



# Journal of Management, Marketing and Logistics

Year: 2018 Volume: 5 Issue: 1



## EVALUATION OF THE INTENTION OF USING PRODUCTS WITH INTERNET OF THINGS WITHIN THE CONTEXT OF TECHNOLOGY ACCEPTANCE MODEL

DOI: 10.17261/Pressacademia.2018.806

JMML- V.5-ISS.1-2018(4)-p.41-54

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### To cite this document

Pazvant, Ece, Faiz, Emel. (2018). Evaluation of the intention of using products with internet of things within the context of technology acceptance model, Journal of Management, Marketing and Logistics (JMML), V.5(1), p.41-54.

Permemant link to this document: <http://doi.org/10.17261/Pressacademia.2018.806>

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### ABSTRACT

**Purpose-** Developments in information technology and digital arena have opened the way for many new applications that will facilitate everyday life. It is important for producers to know the reasons behind acceptance, use and rejection of these new applications. The purpose of this study is to examine the basic factors behind the intention of using products with internet of things technology that are new to our life within the technology acceptance model.

**Methodology-** The Multiple Regression Analysis was employed in this study to test the proposed hypotheses with the questionnaires sampled from 453 individuals living in Düzce/Turkey.

**Findings-** It is seen that there is a strong correlation between attitude and intention among perceived usefulness, ease of use, attitude and intention variables examined in the study. In addition, perceived ease of use is concluded to have positive and significant effects on perceived usefulness and attitudes while the variable of perceived usefulness has the same effect on attitude and intention.

**Conclusion-** The findings of this study not only contribute to theoretical aspects, but also arise practical issues for smart durable goods sellers.

**Keywords:** Internet of things, technology acceptance model, attitude intention of use, regression analysis, mediator effect

**JEL Codes:** M00, M31, M39

### 1. INTRODUCTION

With the developments experienced in technology in the 19th and 20th centuries, a step has been taken for a new era in the world. Especially after the Second World War, technological developments have gained a great momentum. After this process, the whole of the world has become an integrated market. Both societies and businesses are committed to investing in science and technology in order to be able to compete and rank first in the competition.

The technological developments that have taken place and the importance given by societies and businesses to science have started the transition from the industrial society to the information society. With the transition from the industrial society to the information society, the information is placed on the center of everything, the basic capital of the societies has become information and the marketing of the information has become important. A linear relationship between information and communication technologies and economic modernization has begun to be observed. "Networks", which allow transferring all kinds of information such as text, sound, pictures, images etc. from one place to another, are accepted as the basic element of the information society (Webster, 1996: 77, as cited in Tonta and Küçük, 2005: 2). The introduction of information technology to the market through the use of networks, the intensive use of computers and the development of the internet have both increased product diversity and changed consumer's view product and expectation from the product.

Today, this change has taken a very different dimension, and as a result, the concept of the internet of things has been revealed. The internet of things refers to the network where physical things can connect with each other or with larger systems ([www.bs.org.tr](http://www.bs.org.tr)). This technology is completely different from the past, allowing machines and devices to interact with each other and allow them to be remotely controlled by people. For this reason, the Internet of things has the potential to make radical changes in human life. It has changed our way of looking at connected devices, products and devices, and our pattern of behavior. The fact that a product is connected to the internet creates significant value for the consumer.

Marketers also use a variety of tools to answer a lot of questions about customers. The most important data for these tools is provided by the answers given to what and when customers buy. The internet technology of things makes it possible to obtain real-time information about consumers by enabling multi-dimensional and multi-directional communication between thing-customer and brands. Again, due to the internet technology of the things, the product-producer and the customer are brought closer to each other. Thus, producers are able to perceive the changing needs of consumers and realize the necessary changes without losing time.

It is very important that the produced product be accepted by the customer even if the changes that occur have reduced the costs of the producers. What plays role in the customer's acceptance or refusal to use a product produced with technology? Many models have been developed to answer this question. Nowadays, since people have limited time, learning something new without effort, the usefulness of the product to be used, believing that it will make the consumer's work easier, and the presence of a group of people who thinks in this direction will influence the attitude towards the use of this product and the intention to use it in the positive direction.

Most products used by consumers carry smart product features. This case has also shown itself in durable consumer goods in recent years. Durable consumer goods sector in Turkey and the world is experiencing rapidly growing stages of development. The underlying reason for this development is that they have information technologies in their structures. Through their technological infrastructure, they have added smart products to their product range, giving consumers the opportunity to remotely control ovens, refrigerators, washing machines and dishwashers. Learning consumer intentions about durable consumer goods with Internet technology of things is important for manufacturers to learn consumer trends and determine marketing strategies.

