Acceptance of public procurement digitalization using the TAM Technology Acceptance Model (Davis, 1989)

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Abstract—

Digitalization plays a key role in society, it is considered as an important lever to ensure financial inclusion, currently, digitalization has become a must for a company or any type of organization. Indeed, it applies to all areas and ensures an optimization of time and money. In Morocco we note the existence of several projects in the digital with the support of several international organizations like the World Bank

The purpose of this paper is to examine the acceptance of digitalization in public procurement using the TAM (Davis, 1989) acceptance model in a Moroccan context. Using the questionnaire developed by Wong and Teo (2009), we conducted a survey of 200 Moroccan companies working in the field of cleaning and security. The results showed that the TAM can be considered as a valid instrument to study the factors that define and influence the acceptance of the digitalization by the Moroccan cleaning and security companies. They also show that the dimensions of the TAM are articulated in the same way as Davis (1989) and Wong and Teo (2009) have recommended.

Keywords— TAM model, Digitalization, Public procurement, perception.

I. INTRODUCTION

Currently, digitalization in the field of public procurement plays an essential role in establishing transparency. Morocco has opted for the implementation of a system of digitalization of public procurement, and this is considered an instrument of good governance of public finances.

Indeed, the State aims to simplify, improve the performance of procurement, efficiency and transparency of public procurement as positive outcomes of the digital transformation. As a result, the digitalization of public procurement minimizes the risk of mistakes, controls the time required to collect and process data, and makes the management process more secure and transparent.

The digitalization of public procurement procedures is based on three pillars: the public procurement portal represents a database of public procurement, the electronic submission which is a platform for supplier profiles and last but not least the e-auction which is a form of electronic group purchases.

However, the success of this digitalization requires the acceptance and participation of all the companies. But this digital transformation will not be successful if it is not complemented by a real commitment from companies and suppliers, so it would be important to support the users by providing the necessary tools.

In light of these realities, it is important to understand the factors that can influence the acceptance of digitalization among users (Moroccan companies) by using the TAM (technology acceptance model) (Davis, 1989).

The purpose of our study is to test the effectiveness of the TAM as a model that might explain the intention to use digitalization by Moroccan cleaning and security companies.

II. THEORETICAL CONTEXT & METHODOLOGY

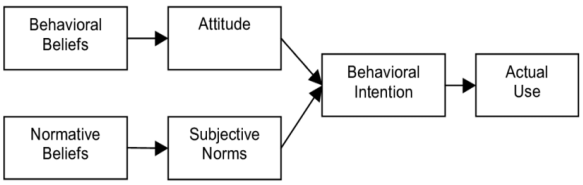
A. Theoretical Context

In the following section, we will review the different theories that have studied this aspect since the seventies of the last century until the latest productions on the topic, in order to mark out the sphere of the variables that can influence the new technologies user's behavior.

1. **Theory of Reasoned Action (Ajzen & Fishbein, 1980 ; Fishbein & Ajzen, 1975) [1] :**

This model presumes and assumes that all behavior is initiated by a behavioral intention, which means that the decisions are purely rational. There are two components of the behavioral intention. first, the attitude towards the behavior and second, the subjective norm.

Figure 1.Theory of Reasoned Action (Ajzen & Fishbein, 1980 ; Fishbein & Ajzen, 1975)



Source: Theory of Reasoned Action (Ajzen & Fishbein, 1980).

The attitude towards the behaviour would be determined by people's beliefs about the consequences of that behaviour multiplied by the evaluation of those consequences. The beliefs are defined by the individual's subjective probability that performing a particular behavior will generate some specific outcome.

The subjective norm translates the social pressure submitted by the individual in the process of the decision making (emission of the behavior); this pressure is concretized practically by the taking into account the manner in which the important people could react facing the emission of some behavior.

