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### **Investigating Academicians' Use of Tablet PC from the Perspectives of Human Computer Interaction and Technology Acceptance Model**

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### Abstract

This phenomenological study examines academicians' beliefs and lived experiences of using tablet PC based on Human-Computer Interaction (HCI) and Technology Acceptance Model (TAM). Participants included 15 academic staff working in a university in Turkey. Data were collected through in-depth semi-structured interviews and subjected to content analysis. Main themes emerged from the data include reasons for purchasing tablet PC, usage patterns, professional and instructional implementation, comparison of tablet with other PCs, future expectations of tablets, and opinions about tablet experiences (performance increase, advantages, health issues). The results showed that academicians were satisfied with tablet PC and used it for presentation, social media, and routine tasks. However, they did not prefer it as a first PC option and they found it inadequate for all their works due to the limitation of subject-specific applications, incompatibility issues, difficulty in writing, and tendency to maintain previous PC usage habits. The findings did not indicate any reduction in the need and use of other PCs due to tablet ownership. Overall, this study supports the interaction of HCI components (user, tool, environment, tasks) and TAM components (perceived usefulness, perceived ease of use) and their effects on the adoption and use of a technological tool.

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### Introduction

Computer is an arithmetic machine that has extensive capability of processing and storing information (Wittich and Schuller, 1973). The first modern example of computers whose invention changed the face of the last century was produced for simple math calculations in 1940s. Having been continuously developed since then, computers have been employed in many areas by means of software packages coded in various programming languages. Development and diffusion of the Internet have increased the importance and functions of computers. Today, there are macro-computers developed for institutional tasks such as database management of organizations as well as micro-computers designed for personal usage (Baecker, 1995). Personal computers are now smaller in size, faster in speed, more economic in price, and more widespread in usage.

Computers have undergone a lot of physical and functional evolutions since the day they were invented. Technological advancements have enabled them to become more powerful and functional in smaller sizes. Desktop was the beginning model of personal computer (PC), but its relatively big size was the most important disadvantage. Later, laptop PC was manufactured as a remedy for this problem, but it had also some limitations such as short battery life and difficulty of its portability. Hence, manufacturers were in search of computers with lighter weight and smaller screen sizes. As a result of such pursuits, mobile devices such as personal digital assistant (PDA), tablet PC and smartphone were produced. They have many features and can do a number of tasks as much as a laptop or a desktop can do, but people generally consider them as an alternative PC (Lank and Phan, 2004; Lin et al., 2004).

Tablet PC is becoming very prevalent among the people of all ages. This attracts researchers to investigate people's expectations, actual usages, and perceptions of tablet PC. Such research is needed to reveal the place and importance of tablet PC in the society. Particularly, the opinions of educators who guide the change and accumulation of the society and their interactions with tablet PC are worth considering. Therefore, in this qualitative study, we deeply examine academicians' beliefs and professional usages of tablet PC. Our research goal is to explain how academicians describe the essence and meaning of their lived experiences with tablet PC. The theoretical framework of the study is composed of Human-Computer Interaction (HCI) and Technology Acceptance Model (TAM), which deal with human behaviors towards information and communication technologies.

### **Tablet PC and Related Literature**

Dating back to the 1960s, tablet PC was evolved as a new commercial product for computer manufacturer companies, especially with the beginning of the third millennium (Barnes, 2007). The potential advantages of tablet PC in comparison to desktop and laptop computers are their smaller size, easier portability and more compatibility with human nature. It does not have any mouse or keyboard, but has a touch–screen. It is known as a new–generation computer alternative as efficient as other computer types in enabling users to access the Internet, watch videos, read e–books, and use various applications (Bulun, Gülnar, and Güran, 2004; Chambers et al., 2006; Gill, 2007; Prey and Weaver, 2007; Marcial, 2010).

In 1968, Alan Kay, an American computer engineer, developed a light weighted and inexpensive device with a touch–screen and mobile keyboard similar to today's Tablet PC, named “Dynabook” for children's use (Daşkıran, 2012). Before the milestone of technology in 2000s, many companies in the computing sector designed touch–screen technologies in their research and development departments. However, interest towards tablet PC has been less than expected by the beginning of 2010. After this date, a serious increase was observed in the production and use of tablet PC. The reasons for this can be widespread introduction and marketing, reasonable level of prices, and design of software and processors appropriate for users (Daşkıran, 2012; Perenson, 2012).

Today, tablet PCs are available on different platforms, with various hardware and features, and with many price options. Using a tablet PC, people can accomplish almost anything that can be done through a laptop computer. The most distinctive feature of tablet PC is its touch–screen and operating system from previous PCs. Users can optionally add an external keyboard in addition to integrated virtual keyboard. Today, there are devices that can be used as both laptop and tablet PC. According HCI scholars, touch–screen is a more suitable technology for human nature. In fact, prior research suggests that children can easily understand and use tablet PCs (Sachs and Bull, 2012). The transition between windows and layers can be achieved by moving the finger on the screen. SmartPen is an optional tool in some tablet PCs and smartphones and can also be used just like finger or a mouse. It is possible to make original drawings with this tool especially in some office programs.

The platforms used on tablet PCs influence many things such as processor speed, image quality, application richness, security and price (Goadrich and Rogers, 2011). Those tablet PCs which use the same operating system have similar functions and uses in many ways (Zhou et al., 2011). Being in the category of portable computers, tablet PC should have a battery life that satisfies users' need outside. Its battery discharge time is longer than that of smartphones, but this situation varies depending on its usage (Bulun et al., 2004).

