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Factors Influencing Intention of Greek Consumers to Use Smart Home Technology

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Abstract: New technologies' advances offer innovative automations to people's daily lives. More and more devices are continuously connected to the internet allowing people to control them remotely. The smart home is such a technological development. However, it is uncertain whether and to what extent the average consumer will accept smart home technology. The purpose of this study is to investigate the factors that affect the intention of Greek consumers to use smart home technology. The results of this study show that Greek consumers are beginning to have a positive attitude towards smart home technology. Important factors that contribute to their intention to use smart home technology include their perceived usefulness, compatibility, and ease of use of smart home technology. On the contrary, they do not think that they are influenced by their social environment regarding their intention to use smart home technology. Finally, they think that the major benefits of using smart home technology include the health monitoring, home security, and cost savings.

Keywords: Greek consumers; perceived compatibility; perceived enjoyment; perceived usability; perceived ease of use; smart home; smart technology; technology acceptance model

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1. Introduction

Recently, the internet has literally entered into our homes, offering automations that facilitate our daily lives. People can control internet-connected devices using just a smartphone or a tablet. The smart home includes a set of devices and services which work individually and together to interact with each other and the user thanks to Internet of Things (IoT) technologies [1]. A smart home is a "home equipped with computer and information technology, which meets the users' needs, working to increase their comfort, security, and entertainment through the management of technology in the home and with the rest of the world" [2]. Smart home services and devices include energy information services [3], services that control interaction between devices [4], payment services [5], lighting control devices [6], interconnected smart white appliances such as smart fridges and washing machines, entertainment devices such as smart TVs, household robots used for various home chores [7], smart thermostats and assisted living systems and devices [8], smart security systems including automated devices such as smoke detectors, smart locks, and doors, and motion detectors [9]. Empirical studies have shown that consumers have a positive attitude towards the use of smart technologies, pointing out benefits such as cost and time savings. In addition, smart home technology can control and reduce the household's energy consumption. Regarding people's well-being and psychology, smart technology can help people that feel isolated, providing them with companionship, support, and assistance. Although smart home technology can reduce energy bills, there is a high cost in buying, installing, and maintaining it. Furthermore, there are ethical challenges as well as legal obstacles such as the lack of legal coverage in using smart home technology.

Although the smart home market is still at an early stage in Greece, more and more Greek consumers have begun to show interest in smart home technology. For example, Tellogleio Foundation in Athens operates a smart energy management system consisting of sensors, controllers, and computer devices covering a building with an area of

5500 square meters [10]. Another building in Gerakas, Athens, provides automated lighting, cooling, and energy management and was implemented via KONNEX technology [10]. Furthermore, Hellas Dom, an integrated device and home management system, enables the management of audiovisual material, as well as the provision of services such as teleconferencing, home security, fire safety services, and more [11].

Next, this paper presents previous studies on smart homes and states the problem to be investigated. Then, the paper presents the methodology, the survey, and the findings. Subsequently, it discusses and analyzes the results. Finally, it concludes, states limitations, and suggests future research directions.

2. Previous Studies and Hypotheses

Despite the technology advances and the expected benefits, there is a limited number of studies that have investigated users' perceptions and acceptance of smart homes. Users in the UK, Germany, and Italy liked the tangible benefits and improved quality of life, but had concerns regarding risks of installation failure, privacy, and difficulty in using smart home technology [12]. Therefore, the penetration of smart homes into people's daily lives is still low, with the United States leading the market, and Japan, Germany, Sweden, and Norway following [13]. Kitchen smart devices are leading the devices market [14]. However, the literature review showed that there are no smart home studies regarding Greek consumers.

Various researchers investigated the degree of smart home technology adoption using popular frameworks and models such as the technology acceptance model (TAM) [15] and innovation diffusion theory (IDT) [16]. TAM investigates the consumer's technology acceptance through perceived usefulness (the degree that a user believes that a new technology will offer more positive and useful outcomes than a different or prior technology) and perceived ease of use (the degree that a user believes that it will be easy to use a new technology). Other researchers [17] argued that it is necessary to extend TAM according to the characteristics of the technology being analyzed, because consumer goals are different for each technology. Thus, extra factors to be measured were added to the TAM such as compatibility and protection of user privacy. Compatibility (the degree to which new technology will work and interact with other home appliances that pre-exist or are to be purchased in parallel) is a critical factor in adopting smart services as it is important to determine whether and to what extent home services are interoperable with various home appliances and external services [17]. This model is suitable for understanding and interpreting a consumer's attitude towards smart home technology, as well as for investigating the factors that influence its adoption. The variables used in this study will be discussed further below.

While TAM looks at a number of factors that explain the acceptance of technology, such as compatibility and ease of use, the factors discussed in the innovation diffusion model focus solely on technology-related criteria [18]. According to [16], the diffusion of innovation is a procedural sequence in which an innovation is communicated through certain channels between the members of a social system. The rate of dissemination is determined by the rate of adoption, which is related to various characteristics of innovation. The following five characteristics of innovation are related to each other, from the point of view of the potential user: relative advantage, complexity, compatibility, the possibility of testing the technology, and the observability of innovation [16].

