

**ADAPTACIÓN DE MODELOS DE ACEPTACIÓN TECNOLÓGICA PARA
TRABAJAR CON ADULTOS MAYORES****ADAPTATION OF TECHNOLOGICAL ACCEPTANCE MODELS TO WORK
WITH OLDER ADULTS****PhD (c). Manuel Bolaños González***, **PhD. Cesar Collazos Ordoñez****
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Resumen: En este artículo se muestran los resultados de un estudio desarrollado para generar y aplicar un instrumento de recolección de información estructurado y confiable, para determinar el nivel de aceptación y uso de la tecnología por parte de los adultos mayores; para lo cual se analizaron algunos de los modelos de aceptación de tecnología existentes, teniendo en cuenta las necesidades y el contexto en el cual se desarrolló el estudio. Por las características de los participantes, se utilizaron grupos focales como herramienta para obtener información precisa, clara y sencilla. Los resultados permiten observar que, para medir el nivel de aceptación y la intención de uso de una nueva tecnología, es necesario identificar las variables adecuadas para poder determinar con precisión el comportamiento y el sentir de los usuarios.

Palabras clave: Adultos mayores, Aceptación de Tecnología, Intención de Uso.

Abstract: This article shows the results of a study developed to generate and apply a structured and reliable information collection instrument to determine the level of acceptance and use of technology by older adults; for which some of the existing technology acceptance models were analyzed, taking into account the needs and the context in which the study was developed. Due to the characteristics of the participants, focus groups were used as a tool to obtain precise, clear, and simple information. The results allow us to observe that, in order to measure the level of acceptance and the intention to use a new technology, it is necessary to identify the appropriate variables in order to accurately determine the behavior and feelings of the users.

Keywords: Elderly People, Technology Acceptance, Intention of Use.

1. INTRODUCCIÓN

The population over 65 years of age globally is growing at a faster rate than the rest of the population segments, according to data from the report "World Population Outlook 2019" (United Nations, 2019), in 2050, one in six people in the world will have over 65 years (16%); By 2050, one in four people living in Europe and North America could be 65 or older, and the number of people aged 80 and over is estimated to triple, from 143 million in 2019 to 426 million in 2050.

Based on the previous report, and taking into account that older adults generally show limited experience with technology, due to factors such as: not perceiving a real utility, little predisposition towards the use of technology, and some associated with their academic training and experience, which directly influences the adoption and acceptance of different technological products (Chaurasia et al., 2016); It is necessary that in the development of new technologies, elements related to the needs, physical, mental and social perspectives that are fundamental in the context of the daily life of the elderly are identified, to guarantee in some way a higher percentage in the level acceptance of the technology by this type of user.

The desire to know if a new technology will be accepted and used by users led to the fact that based on psychological theories that consider socio-cognitive and social learning factors, theories and models of technological acceptance were proposed, which help in some way to determine the attitude, the intention, and the real desire of the users to use the new technological systems and devices.

Technology acceptance models offer different options for conducting studies aimed at evaluating the level of acceptance of new technology. However, it is necessary to identify the model and the variables to be used, according to the context and the users to be evaluated.

2. TECHNOLOGY ACCEPTANCE MODELS

Technological acceptance models focus on collecting data on why and how people feel when interacting with new information technologies; These models are based on the Theory of Reasoned

Action (TRA), which dictates that every action that is carried out leaves teaching and a sensation (Fishbein and Ajzen, 1975); These two variables cause people to adopt or reject the action.

In most of the existing models, the perceived ease of use, the benefit received from the technology, and the law of least effort determine the success in the implementation of new technology (Davis et al., 1989), but there are external variables that determine human behavior and that will also affect the results of each study developed, it is here where different proposals are generated for the creation of technology acceptance models focused from multiple perspectives.

The technology acceptance model (TAM) proposed by Davis (Davis, 1989), which is observed in Figure 1, proposes that the behaviors of individuals depend on their beliefs and subjective norms, and explains the factors that favor the use and acceptance of information systems based on beliefs, attitudes, and interactions (Davis et al., 1989). It measures two fundamental variables:

- Perceived utility: “the degree to which a person believes that the use of a specific system would improve their job performance” (Davis, 1989).
- Perceived ease of use: “the degree to which a person believes that using a given system will be effortless” (Davis, 1989).

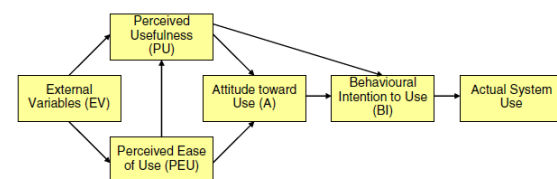


Fig. 1. Technology Acceptance Model (Davis, 1989).