Tablet PC can have as many functions as its operating system supports. Playing games, surfing the Internet, emailing, social media networking, photo–video capturing, online shopping, e–reading are the most common uses of tablet PC (Marcial, 2010; Tractinsky and Lowengart, 2007; Zhou, et al., 2011). Moreover, it is used for working on office documents, language learning or mobile communication. Such uses and gratifications demonstrate how intense tablet PC gets into people's lives. According to some interesting research findings, 88% of tablet owners use their tablets on the road, and 35% do not leave it even in the bathroom (Daşkıran, 2012). The worldwide number of Tablet PC users is around one billion with a penetration rate of 13.8% in 2015 and this figure is forecasted to rise 1.5 billion with a penetration rate of 19.2% in 2020 (Statista, 2017). An average tablet user in the USA spent approximately 81.4 minutes per day on accessing tablet PC in 2016 (Statista, 2017).

Our literature review indicates that existing studies on tablet PCs focus on perceptions of tablet PC, advantages, and limitations of its usage. Tablet PC is being tried to be integrated into the education systems all over the world. Both teachers' and students' perceptions of tablet PC seem to affect their tablet usage. There are positive effects of tablet PC usage on student motivation, classroom interaction, reading, sharing information, and material review (Sachs & Bull, 2012). On the other hand, some students consider tablet PC as a gaming tool as well (Pamuk et al., 2013). Therefore, using tablet PC as an educational tool is a complex phenomenon that requires skillful educators. Prior research indicates limited applications, compatibility problems with other technologies, and lack of user knowledge and skills as the main barriers for tablet usage (Hung, Sung, and Yu, 2015; Ifenthaler and Schweinbenz, 2013; Pamuk et al., 2013). Positive changes can be seen in the perceptions of individuals after using tablet PC. This situation is more evident in the countries where tablet PC usage is more common (Chambers et al., 2006; Kim et al., 2016). Tablet PC can be an active learning tool through its applications and Internet connection. Its implementation into educational contexts can be increased providing that education–oriented applications and their pedagogical evaluations are proliferated (Kamacı and Durukan, 2012; Twining and Evans, 2005).

Health is another issue that should be considered when using tablet PC. The quality of the materials used in its production process and the physical problems in its usage are main concerns of ergonomics studies. Ergonomics is an interdisciplinary area that studies how computers can be designed and used in accordance and concordance with human anatomy, physiology and psychology (Breen et al., 2007). It aims to maximize positive outcomes of computer technology while preventing and mitigating insecure and unhealthy consequences. Scholars emphasize that non-ergonomic computer use conditions may have short-term or permanent negative consequences for users' eyes, muscles and postures, joints, nerves and psychological well-being (Breen et al., 2007; Keser, 2005). Posture and muscle activity of individuals using tablet PCs and resulted musculoskeletal stresses differ from those using desktop computers (Straker et al., 2008; Young et al., 2012). The amount of time spent with smartphone or tablet is getting increased in comparison to those with laptop and desktop. Therefore, it is important to explore physical consequences of using such devices in order to inform guidelines for healthy usage.

## Theoretical Framework

### Human-Computer Interaction (HCI)

HCI is an area of research aiming at making computer technologies suitable for human nature (Helander, Landauer, and Prabhu, 1997). Çağıltay (2011) refers that HCI is an interdisciplinary field dealing with usable and useful design and use of interactive technologies. Focusing on the interfaces between computers and users, HCI encompasses several disciplines such as pedagogy, cognitive psychology, computer science and engineering, information systems, communication, and visual arts (White, Kules, and Bederson, 2005). Design of web pages, evaluation of their usability, development of hardware and software for healthy and disabled individuals, educational technologies appropriate to learning strategies, and design of advertisements that meet producer and consumer expectations are some of the topics studied in this area (Rogers, Sharp, and Preece, 2011).

Taking a human-centered approach to design and development, HCI emphasizes that technological devices should be formed according to people's needs. The main goal of the field is to make technology fit human and thus make its usage easier and more effective. A badly designed interface in a bank's ATM machine and an incomprehensible remote control are some of the negative examples of user-friendly design (Baecker, 2008; Çağıltay, 2011). A product that is easy to use is efficient, effective, satisfying, less likely to make mistakes, and give users options to back from mistakes (Çağıltay, 2011).

According to Çağıltay (2011), the main components of HCI are user, tool, task and context, which can all impacts the usability of a device. In a similar vein, Dix et al. (2004) introduce the main components of an interactive system as the human user, the computer system, and the nature of the interaction. All developments in the HCI field are for human beings to use technology effectively and efficiently. Therefore, the user here refers to an individual, a group of users, or a sequence of user in an organization trying to get the job done using technology (Dix et al., 2004). Tool (interface) involves technological devices, systems and software packages that exist or will emerge in the future. In general, HCI studies are based on the design and usability of these products. Task is the action that the user wants to perform. The context refers to the physical or organization condition and environment in which the user is. Technology is used in almost the whole area of life such as home, office, school, car and shopping place. Therefore the user interacts with technology in order to accomplish something within a social an organizational context related to their lives.

Usability, which is the most important focus of HCI, indicates whether the user can perform specific tasks effectively, efficiently and with satisfaction in a particular context. Computers and related devices should support the user's tasks. They will not be usable if they force the user to adopt an unacceptable mode of work (Dix et al., 2004). Nielsen (1994) defines usability by five components: learnability, efficiency, memorability, errors and satisfaction. In general, the principals of ease of learning, efficiency, and satisfaction are known to be fundamental concepts of usability. Ease of learning refers to how easy it is for users to accomplish tasks at the first time they encounter the design. Efficiency refers to how quickly users can perform defined tasks. Satisfaction refers to how pleasant it is to use the design. These principles are related to each other (Baecker, 2008; Carroll, 2002). The rejection and disuse of produced technologies by the potential users may hinder the emergence of new ones (Roscoe et al., 2014).