The main purpose of the study is to research the intention to use durable consumer goods having Internet of things technology within the Technology Acceptance Model. As a result of the literature search, the internet of things technology has been studied in many fields such as education field and banking sector, but it has been seen that there is no field study related to durable consumer goods sector. The Technology Acceptance Model, which is the basic model of the study, has also been studied in tourism (Kaş, 2015), banking (Doğan et al., 2015, Ceylan et al., 2013), education (Hu et al., 2003, Ma et al., 2005, Menzi et al., 2012) and accounting (Özer et al., 2010) sectors, and the basic variables underlying the acceptance intentions and behaviors of the users have been revealed. The research of the intention of the use of durable consumer goods having Internet technology of the things within the Technology Acceptance Model has an introductory exploratory research feature as it is new in the body of literature. In addition, the study differs from other studies in the body of literature in terms of the sector in which it is conducted.

## **2. LITERATURE REVIEW**

### **2.1. The Internet of Things Technology**

In industry 1.0 period, water and steam power was used for manufacturing, electric power was used with industry 2.0, and the first steps of mass manufacturing were taken. The process was followed by industry 3.0, and this process was called the digital revolution and the manufacturing became automated by the development of information technology. Industry 4.0 is a collective term that encompasses many modern automation systems, data exchanges and manufacturing technologies ([www.endustri40.com/](http://www.endustri40.com/) Access date: 26.03.2017). Within this structure; the internet of the things, the internet of the services and the cyber-physical systems are present. Through the internet technology of things, systems and people can interact in real time. The most important feature of the process is that the machines interact with each other through the Internet in the entire manufacturing process. The smart factories in the industry 4.0 process include a system that can detect work with sensors and connect with remote devices to find the information they need (Alçin, 2016: 20).

The internet of things, as expressed, will provide a connection in a smart way by defining objects (by tagging) and providing them to perceive each other through networks (Yiğitbaşı, 2011: 103). Due to the connection of the tagged objects with the internet, it is possible to collect data from the objects and to move the interaction between the objects further by this data. According to Xia et al. (2012: 1101), the internet of objects refers to a network through which everyday objects communicate with other devices and people through their embedded system. According to Agrawal and Das (2011: 3), the

Internet of objects represents a global network formed by communicable objects by providing unique digital identifier for each object, structured to interact with physical or virtual objects without human intervention.

The basis of the Internet of things technology was first introduced with the camera system that was established in 1991 by 15 academicians at Cambridge University to see the coffee machine. Researchers have designed a system that allows the display of a coffee machine to be sent to computer screens three times per minute. In this way, all researchers in the university have the opportunity to see the coffee machine's status and the amount of coffee in real time (Kutup: 2011: 1).

In 1999, this concept was originally used for the first time by Kevin Ashton. Ashton has included this concept in P & G's meeting on supply chain management. In the supply chain, the use of RFID (Radio Frequency Identification) technology and its association with the internet has been seen as a good method to attract the attention of management (Kutup, 2011: 2). Over the years, it has been seen that the concept of the internet of things has become the title of many things.

Although the beginning of all these developments began in the 1990s, IoT technology has begun to take effect in recent years. The expansion of network communication capacity in the year of 2000s has enabled the introduction of data analysis that will more easily interpret data coming from IOT devices and creating new standards that will facilitate the interaction of IoT software and hardware from different suppliers ([www.radore.com/](http://www.radore.com/) Access date 03.04.2017). IoT technology is used in many areas such as supply chain management, urban planning, library management, retail tracking, stock control, digital logistics, efficient transportation, home automation, mobile payment, warehouse management, health services and private space (Gao and Bai, 2014: 213).

Through the internet of things technology, all kinds of information related to the product embedded in the products and this information is shared in real time with the relevant people in the supply chain. Thus, products' data will be determined as to when, where, and where the products will be found, these data of product will be able to offer the best storage conditions during the transfer of the products.

This technology provides a reliable warehouse management, enabling stock control to be carried out with minimum error and reducing costs by avoiding overproduction for any product. Through the sensors placed on the shelves in the store or supermarkets, the products are monitored by checking the product status. In addition to providing home security through smart home automation, . In addition to providing home security through smart home automation, it also allows home-related settings by connecting remote automation system even when not at home.

#### **Application and Domain of the Internet of Things Technologies**

Technological innovations are made to facilitate people's lives. Along with this development and transformation, consumers are beginning to use many connected devices in their daily lives. The connected devices change the point of view that consumer uses or will use in the future. Because, the fact that a product is connected to the Internet makes both the product and the user much more powerful than non-connected products (Greengard, 2017: 97).

Consumption patterns also change with the internet of things. People are now able to access many things via the internet. It has become possible to control lighting or security systems by connecting them with smartphones. While smart home is to transfer home technology into everyday life which prevents waste of time and allows several works to be done together, home automation refers to the personalization of home technologies to provide home control and protection (Gügül, 2008: 11). Another application area in smart home automation is smart domestic appliance. Existing products currently allow only remote program features to be selected. But in the future; this technology will enable the consumer to connect to the smart refrigerator to control the inside of the refrigerator, to follow the expiry dates of the products or to obtain a list of meals to be prepared from the available materials. In addition, smart products in the future will be able to communicate with each other apart from providing remote control possibility. For example, after selecting the program for the washing machine, the washing machine can suggest the most suitable program for drying the clothes to the drying machine ([www.arcelik.com/](http://www.arcelik.com/) Access date: 10.12.2017).

