Diffusion of innovation: How the use of video games can increase the adoption of new technologies

Juan Francisco Hernández, **Universidad Católica de Murcia (España)**
jfhernandez@ucam.edu

Ángel Pablo Cano Gómez, **Universidad Católica de Murcia (España)**
apcano@ucam.edu

Conchi Parra Meroño, **Universidad Católica de Murcia (España)**
MCparra@ucam.edu

Cómo citar este artículo: Hernández, J. F., Cano, P. y Parra, M. C. (2017). Diffusion of innovation: How the use of video games can increase the adoption of new technologies. *Sphera Publica, 1* (17), 25-46.

RESUMEN

This research examines the influence of videogames in the process of adoption of New Technologies in a sample of individuals from the Region of Murcia, Spain. For this, a quantitative methodology was used, which was based on a personal questionnaire, starting from the theory of Diffusion of Innovations by Everett Rogers. This theory allowed for the identification of the process of adoption of an innovation within a social group in a specific amount of time, identifying the channels through which the flow of information was produced. The behaviour patterns of videogame players and non-videogame players were compared in order to identify the differences and similarities between both groups. The results show the importance that people who play videogames have as drivers of the process of adoption of New Technologies in the social system where they belong to.

PALABRAS CLAVE

Difusión de la innovación: como el uso de videojuegos puede incrementar la adopción de nuevas tecnologías

Juan Francisco Hernández, **Universidad Católica de Murcia (España)**
jfhernandez@ucam.edu

Ángel Pablo Cano Gómez, **Universidad Católica de Murcia (España)**
apcano@ucam.edu

Conchi Parra Meroño, **Universidad Católica de Murcia (España)**
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ABSTRACT

Esta investigación examina la influencia de los videojuegos en el proceso de adopción de Nuevas Tecnologías en una muestra conformada por individuos de la Región de Murcia (España). Para ello, se ha utilizado una metodología cuantitativa, basada en cuestionario personal a partir de la Teoría de la difusión de innovaciones de Everett Rogers. Esta Teoría permite identificar el proceso de adopción de una innovación por un determinado grupo social y durante un determinado periodo de tiempo, identificando los canales a través de los cuales el flujo de información fluye. Los atributos del comportamiento de jugadores y no jugadores son comparados con la finalidad de identificar las diferencias y similitudes existentes entre ambos grupos. Los resultados muestran la importancia de que las personas que son jugadores de videojuegos actúan como líderes del proceso de adopción de Nuevas Tecnologías dentro del sistema social al que pertenecen.

KEY WORDS

INTRODUCTION

At present, videogames have become an indispensable technology for many Asian, European and North American individuals, and the most extensive type of leisure, generating a volume of business in the world that is beyond 99 billion (Newzoo, 2016). The increase of its implementation not only concerns most of the mobile devices used by the users, the increase of titles with which the market consolidates their offerings to the users, but to its introduction into new technological devices and to the widening of the age group that use this form of entertainment, as well as to the notable increase of the presence of women among the players of videogames. Faced with its indisputable implementation in society, there are other aspects that come from their use that have to be taken into consideration by the scientific community in order to truly understand the consequences that the use of a relatively complex technology means to day-to-day life. For these reason, the aim of this research was to show the influence that videogames have on the adoption of new technologies.

According to the opportune observations given by the authors Navarrete, Gómez and Pérez (2014a, 2014b), this research is framed within the subject of Game Studies, but not as a way to resolve the specific nature of the videogame, but instead it is found contextualized as a methodological method that invokes the videogame as an object of study, and focuses on the importance of this phenomenon as a driver for the adoption of New Technologies, and therefore in its importance as a cultural driver. This research study will try to come near the most common studies that practically monopolize the great scientific array where the videogames can be addressed in this sense. Therefore, a change is therefore attempted, offering a new light to the interpretation of this methodology, and emphasizing other possibilities that the day-to-day use of videogames provokes on the individuals.

The creation and addition of a new technology to a social system is worrisome, as at the same time that is produces expectation in some individuals, in others it becomes terrifying. Its inclusion implies the technological growth of the abilities of the individuals that make use of it, dragging, through the experience of some, others that did not have a premature interest. In this way, and as specified in the hypothesis presented, the objective of this study was to determine its influence and its effect on the individual as a driving agent for the acquisition of new technologies. For this reason, the question generated by the starting hypothesis in this research study is: are videogames elements that drive the ease of adoption of new technologies by part of the users? The decision to adopt (a new technology) is not an immediate act, but an attitudinal development of the individual that is determined by the reduction of uncertainty with respect to innovation and that can be –or not- formalized at any moment in time. It should be noted that the environment surrounding the studies on innovation is not sufficiently delimited, and there is especially a tendency of increasing and diversifying the studies of the processes of adoption of technology. This could be due to, as attested by Michael Harris and David Albury (2009), the current state in which society develops, surrounded by an innovative atmosphere where technology and service businesses compete in the global markets.