## **Technology Acceptance Model (TAM)**

TAM was developed to explain and predict user behaviors in the use of technology (Davis, 1989). Derived from the psychological theory of reasoned action and theory of planned behavior, TAM is a widely accepted model that studies the effects of people's beliefs and biases on the use of technology (Lin, 2007; Özer, Özcan, and Aktaş, 2010). In recent years, there are studies conducted to examine relationships between TAM and usability testing (Lin, 2013).

TAM presumes that perceived usefulness (PU) and perceived ease of use (PEU) are primary determinants of an individual's intention to use technology. They influence the development of attitudes and behavioral intentions toward the acceptance of technological innovations (Davis, 1989). PU refers to the level to which an individual believes that using a tool would enhance his/her performance (Davis, 1989). Prior knowledge, bias and anxiety are known to affect both PU and PEU. The production of technological devices should consider the potential needs of users (Wallace and Sheetz, 2014). PU is impacted by external variables including but not limited to gender, level of education, experience, support/training services, peer influence, organizational policies, perceived risk, job relevancy, perceived enjoyment, subjective norms, social pressure, and system characteristics (Shih, 2004; Yousafzai, Foxall, and Pallister, 2007). PEU refers to the level to which an individual believes that using a system would require not much effort. Davis (1989) states that PEU has a strong effect on PU. Moreover, it has been shown to have more influence than PU on attitude (Venkatesh, 2000). Some of the external factors on PEU explored in the previous studies are benefits, educational beliefs, subject knowledge, experience, self-efficacy, subjective norm, and enjoyment (Abdullah, Ward, and Ahmed, 2016; Liaw, Huang, and Chen, 2007). Developing measurement scales for PU and PEU, Davis (1989) refers to some indicator of information technology such as work more quickly, job performance, increase productivity, effectiveness, makes job easier, useful, easy to learn, controllable, clear and understandable, flexible, easy to become skillful, and easy to use.

Attitude can be defined as the positive or negative tendencies of a person to an idea, an object, or a symbol, and it directly affects consumer's perceptions and behaviors. Past experiences and human relationships are important factors affecting formation of attitude toward an object (Ajzen and Fishbein, 1977). Attitude has emotional, cognitive and behavioral dimensions. Tendencies, beliefs, and reactions related to an object involve emotional, cognitive and behavioral aspects respectively. Influenced by attitude, intention is another factor guiding people's behavior. In some cases, intention, with the effect of attitude, may have people make negative decisions (Mathieson, Peacock, and Chin, 2001; Venkatesh et al., 2008).

As a model interested in behaviors, TAM studies the relationships among PU, PEU, attitude and behavioral intention to use a given technology. There have been many studies conducted to find out how individuals behave towards information and communication technologies. The evaluation of services and products from the users' perspective is an important requirement for technology developers (Çağıltay, 2011). TAM can be employed as an underlying framework for such investigations of user tendencies. For example, in a recent study, Camadan et al. (2018) explored the effect of teachers' personality on their tablet PC usage. The results led the authors to conclude that highlighting the conveniences as a result of using tablets and equipping teachers with relevant competencies may be effective in developing behavioral intentions to use tablet PC among teachers.

## **Method**

### **Research Design**

We determined phenomenological qualitative inquiry as the most appropriate methodological framework because our study aims to explain academicians' tablet PC use. Phenomenology focuses on revealing experiences, attitudes and opinions of interested persons or communities with respect to a phenomenon through their lived experiences (Merriam and Tisdell, 2015). The purpose of phenomenological research is to reach a description of the universal essence by reducing individual experiences with a phenomenon (Creswell, 2007). In this study, the phenomenon is tablet PC use among academicians. The goal is to describe the experiences of academicians' use of tablet PC as well as their constructed meanings.

### **Setting and Participants**

The study took place at a major state university located in a southwestern city of Turkey. Creswell (2007)

recommends that phenomenological research should recruit a homogenous group of participants with significant and meaningful experiences of the phenomenon under study. Therefore, we employed two recruitment strategies: purposive and snowball sampling. For the former strategy, the selection criteria were the ownership and usage of tablet PC, experience of earlier PC types (e.g., desktop, laptop), and willingness to participate in the study. This purposive sampling approach assures the presence of knowledgeable and experienced informants on the research subject in which intensive information needs to be collected. It also helps to understand and interpret the facts and events in more detail (Merriam and Tisdell, 2015). The latter strategy extended the study group by asking each participant to tell us about academicians in the university that they know using tablet PC. This enabled us to solicit the names of other possible participants.

Table 1. Demographic Characteristics of Participants

Demographic	Category	f	%
Gender	Male	9	60
	Female	6	40
Age	2–30	7	47
	31–40	3	20
	41–50	3	20
	51 and above	2	13
Title	Research Assistant	3	20
	Instructor	3	20
	Assistant Professor	2	13
	Associate Professor	4	27
	Professor	3	20
Work experience	1–10 year	6	40
	11–20 year	6	40
	21–30 year	3	20
Discipline	Science and Engineering	9	60
	Social Sciences	4	27
	Educational Sciences	2	13

In the selection of the participants, we considered the diversity in terms of variables such as age, gender, title and discipline. There were 15 academicians participated in this study. Of these, research assistants engage in research activities while others engage in both research and teaching activities in the university. Six participants had also administrative positions as follows: one vice-president of the university, one dean of a faculty, one manager of human resource unit and three chairmen of a department. The gender ratio of the group is 3/2 male to female. Participants' age ranged from 26 to 58. Some demographic information about the participants is detailed in Table 1.