The most important category of factors that affect the technology adoption by consumers is related to the technology itself. The decision to adopt smart home technology can be explained by the perceptions of the individual consumer about its features [17]. Perceived usefulness shows how much the users value the usefulness of the device or service they use; therefore, users will not use smart technology if they will not find it useful [19]. Furthermore, perceived usefulness is the best predictor of the intention to use smart homes [19]. German consumers stated that they will not use smart technology if they do not find it useful [19]. Therefore, the following hypothesis is introduced:

Hypothesis 1 (H1). *Perceived usefulness is positively related to intention to use smart homes.*

The cost factor (the degree to which the cost of installing, maintaining, and repairing new technology differs from the cost of old or other technology) [20] is directly related to perceived utility. Consumers will adopt a new technology, as long as the benefits outweigh the cost of installing and using it. It is possible that the maintenance costs and low energy savings discourage users from adopting smart technology systems [21]. Many scholars in the past have defined perceived cost as the sum of a consumer's doubts about the cost of purchasing, maintaining, and operating an intelligent system [21]. Therefore, the following hypothesis is introduced:

Hypothesis 2 (H2). *Perceived cost is positively related to intention to use smart homes.*

Perceived ease of use is the degree to which the user believes that the new technology is manageable and easy to use [22]. This variable can be defined as the perceived effort of consumers when using smart technology in their home environment. This variable can also be influenced by another factor such as social influence (SI). Social influence is the extent to which the consumer is influenced by his/her social environment in adopting a new technology [22]. In short, society will stimulate the consumer who is not aware of smart technology through friends, experts, social media, newspapers, and television. Therefore, the following hypotheses are introduced.

Hypothesis 3 (H3). *Perceived ease of use is positively related to intention to use smart homes.*

Hypothesis 4 (H4). *Social influence is positively related to intention to use smart homes.*

One last factor that affects intention of consumers to adopt smart technology is compatibility. Consumers want to know if the smart device that they are going to buy can efficiently interact and communicate with other devices in the same environment. Thus, the compatibility directly affects the variables mentioned above, the perceived usefulness and the perceived ease of use. According to a recent study [23], compatibility was very important for people with a high level of education and especially for females. In addition, a user's perceptions regarding the compatibility, connectivity, and reliability of the smart home technology as well as the installation's complexity may lead the user to avoid the adoption of smart home technology [24]. Therefore, the hypothesis is developed as follows:

Hypothesis 5 (H5). *Perceived compatibility is positively related to intention to use smart homes.*

The last category of factors that influence the consumer's intention to use smart home technology is the variables that have to do with human personality. Such variables are trust and perceived enjoyment. Consumer trust (the degree to which the consumer trusts a new technology and its operation) plays an important role in trying to overcome any doubts and uncertainties about the adoption of smart technology. Thus, in the general context of smart technology, trust in smart homes is positively related to consumer behavior in terms of their intended use. Therefore, the following hypothesis is introduced:

Hypothesis 6 (H6). *Trust is positively related to intention to use smart homes.*

Perceived enjoyment in the context of smart home technology has to do with the belief that the use of smart technology is enjoyable in itself, regardless of any performance implications that may arise. In the present work, perceived enjoyment is defined as the extent to which the use of smart home technology is fun and enjoyable [20]. Perceived enjoyment has been considered as a factor influencing the adoption of smart home technology [20]. In the same context, perceived enjoyment is related to perceived ease of use, due to the fact

that an easy-to-use and operating technology will only bring a positive feeling to the user and boost his/her self-confidence. Therefore, the hypothesis is:

Hypothesis 7 (H7). *Perceived enjoyment is positively related to intention to use smart homes.*

The purpose of this study is to investigate the degree of intention to use smart home technology services by Greek consumers, to record the benefits and disadvantages of using smart home technology services and to investigate which of these factors affect the acceptance of smart home technology in Greece. In the present research, the technology acceptance model was used as a basic model for interpreting consumer behavior, and for this reason the factors that were evaluated and considered to influence the intention to use smart home technology are perceived usefulness, perceived convenience, perceived cost, perceived compatibility, social influence, and perceived enjoyment. These variables have been investigated by a number of studies which have shown that consumer behavior can be influenced by each one of them [19–27].

Figure 1 shows the research model to be investigated in the next sections. It presents the relationships among all variables that may affect the participants' intention to use smart homes.

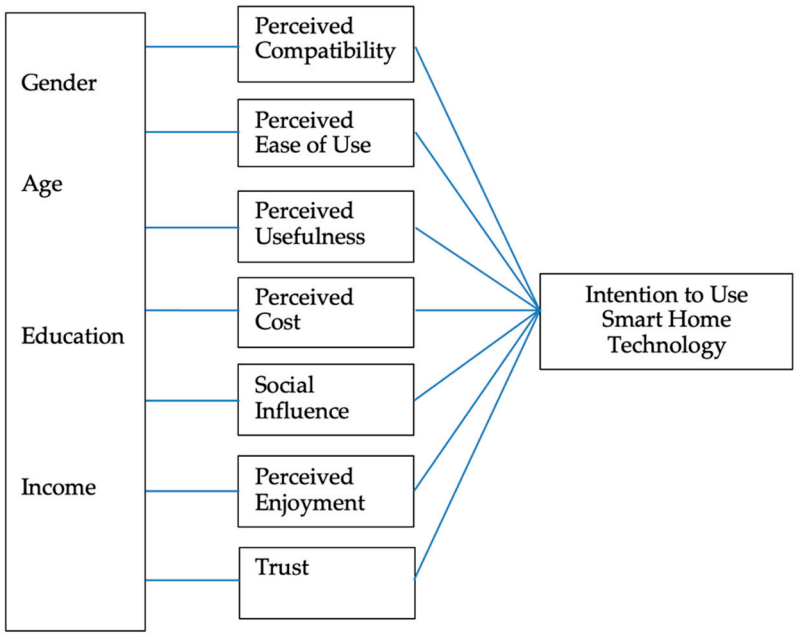

Figure 1. Graphic model of variables' correlations.

3. Methodology

3.1. Type of Research

Based on previous related studies, a quantitative survey was employed using a questionnaire. A cross-sectional survey was conducted to capture the current perceptions of individuals regarding smart home technologies. Using a questionnaire, we can also measure the relationships between variables that are measurable and then statistically analyze these measurements. The questionnaire can be sent to a large number of people, it is easily created and handled, and the respondents have more freedom to choose their answers, while modern computer packages make the analysis of the results easier and the process less time consuming [28]. This study followed a three-stage research process: research and questionnaire design; data collection; data analysis and conclusion.