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Therefore, and as the media continuously sustains, we live in a culture of innovation (Aho, 2006; Bakhshi and Throsby, 2006) where the researchers have already detected different types of innovation –technological, social, distributed, open, of users, closed, etc.- widening the semantic field of the concept "innovation" and provoking, then, that it cannot be defined in a satisfactory way, as attested by Echeverria (2013). This author established three observations, two of which are very important to the subject at hand. In the first relevant observation, he affirms that the processes of innovation are complex entities with complicated structures due to the context in which they develop and the agents that intervene, which means that its evaluation is complicated and frequently controversial. The second relevant observation is that innovations have a relational component as they imply the appearance of something new, which requires a certain change with respect to what was previously there. Then, to determine the appearance of a new "idea", knowing the previous state of said system is required. The research and writings of Everett Rogers help us to improve our understanding of how processes that involve changes at the macro level are linked to processes –group and individual- at the micro level. Then, the Diffusion of Innovations is one of the few social theories that link macro and micro phenomena (Singhal, 2012).

Therefore, selecting Everett Roger's theory for the undertaking of this research work is based on the ability to offer information on why and how the adoption of technology occurs, as it allows for contextualizing the state of the previous technology (the videogames). Theories such as the Technology Acceptance Model (TAM) or the Unified Theory of the Acceptance and Use of Technology (UTAUT) are based, at their onset, on the adoption of a specific technology, which is mainly related to the Information and Communication Technologies (ICT). The new models that have come from both paradigms possess a certain complexity as they share the characteristic that they come from the same model. All of this leads to the inclusion and elimination of specific factors, which has led to the development of new models that comply with the expectations of certain studies according to the objective established, as opposed to the theory of Everett Rogers, which possesses a more defined structure in which all the elements are interrelated for the creation of a more complete study of the innovation-decision process.

Lastly, it should be noted that in order to perform this study, we have opted for a methodology that entails a review of the bibliography from the main authors that have taken on the study of innovation (Rogers, E., 1962, 1983, 1995, 2003; Ajzen and Fishbein, 1980; Bandura, 1986; Davis, Bagozzi and Warshaw, 1989; Venkatesh and Davis, 2000; Venkatesh, Morris, Davis and Davis, 2003; DeLone and McLean, 2003; Fife, Hillebrandt , Pereira and Kim, 2006), to determine the theoretical basis from which to start the present research. Following the review, this study has employed a field study that is founded on statistical analysis, through a quantitative phase that has used the questionnaire, which allows for the analysis of the entire process of diffusion of innovation, in order to answer our initial questions.

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1. DIFFUSION OF INNOVATIONS: THE ADOPTION PROCESS

The process of inclusion of innovations within society is a phenomenon that has been thoroughly reserched. Its success as a discipline comes from its versatility (Everett Rogers, 1971), although its transversality and its presence in all the processes of change in the social system are characteristics that confer it with a great pragmatic value (Nawaz Sharif y Ramesh Ramanathan, 1982).

Inventions that are ideas which are potentially useful for society, when introduced into the technological sphere, can be focused on specific human activity needs, as attested by Rafael Melendreras (2012), becoming innovations and originating processes of change that are microeconomic in nature. The tool that allows for the development and evolution of current technologies is diffusion. Through it, the benefits and usefulness of the innovations at the social level can be determined, which can also help in eliminating the existing divide between what is known and what is used.

Everett Rogers (2013) equates diffusion to a process of transformation, as it is able to produce changes to the structure and functionality of the social system. Ideas that are foreseen, or those that are not planned, provoke a modification of the individual's behaviour, thereby introducing to society the usefulness of the innovation (García, Palao and Rojo, 2003), as well as producing a flow of information from the adopting source to the possible adopters through communication and influence (Wejnert, 2002).

The process of diffusion of innovations proposed by Everett Rogers (2003) consists in its most elemental form, of (1) an innovation (2) an individual or another type of unit of adoption that has knowledge of the innovation or experience in its use, (3) another individual or unit that does not yet have experience with the innovation, and (4) a communication channel that connects both. In each of the phases presented previously there are diverse intervening variables that determine the acceptance or not of the innovation by the individual in a specific period of time. According to William Bell (1963), it is the degree of acceptance of the innovation that determines its success or failure within the social system where it is diffused in. Therefore, it should not only be accepted because it improves efficiency or quality, but it should be able to be integrated into society's culture.

The Diffusion of Innovations is founded on four pillars: 1) innovation, which is an idea, practice or object that is perceived as being new by the individual or another unit of adoption, 2) time, which determines the moment in which the individual makes the decision to adopt, 3) the social system, which is the set of people that comprises the group where the individual belongs to, and 4) the communication channels, which are the pathways for the flow of information and therefore for the knowledge of the innovation between individuals.