### Data Collection

We obtained our phenomenological data through in-depth semi-structured interviews that were designed to explore academicians' conceptions and lived experiences with tablet PC. Face-to-face interviewing is employed as a main way of collecting information about the lived experience of a phenomenon from another person (Englander, 2012). We developed open-ended framing questions with floating probes to guide the conversations. These questions were formed based on the related literature, especially studies of HCI and TAM theoretical frameworks and investigations of tablet PC acceptance by teachers (Booth, 1989; Ifenthaler and Schweinbenz, 2013). They generally focused on the following issues: rationale for owning and using a tablet PC, its uses and gratifications, frequently used applications, user satisfaction, perceived advantages and disadvantages of tablet PC, negative and positive experiences with tablet PC, future expectations from tablet technology, and awareness about healthy usage. We phrased the questions in a general and non-directional manner so that conversations could be flexible and adaptable to each participant's sharing of unique experiences (Merriam and Tisdell, 2015).

The questions were reviewed by three experts: one lecturer who teaches qualitative research methods to graduate students, one academician who are specialized in technology design, and one expert in educational

technology. These experts evaluated the questions in terms of language and expressions, clarity, wording and ordering, appropriateness to research purpose. Upon revising the questions based on the experts' comments, we subjected them to a pilot testing with a volunteer academician to ensure their functionality and efficacy. The pilot interview lasted approximately half an hour and led us to make revisions on some vague and overlapping questions.

We conducted interviews with the finalized questions (see Appendix) in participants' university offices where they feel confident to share their experiences. Interviews were audio recorded in order to capture verbatim language for later transcription and analysis. At the beginning of each interview, we informed the respective respondent about the purpose and content of the study, interview procedures, privacy protection, and voluntary nature of the participation. Exact wording and ordering of the questions remained flexible and new questions were allowed based on the progress of each conversation in order to enable respondents to freely express their opinions and experiences. All recordings were saved on a secure computer to ensure confidentiality. Participants were coded as P1, P2...P15 to protect their anonymity throughout this study.

### **Data Analysis**

We utilized a content analysis on the collected data from the interviews. Content analysis provides a more detailed and in-depth review and interpretation by conceptualizing the data by means of coding and thematizing (Merriam and Tisdell, 2015). The whole process of organization and analysis of the data occurred in several basic steps. First of all, we transcribed interview recordings into text documents. Second, we read and reread these texts several times to fully get acquainted with the data and acquire a sense of every participant and their experiences. Third, we identified significant statements throughout the interview transcripts and coded them by suitable and meaningful concepts based on the related literature. Fourth, we determined which codes could create categories through sorting and combining. The final step involved the clustering of conceptual categories into major themes through which we organized the report of our findings. We looked for validation, stayed away from repetition of concurrence of themes, and noted any discrepancies during the whole process.

### **Validity and Reliability**

We employed several strategies to make the results as much credible and reliable as possible. Firstly, the way that we analyze the data together functioned as a kind of analyst or coder triangulation and peer debriefing (Lincoln and Guba, 1985; Patton, 2002). The collaborative negotiation between us as researchers as well as the review of our works in both coding and interpretation phases made the results and conclusions more convincing. Secondly, we used member checking to ensure accuracy and representativeness (Lincoln and Guba, 1985). For this purpose, we sent three of the participants an executive summary of findings and interpretations and asked them to make comments on the validity. They all stated that the report reflected their true and complete perspectives regarding the phenomena of tablet adoption.

In addition to these strategies, we selected participants from those academicians who have already owned and experienced tablets (i.e., purposive sampling), ensured sufficient interaction with the participants to obtain detailed data (i.e., long term interaction), explicitly articulated data collection and analysis stages (i.e., detailed explanation), and presented adequate direct quotes from the participants (i.e., enough raw data/evidence) to increase the validity of our study (Patton, 2002).

## **Results**

We summarized the opinions of the participating academicians in this section. The content was presented in detail based on the interview texts and codes and themes emerged from the content analysis. In the interviews, some participants expressed more than one answer to a question. For this reason, the ratios are arranged accordingly.

### **The Factors on Purchase of Tablet PC**

Academicians highlighted easy portability of tablet PC (73%) and their desire to deliver course content (e.g., give presentations in class) through tablet PC (33%). Some participants (13%) pointed out the social

attractiveness of owning a tablet and their feeling of curiosity toward it as their rationale to buy a tablet PC. Also, the opinions which tablet PC is superior to other PC's were other factors for buying a tablet PC (27%). Regarding their opinions before having a tablet PC, academicians remarked their expectation from tablet PC and stated that they wondered the usage performance of it. For example, an academician expressed that she hoped to use tablet PC like a laptop but it did not meet her expectation. Another one expressed higher prices of tablets. The participants thought that they could read easier (7%), use the tablet in their class meetings (13%) and they wondered the compatibility of their frequently used programs on tablets (%20). They emphasized the brand (53%) and the performance of the device (40%) as the most important criteria while buying a tablet PC. Price, size-weight, battery adequacy, advertisements-comments and suggestions of users were among the other criteria of participants. The followings excerpts illustrate their opinions:

"Mostly because of its mobility. I travel a lot. It is hard to move the others [desktop and laptop]. Tablet is very practical especially for presentations." (P3)

"It is primarily handy, portable, and light and it has a touch-screen, better battery life. Also, I considered positive opinions of users. Price is not determinant; I prefer well-known brands." (P12)

"First of all, I want to use the touch-screen, measure the speed of using the touch-screen, and develop applications. So let's call it the curiosity in general." (P2)

"I wanted to use it as a laptop but this did not happen...I had not thought the tablet PC was so limited. I had positive views. At this point, I have a disappointment..." (P7)

"I had hesitations about the Office and it turned out to be true. I cannot use Office programs right now...I pay attention its ergonomics, speed, performance, and fast charge. For example, the one-day battery life of the phone is very low, but the tablet well for now." (P10)

"I had no negative thoughts. But before I bought, I did a lot of research. I especially looked for suggestions and opinions over the Internet. In general, I read positive reviews...First of all, my aim was to investigate the most suitable device. I think the tablet is enough for lectures." (P13)

