	36.75	29.76	5.4525	0.065
4001 YTL and over	28.21	44.05		

Table 8 shows the hypotheses tested along with the conclusions whether the hypotheses are supported or not.

Table 8: Summary of Results

Construct	Hypotheses	Support
Consumer Innovativeness*	H_1	Supported
Innovation Characteristics-Visibility (V)*	H_{2a}	Supported
Innovation Characteristics-Relative Advantage (RA)	H_{2b}	Not Supported
Innovation Characteristics-Ease of Use (EU)*	H_{2c}	Supported
Innovation Characteristics-Compatibility (C)*	H_{2d}	Supported
Innovation Characteristics-Result Demonstrability (RD)*	H_{2e}	Supported
Demographics – Gender*	H_{3a}	Supported
Demographics – Age**	H_{3b}	Supported
Demographics – Income**	H_{3c}	Supported

* $p<0.05$
** $p<0.10$

Conclusion

This study focused on definining the consumers' technological innovativeness level and examining the differences of innovation characteristics' perceptions among different innovativeness groups. In order to determine the perceptual differences of innovation characteristics of Smartphone between the consumer innovativeness based segments, a survey was administered to 201 respondents. The survey was composing of three parts. In the first part, technological innovativeness of consumers was measured. Scale used to measure technological innovativeness was adapted from the Goldsmith and Hofacker's (1991) domain specific innovativeness scale. In the second part, consumers perceptions related to innovation characteristics of Smartphone was measured. Scale used to measure innovation characteristics of Smartphone was adapted from Moore and Benbasat (1991) based on the diffusion theory of Rogers (1995). Last part of the survey consisted of questions measuring the demographic characteristics of consumers. Purpose of the study was to define consumer groups based on their technological innovativeness. To this end two, three and four group K-means cluster analyses were applied to data. Two-group cluster analysis produced appropriate results with the 58 % of consumers grouping in high innovators segment and 42 % of consumers grouping in low innovators segment. Innovativeness score means of high innovative consumers group were significantly different from innovativeness score means of low innovative consumers group. Second purpose of the study was to determine the perceptual differences of innovation characteristics of Smartphone between high and low innovator consumer groups defined by cluster analysis. For this purpose, t-test was performed. The results of the t test showed that mean scores of high and low innovators were significantly different on visibility, ease of use, compatibility and result demonstrablity characteristics' of Smartphone. Nonetheless the mean scores of the result demonstrability characteristic of Smartphone was not found significantly diffrent between two groups. In conclusion, agreement on all innovation characteristics but the result demonstrability were higher for high innovator consumer segment compared to low innovator consumer segment. In order to define high and low innovator consumer segments in detail Chi-square analysis was applied to demographic characteristics. The Chi Square tests showed that there were significant differences between the two segments by age, gender and income level.

In summary, high innovator consumers are stand out with their high technological innovativeness scores. These consumers have strong willingness to own new technological products and they are the first among their friends to know and buy new technological

products. In addition they are more interested in technological innovations. They are mostly young, male, and having high income. This profile of high innovator consumer segment is consistent with the findings of previous studies (Benoy and Shailesh, 1984). These consumers perceive Smartphone as highly visible product. They think that many people use now and continue to use Smartphone in the future. High innovators think using Smartphone is easy. They evaluate the use of Smartphone as clear and understandable. According to them remembering smartphone's functions is not difficult. These innovator consumers find Smartphone as a compatible innovation that it is compatible with all aspects of their business and fitting their working style. High innovators find that results of using Smartphone are demonstrable. They don't have any difficulty about telling the results and consequences of Smartphone usage.

On the other hand, low innovator consumers innovativeness scores are low compared to high innovators. These consumers identify themselves as the last among their friends to own new technological products. In addition, they don't interested enough to learn and experience the new technological innovations. Low innovators are mostly female, middle-aged and having middle to low income. These consumers evaluate the Smartphone as moderately visible. They predict that a few people use Smartphone now and will use it in the future. Low innovators find using Smartphone difficult. They don't perceive Smartphone as clear and understandable to use. Besides remembering Smartphone's functions is difficult for them. These consumers find Smartphone is not a compatible innovation that it doesn't fit the way they work. Low innovators found that results of using Smartphone are not demonstrable. They have some difficulties about telling the results and consequences of Smartphone usage.