The process of innovation-decision consolidates different phases the individuals must go through before making a decision. Everett Rogers (2003) defines it as the process through which an individual (or another unit of decision) goes through (1) from a first meeting of the innovation, (2) the

formation of an attitude towards the innovation, (3) to the decision of adopting or rejecting, (4) to the application of the new idea, and (5) to the confirmation of the decision.

This process, as it happens through time, defines each of the individuals into categories of adopters depending on the moment of acquisition, as determined by the variables time and number of individuals. If these variables are transferred to a graphic, the rate of adoption draws a bell-shaped figure when measuring frequency, while the cumulative rate of adopters draws an S-shape curve.

The innovators are the first individuals that adopt, and therefore, have a growing interest in the new ideas. Also, they play a fundamental role in the process of diffusion due to their innovative character, becoming a reference value for the rest of the social group. The early adopters are also innovative people, but are nearer to most of the social system, so they are the main source of enquiry and advice. The early majority are the individuals that adopt right before most of the system does. They interact frequently with the innovators but do not exert as much influence as they do on the rest of the population. The later majority is usually comprised by most of the social system. Their need to acquire the innovation is secondary, and they are therefore pressured by the more innovator-types as shown by their degree of uncertainty. Lastly, the laggards are the last individuals to adopt.

To create a more complete picture of the diffusion of innovations, it is necessary to introduce the term The Chasm. This concept was introduced by Geoffrey Moore (2002), who sustained that there is a chasm between the first to adopt the product (the innovators, or technology enthusiasts and visionaries) and the early adopters. At the same time, he recognizes that with a new technology, they tend to be more pragmatic about its application. As a result, the needs and the making of decisions by these two groups are very different.

2. METHODOLOGY OF THE RESEARCH

2.1 Sampling frame

The population used for this study were individuals aged 15 to 65. The geographic range of the study was representative of the Region of Murcia, due to the counties that comprised it, with those that were questioned chosen through stratified sampling by age and gender. The questionnaire was administered through a personal interview, at the home of the individuals, or on the street. Table 1 shows the technical sheet of the empirical study performed.

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Table 1: Technical datasheet of the study

Type of questionnaire given	Personal with structured questions
Place the questionnaire was given	Interviewee's home/on the street
Location	Residents from the Region of Murcia
Size of the sample	771 gross, 746 validated
Sampling error	±3.6% (on the assumption of random sampling)
Degree of confidence	95%
Spread	p = q = 0.5
Sampling procedure	Proportionally stratified by quotas: county, age and gender
Field Study	From June to October, 2014

2.2 Measuring tool: preliminary questionnaire and final questionnaire

Before its final version, the questionnaire was subjected to various tests:

a) Validation by a groups of experts. The first version of the questionnaire was evaluated by six university staff. The professors were asked for their opinion on the variables and the formulation of the items, and were also asked to mention if the constructs included all the possibilities or if they thought that it would be convenient to add other questions. Their suggestions were taken into account for the final version of the questionnaire.

b) Pilot study of university students from the Advanced Vocational Training and the Communication Degree, with the aim of correcting possible errors found in its creation, as well as the incomprehensibility of certain items, ambiguities, redundancies, etc.

c) Once the filtering of the preliminary tests was done, it was given to a small sample of individuals with two objectives; 1) that the questions were adequate and legible and 2) that all of them were interpreted as they had been designed for by the researchers.

After performing the last test, all those questions that were difficult to understand and answer by those interviewed were modified, broadened or eliminated, to arrive to the final version.

2.3 Measuring tool: preliminary questionnaire and final questionnaire.

In the present research study, the characteristics that differentiate both groups –the videogame players and the non-videogame players- were studied, by examining different variables related to the individual, by asking questions on the use and adoption of new technologies. In this way, differential and determining aspects were analyzed, such as socio-demographics, the use and consumption of new technologies, and the diffusion process of innovation. The study of the

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relationship between these variables constitutes a key element for understanding if the objectives and therefore the main hypothesis were met. For this, it is necessary to present a series of sub-hypotheses whose validation allows us to analyze each of the variables studied as related to both groups. The convenience of the questionnaire has led to a structure composed of five blocks that were determined by the objectvies of the research study.

- **H₁. Hypothesis related to the rate of adoption of new technologies.** The objective is to determine the rate of adoption, which defines the process of adoption of new technologies, and if this complies with the characteristics of the Theory of Diffusion of Innovations

- **H₂. Hypotheses related to the characteristics of the main items of the Diffusion of Innovations.** These analyze the importance of the characteristics of innovation, the channels through which the flow of information is produced, the time it takes to be adopted and the particularities of the the social environment of the individual.

- **H₃. Hypotheses related to the process of innovation-decision.** These determine each of the stages that comprise the process of innovation-decision in order to determine how an individual has conducted the process of adoption –or not- of technology, describing the decisions that are taken in each phase.