### **Tablet PC Usage Patterns**

Almost half of the participants (47%) carried their tablets everywhere, 40% used them every day and 13% spent time with their tablets several times a week. About half (47%) stated that they generally used tablet PC at home. The average use experience was approximately 22 months. The majority of the academics reported that they used tablet PC to search on the Internet and to check email. Moreover, half of the academicians used it for reading and entertainment purposes. One third stated used multimedia features of tablet PC, 27% used tablet PC for presentations, 13% used it as agenda, and 7% were more active on social media through tablet PC. These are some of their views:

"...So, my tablet is with me every time, I leave it only when I am sleeping." (P3)

"In the evenings, I usually use tablet at home for reading, checking email, general media operations. Especially, banking operations are very easy and practical on the tablet." (P5)

"Firstly, I use communication programs and the Internet everywhere. I use it for educational purposes...connect tablet PC to the projection in the class." (P13)

"I use tablet to read my notes and books. I keep up to date with applications. I look at the emails and the Internet on the tablet. I often use media, calendar, appointment and free talk features. It is difficult to carry and read a big book in a car or bus, but I can say I solved it through the tablet. In addition, the community considers you according to the book you read. The tablet keeps me in that..." (P8)

Academicians expressed their satisfaction with using tablet PC. Some mentioned several conveniences, mobility and enjoyment it offered for them. Some were disappointed because they could not use tablet PC as a laptop. However, 40% of the academics considered tablet PC as their first option. They stated that they first tried a task on tablet PC if they thought that it was possible. The remaining who did not consider tablet PC as the first option were in the science areas. They highlighted that the lack of tablet PC about writing, competency of

programs are reasons for it. They highlighted the deficiencies of tablet PC on academic writing and incompatibility of programs as the reasons for their PC preferences. Half of the academics stated that using tablet reduced the need for other types of PCs:

“Today, I can say that I use my tablet more active than my phone. I just use the phone as a phone. Especially, it [tablet] is very useful in travelling. I am very pleased. I prefer it if I can do the task on the tablet. But first, if I have an experience, I use my desktop or my laptop. The habits always are easier...” (P8)

“...I had thought I would be less dependent on other PCs, but this did not happen. Unfortunately, it [tablet] did not provide my demands. I wanted to use it like a laptop. So, I am not happy.” (P7)

“Well, I like to use the tablet for many tasks. But I do not consider it as a computer. So my first choice is a laptop. It has a more widespread use.” (P5)

### **Advantages and Disadvantages of Tablet PC**

Academicians consider ease of learning, practicality and portability as the most important advantages of tablet PC. On the contrary, they mentioned the difficulty of using programs especially for Office tasks, lack of software and some incompatibility issues. Furthermore, they noted that they are accustomed to the operating systems and hardware of desktop and laptop computers and thus it was difficult for them to change these habits:

“The ease of use depends on the operating system. The same operating system on the tablet and phone relieves the works a lot. You know, we tinkered with computers especially with their operating systems during our childhoods. Imagine! You are a child and need to know what to do. Now in tablets, the program is loaded directly and easily...But the operating systems used on tablets are not suitable for programs such as animation and graphical drawing. This is a shortcoming for us...” (P4)

“The ease of portability, long battery life compared to laptop, user–friendliness, ease and quickness of open and close, high performance due to the slight chance of virus infection. I can say its ergonomic and aesthetic are better.” (P6)

“Its [tablet’s] on/off function is very easy and fast. In addition, the shortcut keys/links on the tablet are very lively and more practical. I can read the documents, but writing is very difficult. I cannot do experiments and simulations because there is no application. From my point of view, writing and creating software are the biggest problem...Portability is very easy, wireless, touch, interactivity is increasing, it is very simple to use applications...Besides, it is difficult to share files, there is no USB port, and this is a big problem.” (P3)

“I think that it [tablet] should be handled to use of professional programs. It is very difficult to use in the professional field. It is not compatible with some of the other devices. This is a major disadvantage.” (P14)

“In my opinion, reading is more difficult on tablets than other PCs because of a small screen, but as I said, it is my idea...I use the laptop if I give citation in my writings. But I want to take notes time to time. On the tablet, these things are much more difficult. We get used to use mouse although it is not suitable for human nature. Therefore, sometimes I have difficulty in using tablets...things get mixed up, I click twice, and something is deleted when scrolling to the right...” (P1)

### **Professional and Instructional Use of Tablet PCs**

One of the aims of our study is to reveal academicians’ usage patterns of tablet PC in their academic lives. Therefore, we categorized the related interview data under the themes of professional and instructional uses. Participants reported various answers for professional uses of tablet PC because of their varying study areas. Those academics with managing positions stated that they used tablet as an agenda. Some academicians who work at science areas highlighted that they used tablet as an experimental tool, a sensor and a technical tool. About 40% of the participants expressed that they delivered course content through making presentation on their tablet PCs. Moreover, some of them mentioned that tablet is a useful device for doing academic research,

sharing course materials or communicating with others.