Several models have been developed based on TAM, adapted according to different situations and contexts, adding new constructs or variables that can influence the acceptance of a technological product by users. Some of the models that have been proposed are TAM2 (V. Venkatesh & Davis, 2000), TAM3 (V. Venkatesh & Bala, 2008), the Unified Theory of Acceptance of Technology (UTAUT) (V. M. G. M. Venkatesh et al., 2003), and TAMUX (Mazmela et al., 2018) which is the most recent.

UTAUT is an integrative model proposed by Venkatesh et al. (Venkatesh et al., 2003), where the expectation of effort, the expectation of performance, the social influence, and the facilitating conditions were identified, as antecedents of the acceptance in the context of the systems of information. In addition, the variables gender, experience, age, and willingness to use were identified as significant moderating variables (Taherdoost, 2018), which can be seen in Figure 2.

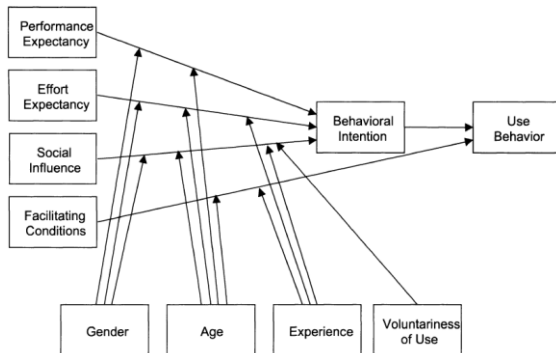


Fig. 2. Unified Theory of Acceptance of Technology (UTAUT) (Venkatesh et al., 2003).

The TAMUX model, which is based on TAM and User Experience (UX), argues that the affective experience is as important as the user experience, since interactive products not only generate utilitarian benefits such as learning or automation of a process rather, they provide experiences (Mazmela et al., 2018).

For a study using TAMUX, it is recommended to take into account the following variables: predisposition, attitude, capacity, ability, knowledge, previous experience, user needs, motivations, expectations, autonomy, and educational level (Mazmela et al., 2018). The definition of tasks is also very important to calculate the level of influence, and this is where factors such as the daily routine of the task, accuracy in the performance, visualization of the interface, content, architecture, data clarity, navigating are taken into account. on the internet, mobility, customization, system reliability, among others.

TAMUX takes into account components such as:

- Instrumental qualities: referring to the usefulness and ease of use.
- Non-instrumental qualities: they refer to aspects such as aesthetics, and correspond

to hedonic attributes in the model of (Hassenzahl, 2008).

- Emotional reactions: derived from subjective feelings, motor expressions, and cognitive evaluations.

3. METHODOLOGY

The study was carried out to generate and apply a structured and reliable information collection instrument, to determine the level of acceptance and use of technology by older adults, for which some of the acceptance models were analyzed. of existing technology, identifying the constructs they use, and taking into account the context in which the study is carried out; A TAM questionnaire was generated and adapted to evaluate the variables required when working with older adults.

Taking into account the characteristics of the participants, focus groups were used as a tool to obtain precise, clear, and simple information (Kitzinger, 1995).

Before the participants developed the proposed questionnaire, an induction by groups was carried out, where the objective of the research and the importance of the information that they were going to record were explained to them.

To carry out the research, a group of 33 older adults aged between 60 and 83 years participated, who developed the prepared technology acceptance questionnaire, and the recorded data were analyzed taking into account the proposed objective.

The results obtained will allow us to verify if the instrument generated is adequate to develop an acceptance study of interactive games for older adults, implemented in virtual assistants.

4. RESULTS

The information registered in the forms allows to identify the knowledge of certain technological devices, and the interest of the participating older adults towards the acceptance of technology, and the interest in using it to carry out different activities of their daily life, is evidenced.

Table 1 shows the results of some of the variables that contain basic data of the 33 participating older adults, and that are relevant to the study.

It can be observed that of the 15 women and 18 men who participated, 72.7% take some medication permanently, which allows identifying the possibility that the games that are implemented focus on functionalities such as reminders about dosage and taking medications, as well as scheduling medical appointments.

Table 1: General information of participating older adults.