- **H₄. Hypotheses related to technological resources.** These ask about diverse aspects relate to the technological resources of the individuals and the importance the new technologies have in their life and their social sphere.

2.4 Analysis of data obtained from the questionnaire

The analysis of the data gathered through the questionnaire requires an itemized evaluation of the variables that represent the tendencies of our sample. For this, diverse statistical tests were performed, which are described next.

In order to perform these analyses, the contributions by Mariano Aguayo (2007a, 2007b, 2012, 2014) and other works and data analysis manuals (Parra, 2006; Hernández, 2006; Martínez, 2011; Cortés, 2012; Berlanga and Rubio, 2012; Beltrán, 2014) were used.

When the degree of association or independence between a quantitative variable and a categorical value is evaluated, the inferencial statistical procedure compares the means of the distribution of the quantitative variable from the different groups established as a function of the categorical value. If this only has two categories (it is dichotomous), the comparison of means between two independent variables is performed by using the *Student's t* test; if it has three or more categories, the comparison of the means between three or more independent groups is performed through a more general mathematical model, the *Analysis of Variance* (ANOVA). In both cases, the statistical tests are strict with having previous requirements: the normal distribution of the quantitative variable in the groups that are compared and the homogeneity of the variances of the populations from which the groups come from; their non-compliance brings with it the need to resort to non-parametric statistical tests (Aguayo, 2014).

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As for the evaluation of the association between two categorical variables, it is important to analyze de degree of independence that exists between them, or the distribution that one caterogical value posseses among the different samples. For this, the Chi-square (χ^2) independence test is used, which compares and contrasts the hypothesis that the variables are independent, as opposed to the alternative hypothesis that one variable is distributed differently for diverse levels of the other.

3. RESULTS OF THE RESEARCH

In this section the results of the statistical tests that have allowed us to determine the validity of each of the sub-hypotheses proposed are presented. The set of results obtained represent the differences between videogame players and the non-videogame players with respect to their behaviour as related to New Technologies. To identify all the existing tendencies, the previously-mentioned statistical analyses were performed, which have served to validate the hypothesis proposed. From the total sample polled for the present study, 34% were videogame players, and 66% were not.

3.1 Rate of adoption of new technologies

Table 2 summarizes the hypothesis related to the rate of adoption of innovations, differentiating the videogame players from the non-videogame players.

Table 2: H1. Hypothesis related to the rate of adoption of new technologies

	Hypothesis	Validation	Type of analysis
$H_{1.1}$	Videogame players are more innovative when acquiring New Technologies than the non-videogame players.	YES	χ^2 Test

Figure 1: Type of adopter – Play video games
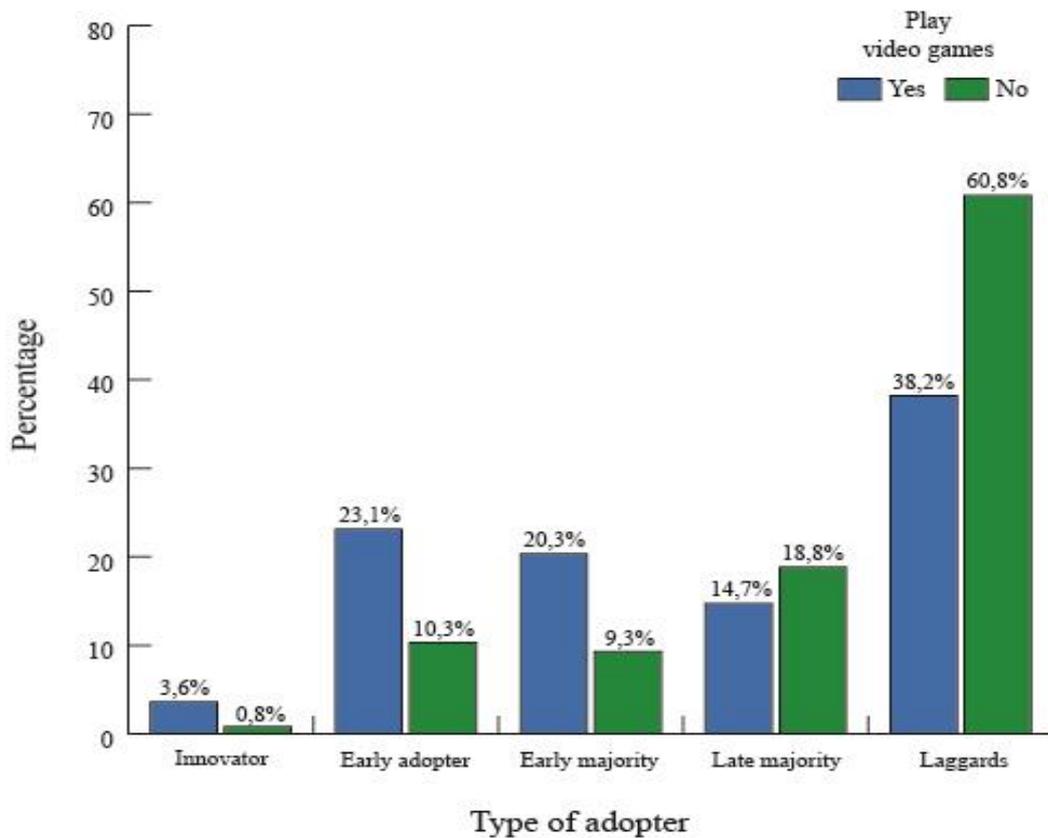
The bar graphs shows how the non-videogame players significantly accumulate in the last two categories of adopters –late majority and laggards-, while the videogame players are found spread out in all the categories. We can observe then, that as related to the innovators, the people that play videogames totaled 3.6% as opposed to 0.8% of those that do not play videogames.