Remote administration of healthcare services through the internet of things technology will reduce the workload of healthcare providers and institutions (Aktaş et al., 2015: 299). Mobile healthcare has emerged to control patients who are difficult to reach a doctor. Therefore, when the internet of things technology and healthcare are integrated with each other, the services provided by this technology will consist of the functions of patient monitoring, identification, verification and collection of patient related data (Atzori et al., 2010: 2795).

The internet of things technology has made feel its effect in many areas since entering everyday life. Transportation and shipping are also within these areas. Many companies that are beginning to explore the benefits of mobile devices are pursuing technological developments and targeting to reduce their costs by optimizing their companies' resource utilization. Technology has become important in the procurement of raw materials, product manufacturing, transportation, distribution and sales through RFID tags. It has become easy to learn about the traffic situation and provided route

optimizations to the transport companies to reach the actual data about the vehicle's location, condition and delivery time (Atzori et al., 2010: 2794). The condition of the spoilable products is monitored by the sensor technology and prevents the spoilage of the products, thus increasing the productivity.

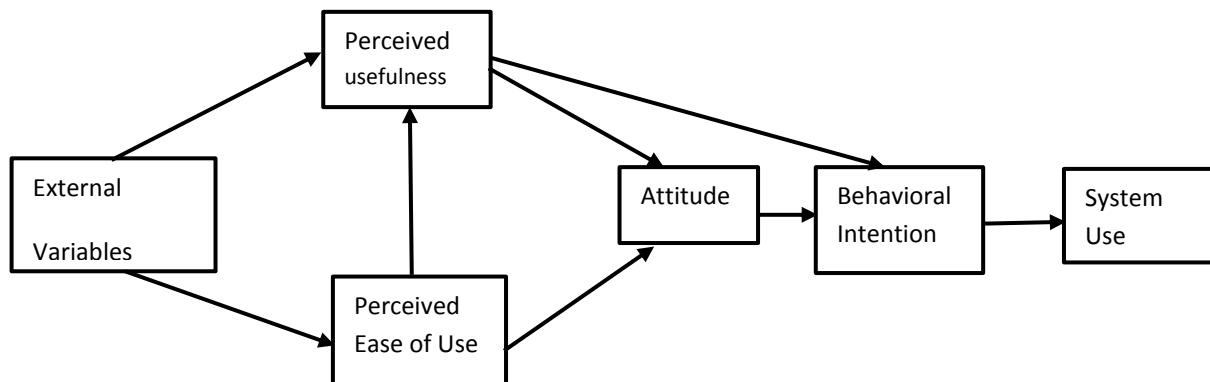
## 2.2. Technology Acceptance Model

As information technology becomes widespread and influential in everyday life, acceptance and use of technology has become an area that needs to be researched. Various theories have been put forward in order to better understand the factors behind the acceptance or use of technology.

In 1989, Davis proposed a technology acceptance model (TAM) to explain the intention of potential users to use technological innovation (King and Hu, 2006: 740-755). TAM, adapted from TRA (Theory of Reasoned Action), was developed to explain and predict the individual acceptance of computer technology (Chau and Hu, 2001: 703). The technology acceptance model is the theory of information systems and explains how an individual or a community can accept technology. The purpose of this theory is to explain the external factors that influence the attitude and intention while determining the behavior patterns of the consumers who will use innovation (Serçemeli and Kurnaz, 2016: 44).

TAM is based on social psychology and is based on the theory of reasoned action. TAM consists of a 4-step structure. The perceived ease of use and perceived usefulness found at the core of the theory have a direct influence on the attitude and behavioral intent of the individual. According to Davis; Behavioral intentions of the consumer to use technology are influenced by attitudes as well as beliefs (Karabanna et al., 2006: 782). Davis's TAM model suggests that perceived usefulness and perceived ease of use determine the consumer's intent to use a new technology. The perceived usefulness and perceived ease of use included in the technology acceptance model provide for the prediction of one's attitude towards technology. If the consumer believes that the use of a new technology does not require effort, the use of this technology results in increased performance, and the more positive attitudes towards technology use, the higher the likely it is to realize the behavior.

**Figure 1: Technology Acceptance Model**



Source: Davis, 1989: 319-340

### External Variables

These variables are outside the control of the individual. Demographic characteristics of the consumer can be shown as an example. TAM argues that external factors are influential in consumers' preferences for use. (Park et al., 2009, as cited in Ceylan et al., 2013: 146). Examples of external variables include the individual's social environment, level of education, work experience, age, gender, personal abilities, etc. (Davis, 1989, as cited in Akbulut, 2015: 33).

### Perceived Usefulness

According to Davis, the perceived usefulness is the tendency and thoughts of one about his increasing own performance as a result of his use of a system (Turan and Colakoglu, 2008: 113). Perceived usefulness refers to the degree to which a consumer will use a particular information system, perform a specific task (Keller, 2005: 302), or increase business performance (Aydin, 2015: 34).

