Determinants of use ICTTechnologies by SME in the HassiMessaoud region by using the technology acceptance Model(TAM)

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Abstract:

This research paper aims at a descriptive study on the use of information and communication technologies (TIC) by small and medium enterprises that are active in the Hassi Messaoud region in the field of technology (networks, optical fibers and applications) using the technology acceptance theory (TAM), and to test the extent of the influence of external determinants on the model from Through two main determinants (perceived ease of use and perceived usefulness of use), the questionnaire tool was used to collect data that was distributed to 58 institutions, and 28 of them were retrieved and studied, and 28 were valid for testing. strong among external determinants (efficiency of using technologies, Gaining time due to use, government subsidies, complexity) and model limitations (TAM) This confirms the existence of an influencing relationship between external determinants and the use of information technologies by SME in the Hassi Messaoud region.

Keywords:TAM Model, ICT, SME.Perceived ease of use, Perceived usefulness.

Jel Classification Codes :M13, O14, M40

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1. Introduction :

Use of information and communication technologies (ICT), is a set of processes concerned with employment and re-employment, with finding new ways, with technical acceleration to find the easiest way to use, It's certain of obtaining a prior results, of using a set of steps, and this degree of accuracy goes back to the origin of the military term, that appeared in the "*First World War*"(Michel.D.c, 1990)Algeria's interest in ICT field and innovative industries, was not now, but rather dates back to the **1970**s; al public institutions were allocated, a budget in research and development, more than that a many workers were being trained in developed countries, but the results were insignificant and needed repairs after each period, the first of which was in 1994(Abdelkader D, 1992).

On the beginning of 2000s, with application of Law N° 2000 of 03 /08/2000, actions aimed at digital transformation multiplied(Journal, 2000), strategic digitization program :"E-Algeria 2008-2013" which includes 13 axes are implemented, and to ensure the application of this program, a "FAUDTIC" Aid Fund has been set up, and in parallel technology parks and incubators have been created, in order to encourage innovation and provide assistance to entrepreneurs in the digital field, and to catch up with the delay of a new law has become widespread to continue the work of digitization of different sectors(CNUCED, 2019).

The number of active SMEs in Algeria is 1,060,289 according to data from the Ministry of Industry and mining (2020). Very small businesses (SME) (workforce with less than 10 employees), represent a majority share (98%) so 1,036,243 which employ 2,643,122 employees, a weighted penetration rate of ICT in Algerian SMEs is 45%. This percentage includes the use of fixed and mobile telephones, personal computers, internet, ADSL access, intranet/extranet networks, the web, and the portal. share of NTIC investments is estimated at 6.72%.

according to this observation we aimed to determine the importance of using ICT since it constitutes an important source of competitive advantage for Algerian SMEs, therefore we have tried to identify a set of important factors that affect SMEs to use ICT for this, we propose our research problematic as follows:

What is the external determinants effect on the TAM Model by using ICT among SMEs in the locality of HassiMessaoud?.

The main objective of this study is to examine the internal and external determinants of the TAM model effecting for using ICT by SMEs in hassimessaoud region.

1. Theoretical framework of the research:

In beginning of 1980, a new term appeared in the business world whose studies adoption and spread of ICT, a new term appears which is "*Acceptance*", how was a major determinant of the use a new technology. **Davis, Fred** was a founder of the science of accepting technologies by developing the **TAM** (*Technology*

Acceptance Model) in **(1985**) as part of his presentation of a PhD thesis at the College of Technology at the University of Massachusetts in the United States of America(Davis, 1985)**,** The term "***Technology Acceptance***" is broad and includes many meanings according to the influencing factors: (the desire and behavior of the user, optional or compulsory technology, the work environment), and that the goal of using ICT is to increase the employee's profitability by developing his work method, thus leading to an increase in the performance of The facility to maintain its competitiveness for as long as possible, the individual user is the basis in the process of accepting ICT(Davis and al, 1989)**.**

This scientific field had attracted the attention of many contemporary researchers, and they have presented many scientific theories were interested in studying the using of **ICT** by test **TAM Model**, so we will note the models from which the theory was extracted and started with the basic rule, which is "***Reasoned Action theory***" "**TAR**" Model, and both of (Ajzen et Fishbein, 1977)defined **TAR** :

"People usually act thoughtfully, they take into account a available information, and consider implicitly or explicitly the consequences of their actions", so this theory focuses on two main internal determinants, which is the interest and tendencies of the user (entrepreneur) and this appears through his behavior and the other are an external determinant are appears through external laws and decrees...etc.