Also, the videogame players that are considered early adopter or early majority add up to 43.4%, as opposed to those who do not play videogames, with a total of 19.6%. It is only in the case of the late majority and the laggards where the non-videogame players surpass the videogame players, with a total of 79.6% as opposed to 52.9%, respectively. These data show that the videogame players are considered to be more innovative, and therefore adopt new technologies earlier than the non-videogamers, who are considered to be less innovative, and therefore take longer to adopt.

3.2 Diffusion of innovation among the population

Table 3 shows a summary of the hypothesis contrasts performed and its results, as related to the main characteristics of the Diffusion of Innovations.

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Table 3: H_2. Hypothesis relative to the main characteristics of the Diffusion of Innovations

		Hypothesis	Validation	Type of analysis
Innovation	$H_{2.1}$	Videogame players are more willing to adopt a technology due to an incentive as compared to the non-videogame players.	YES	χ^2 Test
	$H_{2.2}$	The relative advantage of a technology is more important to the videogame players.	YES	Mann-Whitney *U* Test
	$H_{2.3}$	The technologies are more compatible to the values, experiences and/or needs of the videogame players.	NO	Mann-Whitney *U* Test
	$H_{2.4}$	The videogame players are able to better understand and use the technology than the non-videogame players.	YES	Mann-Whitney *U* Test
	$H_{2.5}$	Videogame players are more likely to try out the technology before adopting it than non-videogame players.	YES	Mann-Whitney *U* Test
	$H_{2.6}$	There are differences between videogame players and non-videogame players related to the possibility that the technology is already owned by someone in their environment.	YES	Mann-Whitney *U* Test
Time	$H_{2.7}$	Videogame players take less time to acquire New Technologies than the non-videogame players.	YES	χ^2 Test
Comunication channels	$H_{2.8}$	Videogame players search for information before acquiring a technology as compared to the non-videogame players.	YES	χ^2 Test
	$H_{2.9}$	The communication channels that have the most influence on the people's taking of decisions depend on if they are videogame players or not.	YES	χ^2 Test
Social system	$H_{2.10}$	The environment of the videogame players show more interest in New Technologies than that of the non-videogame players.	NO	Mann-Whitney *U* Test
	$H_{2.11}$	The videogame players are more encouraged to acquire technology by the people in their environment than the non-videogame players.	NO	Mann-Whitney *U* Test
	$H_{2.12}$	The environment of the videogame players gives more advise about New Technologies as compared to the environment of non-videogame players.	NO	Mann-Whitney *U* Test

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H$_{2.13}$	The non-videogame players rely more on their environment to stay informed about New Technologies.	NO	Mann-Whitney *U* Test
H$_{2.14}$	The videogame players talk more with their environment about subjects related to New Technologies as compared to non-videogame players.	YES	Mann-Whitney *U* Test
H$_{2.15}$	The videogame player's environment is more predisposed to acquire New Technologies than that from the non-videogame players.	NO	Mann-Whitney *U* Test
H$_{2.16}$	The people in their environment resort to the videogame player to a greater degree to inform themselves about New Technologies.	YES	Mann-Whitney *U* Test
H$_{2.17}$	There are differences in the socio-economic level of the two group' social sphere.	NO	Mann-Whitney *U* Test

The results related to the characteristics of the Diffusion of Innovation show that in first place, according to the characteristics of the innovation, the videogame players have a greater willingness to acquire New Technologies if some type of incentive is added for its adoption (68.1%), than the non-videogame players (59.6%). Likewise, the relative advantage that a technology supposes is more imporant for the players (4.09) than for the non-players (3.89%). There is also a difference between players (4.22) and non-players (3.41) in the ease of understanding and using of the technology. The comparison of the means from both groups also show that the videogame players (3.38) tend to try out the technology before its acquisition as compared to the non-videogamers (2.86), and it is more probable that the technology is already owned by someone in the non-videogamers's sphere (3.52) than that of the videogamers (3.18), as this last group tends to adopt it earlier.