### **Perceived ease of use**

The perceived ease of use means that a person uses a system without difficulty and effortlessly. Effort is the limited resource for which the individual spares several activities (Davis, 1989: 320). Even if all other factors are equal, it is easier for the consumer to accept if it is perceived that the use of a technology is easy. According to Davis (1989: 320), perceived ease of use has a direct influence on the perceived usefulness.

### **Attitude**

Attitude is positive or negative evaluation of an object, subject, idea, person or people, and these evaluations influence our tendency to behave in a certain way (Koç, 2007: 158). Our attitudes are influenced by our experience and the environment in which we live. Therefore, attitude can change over time because it is an impetus learned later.

### **Behavioral Intention**

The concept of intention, which provides the link between attitude and behavior and is described as planning to do something in advance, is also defined as the most important indicator of the actual will to actualize the behavior (Mutlu et al., 2011: 55). Consumer intent is important for marketing researchers to predict the consumer's future behavior (Goldsmith, 2002: 23). According to Davis (1986: 16), intention is the likelihood that a consumer will exhibit a certain behavior. Perceived usefulness and perceived ease of use are related to intention (Karahanna, 2006: 782). Intent is to act towards the result of the behavior targeted. Intention is mentioned as the level of desire felt by the individual to perform an action and the intensity of the effort he intends to put forth (Ajzen, 1991, as cited in Kocagöz and Dursun, 2010: 140). The intention of the individual to use a technology is the basic step for success.

## **3. DATA AND METHODOLOGY**

### **3.1. The Research Problem**

The main research problem is to determine which factors influence consumers' intention to use the technology, within the technology acceptance model first introduced by Davis (1986), for products with the internet of things technologies. Sub-problems of the research are determined as following;

- Is there any effect of the perceived ease of use variable on the variable of perceived usefulness?
- Is there a significant effect of the perceived usefulness and perceived ease of use variables on the attitude towards use?
- Is there any significant effect of attitude towards use on the variable of intention towards use?

### **3.2. The Research Model**

There are many models in the literature about consumers' acceptance and use of technology. The internet of things technology has made its name mentioned on durable consumer goods especially in recent years. In our study, the effects below have been tried to be revealed for durable consumer goods with internet technology,

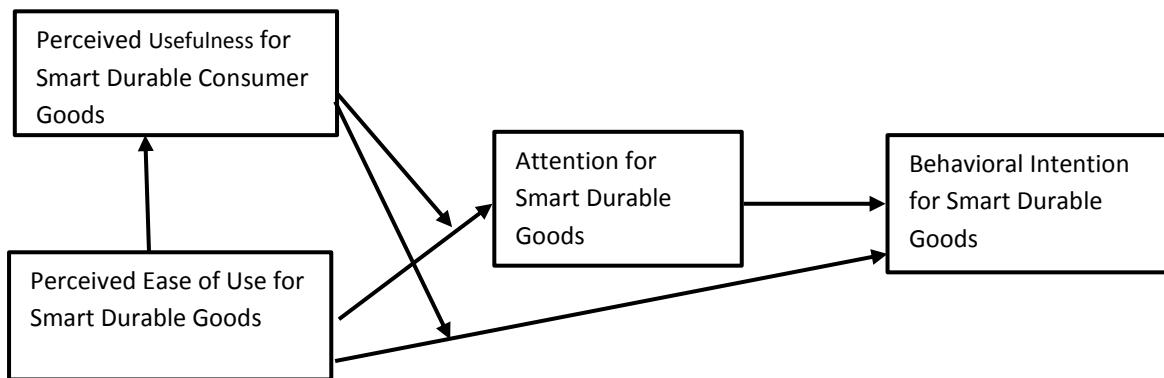
the perceived ease of use → the perceived usefulness,

the perceived ease of use → attitudes,

the perceived usefulness → attitudes

attitude → intention to use.

In order to reveal the relationship between the variables in the study, the model given in Figure 2 is preferred.

**Figure 2: The Research Model**

The model has been adapted from the original Technology Acceptance Model developed by Davis (1986) for this study. The actual system use variable involved in Davis' model was left out of this modified model. Since the use of durable consumer goods with the Internet of things technology in our country is still not widespread, the behavior variable is excluded from the model in order to remove the risk of not getting enough data.

### 3.3. Universe and Sample

The research universe is consisted of the individuals aged 15 years or older who can use technology and live in the center of Düzce. According to TurkStat, 2016 household information technology use research, internet use rate of 16-74 age group is 61.2% ([www.tuik.gov.tr/](http://www.tuik.gov.tr/) Access date: 18.12.2017). Attention is drawn to the fact that the persons from whom the data are collected should have an experience in the use of domestic appliance. Also, it was not paid attention whether the respondent was a woman or a man, and data were collected from both groups.

The convenience sampling method was used to determine the sample. Through convenience sampling method, data are gathered from the persons who can be reached at ease till the required number of sample (Gurbuz and Şahin, 2016: 134).