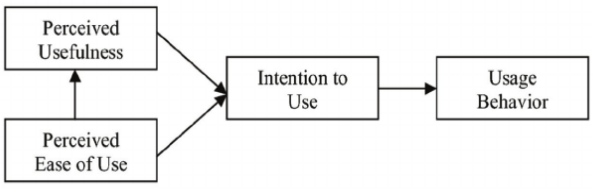
The theory of reasoned action assumes that all other factors that influence behavior are done so indirectly, such as by influencing attitudes toward the behavior or subjective norms.

However, the scope of the theory of reasoned action remains limited to behaviors under intentional control.

2) Technology Acceptance Model 1989 (TAM1) [2] :

The Technology Acceptance Model (TAM) proposed by DAVIS in 1989 has become the most dominant model of the acceptability of the technologies the information and the communication. It aims to explain the adoption or not of technology.

Figure 2.Technology Acceptance Model 1989 (TAM1)



Source: Fred D. Davis, Richard P. Bagozzi et Paul R. Warshaw, « User Acceptance of Computer Technology: A Comparison of Two Theoretical Models », 1989.

The TAM has two fundamental determinants of the acceptance of the technologies: The perceived usefulness and the perceived ease of use.Davis has defined perceived utility as: "The prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context".

As for perceived ease of use, it was defined as follows: "The degree to which the prospective user expects the target system to be free of effort".

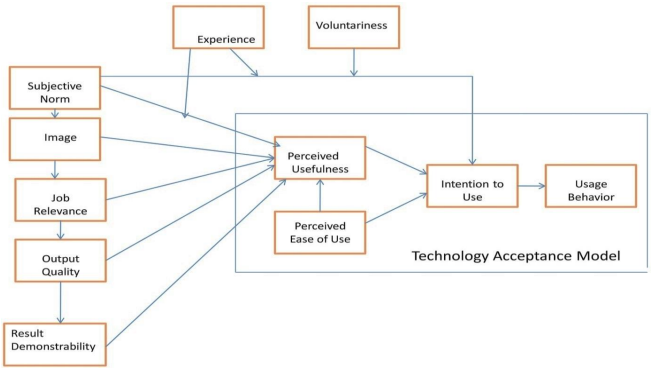
3) Technology Acceptance Model 2000 (TAM2) [3] :

In 2000, Viswanath Venkatesh and Fred D. Davis published the results of a study they conducted on four organizations to test the theoretical extension of the first version of Davis' 1989 technology acceptance model.

They have measured the TAM constructs three times; the first one before the implementation of the information system, the second one after one month of its implementation and the last one three months after the implementation. These three measuring points allowed us to identify the power of the TAM in predicting the users' behavior for all the studied organizations.

The year 2000 model represents an upgrade to TAM 1 because it presents several components of the perceived usefulness (PU), which represents the major construct of the TAM in addition to the perceived ease of use, the second most important component of the intention to use in the basic TAM model.

Figure 3.Technology Acceptance Model 2000 (TAM2)



Source : Viswanath Venkatesh et Fred D. Davis, « A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies ».

In this model Davis and Venkatesh enumerated seven external elements of the TAM that have a direct influence on the perceived usefulness. They are divided into two sections:

first, the social influence process that includes the subjective norm, voluntarism and image.

Second, the instrumental cognition process that includes the relevance of the work, the quality of the output, the demonstrability of the results and the perceived ease of use.

4) Unified Theory of Acceptance and Use of Technology 2003 (UTAUT) (TAM3) [4] :

Developed by Venkatesh et al.(2003) it' s a synthesized and complete theory, which seeks to test and analyze eight pre-existing theories of technology acceptance, which are; ; TAM (Davis 1989), Diffusion of Innovations Theory (Rogers 1962), TAR (Ajzen and Fishbein, 1975), Motivation Model (Davis 1992), TCP (Ajzen 1991), MAT and TCP combined (Taylor and Todd 1995), PC Use Model (MPCU), and Social Cognitive Theory (Bandura 1989, Compeau and Higgins 1995).

By bringing together, consolidating and refining the previously established theories, UTAUT is considered by its

authors to be a model that provides the best account of the adoption and use of technology.

UTAUT assumes that the actual use of a technology is a function of the intention to use, which is influenced by the following components: the expected performance, the expected effort, the social influence, and the facilitating conditions.