According to the time taken for adoption, which defines the category of adopter, most of individuals in the videogame player group adopted early as compared to the non-videogame players. In the accumulated percentage, the players (57.4%) took at most only a few months before adopting New Technologies; only 24.3% wait more than a year before acquiring the device. The non-videogame players adopted at two different time points. On the one hand, 33.5% adopted after a few months at most, but a full 51.1% waited more than a year before acquiring the product.

According to information channels, although most members of both groups search for all the information before acquiring a technology, there was a great difference, as the videogame players (80.5%) searched for more information than the non-videogame players (62.4%). The first group resorted overall to the Internet (71.7%) to inform themselves about New Technologies, although their friends were consulted as well (59.4%). The second group (non-videogame players) resorted to their

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personal networks of friends (51.5%) and family (48.9%). Their colleagues were less important for both groups, as well as the Television, the Radio and Other media, which were minor. For the videogame players, the most influential channels were their friends (41.7%), while for the non-videogame players, the family members were more important (45.9%).

Lastly, the results related to the social system showed that the means of both groups indicated that there was a difference between videogame players (3) and non-videogame players (2.6). This meant that the videogame players talked more about New Technologies with people from their environment. Similarly, the people in their environment talked more to the videogame players (3.04) than to the non-videogame players (2.1) when they had to inform themselves about New Technologies.

3.3 Innovation-decision process

Table 4 shows a summary of the hypotheses related to the process of innovation-decision as well as the statistical tests performed for each one of them.

Table 4: H_3. Hypotheses related to the process of innovation-decision

		Hypothesis	Validation	Type of analysis
Stage of knowledge	$H_{3.1}$	Knowledge of the existence of the technology before having it does not differ as a function of being a videogame player or not.	NO	χ^2 Test
	$H_{3.2}$	To a greater degree, the non-videogame players tend to acquire the technology due to its ease of use.	NO	χ^2 Test
	$H_{3.3}$	The non-videogame players are more motivated to acquire the technology by someone in their environment as compared to the videogame players.	YES	χ^2 Test
	$H_{3.4}$	To a greater degree, the non-videogame players acquire the technology when they know they can use it.	YES	χ^2 Test
	$H_{3.5}$	The technical characteristics and the possibilities of the technology have a greater influence on the videogame players.	YES	χ^2 Test
Stage of persuassion	$H_{3.6}$	It is easier to convince a videogame player to adopt a technology.	YES	χ^2 Test
Stage of decision	$H_{3.7}$	The opinion of the environment when deciding to acquire a technology has a greater influence on the non-videogame players.	YES	χ^2 Test
	$H_{3.8}$	The videogame players have more opportunities to try or to get to know the	NO	χ^2 Test

		technology before adopting it than the non-videogame players.		
	H$_{3.9}$	The non-videogame players are more predisposed to not keep the technology.	NO	χ^2 Test
	H$_{3.10}$	The non-videogame players have more motives for not keeping a technology than the videogame players.	NO	χ^2 Test
Stage of execution	H$_{3.11}$	The videogame players make more modifications to the technology if they are not convinced as compared to the non-videogame players.	YES	χ^2 Test
	H$_{3.12}$	The videogame players have more preliminary knowledge about the modifications they can make to a new technology.	NO	χ^2 Test
	H$_{3.13}$	The videogame players give the technology a different use so that it satisfies their needs as compared to non-videogame players.	YES	χ^2 Test
	H$_{3.14}$	The use that the videogame players give to the technology convinces them more than non-videogame players.	NO	χ^2 Test
Stage of confirmation	H$_{3.15}$	To a greater degree, the videogame players do not adopt a technology, but know that their use is positive as compared to the non-videogame players.	NO	χ^2 Test
	H$_{3.16}$	Videogame players look for more information or alternatives to the technology than the non-videogame players.	YES	χ^2 Test
	H$_{3.17}$	The non-videogame players acquire the technology but do not use it more than the videogame players.	NO	χ^2 Test
	H$_{3.18}$	Videogame players share more content and information with other users about the technology than non-videogame players.	YES	χ^2 Test
	H$_{3.19}$	Videogame players greatly encourage other users to use the technology as opposed to non-videogame players.	YES	χ^2 Test

The results related to the process of innovation-decision show that the individuals that do not play videogames were motivated to acquire the technology by their environment, with a percentage of 63.2% as compared to 47.8% of those that did play videogames. 39.6% of the non-videogame players acquired the techonology when they knew how to use it, as compared to 24.7% of the videogame players. Likewise, most of the players as well as the non-players (75.3% and 60.4%, respectively) did not need to know how to use the technology before acquiring it, but the videogame players (84.5%) mostly acquired the technology due to its characteristics and technological possibilities as opposed to the non-players (72.1%). The results also show that most of