3.2. Sample

Convenience sampling (non-probabilistic technique) was chosen as it was the fastest sampling technique. Convenience sampling selects samples from the population based on the researchers' convenient accessibility and proximity. The questionnaire was distributed via Facebook and email to 158 individuals in the area of Oreokastro and the wider area of central Thessaloniki, Greece. The questionnaire clearly stated the purpose of the study and a description of smart home technologies, guaranteed respondents' privacy, and asked for their voluntary participation in the survey by clicking a hyperlink to the questionnaire Google Form. Out of 138 completed questionnaires (response rate equal to 87.34%), 30 questionnaires were excluded due to missing information and other errors. The final sample amounted to 108 useful questionnaires.

3.3. Questionnaire Design

The questionnaire asked for the participants' consent to voluntarily and anonymously provide their perceptions about smart home technology and services. The first section of the questionnaire includes questions about the demographics of the respondents and specifically their age, gender, level of education, employment status, annual income, number of family members, and level of information technology and mobile knowledge and use. The second section includes 23 scale questions regarding the factors that influence the adoption of smart home technology. For each of these 23 questions, the user can select one out of 5 choices (5-point Likert scale from one to five) declaring the degree of agreement or disagreement regarding perceived usefulness, intended use, perceived ease of use, perceived compatibility, perceived cost, perceived enjoyment, and social influence. Finally, the participants were able to indicate which benefits and barriers of the smart home technology are most important to them and which household devices they use, would use, and will use in the future in their own environment. The questions (items) are presented in the corresponding Tables A1–A10 in the Appendix A.

3.4. Statistical Method

Analysis of the data was performed in SPSS version 25 statistical processing software. For data analysis, both techniques and indicators of descriptive analysis were used: percentage (%) and frequency (n) as well as mean value (MT) and standard deviation (TA). The data analysis followed similar statistical methods as in previous studies in other fields [29–31]. *t*-tests and one-way ANOVA were used to investigate differences in the demographic characteristics of the participants. The Pearson correlation coefficient was used to investigate whether there is a significant correlation between the factors associated with the use of smart technology and the intention to use smart technology services. In order to investigate the demographic characteristics of users and their perceptions regarding smart technology services, the technique of multiple linear regression was used through forward selection methods. All analyses were performed at a minimum level of significance $\alpha = 0.05$. According to Table A11, the study is defined as trustworthy, as the Cronbach index takes values between $\alpha = 0.655$ and $\alpha = 0.852$.

4. Findings

The social and demographic profile of the consumers is an important variable in the adoption of smart home technology. Highly educated consumers adopt innovation more easily than the less educated [13]. Additionally, less educated people can even resist new technologies and so low education could become an obstacle to technology adoption [19]. Regarding age, younger people adopt new technologies easily and older people avoid technological changes in their daily lives [23]. The participants (n = 108) were mostly females (54.6%) (males, 45.4%) (Table A12). Additionally, 38.9% (n = 42) of the participants were up to 26 years of age and 38.9% (n = 42) were aged 26 to 35 years. Regarding their educational level, 62% (n = 67) of the participants were graduates of higher education and 25.9% (n = 28) held a master's degree (Table A12).

Table A1 presents the participants' responses to the items that describe their perceived usefulness of smart home technology. They recognize to a very large extent that the use of smart home services and appliances facilitates the control of the operation of the house (M = 4.3). Similarly, to a large extent, they value services in areas such as home security that will be based on new technologies (e.g., security cameras) instead of traditional security methods such as the standard alarm (M = 3.9). Finally, regarding which services and devices of smart technology they use most often, it emerged that the most popular services/devices are payment services (e-banking) (M = 4.4), smart entertainment devices (smart TV, headphones, speakers) (M = 4.4), and network devices (routers, smartphones, printers) (M = 4.3). To a lesser extent, they use energy information and electricity management services (M = 2.4), interaction control services and operation of home appliances (M = 2.4), business information services (M = 2.5), smart smoke detectors (M = 2.0), telemedicine services (M = 2.5), smart thermostats (M = 2.2), and household robots and robotic cleaning devices (M = 2.0). On average, they expressed a moderate level of perceived usefulness (M = 3.0).

Table A2 presents the participants' responses to the items that describe their perceived ease of use of smart home technology. They recognize to a great extent that it is easier for people with mobility difficulties or the elderly to use services such as telemedicine than to visit a doctor or hospital that requires transportation (M = 4.3). Similarly, to a large extent, the participants feel able to use the smart devices of their home without learning or having technological specialization (M = 3.9). However, there are moderate difficulties for elderly people in the family environment to operate smart home appliances (M = 2.9). On average, they expressed a moderate to high level of perceived ease of use of smart home technology (M = 3.7).

Table A3 presents the participants' responses to the items that describe their perceived compatibility of smart home technology. To a great extent, they feel comfortable with electronic payment services such as e-banking (M = 4.3). Additionally, to a moderate extent, they feel that the use of smart services and devices is compatible with their daily activities (M = 3.2). Finally, their responses showed that, to a moderate extent, voice command services such as Google Nest or Apple Siri are ideal to interact with their home devices (M = 3.2). On average, they expressed a moderate to high level of perceived compatibility of smart home technology (M = 3.7).

Table A4 presents the participants' responses to the items that describe their perceived cost of smart home technology. They largely recognize that the use of smart home technology helps them save money through its applications (M = 3.9). In addition, to a moderate extent, participants feel that they can meet their needs by paying lower prices than those of smart home services (M = 3.6). Finally, they believe that the cost of installation, repair, and maintenance of smart home technology is high (M = 3.4). On average, they expressed a moderate to high level of perceived cost of smart home technology (in comparison to the cost of the old or another technology) (M = 3.6).