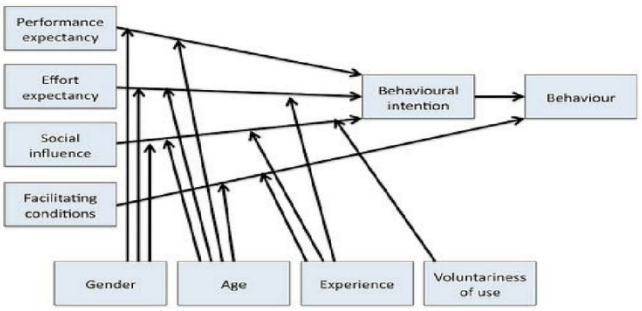
The expected performance is the gain a user expects to achieve by using the technology .

The expected effort refers to the amount of effort a user has to make in his daily use of the technology.

The Social influence is a belief that other people will support the user in his choice to use technology.

And finally we have the facilitating conditions that are defined by Venkatesh as follows: "the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the System.

Figure 4.Unified Theory of Acceptance and Use of Technology 2003 (UTAUT) (TAM3)



Source: Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis et Fred D. Davis, « User Acceptance Of Information Technology: Toward A Unified View ».

The UTAUT incorporates new categories of variables known as moderators that can change the influence of the component variables on the intention to use.

They are: gender, age, experience of use, and mandatory or voluntary.

5) Technology Acceptance Model 2008 (TAM3) [5] :

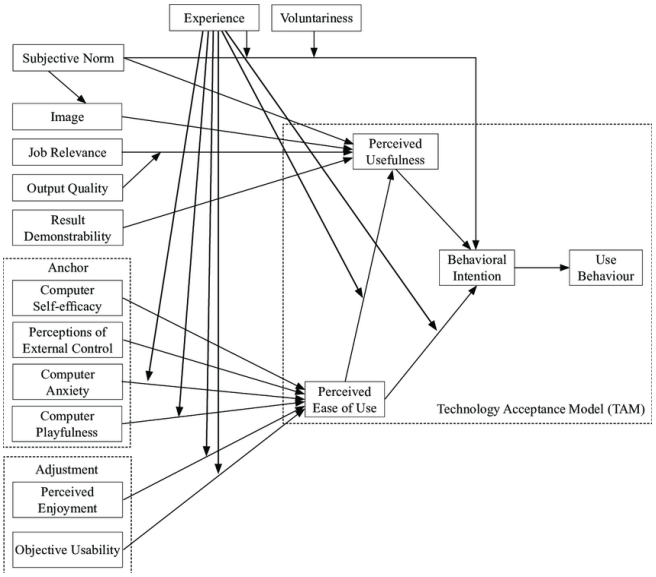
Despite the existence of a body of research that explains the factors that help ease the technology acceptance, many of the adoptions failed.

After much research Venkatesh was finally able to identify in 2008 one anomaly related to TAM that is considered to be the strongest technology acceptance model. This anomaly was clarified according to Venkatesh by the following question; "imagine talking to a manager and saying that to be adopted technology must be useful and easy to use. Imagine the reaction would be 'Duh!' The more important questions are what makes technology useful and easy to use".

TAM3 attempts to draw out all the variables that may influence the future use of any technology. Venkatesh and Bala combined the TAM2 (Venkatesh and Davis, 2000) with the perceived ease of use components (Venkatesh, 2000).

The goal of this production is to provide an integrative model of decision-making of a user with respect to the use of a technology by specifying all the components of perceived usefulness and perceived ease of use .

Figure 5.Technology Acceptance Model 2008 (TAM3)



Source : Greg Walker et Nancy Johnson, « Faculty intentions to use components for web-enhanced instruction ».

Venkatesh and Baia (2008) have combined the perceived usefulness components presented in TAM 2 with the perceived ease of use components suggested by Venkatesh (2000). they are distinguished into two categories :

1- Anchors: it represents the set of beliefs that one has about computers and/or their use. It includes four components: Computer self-efficacy, perceptions of external control, computer anxiety and computer playfulness.