On the other hand, participants also stated some reasons for why they cannot use tablets professionally or instructively. For example, one fifth reported that they could not use tablet for professional purposes. They think that they do not have enough time to learn how to use it as well as it has limited access and applications for their profession. Almost half stated that they could not use tablet PC for instructional tasks. They believe that tablet PC is incompatible with other computers, sharing files is difficult and there is no time to learn its features:

“It [tablet] is one of my vital devices. I am both a manager and an academic so I am busy. It is like a reminder secretary. It is good for reading but it is hard to say that I use it fully in the lessons. I use the tablet when I need to show a photo or need to look at the Internet” (P8)

“Professionally: I use it for adding images, recording media, GPS location, specific tasks such as hygrometer, thermometer. Academically: I use it for making presentations.” (P15)

“In terms of professional usage; we run some programs related to manufacturing and business parameters on the tablet. I control the businesses for which I am responsible. I think it is easier to use the media, and Skype-like calls are better. But textual and Office works are difficult...” (P8)

“I only use it [tablet] to show something to my friends. Tablet PC allows practical observation and demonstration. I think this is important in architecture.” (P4)

“...I use the tablet PC for lessons or conferences. When we talk about something with the students in the lessons, we have the possibility to search the Internet immediately. I uploaded some books to tablet PC. This also allows me to carry a library with me.” (P13)

### **Performance Increase through Tablet PC**

The common points of participants were that tablet PC caused a performance increase in emailing, Internet and media usage. Also, some stated that it relieved themselves in reading time in different aspects. They further expressed that it could prevent paper waste and resolve light problem through its live screen. Ability to make practical presentations and agenda features were also emphasized as benefits of tablet PC:

“...As I said earlier, especially in text reading, I think it [tablet] is more effective, beautiful, and cost effective. Reading a project on paper is costly, heavy and difficult to transport. Also, it has a bright screen to read. These are important advantages...” (P7)

“It is very fast and practical in the case of email and Internet. I can say I have relaxed...” (P9)

“Tablet makes the reading easier. Honestly, I am more pleased with the tablet for email and browsing the web.” (P11)

“Email, Internet and banking operations have been extraordinarily practical. I think it [tablet] can be bought just for these jobs. The phone does the same things too, but it does not give me confidence.” (P5)

“Tablet allows for checking email, using time more effectively and thus being more active. I do not depend on my house or office anymore. Maybe, it did not make much difference academically, but it has relieved me very much as a manager. I can make decisions faster through it even without having to be there...” (P8)

### **The Comparison of Tablet PC with Other PCs**

In this theme, the tablet PC is compared to the other PCs including desktop, laptop and smartphone in terms of positive and negative aspects. While the participants pointed out tablet's portability, better image quality and more protection against viruses, they highlighted some difficulties in using programs such as Office applications and incompatibility with other PCs as the most important deficiencies of tablet PC:

“Portability, elegance, ergonomics are ahead of the desktop...I use the desktop at school. I think writing and reading are easier on the desktop. I use the phone and tablet for entertainment, Internet, and email...The desktop and the laptop make it possible to use a mouse as a habit. My

first choice is the desktop because of the writing. So obviously, I have not considered the tablet like a computer and could not use it.” (P11)

“Let's start with the superior sides of the tablet. Battery life and carrying. The simplicity of opening and closing and nice to touch. Drawbacks...we need to do simulation and application tasks on the desktop or laptop. But I can use the tablet anywhere even lying down. I think the screen of tablet is more quality and healthier.” (P2)

“I use the desktop in my office for academic studies. The small screen of my tablet does not affect me. Not too small anyway, 10 inches. Especially, it is perfect for trips. It is elegance, handy and its visual display is better than others. I think the deficiency of it is related to writing. But it seems unnecessary for me to get a keyboard because I do not need it.” (P5)

We noticed that our participants were contradictory on some issues. For example; two of them considered that tablet performed better, while another two were not satisfied with its performance. Similarly, a couple of participants mentioned that tablet PC did not seem to be serious and reliable enough, while one emphasized that it was more protected. Also, while a few thought tablet PC was more practical and useful, they stated that they could not use it too much because of its limited functions:

“...the advantages include easy portability, long battery life, user-friendliness and easy on/off. Its [tablet's] performance is good because of strong protection from viruses...Regarding the positive aspects of laptop, many programs work with together and my documents are in it. Also, it is available for Office and other professional programs.” (P6)

“Laptop is in the lead in terms of program coding and writing text on Office because of its higher performance, keyboard availability, and bigger screen size. But I definitely prefer the tablet for other works.” (P3)

According to the academicians, the main difference between tablet PC and smartphone is the screen size. The better battery life and superior performance were seen positive aspects of tablet PC compared to others. Also, some participants mentioned that tablet was manufactured with better quality, had bigger memory and was more educational, so it was seen as a more reasonable device than the smartphone. On the other hand, participants using smartphone reported that the phone was always with them and they used common applications more often on the phone due to its more practicality:

“The software of my tablet is the same with my phone's. The first difference is the screen size and tablet is faster and better in terms of battery. The phone is constantly in my pocket. So maybe I use it more often. Portability is easier and the phone is a necessity.” (P1)

“The phone is always with me but its battery finishes faster, maybe twice a day. I consider that the tablet is more quality. It is a more reasonable tool than a smartphone. And also, I never compare a tablet with a laptop or a desktop.” (P11)

“Charging times are different, the tablet is better. The screen looks more like a good. The phone is too slow. I also do not read on the phone because its screen is too small.” (P15)

### **Health Issues in Tablet Usage**

The participants believe that tablet's mobility features relieve them, modify the environment easily and it has a better quality of screen that is more healthy for human eyes. On the contrary, some academics stated that tablet could overstrain eyes and increase body fatigue because it is always with them:

“Obviously, as a doctor, I have always thought about this. The desktop computer is very stable. To carry a laptop is a little harder than a tablet. Because it is heavy with its bag and add-ons. Using a tablet and a phone is similar and requires closer look at the screen, which might cause pressure on the eyes.” (P5)

“I think the desktop is more comfortable. There is an appropriate seating arrangement and it is easier to look at because the screen is quite bigger.” (P9)

“Tablet is very flexible; you can use it in every bodily position. It is very good about it. The biggest disadvantage of others is that the skeletal system may become tired.” (P14)

“Well, some healthy issues occur if you want to handle everything on tablet PC. We use the tablet and the phone more closely. It is true that we are exposed to more radiation in this direction...But the bigger screen of a desktop is easier to see. I think this is why the eyes are tired less than others” (P15)