Table A5 presents the participants' responses to the items that describe their social influence regarding smart technology. They will be moderately affected if their social environment buys a state-of-the-art device (M = 2.9). In addition, they moderately acknowledged that the application for the new messaging service of 13033, the use of which was recommended by the state during the lockdown period, leads them to use their mobiles more (M = 2.8). Finally, they admit to a small extent that they want to be the first to buy a new product, due to the fact that they will stand out from the rest who use older technology devices (M = 1.8). On average, they expressed a moderate to low degree of influence from their social environment (M = 2.5).

Table A6 presents the participants' responses to the items that describe their trust in new technologies. They moderately avoid using services such as telemedicine because they believe that they may not receive services similar to those from a physically present doctor (M = 3.2). In addition, they moderately acknowledged that it is safe to provide personal information to providers of smart devices such as Google Nest or Apple Cloud

(M = 3.2). Finally, they are to a small extent afraid to use electronic payment services such as e-banking, for fear of others intercepting their data (M = 2.1). On average, they expressed a moderate degree of trust in new technologies (M = 2.8).

Table A7 presents the participants' responses to the items that describe their perceived enjoyment from using smart home technology. They largely believe that the use of smart home services and entertainment devices is fun when they have to spend many hours at home (M = 4.3). In addition, they largely acknowledged that the use of devices makes them feel comfortable during the lockdown period because they can get in touch with others via the internet using a smartphone or tablet (M = 4.6). Finally, to a great extent, they recognize that they can watch the same movie or listen to the same music on different devices through their connection to the home network (M = 4.4). On average, they expressed a high level of perceived enjoyment from the use of smart home technology (M = 4.4).

Table A8 presents the participants' responses to the items that describe their intention to use smart home technology. The most popular technologies include e-payment services (M = 4.5), smart entertainment devices (e.g., smart TV, headphones, speakers, etc.) (M = 4.5), and network devices (e.g., routers, smartphones, printers, etc.) (M = 4.4). On average, they expressed a moderate to high degree of intention to use smart home technology (M = 3.7).

Table A9 presents the importance of various benefits of using smart home technology according to the participants. They consider as the most important benefits the monitoring and management of patients and the elderly (M = 4.5) (in agreement with Lee et al., 2014), as well as the storage of health records and electronic prescriptions (M = 4.5). Improving home security systems (M = 4.4), saving money (M = 4.4) (in agreement with [32]), simultaneous use of different entertainment systems (M = 4.3), control and management of energy use (M = 4.2), temperature control (M = 4.1), and automatic control of white devices (M = 4.0) follow.

Table A10 presents the importance of various barriers to the use of smart home technology according to the participants. They consider as the most important barriers the lack of awareness and resistance to change (M = 4.0) (in agreement with [19]), possible breach of security data (M = 3.9) (in agreement with [12,19]), installation, maintenance, and repair costs (M = 3.9) (in agreement with [25]), as well as the complexity of installing and managing smart technology (M = 3.8) and the devices' interconnectivity (M = 3.8) (in agreement with [33]).

The results of the *t*-test according to the participants' gender (Table A13) showed a significant difference with gender in terms of the level of perceived usefulness (t = 2.033, $p = 0.003$), the level of perceived ease of use (t = 2.442, $p = 0.016$), and the intention to use (t = 3.169, $p = 0.002$). More specifically, the results showed that males express a higher level of perceived usefulness and perceived ease of use while having a greater degree of intention to use smart home technology.

The results of the one-way ANOVA test in terms of the participants' age group (Table A14) showed that there are no significant differences in terms of age in any of the dimensions studied ($p > 0.05$ in all cases).

The results of the one-way ANOVA test in terms of the participants' educational level (Table A15) showed that there are no significant differences in terms of educational level in any of the dimensions studied ($p > 0.05$ in all cases).

The results of the one-way ANOVA audit in terms of the participants' income (Table A16) showed a significant difference with income in terms of perceived usefulness level (F = 2.749, $p = 0.047$) and social influence (F = 2.891, $p = 0.039$). More specifically, the results show that people with higher incomes express a higher level of perceived usefulness while people with incomes up to EUR 5000 per year show a lower degree of social influence.

According to Table A17, perceived usefulness (r = 0.778), perceived ease of use (r = 0.443), perceived compatibility (r = 0.462), social influence (r = 0.290, $p = 0.002$), and perceived enjoyment (r = 0.221, $p = 0.023$) are positively related to the intention to use smart home technology. Perceived usefulness is positively related to perceived ease of use (r = 0.470), perceived compatibility (r = 0.438), and social influence (r = 0.356). Per-

ceived ease of use is positively related to perceived compatibility (r = 0.598), perceived cost (r = 0.333), social influence (r = 0.247), and perceived enjoyment (r = 0.465). Perceived compatibility is positively related to perceived cost (r = 0.254), social influence (r = 0.254), and perceived enjoyment (r = 0.467). Finally, social influence is positively related to trust (r = 0.378). Previous studies [8,24,25,32,34] found similar results.

5. Discussion

The purpose of this study was to investigate the degree of acceptance of smart home technology services by Greek consumers, to record the benefits and disadvantages of using smart home technology services, and to investigate what factors affect the acceptance of smart home technologies in Greece. In the present research, the technology acceptance model was used as a basic model for interpreting consumer behavior, and for this reason the factors that were evaluated and considered to influence the intention to use smart home technology are the following: perceived usefulness, perceived convenience, perceived cost, perceived compatibility, social influence, and perceived enjoyment. These variables have been investigated by a number of studies which have shown that consumer behavior can be influenced by each one of them [13,19,22,23].