2- Adjustment: it is the feedback of the users after using the system in question. It includes two components: Perceived enjoyment and objective usability.

The essence of this theoretical section is to synthesize all the different models related to technology acceptance in order to allow researchers to understand the mechanisms that may influence the behavior of the final user. Moreover, we want to help any organization wishing to introduce a new technology, to understand the acceptance issues it might be confronted to.

B. Research Hypotheses

Based on the TAM model and questionnaire developed by Wong and Teo (2009), we will test the following hypotheses:

H1: Perceived ease of use has a positive effect on the perceived usefulness of computers (digitalization) in Moroccan companies;

H2: Perceived ease of use has a positive effect on attitudes towards computers (digitalization) in Moroccan firms;

H3: Perceived usefulness has a positive effect on attitudes towards computers (digitalization) among Moroccan firms;

H4: Perceived usefulness has a positive effect on the intention to use computers (digitalization) among Moroccan firms;

H5: Attitudes towards computers (digitalization) has a positive effect on the intention to use computers (digitalization) among Moroccan firms.

C. Methodology

In order to test the mentioned hypotheses, we used a quantitative approach :

the study sample

The participants of this research are 200 Moroccan companies that provide cleaning and security services, to have a certain representativity, we realized the questionnaire on companies that are located all over the Moroccan territory.

Our questionnaire is made of 16 items, online format, the profiles of the respondents and their functions are listed in Table 1:

Table 1.Respondent information

Gender	Nbr	%
Male	68	34
Female	132	66
TOTAL	**200**	
Function	**Nbr**	**%**
Manager	52	26
Head of a department	82	41
Commercial	66	33
TOTAL	**200**	
Specialty	**Nbr**	**%**
Economics and Management	121	60.5
Right	52	26
Computer Science	22	11
ISTA Diploma	5	2.5
TOTAL	**200**	
Education level	**Nbr**	**%**
Baccalaureate or less	7	3.5
Bac +2	71	35.5
Bac +3	83	41.5
Bac +5	34	17

Source: Author's processing of survey data

Measuring Instrument:

In this research, we used Likert scale survey questions it's a 5-point scale developed by Wong and Teo (2009). The 16 items are affirmations with 5 answer options that range from "completely disagree" to "completely agree".

The questionnaire items are grouped into 4 axes as presented in Table II.

Table 2.List of dimensions and corresponding items

	Question	Code
Perceived usefulness (adapted from Davis, 1989)	The use of the public procurement portal will improve my work.	**A 1.1**
	Using the procurement portal will improve my efficiency.	**A 1.2**
	Using the procurement portal will increase my productivity.	**A 1.3**
	I find the procurement portal to be a useful tool in my work.	**A 1.4**
Perceived ease of use (adapted from Davis, 1989)	My interaction with the procurement portal is clear and understandable.	**B 1.1**
	I find it easy to manipulate the portal of the public markets I want.	**B 1.2**
	Interacting with the public procurement portal does not require much mental effort.	**B 1.3**
	I find the procurement portal easy to use.	**B 1.4**
Intention to use the computer (adapted from Davis, 1989)	I will be using the public procurement portal in the future.	**C 1.1**
	I make a plan to use the public procurement portal	**C 1.2**
	I will register for training to better use the public procurement portal	**C 1.3**
	I will seek support to master the use of the public procurement portal	**C 1.4**
Attitudes toward computer use.	The public procurement portal makes the job more interesting.	**D 1.1**
	Working with the public procurement portal is fun.	**D 1.2**
	I like working with the public procurement portal.	**D 1.3**
	I am looking for aspects of my job that require the use of the Public Procurement Portal.	**D 1.4**

Source: Source: Wong and Teo (2009).

Data analysis

The purpose of this work is to study the measurement instrument by using Cronbach's alpha score and Exploratory factor analysis (EFA) in order to evaluate the Dimensionality, Reliability and the Validity of the constructs.