### Future Expectations of Tablet PC

Participants' expectations about the improvement of tablet PC are focused on structural developments, resolving software–hardware deficiencies and incompatibilities, and ease of writing and office applications. The structural expectations include greater screen size, reduced weight and thickness, increased battery and memory capacity, resolved file sharing problems, and lowered specific absorption rate (SAR) values. While participants expressed the benefits of tablet PCs, they emphasized the incompatibilities because of the differences in operating systems. One of the common views of participating academics is that tablet PC is not particularly suitable for academic writing. Participants, as a result of this, marked the smallness of the screen, low performance of virtual keyboard synchronization, and difference and incompatibility of office programs in PCs. They suggest improving transcription programs, increasing the effectiveness of writing equipment like SmartPen, and facilitating the usage of additional keyboards:

“The biggest problem for me is writing and developing software. There are also shortcomings in terms of applications. However, I would state that certainly, tablet PC will take the place of other computers. For this, companies should develop themselves in terms of performance and application.” (P2)

“1. The writing applications should be improved. 2. The number of programs suitable for tablets must be increased significantly. 3. Transcription programs should become widespread so that the writing problem can be solved in this way. 4. It should be lighter and thinner and foldable screen technology can be integrated into the tablet.”(P3)

“The screen should have bigger size but it should not affect portability. Tablet manufacturers should increase its performance and number of applications. I have a SmartPen, but it is not much useful. The work on paper is better and faster. ” (P4)

“The writing problems can be solved through speech recognition systems...Battery can go longer, a projector can be integrated into tablet PC, and virtual keyboards can be added in the future.” (P13)

### Discussion and Conclusion

When interview records and findings are examined, the ease of portability seems to be the most important reasons for academicians' choice of tablet PC. In addition to this, they seem to be affected by social sphere consisting of advertisements, friends, and comments in the decision to buy a tablet PC. They have not read any scientific article about it before buying their tablets. They get the necessary information from advertisements designed to sell the product, unfiltered internet reviews, or subjective opinions of friends. According to these findings, tablet's ease of portability, elegance and appearing as a social status tool in the society are the main determinants of its adoption. In fact, some participants think that enthusiasm about a new technology, peer influence and feeling of becoming more valuable and charismatic due to the ownership of tablet led them to buy a tablet PC. These findings show that HCI components (e.g., user, tool, environment, tasks) affect the reasons and thoughts of purchasing a tablet PC. Brand appears to be the most important factor for academicians' tablet preferences, getting ahead of performance, price, ergonomics, and so on. This indicates the power of brand in increasing the positive perception, emphasizing the importance of intention as a TAM factor. Therefore, consistent with the previous studies (Lederer et al., 2000; Özer et al., 2010; Lin, 2013), our study supports the premise that perceived usefulness and perceived ease of use impact the intention to use a technological device.

Academicians' thoughts vary before they buy a tablet PC. It is clear that they want to use it like a desktop or a laptop. This is not surprising because people expect to carry out their habits on their new tools. It is hard to perform a task by using two different devices. In general, findings show that participants have these concerns. The interviews do not indicate any reduction in the need and use of other PCs for those who have started using tablet PC. Another important point here is that habits guide people. People wonder new technologies and show

interest to their innovations, but they also want to continue their habits. This supports the idea that the most complex aspect of the HCI domain is the user (Çağiltay, 2011).

Participants state that they can easily use the tablet but cannot do all their works on it. This situation complies with perceived ease of use factor of TAM but not with task component of HCI. Task ensures that users can do what they want to do with technology (White et al., 2005). The interviews with academicians reveal that tablet PC is not adequate to do all their works. Tablet PC is a device that can always be with users because of easy portability. Half of the participants always carry their tablets and use them continuously if needed. Other participants prefer to keep the tablet at home and use it at the end of the day. The main factors for using the tablet mostly at home include lack of subject-specific programs, difficulty in academic writing and preparing lecture notes and using tablets mostly for communication and entertainment purposes. Another important detail in the explanations is that half of the participants keep the smartphone with them constantly. They believe that they can do most of their works on the phone and thus they do not want to carry a second device.

One of the important aspects of our study is the investigation of academicians' tendencies of using tablet PC in their professional and teaching activities. We found that participants who have also managing positions used the tablet as an active agenda. Some academics used multimedia applications for visualization purposes. Some used as a GPS device. Similar results exist in the literature as well (e.g., Clegg et al., 2006). It is possible that people who go on short trips can remotely manage their businesses through their tablets. Besides, tablet PC provides the academicians who study in technology areas with the opportunity to improve themselves. In terms of teaching activities, academicians want to use tablets actively in class, but they seem to have some difficulties about it. Generally, instructors prepare course presentations on a desktop or a laptop, but they prefer tablet PC for presentations. For this reason, academicians think that it is inadequate in preparing a presentation. This thought is affected by the unfamiliarity with tablet PC and its applications, inexperience with the use of touch-screen, and the tendency to maintain previous PC usage habits. The results show that some of the participants communicate on tablets with each other about lessons and research studies and share related documents. This demonstrates that the use of tablet PC contributes to teaching and learning outside the classroom. Besides, it marks that tablet has a potential to increase communication and interaction between teachers and students.

Although participants' opinions on the advantages and disadvantages of tablet PC vary, ease of portability and learning are expressed as the important advantages while the inadequacy and incompatibility of applications are seen as major disadvantages. It is salient that participants have dissimilar opinions about the issues of screen size and difficulty of reading. Some prefer tablets for reading, while a few see tablets weak for reading. Likewise, some note that tablet's screen size is wide and sufficient, while others state that tablets with larger screens will be more functional. The divergence here comes from user characteristics and their preferences. Especially in the technical fields, it is natural to ask for tablet PCs with larger screens. Some participants suggest that tablet manufacturers can solve this problem with foldable screen technology. Again, these findings support the opinion that the user is the most complex component of the HCI. Therefore, it is difficult to produce a product that will satisfy all users. Different users are in contrast to each other about the same function or feature. Another important issue is that tablet PC usage is affected by changes in the environment, indicating the importance of context component of HCI. Academicians using tablets in different areas and environments use different functions of their tablets and thus they have different expectation and satisfaction.