After the research developed by **Fishbein and Ajzen (1975-1980),** until the end of the eighties, each of them found that the**(TAR),** theory does not count the involuntary behavior of the user, so they developed the (TAR), theory research, extracting a new theory and model, whose named it " *Planned Behaviortheory*" (**TBP**), with the aim of explaining a many factors affecting people's The use of technologies, whether advanced information or communication, was the origin of its inception through the interviews that came after research; **(Ajzen and Mdden, 1986)**an influential factor has been added that is an indicator that explains the control of perceived behaviors through (limited activity, cost of time, effort expenditure, etc.), which are external factors that the user cannot control and therefore inevitably affect his desire and orientation to use. Perceived use and perceived benefit from use) which are determinants of technology acceptance **theory** (Ajzen, 1991)and thus we arrive at technology acceptance **"TAM theory"**.

TAM theory is a model that depends on the user of ICT who is perceives intention to use, and on the other hand, which depends on the adoption of information technologies ICT, by the institutions capacity to predict the usefulness used, as well as the ease of use of these technologies used in the future.(Vankatesh and Davis, 2000)**.**

2. Determine the study variables:

this study consiststo determine a factors effecting the use of information technologies ICT by SME (entrepreneurs) through using (**TAM Model)** according to its fixed internal determinants of (perceived usefulness (PU) - perceivedease of use (PEOU) – attitude of intention(AI)- actual use (Au)) and we will

determine the external factors by trying to limit through the sample that we have chosen from (**58**) entrepreneurs active in the field of technology ICT,inHassiMessaoud region, we identified a group of effect external factors represented in (use efficiency - time saving - subjective standard - complexity).whose effecting on "perceived ease of use" and "perceived usefulness", which in turn affect "intended use (AI) and actual use(AU)"; In the following, we will present the effect of the external determinants, each one separately.

a)- Use efficiency:

(Hsiao CH and al, 2011)'s analysis shows that are differences in the effect of the efficiency of ICT user on the determinant of perceived ease of use **(PEOU**) as well as perceived usefulness (**PU**), because the ICT user's sense of self-efficacy makes him able to perform his tasks efficiently and achieve his goals and thus will generate a desire to use for the rest of the employees ; On the other hand efficiency use ICT especially "computer technologies", is based on the user's participation in carrying out of his tasks, which clearly affects him during and after the process of use(Vankatech and Davis, 1996)**, t**herefore, we retained a following hypotheses:

- H1a: Use efficiency have a significant effect on the perceived usefulness of ICT .
- H1b: Use efficiency have a significant effect on ease perceived use of ICT.

b)- Time saving:

A "Time saving" is important and influential on the use of information technologies (ICT), and cost of time taken to complete the activities is related to perceived ease of use and perceived usefulness, there is a profit for time and the completion of a doubled number of activities, thus increasing the profitability of using ICT (Nickol and al, 1983) therefore, we retained a following hypotheses:

- H2a: Time saving has a significant effect on the perceived usefulness of ICT.
- H2b: Time saving has a significant effect on the perceived ease of use of ICT.

c)- Government Subsidies:

(Fichman R and Kermerer, 1999)found that the SME that succeed in the processes of promotion and advertising are the SME wich have received government subsidies, which include the financial and structural dimensions as well as the personal characteristics of managers and employees, such as the level of education, the number of technical specialists, as well as sophisticated communication tools, the greater and profitability communication channels., which focus on social and organizational determinants and structural determinants, which are funded by government subsidies in the field of research and development (Rogers, 1983); therefore, we retained a following hypotheses:

- H3a: Government Subsidies has a significant effect on the perceived usefulness of ICT.
- H3b: Government Subsidies has a significant ieffect on the perceived ease of use of ICT.

d)- Complexity:

Determinant "*complexity"* includes all equipment, tools, and technological means, whether advanced, micro or invisible, that operate by electric power, in addition to connected applications and exploited through the Internet on an ongoing basis, depending on information and communication technologies (ICT)(Chin and al, 2015)**;** therefore, we retained a following hypotheses:

- H4a: Complexity has a significant effect on the perceived usefulness of ICT.
- H4b: Complexity has a significant effect on the perceived ease of use of ICT.

e)-**Perceived Ease of Use (PEOU):**

This determinant is the first essential determinant of the TAM technology acceptance model and expresses the" perceived ease of use" of ICT, equipment and technological means without resorting to specific capabilities, and it also affects directly the perceived usefulness of using ICT as well as the intention Atittude(Davis, 1985)whenever the user find that the technology does not need an effort that has increased their desire to work with it, so we extract the following hypothesis:

H5: Perceived ease of use has a significant impact on perceived usefulness.