The statistical analyses of the data were carried out under the software "Stata Corp Stata 14.2 (Revision 16 Nov 2016)".

Results

In this section we will present the results obtained by our research.

1. The study of the measuring instrument

In order to evaluate the reliability of our dimension, we will calculate the indicator of the reliability of the dimensions ALPHA of Cronbach, as shown in the following table we note that the values obtained are satisfying.

Table 3.Measures of Dimensional Fidelity

Dimension	Number of items	Cronbach's Alpha
Perception of usefulness	4	0.75
Perceived ease of use	4	0.72
Intention to use the computer	4	0.87
Attitudes towards computer use	4	0.79

Source: Author's processing of survey data

2. Exploratory factor analysis

In this step, we performed a factor analysis with the VARIMAX normalization Kaiser rotation on all the items retained during the reliability study.

The extraction method used is the principal axes factorization. Concerning the number of factors to be extracted.

Table 4.Exploratory factor analysis

		Factor			
Item	Code	1	2	3	4

The use of the public procurement portal will improve my work.	A 1.1	,809			
Using the procurement portal will improve my efficiency.	A 1.2	,756			
Using the procurement portal will increase my productivity.	A 1.3	,903			
I find the procurement portal to be a useful tool in my work.	A 1.4	,590			
My interaction with the procurement portal is clear and understandable.	B 1.1				,790
I find it easy to manipulate the portal of the public markets I want.	B 1.2				,450
Interacting with the public procurement portal does not require much mental effort.	B 1.3				,868
I find the procurement portal easy to use.	B 1.4				,490
I will be using the public procurement portal in the future.	C 1.1			,811	
I make a plan to use the public procurement portal	C 1.2			,895	
I will register for training to better use the public procurement portal	C 1.3			,503	
I will seek support to master the use of the public procurement portal	C 1.4			,390	
The public procurement portal makes the job more interesting.	D 1.1		,689		
Working with the public procurement portal is fun.	D 1.2		,976		
I like working with the public procurement portal.	D 1.3		,358		
I am looking for aspects of my job that require the use of the Public Procurement Portal.	D 1.4		,607		

Source: Source: Wong and Teo (2009).

3. Tests of the research hypotheses

In this part we analyze by structural equations the causality links that exist between the dimensions of the research model.

Tested link	β	S.E	C.R	Validation of H
Perceived usefulness Perceived ease of use	,560	,113	5,120	H1 VALIDATED
Attitudes toward computer use Perceived ease of use	,648	,145	4,245	H2 VALIDATED
Attitudes toward computer use Perceived usefulness.	,501	,111	4,527	H3 VALIDATED
Intention to use the computer Attitudes toward using the computer	,367	,074	4,564	H5 VALIDATED
Intention to use the computer Perceived ease of use	,597	,112	5,186	H4 VALIDATED

Source: Author's processing of survey data

According to this table, the results obtained confirm the basic assumptions. All effects are positive.

III. Discussion and Conclusion

Our work is based on the measurement of reliability and validity of the TAM model in a Moroccan context. The study was conducted among Moroccan companies that provide cleaning and security services.

The basis of our case study is the questionnaire developed by Wong and Teo (2009). Indeed, our research has shown that the questionnaire items are correctly positioned in the four axes, also, the Cronbach's Alpha is greater than 0.7 so the constructs are reliable.

In conclusion, the results of the empirical study show that the TAM model is valid to explain and predict correctly the intention to use computer (digitalization) in the cleaning and security company.

This validation showed us that the cleaning and security companies accept to use the public procurement portal (PMP) as a tool for managing public procurement and consequently, we can say that these companies have a very positive perception of the digitalization applied by the Moroccan State.

The Limits :

Our research contains some limitations, they are the following:

- The choice of a reduced sample constituted only by cleaning and security companies makes it difficult to generalize the conclusions reached on all the users.

- The perception has a psychological aspect that cannot be evaluated by a quantitative approach (which we have adopted), and this can make the results unbalanced.

- The choice of an analysis model from 1989 to analyze a phenomenon in 2021 makes the study a little bit less satisfying.

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