The findings of the present study showed that Greek consumers recognize to a moderate level the usefulness of new technologies with the most popular services and devices being payment services (e-banking), smart entertainment devices (smart TV, headphones, speakers), and networking devices (routers, smartphones, printers). In addition, Greek consumers are moderately aware of the conveniences provided by new technologies. One of the most important facilities provided by new technologies is the ease of using services such as telemedicine for people with mobility difficulties or the elderly. Similarly, Greek consumers appreciate, to a moderate to high level, the compatibility of new technologies and to a high level the perceived enjoyment of using new technologies. On the contrary, Greek consumers recognize the high cost of new technologies. Regarding the possible social influence, Greek consumers seem to be accepting, to a moderate to low degree, of social influence in the use of new technologies. Finally, Greek consumers show a moderate level of trust in the use of new technologies. These results confirm that the use of smart home technology offers some degree of convenience to users [32,35] and a high degree of compatibility [25]. The main negative factors of using smart home technology include the low confidence of users in these technologies [20] and the high cost [21].

The results show that perceived usefulness, perceived ease of use, perceived compatibility, social influence, and perceived enjoyment are positively related to the intention to use smart home technology. Perceived usefulness is positively related to perceived ease of use, perceived compatibility, and social influence. Perceived ease of use is positively related to perceived compatibility, perceived cost, social influence, and perceived enjoyment. Perceived compatibility is positively related to perceived cost, social influence, and perceived enjoyment. Finally, social influence is positively related to trust.

In addition, males express a higher level of perceived usefulness and perceived ease of use while having a greater degree of intention to use smart home technology. Additionally, participants with higher income express a higher level of perceived usefulness while participants with income up to EUR 5000 per year show a lower degree of social influence. However, there are no significant differences in terms of age and in terms of educational level.

6. Conclusions, Limitations, and Future Research

Previous studies investigated the acceptance of smart home technologies in various countries but not in Greece. Furthermore, previous studies did not consider all combinations of factors, benefits, and obstacles investigated by this study. The results of the research showed that Greek consumers recognize to some extent the usefulness of smart home technologies as well as the facilities that they provide such as monitoring and managing patients and the elderly, saving money compared to previous methods, and managing

energy consumption. Furthermore, they are attracted by smart home technology due to the financial benefits it offers, something that particularly affects the elderly who have to spend a large part of their money on their health care. On the other hand, Greek consumers seem to have a moderate level of trust in these technologies, showing that they are still not convinced about issues such as providing their data to smart service providers, while there was a moderate degree of fear of data interception. However, recognizing these benefits is not enough to adopt smart home technologies, with the major obstacles observed being a lack of knowledge about these new technologies and installation, maintenance, and repair costs as well as possible security breaches of their personal data. However, the most important factors that seem to contribute to the acceptance of smart home technology and its possible future use are the perceived level of usefulness and compatibility, factors which smart home technology suppliers and providers can use to their advantage, attracting even larger numbers of consumers. As a practical matter, providers of smart homes should provide devices that follow open standards and interoperate with each other even if they belong to different brands. Furthermore, they should advance the devices' ease of use by anyone, anywhere, and at any time. A user should interact with the devices using multiple modes in an enjoyable way without any effort. Greek consumers are getting acquainted with smart home technology although they do not seem to be convinced about issues such as providing their personal data to smart service providers.

The main limitation of this study is the small sample size and the non-representativeness of the sample. The literature review showed that there are no similar studies conducted in Greece. This study can be treated as a pilot that can provide ideas and lessons for the design of a nationwide survey. The results of the present study are not directly comparable with other studies in other countries due to the different culture and socio-economics of Greek consumers from other country's consumers. Secondly, at the model level, this study has focused on the user's characteristics. However, some other factors might be included and tested, such as attributes of smart homes and subjective norms. A key recommendation for future research is to extend the study to consumers in other countries with different cultures and socio-economics, in order to identify differences between the consumers. A final recommendation for future research is to use a proportional stratified sample so that each subgroup of the sample is adequately represented throughout the research population.

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Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Perceived usefulness of smart home technology.

Items for Perceived Usefulness of Smart Home Technology	Not at All		A Little Bit		Moderate		Very		Very Much		M	SD
	n	%	n	%	n	%	n	%	n	%		
I find that using smart home services and devices helps me to control the operation of my home, because I can monitor it even when I am away from home using my smartphone.	1	0.9%	3	2.8%	14	13.0%	38	35.2%	52	48.1%	4.3	0.9
I prefer to use services in areas such as home security that will be based on new technologies (e.g., security cameras) instead of traditional security methods such as standard alarms.	4	3.7%	4	3.7%	29	26.9%	32	29.6%	39	36.1%	3.9	1.1
I find the energy information and electricity management services useful.	42	38.9%	23	21.3%	19	17.6%	11	10.2%	13	12.0%	2.4	1.4
I find it useful to control the interaction and operation of home appliances (e.g., Google Nest).	37	34.3%	22	20.4%	25	23.1%	13	12.0%	11	10.2%	2.4	1.3
I find the e-payment services useful (e-banking).	3	2.8%	3	2.8%	9	8.3%	30	27.8%	63	58.3%	4.4	1.0
I find the utility information services useful.	25	23.1%	18	16.7%	27	25.0%	15	13.9%	23	21.3%	2.9	1.4
I find the smart entertainment devices useful (smart TV, headphones, speakers, etc.).	2	1.9%	4	3.7%	11	10.2%	18	16.7%	73	67.6%	4.4	1.0
I find the smart smoke detectors useful.	56	51.9%	17	15.7%	23	21.3%	6	5.6%	6	5.6%	2.0	1.2
I find it useful to control smart white devices (smart air conditioners, refrigerators, dishwashers, and washing machines).	23	21.3%	11	10.2%	23	21.3%	17	15.7%	34	31.5%	3.3	1.5
I find the smart lighting useful.	35	32.4%	18	16.7%	17	15.7%	18	16.7%	20	18.5%	2.7	1.5
I find the telemedicine useful.	40	37.0%	17	15.7%	25	23.1%	14	13.0%	12	11.1%	2.5	1.4
I find the network devices useful (routers, smartphones, printers, etc.).	5	4.6%	7	6.5%	11	10.2%	13	12.0%	72	66.7%	4.3	1.2
I find the smart thermostats useful.	47	43.5%	16	14.8%	27	25.0%	9	8.3%	9	8.3%	2.2	1.3
I find the household robots and robotic cleaning devices useful.	56	51.9%	17	15.7%	22	20.4%	9	8.3%	4	3.7%	2.0	1.2
Perceived Usefulness											3.0	0.7

Table A2. Perceived ease of use of smart home technology.