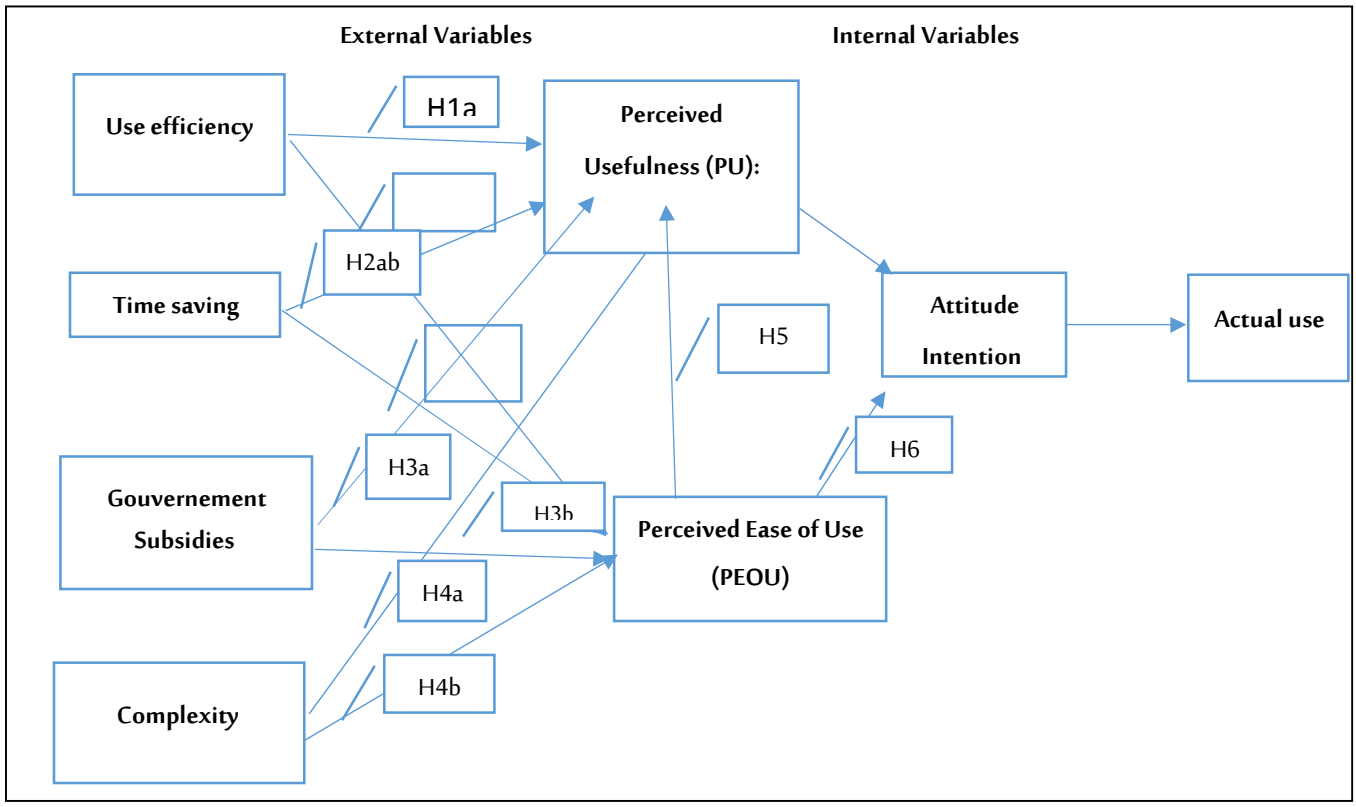
f)- Perceived Usefulness (PU):

Perceived usefulness is defined as the degree to become certain of use ICT, where technology will increase his productivity, and on the other hand is the degree where user feel that his performs proregression and his tasks done successfully, in result the intention to use ICT increases (Chin and Lin, 2015)**.** Thus, we extract the following hypothesis:

H6: Perceived Usefulness has a significant effect on Attitudes intentions.