Limitations

The results of this study confirm the relevance of consumer innovativeness in determining the acceptance of new technological products. Segmenting consumers according to their innovativeness level should be a tool in the strategic kit of marketing managers. But there are several limitations that need to be pointed out. As with any study, the generalizability of our findings beyond the sample and product class may be limited. Research results are from the technological product category in which consumers tend to be highly involved in information search and purchase decision making due to relatively high cost of adopting new products (Foxall, 1995). In this study, 201 respondents were surveyed and Smartphone, which is only one of the various types of technological products available, is investigated. Further research can verify whether these findings hold for other samples and technological products.

Research results suggest that consumer technological innovativeness and demographic characteristics such as gender, age and income will help marketers segment consumers into high and low innovators. However caution must be taken in generalizing this finding as technological products may be a category where personal characteristics such as gender, age and income may play a more critical role.

Implications for Future Research

While the results of this study are domain specific and thus limited to the technological product, they provide a paradigm of how the innovativeness scale can be used to identify and measure consumer innovativeness in the potential market for a new product. The findings of the study also clearly demonstrate that how consumers' technological innovativeness level plays an important role on innovation characteristics perceptions.

From the analyses conducted in this study, marketers can use these results as a reference to improve on various marketing strategies. Identifying innovators and determining their innovation characteristics perceptions' are logical ways to create marketing strategies. Innovators' perceptions of innovation characteristics should be used to improve products' attributes, and hence enhance brand equity and competitive advantages. In other words, "an innovating firm should research the characteristics of innovators and early adopters and direct marketing efforts to them" (Kotler, Brown, Adam and Armstrong, 2001) should not be seen as an understatement. In addition, as Sawhney, Verona and Prandelli (2005) suggested in their study, collaborating with customers and using their ideas as an input in order to create better new products during the new product development process provide competitive advantage to firms. Thus, in order to determine collaborating consumer partners, it is important for firms to identify innovators.

Future research may take a longtitudinal approach and trace how consumers' technological innovativeness and the perception of innovation characteristics change over time. In addition variables other than demographics such as information sources used (word-of-mouth recommendations, advertising), product category involvement, opinion leadership, venturesomeness, cosmopolitanism, preference and decision-making ability might be used to profile consumer innovators.

References

Agarwal R. and Prasad J.A (1998), "Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology", *Information Systems Research*, 9, 2, 204-215.

Agarwal R. and Prasad J.A. (1999), "Are Individual Differences Germane to the Acceptance of Information Technologies?", *Decision Sciences,*30, 2, 361-391.

Benoy J. and Vyas S.J. (1984), "Concurrent Validity of a Measure of Innovative Cognitive Style", *Journal of Academy of Marketing Science*, 12, 1, 159-176.

Berthon, P.R., Pitt, L.F., McCarthy, I. & Kates, S.M. (2007), "When Customers Get Clever: Managerial Approaches to Dealing with Creative Consumers", *Business Horizons,* Vol. 50, 39-47.

Bridges E., Coughlan, A.T. and Kalish, S. (1991), "New Technology Adoption in an Innovative Marketplace: Micro- and Macro-Level Decision Making Models", *International Journal of Forecasting,* 7, 3, 257-270.

Citrin A.V., Sprott, D.E., Silverman, S.N. and Stem, D.E. Jr. (2000), "Adoption of Internet shopping: The Role of Consumer Innovativeness", *Industrial Management and Data Systems*, 100, 7; 294-301.

Flynn L.R., Goldsmith, R.E**.** (1993), "Identifying Innovators in Consumer Service Markets", *Journal of the Service Industries,* 13, 3, 97-109.

Foxall G.R. (1995), Cognitive Styles of Consumer Initiators, *Technovation,* 15, 269–288.

Foxall G.R. and Szmigin I. (1999), "Adoption-innovation and Domain Specific Innovativeness", *Psychological Reports,* 84, 1029–1030.

Gatignon H. and Robertson, T.S. (1985), "A Propositional Inventory for New Diffusion Research" *Journal of Consumer Research,* 11, 849–867.

Goldsmith R. and Flynn L.R. (1992), "Identifying Innovators In Consumer Product Markets**,** *European Journal of Marketing*; 26,12, 42-55.