Items for Perceived Ease of Use of Smart Home Technology	Not at All		A Little Bit		Moderate		Very		Very Much		M	SD
	n	%	n	%	n	%	n	%	n	%		
I am able to use the smart devices of my home without learning or technological specialization.	1	0.9%	9	8.3%	22	20.4%	41	38.0%	35	32.4%	3.9	1.0
It is not difficult for my parents to operate smart home appliances such as the use of a smart refrigerator.	9	8.3%	39	36.1%	31	28.7%	15	13.9%	14	13.0%	2.9	1.2
It is easier to use services such as telemedicine for people with mobility difficulties or advanced age than to visit a doctor or hospital that requires transportation.	4	3.6%	4	3.6%	13	11.7%	28	25.2%	62	55.9%	4.3	1.0
Perceived Ease of Use											3.7	0.7

Table A3. Perceived compatibility of smart home technology.

Items for Perceived Compatibility of Smart Home Technology	Not at All	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
The use of smart services and devices is compatible with my daily activities.	16	19	17.6%	25	23.1%	25	23.1%	23	21.3%	3.2	1.4
Using a voice command service like Google Nest or Apple Siri is great for interacting with my home devices.	11	18	16.7%	35	32.4%	30	27.8%	14	13.0%	3.2	1.2
I feel comfortable with electronic payment services like e-banking because I can manage my mobile accounts at any time without any problem.	4	4	3.7%	12	11.1%	27	25.0%	61	56.5%	4.3	1.0
Perceived Compatibility										3.5	0.9

Table A4. Perceived cost of smart home technology.

Items for Perceived Cost of Smart Home Technology	Not at All	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
The cost of installing, repairing, and maintaining smart home technology is high for me.	4	12	11.1%	46	42.6%	24	22.2%	22	20.4%	3.4	1.1
I can meet my needs by paying lower prices than those of smart home services.	5	11	10.2%	33	30.6%	28	25.9%	31	28.7%	3.6	1.1
Using smart home technology helps me save money through technology applications.	2	4	3.7%	28	25.9%	42	38.9%	32	29.6%	3.9	9.9
Perceived Cost										3.7	0.9

Table A5. Social influence regarding smart technology.

Items for Social Influence Regarding Smart Technology	Not at all	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
If someone from my social environment buys a state-of-the-art device like the latest smartphone, it will affect me in terms of buying.	13	27	25.0%	32	29.6%	25	23.1%	11	10.2%	2.9	1.2
The new 13033 messaging service recommended by the state during the lockdown period leads me to use my mobile phone more and more.	31	16	14.8%	20	18.5%	24	22.2%	17	15.7%	2.8	1.5
I want to be the first to buy a new product, because I will stand out from the rest who use older technology devices.	65	18	16.7%	14	13.0%	3	2.8%	8	7.4%	1.8	1.2
Social Influence										2.5	0.9

Table A6. Trust in new technologies.

Items for Trust in New Technologies	Not at All	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
I am afraid to use services like telemedicine because it may not serve me like the physical presence of a doctor.	10	23	21.3%	31	28.7%	24	22.2%	20	18.5%	3.2	1.2

Table A6. *Cont.*

Items for Trust in New Technologies	Not at All	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
I am afraid to use electronic payment services such as e-banking, for fear of intercepting my data.	45	30	27.8%	17	15.7%	10	9.3%	6	5.6%	2.1	1.2
I consider it safe to provide my information to smart device interaction control providers such as Google Nest or Apple Cloud.	16	15	13.9%	33	30.6%	24	22.2%	20	18.5%	3.2	1.3
Trust										2.8	0.9

Table A7. Perceived enjoyment from the use of smart home technologies.

Items for Perceived Enjoyment from the Use of Smart Home Technologies	Not at All	A Little Bit		Moderate		Very		Very Much		M	SD
	n	n	%	n	%	n	%	n	%		
Using smart home services and entertainment devices (e.g., smart TV) is fun when I have to spend many hours at home (e.g., during the lockdown period).	3	1	0.9%	16	14.8%	25	23.1%	63	58.3%	4.3	1.0
The use of devices makes me feel comfortable during the lockdown period because I get in touch with anyone I want via the internet using a smartphone or tablet.	0	4	3.7%	6	5.6%	23	21.3%	75	69.4%	4.6	0.8
I can watch the same movie or listen to the same music on different devices by connecting them to the home network.	1	2	1.9%	16	15.1%	21	19.8%	66	62.3%	4.4	0.0
Perceived Enjoyment										4.4	0.7

Table A8. Intention to use smart home technologies.