Therefore, the study model will be as follows:

Figure N° 01 TAM's research Model



Sources: PhD student

II– Methods and Materials:

As we mentioned before to limits the determinants, we used the three-factor questionnaire tool that was built through the previous studies to determine the variables to conduct a survey to collect data from a sample not random, we distributed over the number (58) of entrepreneur (SME) who are active in the HassiMessaoud region, and we got it back of (28) active in the field of technologies (equipment, means and programs).a number of questioners distributed, retrieved and capable of processing consisted in:

Table n°01 Statistics of the distributed and retrieved questioner

Data	Entrepreneurs	Percentage
Distributed questionner	58	100%
Recovered questionner	50	86,20
Valid questionner	49	84.48%

Sources: PhD student

From the table (1), percentage of valid questioners was 84.48%, which is a very acceptable rate, as the percentage of canceled questioner was 15.51%. This reflects entrepreneurs who answered neutral.

It should be noted that the three-point Likert scale was adopted, and due to its use in many previous studies in this field, students were asked to give their degree of approval for each of the phrases contained on the "triple Likert" scale as follows: "Agree (03 pts) given It has 3 grades; Neutral, given degrees; one score is given for

expressing disagreement (non agree)". To find the correlation and interactive relationships between the external and internal variables of the TAM model; we built 10 hypotheses that we have identified from the variables addressed by previous studies, and we have prepared two parts (the first one deals with the personal characteristics of the entrepreneur, and the second part is questions related to the variables study), which resulted in (**25**) questions and were tested with**SPSS.23** We use a coefficient "Cronbach's Alpha" (α), which takes the value from (0 - 1), which expresses the stability ratio that shows the percentage of entrepreneur and who repeat the same answer if they are re-questioned in the same circumstances. In general, the following table shows the test results.

Table (2): Results of the Cronbach Alpha Labs test for the study questioner

Cronbach Alpha	Students
Cronbach Alpha's SME	96.85%
Number of contents	25

Source: Prepared by the researcher based on the statistical analysis of the questionnaire results using the SPSS program

The Cronbach alpha values for the study dimensions were: 96.85% which is an acceptable value for measuring the reliability of accuracy, with regard to testing the validity of their content, consistency was calculated; The results indicated that there is a significant correlation between each dependent and independent variable, and this indicates the possibility of measuring these paragraphs of variables.

-The first part: a study of the personnel characteristics:

Table n° (3): Results of the Cronbach Alpha Labs test for the study questioner

Data			Studentresult		
N	Variables	Category	N	Frequency	Percentage
01	Gender	Male	76	37	49%
		Female	76	12	16%
02	Seniority in activity	More than 10years	76	28	37%
		05 to 10 years	76	12	16%
		underthan 05 years		09	12%
03	Academicdegree	Universitydegree	76	15	20%
		professionaltechnician	76	34	45%
04	SME	National	**76**	15	20%
		private		28	37%
		indivisual		06	8%
05	Workersnumbers	More than 50 employees	**76**	10	14%
		Between 10 and 50		26	35%
		underthan 10		13	17%

Source: Prepared by the researcher based on the statistical analysis of the questioner results using the SPSS program

Through the results obtained when testing the previous three variables, we note that the ratios are intermediate between [12, 49] and Results for both the arithmetic mean and the standard deviation of the variables it is detailed in the appendices.

2-2 Measurement model:

We start with the first part of the questions about the SME and proceed to the describe analysis of the variables, results of the first part were as follows:

characteristics of the person in HassiMessaoud region showed that 49% of the surveyed entrepreneur are male category, although there are small establishments under name of the females or their owners are females, but they are run by males. dominance is very strong in this field.

Results of the educational level showed a discrepancy between 20% of the entrepreneurs with high degrees and they are divided between (20% of the educated in the ICT field and the 45% from different specializations, but they obtained on trainings in the ICT field), 37% are Entrepreneurs who working in private and 20 %national, a rest represent 06% individual institutions that are active in the ICT field, so they are active according to their previous professional experience, there is a discrepancy 26% employs from 10 to 50 workers 35% employs less than 10 workers and 14% employs more than 50 workers; distribution of workers varies according to the workshops that are granted to work in them, and it changes according to the geographical location and the type of projects.

III- Results and discussion:

1- **efficiency use:** Regression analysis of this effect relationship between external factor (efficiency use) and (perceived ease of use) and (perceived usefulness), was high and a degree of correlation was according to Pearson's moduluswe find perceived usefulness was 0.666, 0.669. that prove a strong correlation between theses factors. Tabular value was $0.000<\alpha$ (sig= 0.05) for the independent variable so the effect was at a significant level 0.000, and the result of T-test was T 0.869, that means the efficiency use has positive high impact on perceived usefulness and perceived ease of use, so we accepted the hypothesis:

- H1a: Use efficiency have a significant effect on the perceived usefulness of ICT .
- H1b: Use efficiency have a significant effect on ease perceived use of ICT.