Goldsmith R.E. (1984), "Personality Characteristics Associated with Adoption-Innovation", *Journal of Psychology*, 117, 159-165.

Goldsmith R.E. and Hofacker C.F. (1991), "Measuring Consumer Innovativeness", *Journal of the Academy of Marketing Science,* 19, 3, 209-221.

Goldsmith RE., Freiden J.B. and Eastman J.K. (1995), "The Generality / Specificity Issue in Consumer Innovativeness Research", *Technovation,* 15, 10, 601-613.

Hirschman E.C. (1980), "Innovativeness, Novelty Seeking, and Consumer Creativity" *Journal of Consumer Research,* 7, 283-295.

Hurt H.T., Joseph K. and Cook C., "Scales for the Measurement of Innovativeness", *Human Communication Research,* 4, 58-65.

Im S., Bayus B.L. and Mason C.H. (2003), "An Empirical Study of Innate Consumer Innovativeness, Personal Characteristics, and New Product Adoption Behavior", *Journal of Academy of Marketing Science,* 31, 1, 61-73.

Kirton M.J. (1976). "Adaptors and Innovators: A Description and Measure", *Journal of Applied Psychology,* 61, 622–629.

Kotler P., Brown L., Adam S. and Armstrong G. (2001), *Marketing*, 5th Edition, Prentice Hall, Sydney.

Kotler, P., *Marketing Management: Analysis, Planning, and Control,* Prentice Hall. Englewood Cliffs, NJ, 1984.

Lewis W., Agarwal R. and Sambamurthy V. (2003), "Sources of Influence on Beliefs About Information Technology Use: An Empirical Study of Knowledge Workers"**,** *MIS Quarterly,* 27, 4, 657-678.

Manning, K.C., Bearden W.O. and Madden T.J. (1995), "Consumer Innovativeness and Adoption Process, *Journal of Consumer Psychology,* 4,4, 329-345.

Midgley F.D. and Dowling G.R. (1993), "A Longitudinal Study of Product Form Innovation. the Interaction between Predisposition and Social Messages", *Journal of Consumer Research*, 19, 611-625.

Midgley F.D. and Dowling G.R.(1978), "Innovativeness: The Concept and Its Measurement" *Journal of Consumer Research*, 4, 229-242.

Moore G. and Benbasat I. (1991), "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation", *Information Systems Research,* 2, 3, 192-222.

Nunnally J.C. (1978), *Psychometric Theory,* 2nd Edition, New York: McGraw Hill.

Roehrich G. (2004), "Consumer Innovativeness: Concepts and Measurements" *Journal of Business Research,* 57, 671–677.

Rogers, E.M. (1995), *Diffusion of Innovations,* 4th Edition, New York: Free Press.

Rosen, D.E., Schroeder J.E. and Purinton E.F. (1998), "Marketing High Tech Products: Lessons in Customer Focus From the Marketplace", *Academy of Marketing Science Review,* 1-19.

Sawhney, M., G. Verona & E. Prandelli (2006), "Collaborating to create: the Internet as a platform for customer engagement", *Journal of Interactive Marketing*, 19, 4 (Autumn), 4-17.

Steenkamp J.B.E.M, Hofstede F. ter, Wedel M. (1999), "A Cross-national Comparison into the National Cultural Antecedents of Consumer Innovativeness", *Journal of Marketing,* 63, 2, 55-69.

Van Slyke, Belanger C.F. and Communale C. (2004), "Factors Influencing the Adoption of Web-based Shopping: The Impact of Trust", *Database for Advances in Information Systems*, 35, 2, 32-49.

Von Hippel, E. (1986), "Lead Users: A Source of Novel Product Concepts", *Management Science,* 32 (7), 791-805.

Von Hippel, E. (2005), *Democratizing Innovation*, Cambridge, MA, MIT Press.

Walfried M.L., Manolis C. Lassar S.S. (2005), "The Relationship Between Consumer Innovativeness, Personal Characteristics, and Online Banking Adoption, *The International Journal of Bank Marketing,* 23, 2/3, 176-199.

Yi M.Y., Fiedler K.D., Park J.S. (2006), "Understanding the Role of Individual Innovativeness in the Acceptance of IT-Based Innovations: Comparative Analyses of Models and Measures" *Decision Sciences,* 37, 3.