Items for Intention to Use Smart Home Technologies	Not at All		A Little Bit		Moderate		Very		Very Much		M	SD
	n	%	n	%	n	%	n	%	n	%		
I intend to use energy information and electricity management services.	16	14.8%	13	12.0%	23	21.3%	24	22.%	32	29.6%	2.9	1.4
I intend to control the interaction and operation of home appliances (e.g., Google Nest).	10	9.3%	9	8.3%	26	24.1%	29	26.9%	34	31.5%	3.1	1.3
I intend to use e-payment services (e-baking).	2	1.9%	4	3.7	13	12.0%	19	17.6%	70	64.8%	4.5	0.8
I intend to use utility information services.	14	13.0%	14	13.0%	23	21.3%	24	22.2%	33	30.6%	3.4	1.3
I intend to use smart entertainment devices (smart TV, headphones, speakers, etc.).	4	3.7%	2	1.9%	12	11.1%	18	16.7%	72	66.7%	4.5	0.8
I intend to use smart security cameras and locks.	7	6.5%	5	4.6%	21	19.4%	19	17.6%	56	51.9%	3.3	1.3
I intend to use smart smoke detectors.	24	22.2%	7	6.5%	14	13.0%	23	21.3%	40	37.0%	2.8	1.4
I intend to use smart white devices (smart air conditioners, refrigerators, dishwashers and washing machines).	7	6.5%	4	3.7%	15	13.9%	18	16.7%	64	59.3%	3.8	1.4
I intend to use smart lighting.	7	6.5%	1	0.9%	14	13.0%	22	20.4%	64	59.3%	3.6	1.3
I intend to use telemedicine.	9	8.3%	3	2.8%	11	10.2%	28	25.9%	57	52.8%	3.3	1.5
I intend to use network devices (routers, smartphones, printers, etc.).	2	1.9%	3	2.8%	7	6.5%	19	17.6%	77	71.3%	4.4	0.9
I intend to use smart thermostats.	13	12.0%	10	9.3%	16	14.8%	25	23.1%	44	40.7%	3.0	1.4
I intend to use household robots and robotic cleaning devices.	14	13.0%	6	5.6%	15	13.9%	15	13.9%	58	53.6%	2.9	1.5
Intention to Use											3.7	0.7

Table A9. Benefits of using smart home technology.

Importance of Benefits of Using Smart Home Technology	Not at All		A Little Bit		Moderate		Very		Very Much		M	SD
	n	%	n	%	n	%	n	%	n	%		
Monitoring and management of patients and the elderly.	2	1.9%	1	0.9%	6	5.6%	36	33.3%	63	58.3%	4.5	0.8
Storage of health records and electronic prescriptions.	0	0.0%	1	0.9%	9	8.3%	35	32.4%	63	58.3%	4.5	0.7
Reduction of costs and time of care due to telemedicine.	10	9.3%	4	3.7%	21	19.4%	25	23.1%	48	44.4%	3.9	1.3
Energy use control and management.	3	2.8%	5	4.6%	14	13.0%	30	27.8%	56	51.9%	4.2	1.1
Improving the user's sociability and dealing with the feeling of isolation.	7	6.5%	9	8.3%	20	18.5%	24	22.2%	48	44.4%	3.9	1.2
Remote control of house temperature.	2	1.9%	6	5.6%	19	17.6%	38	35.2%	43	39.8%	4.1	0.9
Simultaneous use of different entertainment systems.	2	1.9%	2	1.9%	16	14.8%	30	27.8%	58	53.7%	4.3	0.9
Improving home security systems.	2	1.9%	1	0.9%	9	8.3%	35	32.4%	61	56.5%	4.4	0.8
Automated control of white devices.	4	3.7%	8	7.4%	18	16.7%	30	27.8%	48	44.4%	4.0	1.1
Save money compared to using older methods.	1	0.9%	3	2.8%	10	9.3%	29	26.9%	65	60.2%	4.4	0.8

Table A10. Barriers to the use of smart home technology.

Importance of Barriers of Using Smart Home Technology	Not at All		A Little Bit		Moderate		Very		Very Much		M	SD
	n	%	n	%	n	%	n	%	n	%		
The complexity of installing and managing smart technology.	2	1.9%	10	9.3%	22	20.4%	50	46.3%	24	22.2%	3.8	0.9
Possible breach of security data.	4	3.7%	14	13.0%	14	13.0%	34	31.5%	42	38.9%	3.9	1.2
Connectivity of devices between different brands.	3	2.8%	6	5.6%	44	40.7%	26	24.1%	29	26.9%	3.7	1.0
Lack of network connection.	8	7.4%	14	13.0%	30	27.8%	25	23.1%	31	28.7%	3.5	1.2
Lack of awareness of legal coverage.	4	3.7%	21	19.4%	29	26.9%	23	21.3%	31	28.7%	2.5	1.2
Installation, maintenance, and repair costs	4	3.7%	6	5.6%	26	24.1%	36	33.3%	36	33.3%	3.9	1.1
Help from specialist.	4	3.7%	15	13.9%	31	28.7%	33	30.6%	25	21.1%	3.6	1.1
Lack of awareness and resistance to change.	3	2.8%	8	7.4%	19	17.6%	29	26.9%	49	45.4%	4.0	1.1

Table A11. Cronbach's reliability coefficient results by dimension of the questionnaire.

Dimension	Cronbach Index α
Perceived compatibility	0.818
Perceived ease of use	0.781
Perceived usefulness	0.689
Perceived cost	0.703
Social influence	0.812
Perceived enjoyment	0.774
Trust	0.695
Intention to use	0.852
Attitude	0.655

Table A12. Sample demographical characteristics.

		N	%
Gender	Female	49	45.4%
	Male	59	54.6%
Age	16–25 years old	42	38.9%
	26–35	42	38.9%
	36–45	7	6.5%
	46–55	7	6.5%
	56 and above	10	9.3%
Educational level	Primary education	4	3.7%

Table A12. *Cont.*

		N	%
	Secondary education	9	8.3%
	Higher	67	62.0%
	Master's degree	28	25.9%
	PhD	0	0.0%
Employment situation	Unemployed	9	8.3%
	Student	30	27.8%
	Retired	8	7.4%
	Private employee	29	26.9%
	Public servant	13	12.0%
	Self-employed, Freelancer	15	13.9%
	Other	4	3.7%
Annual income (euros)	0–5000	50	46.3%
	5001–10,000	25	23.1%
	10,001–15,000	18	16.7%
	15,001–20,000	6	5.6%
	20,001 and above	9	8.3%

Table A13. *t*-test results for the differentiation of factors and intention to use services in terms of gender.