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the videogame players (74.1%) are more easily convinced to acquire a certain technology, as opposed to the non-videogame players (66.9%). To 73.9% of the individuals that do not play videogames, the opinion of people in their social sphere helped them to decide. This percentage is less in the case of players, being 63.7%. The results also indicate that more than 53.8% of the individuals that are players do modify the technology so that is complies with their expectations, as opposed to the non-players, with only 32.5% performing these types of actions. It is also important to note that the players gave different uses to the technology so that it met their needs in 59.8% of the cases, as compared to the non-players, who had a percentage of 49.9%. The crossing of variables indicated that the players (45.4%) searched for more information or alternatives to the technology as compared to the non-players, of whom only 29.3% performed these types of actions. The results also revealed that with a greater difference between the groups, the players do share content or information in 68.5% of the cases, as opposed to the non-players, who only did this in 48.7% of the cases. The player group encourages others to use the technology in 78.1% of the cases, while the non-players only did it in 59.4% of them.

3.4 Technological resources

Table 5 shows the hypotheses related to technological resources and a summary of the tests performed for their analysis.

Table 5: H_4. Hypotheses related to the technological resources

	Hypothesis	Validation	Type of analysis
$H_{4.1}$	Videogame players possess greater technological resources than the non-videogame players.	YES	Mann-Whitney U Test and χ^2 Test
$H_{4.2}$	Videogame players use different technologies as compared to videogame players.	YES	χ^2 Test
$H_{4.3}$	Videogame players are more active users of New Technologies than non-videogame players.	YES	Mann-Whitney U Test
$H_{4.4}$	Videogame players are more interested in New Technologies than non-videogame players.	YES	Mann-Whitney U Test
$H_{4.5}$	New Technologies are more important in the lives of videogame players than in the lives of non-videogame players.	YES	Mann-Whitney U Test
$H_{4.6}$	New Technologies have a greater importance for the social sphere of videogame players.	NO	Mann-Whitney U Test
$H_{4.7}$	Videogame players have a superior level of use of New Technologies as compared to non-videogame players.	YES	Mann-Whitney U Test

The results related to technological resources indicated that the television was the device that was most commonly found in 100% of the player's homes and 98.6% of the non-players. In a high percentage, the players also had a portable computer available (81.7%), smartphone (92.4%) and videogame console (80.5%). On the other hand, 78.8% of the non-players had a portable computer, and 85.9% a smartphone, mainly. The television and the computer –desktop and portable- are the second- and third-most used technology for both groups, while the tablet, the MP3/MP4 player, the e-book and the videogame console were the least used. The players (3.92) were considered to be active users of the New Technologies to a greater degree than the non-players (3.12). Likewise, the players (3.9) were more interested in New Technologies as compared to the non-players (3.11). The descriptive statistics show that for 3.69 of the players, the New Technologies were more important to their life as compared to the non-players (3.26 on average). The statistics also showed that the level of use of New Technologies was greater for videogame players (4.06) than the non-videogame players (3.35).

CONCLUSIONS

This research work came from the intention of analyzing the influence of videogames as drivers of the process of technological adoption in society. According to the results obtained after administering the questionnaire to the individuals that comprised the sample, a number of conclusions have been deduced, which answer the initial hypothesis. The hypothesis was to determine the influence of videogames as drivers for the adoption of New Technologies, as a function of an individual being a videogame player or not.

According to the rate of adoption, we can conclude that the results for New Technologies is different to that proposed by the American professor Everett Rogers. However, the tendencies studied do show similarities to the rate of adoption proposed by Jacob Goldenber, Barak Libai and Eitan Muller (2002) named The Saddle Case. This Saddle Case describes one of the possible cycles of adoption of an electronic product, and has a figure in the shape of a saddle. Then, in relation to the acquisition of New Technologies, the pattern is the same. There is a reduced number of innovators that adopt the technology, followed by an initial peak of early adopters. However, this peak is followed by a depression of moderate depth and duration caused by the early majority, followed by adoptions that in time overcome the initial peak with the late majority, reaching its highest point with the laggards. Therefore, most of the people are laggards with respect to the adoption of New Technologies, and only an innovator minority exists. This fact leads to discard the theory proposed by Everett Rogers with respect to the rate of adoption, concluding that the adoption of New Technologies maintains the same pattern designed by Jacon Goldenberg, Barak Libai and Eitan Muller (2002), known as The Saddle Case.

The non-videogame players lag more in the acquisition of New Technologies. Their resulting figure shows the same pattern, but the group of videogame players shows a considerable increase

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in the percentage of individuals that are more innovative and therefore adopt earlier, with an important decrease in the number of subjects that are laggards. Therefore, if the subject is a videogame player, it is more probable that he or she is an innovator. The fact that an important number of laggards still exists in this group is due to the penetration of the videogames as part of the leisure activities of the female target group and adult males. Even then, we can attest that the players are more innovators than the non-players.