According to Sekeran, if the size of the population is 75.000 and the size of the sample should be 382 and if the size of the population is 1.000.000, then it is sufficient to have a number of 384 (Sekeran, 2002: 294). Information was obtained from the Duzce Population Directorate's official web site in order that the population can be correctly identified. According to the report of TURKSTAT on 31 January 2017, the general population of Duzce province was 370.371 in 2016. Because the population of the province was 370.371 in 2016, the lower limit was determined as 384 persons with 95% confidence interval and 5% error margin.

### 3.4. Development of Data Collection Tool and Collection of Data

Data were collected by using the online survey on the internet (Malhotra, 2010: 219). An online survey has been preferred in the study in order to make the returns faster because of the difficulty of reaching the required number for the sample. Since the individuals who have intention to use the products with the internet of things technology are thought to be closer to the electronic environments, the form to collect the data was prepared as an online survey and they were provided with a link to this form.

The expressions of perceived usefulness and perceived ease of use variables belonging to the first part of the survey are taken from Davis (1986) and the expressions of attitude and intention variables are taken from Karahanna et al. (2000). Despite the fact that the variables included in the model were included in many studies before, the necessity of arranging statements was needed because the sample to be collected was different and the research topic was different from these studies. The validity of the scale in Davis' work was tested by following the process of "translation - re-translation" and then it was arranged so that expressions would be adapted to the subject. Survey questions were prepared in a 5-point Likert scale type [(1) strongly disagree ... (5) strongly agree]. The survey was applied to 90 people within the scope of the pretest, and the survey was continued after it was found that there was no need for any correction. During the survey, a total of 453 people were reached. However, after the data was collected, a total of 17 surveys with a response time of less than 3 minutes were extracted from the data set, possibly due to the fact that they were answered without reading. Analyses were made with a total of 436 surveys available for analysis along with 90 surveys in the pre-test.

#### 4. FINDINGS AND DISCUSSIONS

##### 4.1. Demographic Characteristics and Descriptive Statistics of the Sample

As a result of the research, frequency and percentage analysis was applied to the data to find the demographic characteristics of the participants. Findings related to the demographic characteristics of the participants are as in Table 1.

**Table 1: Descriptive Data for the Study Group**

	Gender	Frequency	%
Women		318	65,4
Men		118	24,3
	Marital Status	Frequency	%
Married		196	40,3
Single		240	49,4
	Age Group	Frequency	%
15-21		45	9,3
22-28		193	39,7
29-35		93	19,1
36-42		50	10,3
43-48		25	5,1
49-55		23	4,7
56 and above		7	1,4
	Education Level	Frequency	%
Primary		6	1,2
High School		80	16,5
Associate degree		37	7,6
Bachelor's degree		265	54,5
Master Degree		48	9,9
	Monthly Income	Frequency	%
0-1399 TL		140	28,8
1400-2799 TL		111	22,8
2800-4199 TL		105	21,6
4200-5999 TL		41	8,4
5600 TL and above		39	8,0
	Job	Frequency	%
Civil Servant		64	13,2
Private Sector Employee		136	28,0
Self-employed		30	6,2
Retired		11	2,3
Housewife		57	11,7
Student		138	28,4

As shown in Table 1, the number of women participating in the survey is 318 (65.4%) and the number of males is 118 (24.3%). When the marital status of the participants is checked, it is seen that 49.4% are single and 40.3% are married. When age groups are analyzed; it is observed that 9.3% (45) are in the range of 15-21, 39.7% (193) are in the range of 22-28, 19.1% (93) are in the range of 29-35, 10.3% (50) are in the range of 36-42, 5.1% (25) are in the range of 43-48, 4.7% (23) are in the range 49-55, and 1.4% (7) are in the range of 56 and over . When the educational status is examined; it is found out that 1.2% (6) have primary school degree, 16.5% (80) have high school degree, 7.6% (37) have two-years degree, 54.5% (265) have bachelors' degree, 9% (48) have master degree. When monthly income is examined; it is observed that 28.8% (140) are in the range of 0-1399 TL, 22.8% (111) are in the range of 1400-2799 TL, 21.6% (105) are in the range of 2800-4199 TL, 8.4% (41) are in the range of 4200-5999 TL, and 8% (39) are in the range of 5600 TL and above. When occupational groups are examined; it is observed that 13% (64) are public employee, 28% (136) are private sector employees, 6.2% (30) are self-employed, 2.3% (11) are retired, 11.7% (57) are housewives and 28.4% (138) are students.

For reliability analysis of the scale, Cronbach's alpha coefficient is used. The Cronbach alpha coefficient for all factors is 0,931. The Cronbach alpha coefficients of the factors are given below in Table 2.

**Table 2: Cronbach's Alpha Coefficients of Factors**

Factors	Item No	Cronbach's Alpha Coefficient
PBenefit	11	,939
PEase of Use	10	,817
Attitude	3	,931
Intention	2	,933

In the study, factor analysis is applied in relation to scale items. Prior to factor analysis, the Kaiser-Meyer-Olkin (KMO) Test for Sampling Adequacy and the Bartlett's Sphericity Test were conducted to measure the adequacy of the correlations of the items and factors for the factor analysis.