Academicians' use of tablet PC is not similar to their previous habits on computer usage. Participants hope to use tablet PC like a laptop or a desktop. However, it has not given exactly what they want yet because its different operating system and programs, new touch-screen technology and lack of applications limit their usage. Participants' desire to continue their habits in the new technologies is an example for the influence of user expectations on perceived usefulness and perceived ease of use. In spite of being satisfied with tablet PC, participants do not prefer it as a first PC option. One reason for this preference can be that tablet PCs might have not fully reduced their needs for other PCs. From the HCI perspective, it can be said that the device is not suitable enough for the tasks. According to participants' views, the task component of HCI affects their PC usage and preferences. So, the (in)ability of the device (e.g., tablet PC) to complete the tasks emerged by the users in a given context impacts user views on the device (e.g., perceived usefulness and perceived ease of use).

The results reveal that tablet PCs are generally compared with smartphones due to the similarities in their operating systems and functions. Participants do not want to carry two devices similar to each other. Half of the participants use their tablets only at home. While academicians indicate some differences (e.g., screen size, battery life) between tablet and smartphone, they think that tablet is more educational and reasonable. Looking at this from the HCI perspective, although tablet and smartphone are similar in terms of task component, they

have different features in terms of the tool component. This result shows the interaction of TAM and HCI components on the usefulness and ease of use of a technological tool.

In this study, academicians also evaluate the tablet PC in terms of human health. They believe that the smaller screen size of tablet PC and its long term usage may cause more fatigue. However, some participants also think that tablets provide ease of movement and quality images. Ergonomics research on tablet PCs is still in its infancy stage. Hence, users do not have much information about tablet PC ergonomics and related health issues. A few studies on the subject suggest that tablet PCs cause more curvature of the spine and thus more fatigue (Young et al., 2012). It is important to increase scientific research on ergonomics of tablet usage and informing potentials users about the possible health risks.

Participants want to use tablet PC for many tasks in different areas. For this reason, they have some expectations and suggestions to producers. First of all, they expect tablets to reduce the need for other types of computers. The proliferation of applications for the tablet PC and the ease of office applications are fundamental expectations. They think that synchronization of the virtual keyboard is somewhat slow. They recommend standardizing the specification of additional keyboard among the producers and facilitating the use of related hardware such as SmartPen. Another expectation related to their profession is to improve the transcription technology for academic writing. They look forward to having tablets with a larger screen but lighter and thinner. Furthermore, some participants point out the necessity of increasing battery and memory capacity and solving file sharing problems. Considering the analysis of their expectations, the interaction of the TAM and HCI components once again appears here. The user builds a preliminary attitude against the tool through his/her positive or negative perceptions about it. This preliminary attitude offers an intention to the user. The user tests the tool's functions within a context and this affects his/her attitudes, perceived usefulness and perceived ease of use. As a result, the user expresses satisfaction or dissatisfaction with the tool according to these experiences.

In closing, based on the findings of this research, we offer some suggestions to the tablet PC users, producers and academicians who study this tool. Users should access the information they need about the tablet PC through objective research and suspect subjective evaluations. They should prefer those tablets that comply with their needs. Tablet PCs are not produced to replace other PCs and thus they may not do some tasks which other PCs can. Therefore, the users should determine their expectations from tablets with this in mind. It is clear that the interest shown for the tablets in the last decade is going to continue and that the focus point of PC world will still be tablet PCs. Besides, the choice of a smaller, performance-capable computer is quite natural. Technology manufacturers aim to increase and diversify their products and users portfolio by developing more useful products based on the evaluation of previous ones. Therefore, it is obvious that those who consider user experiences and expectations will most likely to be preferred among the consumers.

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### Appendix. The Interview Questions

- (1) First of all, would you tell us a little bit about yourself? (title, gender, age, work experience, department, etc.)
- (2) How long have you used tablet PC?
- (3) What are your reasons for purchasing a tablet PC? (the shortcomings of other PCs, properties of tablet PC, imitation, etc.)
- (4) What are the factors that affect your tablet PC usage?
- (5) What did your opinions about tablet PC before buying it?
- (6) Could you tell us about the features of your tablet? (size, operating system, price, etc.)
- (7) How often do you use your tablet PC?
- (8) Do you select your PCs by environment?
- (9) Which purposes do you use tablet PC for?
- (10) Could you tell us whether you use tablet PC efficiently?
- (11) How do you use tablet PC in your profession and teaching?
- (12) In which functions of the tablet PC do you most use?
- (13) Is there a field of use where you enhance your performance using your tablet PC?
- (14) What can you say about the ease of use or difficulty of your tablet PC?
- (15) Which features on the Tablet PC do lead you to use the tablet PC? What are the superior features of it?
- (16) What about the advantages and disadvantages of tablet PC if you compare it with other PCs?
- (17) Is there a decrease in your need for other types of PCs after owning your tablet PC?
- (18) Now that you own a tablet PC, can you say that your first PC choice is a tablet? or Is it an alternative device for you?
- (19) Do you use a smartphone? What are the differences that you see between your smartphone and tablet PC?
- (20) Certainly, one of the most important issues to be evaluated in technology use is our health. The effect of PC use on eye, nerve and skeletal health has been the subject of research before and identified some negative effects. How do you evaluate this situation with your experiences with tablets?
- (21) What do you think about the shortcomings of tablet PCs?