Age	Take medication	Listening level	Clearly understand your words	Studies
83	Yes	Regular	Always	High school
69	Yes	Well	Always	Postgraduate
82	Yes	Regular	Usually	Primary
72	Yes	Well	Always	High school
66	Yes	Well	Usually	Postgraduate
66	No	Well	Always	High school
60	Yes	Well	rarely	Postgraduate
63	No	Well	Usually	Postgraduate
60	No	Well	Usually	Postgraduate
63	Yes	Well	Always	Postgraduate
64	Yes	Well	Always	Postgraduate
67	Yes	Regular	Usually	Postgraduate
68	Yes	Well	Usually	Postgraduate
69	Yes	Well	Always	Postgraduate
69	Yes	Well	Always	Technological
78	Yes	Well	Always	Primary
67	No	Well	Usually	Postgraduate
60	Yes	Well	Usually	Technological
66	Yes	Well	Usually	Technical
66	Yes	Well	Always	Postgraduate
61	Yes	Regular	Always	High school
64	Yes	Well	Occasionally	Technological
60	Yes	Well	Usually	Professional
71	Yes	Well	Usually	High school
70	No	Well	Usually	Postgrado
66	Yes	Well	Always	Technological
61	No	Well	Usually	Postgrado
61	No	Well	Usually	Professional
82	Yes	Well	Always	Professional
78	Yes	Regular	Always	High school
60	Yes	Well	Always	Postgrado
64	No	Well	Always	Postgrado
76	No	Well	Always	Postgrado

If one takes into account that one of the important aspects of virtual assistants is their oral interface, it is very relevant to observe that 84.8% of the participants have no problems listening and 15.2% say that they listen regularly, none have problems listening treble. Similarly, it is important to note that 94% of the participants consider that they communicate without verbal problems, 3% say that they occasionally have problems, and 3% say that they rarely understand what they say.

Regarding studies, it is observed that 51.5% have postgraduate studies, 9.1% are professional, 12.1% carried out technology studies, 3% are technical, 18.2% certify secondary school studies and 6.1% have studied elementary school. If it is taken into account that the level of education is one of the variables that positively affect the acceptance of technology according to the existing models, it could be inferred that there is a high percentage of possibility that the group of participants will accept and adopt the games implemented in virtual assistants.

Table 2 shows the results obtained in terms of whether the participating older adults drive and are using technology, and specifically, the cell phone, which is a technological device that within its functionalities has an oral interface such as virtual assistants.

Table 2: consolidated on the use of technology

	Use technology to facilitate your activities	Make phone calls through a cell phone	Use your cell phone for video calls, instant messaging, email
Always	36,40 %	94 %	36,40 %
Usually	54,50 %	3 %	39,40 %
Occasionally	0 %	0 %	15,20 %
Hardly ever	6,10 %	3 %	6 %
Never	3 %	0 %	3 %

It is important to note that 90.9% use technology in some way to facilitate their daily activities, 6.1% rarely use it and 3% never use technology to help them in their activities, which can enhance the use of virtual assistants functionalities.

It can be seen that the vast majority of participants 97% make calls using a cell phone and only 3% do

not, which shows very clearly the importance of this device in the communication of older adults.

36.40% affirm that they always use the cell phone for videoconferencing, instant messaging, email among other functionalities, 39.40% say that they do it almost always, 15.20% do it occasionally, 6% rarely, and 3% do not use their cell phone for these activities; This information shows that participating older adults have skill in handling cell phones.

The results obtained allow us to identify the importance of technology for the elderly, and especially a device such as a cell phone that is very useful for them to communicate and perform tasks that somehow facilitate their daily activities. This information must be taken into account when developing playful strategies supported by virtual assistants, seeking that their operating characteristics are attractive and useful for the users to whom they are directed.

5. CONCLUSIONS

The existing technology acceptance models propose a series of constructs and variables to carry out studies that allow gathering information about how users feel when interacting with technological devices and systems; Similarly, studies can be carried out to determine the level of acceptance of new devices and systems by users. However, each study has its peculiarities, such as the type of users to whom it is directed, the experience of the users, and the context in which the new technology will be implemented; which regardless of the model used, it is necessary to adapt the information collection instruments with the appropriate variables to guarantee objectivity in the results obtained.

The development of this research made it possible to determine that, when conducting technology acceptance studies with older adults, it is difficult to find a model that fits and punctually identifies each of the factors and variables required to work with this very specific type of users; Therefore, it is necessary to adapt the constructs and variables of the models, to guarantee objectivity in the results.

The results obtained show the importance and incidence that technology has for older adults in the development of their daily activities, and especially in communication and interaction with the people around them; which allows us to conclude that older adults accept and adopt

technology if they perceive a utility or the solution to a need. These results serve as the basis for defining the characteristics that interactive games for older adults supported by intelligent virtual assistants should have that are going to be developed.

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