**Table 3: KMO and Bartlett Test Results**

KMO and Bartlett Tests		
Kaiser Meyer Olkin Tests		,936
Bartlett's Test of Sphericity	Approx.Chi-Square	7433,996
	Df	300
	P	,000

Since the KMO value is 0,936, it is seen that the suitability of the variables for the factor analysis is excellent and the significance according to the Bartlett test result is 000. According to the results of KMO and Bartlett test, factor analysis for the survey is suitable.

**Table 4. Factor Analysis Results**

Factors	Variables	Factor Mutual Variance	Factor Loadings	Variance Explained	Eigenvalue
Perceived Usefulness	PB1	,550	,741		
	PB2	,545	,738		
	PB4	,674	,821		
	PB5	,696	,834		
	PB6	,752	,867		
	PB7	,579	,761	26,880	10,728
	PB8	,521	,722		
	PB9	,618	,786		
	PB10	,560	,749		
	PB11	,729	,854		
	PB12	,742	,861		
	PEU1	,437	,717		
Perceived Ease of Use	PEU3	,514	,708		
	PEU4	,160	,687		
	PEU7	,313	,661		
	PEU8	,407	,638	15,615	2,690
	PEU9	,501	,622		
	PEU10	,369	,608		
	PEU11	,386	,565		
	PEU12	,319	,559		
	PEU13	,473	,400		
	A1	,891	,944		
	A2	,923	,961	12,159	2,093
	A3	,828	,910		
Intention	I1	,938	,968	10,226	1,358
	I2	,938	,968		

<b>Evaluation Criteria</b>	KMO: ,935. Approx.Chi-Square:8520,571. Bartlett's Test of Sphericity: ,000. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Explained Variance: Total: 64,881
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Principal component analysis and Varimax rotation technique are used for factor analysis. The factor loading value refers to the correlation of the item or variable with the factor, and the factors with the factor loading value of 0,50 result in strong factors (Gürbüz and Şahin, 2016: 311). AF3 (To use smart domestic appliance enhance my performance) item, which is under the perceived usefulness factor as a result of the factor analysis conducted, has been extracted from the structure due to the fact that the factor load is smaller than 0.5. When factor analysis table is examined, it is seen that some factor weights have close values under more than one factor. In such a case, when the item takes a close value in the column of more than one factor, the expression should be excluded from the analysis (Durmuş et al., 2013: 85). For this reason, AKK2 (I make mistakes when using smart domestic appliance), AKK5 (I have to use the manual in general to interact with smart domestic appliance) and AKK6 (I can easily compensate mistakes when using smart domestic appliance) expressions in the structure have been extracted from the analysis because of the close values.

Regarding the expressions extracted from the analysis; despite consumers perceive benefit related to the use of smart domestic appliance, they cannot perceive the ease of use because the use of smart domestic appliance has not yet become widespread.

In this part of the study, the relations between the variables in the model are examined.

**Table 5: Correlation Table for Variables**

	Mean	SD	1	2	3	4
<b>PB</b>	4,07	,74	1			
<b>PEU</b>	3,67	,55	,486**	1		
<b>Attitude</b>	3,78	,87	,586**	,495**	1	
<b>Intention</b>	3,62	1,00	,520**	,453**	,758**	1
Correlation significant at 0,01						
N=436						

When Table 5 is examined, it is seen that there is a positive pairwise correlation (\*\*) according to the correlation coefficients. When examining the data in the table; it is seen that there is a moderate positive correlation ( $r = 0.488$ ) between the perceived usefulness and perceived ease of use, there is a moderate positive correlation ( $r = 0.495$ ) between the perceived ease of use and attitude, there is a moderate positive correlation ( $r = 0.586$ ) between the perceived usefulness and attitude, there is a moderate positive correlation ( $r = 0.453$ ) between the perceived ease of use and intention, and there is a strong positive correlation between attitude and intention.

In the scope of the study, the following hypotheses were formed and tested according to the research problem.

H1. The perceived ease of use has a positive effect on the attitude towards smart domestic appliance use.

First, the effects of perceived ease of use on attitude, perceived ease of use on perceived usefulness, and perceived usefulness on attitude will be tested by simple linear regression, and finally, the effects of perceived ease of use and perceived usefulness variables on attitude will be tested by multiple regression.

**Table 6: Simple Regression Analysis Result of Relationship between Perceived Ease of Use – Attitude**

	Variables	B	Std. Error	$\beta$	t	p	Result
<b>H1</b>	PEU	,898	,246	-	3,651	,000	<b>Accept</b>
	Attitude	,785	,066	,495	11,874	,000	

R=.495 R<sup>2</sup> = ,245 Adjust R<sup>2</sup> = ,243 F= 140,994

Dependent variable: Attitude

The effect of perceived ease of use on attitude is tested by simple linear regression analysis and the analysis result is found to be statistically significant ( $F = 140,994$   $p = 0,000$ ). When  $\beta$  value is examined ( $\beta = 0,495$   $p < 0,001$ ), the perceived ease of use variable has a significant contribution to explain the attitude variable. For this reason, the H1 hypothesis is accepted.