The characteristic of innovation results show that for both players and non-players, the technology they acquire is related to their values, experiences and/or needs; however, the players are more prone to acquire it due to some incentive, and they also adopt it to a greater degree if the technology they acquire supposes a relative advantage to the technology it replaces. The players are also able to better understand and use the innovation they acquire, and are more inclined to try its functioning before they acquire it. Lastly, the fact that the players do not usually have people in their environment that do already have it before them is notable, as it is another indication of the innovator character.

The time it takes the two groups to adopt a technology had differences as well. The players adopt earlier, as most of them acquired it within only a few months. On the other hand, the non-players decided to wait a year or longer before acquiring the device.

As for the communication channels, the players searched for information before acquiring the technology, overall using the Internet and their friends, but it is this last channel the medium that had the most influence when they had to make the final decision. The non-players, when they informed themselves, did this through friends and family, with the last channel (family) being the one that had the most repercussion in their decision-making. Therefore, the importance and influence of the interpersonal channels for the subject are confirmed. This is independent of the individual being more or less of an innovator, but it is important to point to the transcendence and effect that the Internet has, especially for the players, when looking for information on New Technologies.

Lastly, and as related to the characteristics of the social system where the individual finds his/herself, the players as well as the non-players have a similar socio-economic level as the members of their respective spheres. Also, both are interested in New Technologies, and encourage the individuals to adopt them. Even as attested in the previous paragraph, the spheres give advice on the existing novelties, so that the people also reach to them to be informed, as they are pre-disposed to adopt. Even though the players and non-players show many similarities with respect to their social systems, the results confirm that the players talk to their spheres more frequently about New Technologies, and the people go more to them than to the non-players when they need to be informed about this topic.

The results on the process of innovation-decision's first phase, the stage of knowledge, shows that the individuals have a notion of the existence of the technology before acquiring it, regardless of them playing videogames or not. Then, there are no differences between them when deciding to adopt due to the ease of use they possess. But the non-players, being less innovators, are more

motivated by their environment to obtain New Technologies. On the other hand, the players do not really mind owning the device without really knowing how to use it, as they understand that due to their knowledge, they will not have trouble using it, and they also acquire it to a greater degree as compared to the non-players, due to its characteristics and technological possibilities.

In the second phase, known as the stage of persuassion and within which the individual is convinced to adopt, we conclude that the players were more moderately easier to convince to acquire a specific technology, although there are not too many difficulties in persuading the non-player either.

After the two first phases comes the decision stage, when the individuals make the decision to acquire the innovation. To the non-players, the opinion of people in their environment helped them make the decision, even though both groups had the same opportunities to try and understand the technology before acquiring it, and similarly, they did not think about return it once adopted. In the case that either group did not adopt the innovation, the price of the device was the main reason that would justify the decision.

The fourth phase, after making the decision, is the stage of execution. In it, we confirmed that the videogame player's knowledge as innovators allowed them to make modifications to the technology if it didn't convince them. This was the case even though both groups had similar knowledge that these modifications could be performed, but the players were more inclined to even use it differently, as long as their needs were met. Even with all the possible alterations of the technology, all the individuals felt satisfied when adopting, due to the preliminary idea that they had of it. But the players felt more able and had a greater predisposition to transform it so that it served its function.

Lastly, we find the phase of confirmation, where the individuals exerted the final decision to keep the technology once it was adopted. The individuals were conscious that in the case of non-adoption, its use could be positive for other people in their environment, but the videogame players were the ones who, in the case of non-adoption, looked for information or an alternative. There very few cases where the technology was acquired but not used. In the end, there were two indicators that the players were more innovative; they shared much more information about technology with people in their environment, and they were the ones who encouraged the non-players to acquire it.

The data obtained after analyzing the technological resources of the individuals led to the conclusion that overall, the players possessed a television, a desktop, a portable computer, smartphone and videogame console, and the non-players had mainly a television, a smartphone and portable computer. Also, the amount of devices they had also depended on if they were players or not. Therefore, the former tended to have a greater quantity, as shown by their ownership of a desktop computer, a smartphone, a table, a MP3/MP4 player and videogame console, with the distribution of the other devices being equal among both groups, and the smartphone sitting in first place as the technology that was most used in general.

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The second part of the segment dedicated to the resources showed that the players were more active users of the New Technologies, as they were more interested in them, and that the importance that these technologies had for them was greater as compared to the non-players. This could also be said of the degree of use of the technology.

This all meant that the innovator character of the players stimulated them due to their need to possess more variety and quantity of technology. Also, the fact that the videogames were present in all the devices analyzed made the players more interested in them, as they were more active and had a greater degree of usability.

Future research lines should plan on transversal and longitudinal research with the aim of comparing the results obtained here with other samples, to analyze the evolution of the phenomenons proposed in this research, and to establish the behavioral tendencies of the videogame players.

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