	Gender				t	*p*
	Male		Female			
	M	SD	M	SD		
Perceived usefulness	3.3	0.7	2.9	0.7	2.033	0.003
Intention to use	3.9	0.7	3.5	0.7	3.169	0.002
Perceived ease of use	3.9	0.7	3.5	0.7	2.442	0.016
Perceived compatibility	3.7	0.9	3.4	0.8	1,522	0.131
Perceived cost	3.7	0.6	3.6	0.7	0.936	0.451
Social influence	2.5	1.0	2.5	0.8	0.165	0.870
Trust	2.7	0.9	2.9	0.8	−1.649	0.102
Perceived enjoyment	4.5	0.6	4.4	0.8	1.052	0.295

Table A14. *t*-test results for the differentiation of factors and intention to use services according to the age group.

	Age								F	*p*
	Up to 25		26–35		36–55		56+			
	M	SD	M	SD	M	SD	M	SD		
Perceived usefulness	2.9	0.6	3.2	0.7	3.1	0.5	3.1	1.3	1.209	0.310
Intention to use	3.6	0.7	3.8	0.7	3.8	0.7	3.6	0.9	0.528	0.664
Perceived ease of use	3.6	0.7	3.7	0.7	3.8	0.8	4.0	0.9	1.239	0.299
Perceived compatibility	3.6	0.9	3.5	0.8	3.4	0.8	3.9	1.0	0.802	0.496
Perceived cost	3.6	0.6	3.6	0.7	3.9	0.4	3.7	0.8	0.859	0.465
Social influence	2.4	0.8	2.5	0.9	2.6	0.7	3.2	1.1	2.478	0.070
Trust	2.9	0.8	2.9	0.9	2.3	0.6	2.6	1.2	2.273	0.084
Perceived enjoyment	4.4	0.7	4.4	0.8	4.7	0.4	4.4	0.7	1.069	0.366

Table A15. Results of *t*-test for the differentiation of factors and intention to use services in terms of educational level.

	Education						F	*p*
	Up to Secondary		Tertiary		Postgraduate			
	M	SD	M	SD	M	SD		
Perceived usefulness	2.9	0.9	3.0	0.7	3.1	0.6	0.286	0.752
Intention to use	3.6	0.8	3.7	0.8	3.8	0.5	0.562	0.572
Perceived ease of use	3.4	0.8	3.7	0.8	3.7	0.6	1.337	0.267
Perceived compatibility	3.2	1.1	3.6	0.9	3.4	0.8	1.450	0.239
Perceived cost	3.5	0.7	3.8	0.7	3.5	0.6	1.649	0.197
Social influence	2.7	0.8	2.5	0.9	2.6	0.9	0.453	0.637
Trust	2.8	0.7	2.8	0.9	2.8	0.7	0.026	0.974
Perceived enjoyment	4.0	1.0	4.5	0.6	4.4	0.7	3.030	0.053

Table A16. Results of *t*-test for the differentiation of factors and intention to use services in relation to the annual family income.

	Income (Euros)								F	*p*
	Up to 5000		5001–10,000		10,001–15,000		15,000+			
	M	SD	M	SD	M	SD	M	SD		
Perceived usefulness	2.9	0.7	3.1	0.6	3.1	0.9	3.4	0.7	2.749	0.047
Intention to use	3.6	0.7	3.8	0.7	3.5	0.8	3.9	0.7	1.130	0.341
Perceived ease of use	3.6	0.8	3.5	0.6	4.0	0.6	4.8	0.6	2.137	0.100
Perceived compatibility	3.4	1.0	3.6	0.7	3.6	0.8	3.8	0.9	1.026	0.384
Perceived cost	3.7	0.7	3.7	0.7	3.5	0.5	3.8	0.5	0.689	0.561
Social influence	2.3	0.8	2.9	0.9	2.6	1.2	2.7	0.6	2.891	0.039
Trust	2.9	0.9	3.0	0.8	2.6	0.8	2.4	0.8	2.297	0.082
Perceived enjoyment	4.4	0.8	4.4	0.6	4.5	0.5	4.6	0.7	0.396	0.756

Table A17. Effects of correlation between factors and intention to use smart technology services.

		Perceived Usefulness	Perceived Ease of Use	Perceived Compatibility	Perceived Cost	Social Influence	Trust	Perceived Enjoyment	Intention to Use
Perceived usefulness	r	1							
	p								
	N	108							
Perceived ease of use	r	0.470 **	1						
	p	0.000							
	N	108	108						
Perceived compatibility	r	0.438 **	0.598 **	1					
	p	0.000	0.000						
	N	108	108	108					
Perceived cost	r	0.025	0.333 **	0.254 **	1				
	p	0.796	0.000	0.008					
	N	108	108	108	108				
Social influence	r	0.356 **	0.247 **	0.254 **	0.117	1			
	p	0.000	0.010	0.008	0.226				
	N	108	108	108	108	108			
Trust	r	0.199 *	0.200*	0.093	0.200 *	0.378 **	1		
	p	0.039	0.037	0.340	0.038	0.000			
	N	108	108	108	108	108	108		
Perceived enjoyment	r	0.171	0.465 **	0.467 **	0.416 **	0.011	−0.028	1	
	p	0.079	0.000	0.000	0.000	0.911	0.778		
	N	108	108	108	108	108	108	108	
Intention to use	r	0.778 **	0.443 **	0.462 **	0.031	0.290 **	0.124	0.221 *	1
	p	0.000	0.000	0.000	0.748	0.002	0.199	0.023	
	N	108	108	108	108	108	108	108	108

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

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