H2. The perceived ease of use has a positive effect on the perceived usefulness of smart domestic appliance use.

**Table 7: Simple Regression Analysis Result of the Relationship between Perceived Ease of Use - Perceived Usefulness**

		Variables	B	Std. Error	$\beta$	t	p	Result
<b>H2</b>	PB	1,641	,210	-	7,800	,000	<b>Accept</b>	
	PEU	,663	,057	,490	11,714	,000		

R=.490 R<sup>2</sup> = ,240 Adjust R<sup>2</sup> = ,238 F= 137,209  
Dependent variable: Perceived usefulness

According to the results of simple linear regression conducted to test the effect of perceived ease of use variable on the perceived usefulness variable, there is a significant and moderate positive relationship between the two variables ( $t = 7,800$ ). The regression result is statistically significant ( $F = 137,209 p = .000$ ). When the  $\beta$  value is examined ( $\beta = 0.490 p <0.001$ ), there is a significant contribution of the perceived ease of use variable in explaining the perceived usefulness variable. The H2 hypothesis has been accepted.

H3. There is a mediator effect of perceived usefulness in the relationship between the consumer's perceived ease of use for smart domestic appliance and the attitude towards product use.

**Table 8: Simple Regression Analysis Table of the Relationship between Perceived Usefulness – Attitude**

Variables	B	Std. Error	$\beta$	t	p
Attitude	,984	,189	-	5,202	,000
PB	,687	,046	,586	15,058	,000

R=.586 R<sup>2</sup>= ,343 Adjust R<sup>2</sup> = ,335 F= 226,747

Dependent variable: Attitude

A simple linear regression analysis of the perceived usefulness variable for the effect on attitude is performed and found statistically significant ( $F = 226,747 p = .000$ ). It is seen that there is a significant positive relationship ( $t = 5,233$ ) between perceived usefulness and attitude. The effect of perceived ease of use as an independent variable with the perceived usefulness variable determined as a mediating variable on attitude as dependent variable are tested with multiple linear regression. The results are summarized in table 8:

**Table 9: The Mediation Effect of the Perceived Usefulness Variable on Attitude**

Steps	Regression Coefficients			Model Statistics
	B	S.H.	$\beta$	
<b>1.Step</b> PEU	,898	,24	,495**	R <sup>2</sup> = 0,24 F= 140,994 P=,000
Attitude				
<b>2.Step</b> PEU	1,641	,05	,490**	R <sup>2</sup> = 0,24 F= 137,209 P=,000
PB				
<b>3.Step</b> PB	,984	,18	,586**	R <sup>2</sup> = 0,34 F= 226,747 P= ,000
Attitude				
<b>4.Step</b> PEU	,434	,05	,274	R <sup>2</sup> = 0,4 F= 144,425 P= ,000
PB	,530	,06	,452	
Attitude				

The effect of perceived usefulness variable on attitude is positive and significant ( $\beta = .45$   $p = ,000$ ) and the perceived ease of use variable has a positive and significant effect on attitude ( $\beta = .27$   $p = ,000$ ). When the mediating variable is added in the model, the value of the perceived ease of use is decreased ( $\beta_1 = .49$   $\beta_2 = .27$ ). This situation shows the mediating role of the perceived usefulness variable between the perceived ease of use and attitude. The relationship is still significant, although there is a decrease in the  $\beta$  values of the perceived ease of use. Since its effect is decreased without being insignificant, the perceived usefulness variable is a partial mediator. The H3 hypothesis has been accepted.

H4. There is a mediator effect of perceived usefulness on the relationship between the perceived ease of use and intent to use towards consumer's smart domestic appliance use.

In the analysis, a simple linear regression analysis is performed between perceived ease of use and perceived usefulness, perceived usefulness and intention, and perceived ease of use and intent, respectively. In the final step of the analysis, multiple regression is performed to test the effect of the mediating variable between perceived ease of use and intention. The results are given in Table 9:

**Table 10: The Mediation Effect of the Perceived Usefulness Variable on Intention**

Steps	Regression Coefficients			Model Statistics
	B	S.H.	$\beta$	
<b>1.Step</b>				$R^2 = 0,24$
PEU	1,641	,05	,490**	$F = 137,209$
PB				$P = ,000$
<b>2.Step</b>				$R^2 = ,27$
PB	,770	,22	,520**	$F = 161,039$
Intention				$P = ,000$
<b>3.Step</b>				$R^2 = 0,20$
PEU	,593	,290	,453**	$F = 112,135$
Intention				$P = ,000$
<b>4.Step</b>				$R^2 = 0,4$
PEU	,475	,08	,261	$F = 144,425$
PB	,528	,06	,392	$P = ,000$
Intention				

Multiple regression analysis is performed to test the mediation effect of the perceived usefulness on the relationship between perceived ease of use and intent. When the mediating variable is added in the model, the perceived ease of use appears to be less effective on intention ( $\beta_1 = .49$   $\beta_2 = .26$ ). Even if the effect of the variable is decreased, the relationship between them is still significant. Since the effect is not insignificant, the perceived usefulness is the partial mediator. The H4 hypothesis has been accepted.