2)- Time saving: Regression analysis of this effect relationship between external factor (Time saving) and (perceived ease of use) and (perceived usefulness) was high and degree of correlation was according to Pearson's modulus 0.630 and, 0.704, that means a strong correlation between factors. Tabular value was $0.000<\alpha$ (sig= 0.05) for the independent variable, so the effect was at a significant level 0.000, and result of T-test was T 0.868 factor have high positive effect and we confirmed that "Time saving" has positive impact on Perceived ease of use، and perceived usefulness so we accept the hypothesis:

- H2a: Time saving has a significant effect on the perceived usefulness of ICT.
- H2b: Time saving has a significant effect on the perceived ease of use of ICT.

3)- Government Subsidies: Regression analysis of this effect relationship between external factor (Government Subsidies) and (perceived ease of use) and (perceived usefulness) was high and degree of correlation was according to Pearson's modulus 0.671 and, 0.723, that means a strong correlation between factors. Tabular value was 0.000<α (sig= 0.05) for independent variable, so the effect was at a significant level 0.000, and result of T-test was T 1.063, factor have high positive effect and we confirmed that "Government Subsidies"has positive impact on Perceived ease of use، and perceived usefulness so we accept the hypothesis:

- H3a: Government Subsidies has a significant effect on the perceived usefulness of ICT.
- H3b: Government Subsidies has a significant effect on the perceived ease of use of ICT.

4)- Complexity: Regression analysis of this effect relationship between external factor (Complexity) and (perceived ease of use) and (perceived usefulness) was high and degree of correlation was according to Pearson's modulus 0.798 and, 0.802, that means a strong correlation between factors. Tabular value was 0.000<α (sig= 0.05) independent variable, so the effect was at a significant level 0.000, and result of T-test was T 0.623 that means a factor high positive effect and we confirmed that "Complexity" has positive impact on Perceived ease of use، and perceived usefulness so we accept the hypothesis:

- H4a: Complexity has a significant effect on the perceived usefulness of ICT.
- H4b: Complexity has a significant effect on the perceived ease of use of ICT.

5)-**Perceived Ease of Use (PEOU):** Regression analysis of this effect relationship between external factor (perceived ease of use) and (perceived usefulness)was high and degree of correlation was according to Pearson's modulus 0.776 that means a strong correlation between factors. Tabular value was 0.000<α (sig= 0.05) for the two independent variables, so the effect was at a significant level 0.000, and result of T-test was T 0.763, both of two factors have high positive effect and we confirmed that "Perceived Ease of Use" has positive impact on perceived usefulness, so we accept the hypothesis:

H5: Perceived ease of use has a significant effect on perceived usefulness

6)- Perceived Usefulness (PU): Regression analysis of this effect relationship between external factor (*perceived usefulness*) was high and degree of correlation was according to Pearson's modulus 0.776 that means a strong correlation between factors. Tabular value was 0.000<α (sig= 0.05) for the two independent variables, so the effect was at a significant level 0.000, and result of T-test was T 9.825, T 9.781 both factors have high positive effect and we confirmed that "Perceived Usefulness" has positive impact on intention attitude, so we accept the hypothesis:

H6: Perceived Usefulness has a significant effect on Attitudes intentions

Through the data extracted from the SPSS table the hypotheses (10) were tested , all of them appeared with a significant statistical effect expressing a correlation between the external determinants and their direct

and strong impact on the internal determinants of the TAM acceptance model, in particular the determinants (perceived ease of use) and (perceived Usefulness), which are in turn, they directly affect the" *intention to use ICT*" and the" actual use." Among these hypotheses, we find most of them are strong and positive.

IV-Conclusion:

The impact of information and communication technologies ICT on SME whether by use or adoption, has been studied in many academic studies, but in this study we decided to study the real impact by identifying the influencing factors through a global model specialized in dealing with information and communication technologies TAM Model , and the impact of The external determinants represented as (use efficiency, time profit, state subsidies, complexity in techniques) on the TAM model and represented in the determinants "perceived ease of use" and "perceived usefulness" , that confirmed the actual use of technologies (equipment and software) by the SME in the region for information and communication technologies ICT, and the continuous use of them.

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