H5. The attitude towards the use of smart domestic appliance has a positive effect on the intention of these products to use.

**Table 11: Simple Regression Analysis Result of the Relationship between Attitude and Intention**

	Variables	B	Std. Error	$\beta$	t	p	Result
<b>H5</b>	Attitude	,331	,140	-	2,375	,018	<b>Accept</b>
	Intention	,870	,036	,758	24,220	,000	
R=.758      R <sup>2</sup> = ,575    Adjust R <sup>2</sup> = ,574    F= 586,605 Dependent variable: Intention							

It appears to be a strong and positive relationship between the two variables (.758). In addition, when the value of table t is examined, there is a positive relationship between two variables at the level of  $p < 0.01$  ( $t = 2,375$ ). According to the regression analysis that Davis (1986: 106) conducted in his study, it is seen that the perceived ease of use variable has a

significant effect on both perceived usefulness variable ( $t = 10.66$   $p <.01$ ) and attitude variable ( $t = 2.04$   $p <.05$ ). It is also seen that the perceived usefulness variable has a significant effect on attitude ( $t = 9.89$   $p <.01$ ). According to Davis et al. (1989) results of their studies on technology acceptance model; first, the consumer's use of a system can be explained by the intentions of the consumers. Perceived usefulness is the primary explanatory intent, and perceived ease of use is the secondary explanatory intent. In the study performed by Özbek et al. (2014), when the effect of perceived ease of use variable on intention was  $\beta_1 = 0.582$ ; when the perceived usefulness variable is added to the model as mediating variable,  $\beta_2 = 0.237$  is reached. The partial mediation effect of the perceived usefulness variable is also seen in this study. Findings in the study support the literature however; it is lower than that of the literature. Besides, the fact that the number of companies that sell technological products in Duzce is low, keeps the use of these products at a low level.

## **5. CONCLUSION AND RECOMMENDATIONS**

Although many models exist in the literature to determine the intentions of consumers towards using a new technology, Davis (1986), who put forward the 'Technology Acceptance Model', is the most commonly used. According to this model, the intention lies behind the behavior of a person accepting a new technology, and the intention is influenced by its attitude towards that behavior. The attitude of the person is influenced by the benefit and ease of use that one perceives from that technology.

The aim of the study is to determine the main factors behind the intention to use domestic appliances with the internet of things technology. The model, the source of this study is Davis (1986)'s original technology acceptance model. Since the use of durable consumer goods with the internet of things technology is not yet widespread, the actual behavior variable in the original model has been left out of the model. An online survey was applied to consumers to measure the basic variables in the model.

The results obtained in the study support the results in the literature. Direct and indirect effects are presented in the study. As a result of the analyzes conducted, consumers' intentions to use smart domestic appliance is found to be most affected by attitude. The more positive attitudes of consumers towards smart domestic appliance, the more positive their intentions to use them.

The lowest relationship appears between perceived ease of use and perceived usefulness. Consumers perceive benefits for smart domestic appliance use. Although consumers are aware of the fact that when they use these products their lives will get easier, their quality of life will increase, they will save time, and they can spend this time in different ways, they think that the use of domestic appliances with the internet of things technology will be complicated because they are not yet widely used.

The mediation effect of the perceived usefulness variable in the study is also revealed. The partial mediation effect of perceived usefulness in the relationship between perceived ease of use and intent also arise from the fact that people have not yet fully perceived this technology.

The fact that the study is an introductory exploratory study in this area provides important clues that companies operating in this sector in our country can determine more successful marketing strategies. Companies, especially when they start to use interactive devices also in production mechanisms, will provide simultaneous delivery of data during production. With smart factories, every stage of production can be easily controlled and the probability of making mistakes will be reduced.

Today, consumers pay more attention to the content it offer than the promotion of the product. For this reason, it is considered important that the food is ready when the people return home and that they can control the refrigerator while away from home. Domestic appliance companies which came to realize this situation have started to act and produce products equipped with new technologies that will provide the expectations of the customers and to present the market. Bosch in 2016 in Turkey to be offered 'Home Connect' technology is an important step forward for this transformation ([www.blog.bsh-group.com.tr/](http://www.blog.bsh-group.com.tr/) Access Date: 11.12.2017). Arçelik aims to save time and energy by providing the interaction of products with this transformation called "HomeWhiz" ([www.iot.gen.tr/arcelik/](http://www.iot.gen.tr/arcelik/) Access date: 12.11.2017). Vestel provides the interaction of its products with this change called "Smart Home" ([www.iot.gen.tr/vestel/](http://www.iot.gen.tr/vestel/) Access date: 12.11.2017).

As it has been seen, each domestic appliance company operating in Turkey has adopted the internet of things technology and started to use it to not remain behind technological developments and to be a pioneer in the industry. Their goal is to meet consumers' personalized product demands. Personalized products and devices that learn consumer habits will make life easier for the consumer. Consumers will be able to remotely control their smart products.

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