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Evaluating the Adoption of ICT Among entrepreneurs Through the Lens of TAM

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Abstract:

This study aims to identify the determinants, whom affect the acceptance use of (ICT) by entrepreneurs, initiated on technology acceptance theory (TAM) literature review, and to select a determinants studied, an questionnaire includes a framework composed of (52) items whom reflect (10) internal and external determinants, than (150) questionnaires were distributed to sample, and (93) valid ones were recovered, to extract a model for prediction to measure the degree of use, we use a structural equations modeling according to partial least squares method using (Smart PLS4.0) software.

The results showed an effect between the internal and external determinants, the effect was high for both of government support on perceived usefulness, and risk on perceived ease of use, as well as the entrepreneur's intention on actual use, while perceived ease of use was recorded on both perceived usefulness and attitude towards (ICT) use, and perceived usefulness on the entrepreneur's intention to use moderate effect; While the effect was weak for reliability on the perceived usefulness, and for government support on the perceived ease of use, and the perceived usefulness on the attitude towards use, which in turn affected the entrepreneur's intention, and this applies with regard to the determinant of efficiency on both the perceived usefulness and the perceived ease of use, in contrast, it was not recorded, so no effect of the reliability determinant on the perceived ease of use, and risk on the perceived usefulness, and the same result with regard to external pressures on both the perceived ease of use and the perceived usefulness, this resulted in the completion of valid model to predict with an acceptable degree of conformity with the field data.

Keywords: determinants, technology acceptance model, entrepreneur, perceived usefulness, perceived ease, TIC, TAM

Jel Classification : :M13, O14, M40.

Introduction

The Fourth Industrial Revolution, compared to the previous three revolutions, is characterized by the resources it relies on (intangible capital), represented by (ICT), which changed the features of the world, which in turn was divided into two parts: a developed world that possesses knowledge, and a backward world that is trying to absorb successive inventions in many fields. Algeria, like other developing countries, is trying to catch up with global development. It has shown interest in the field of technology since the seventies, as it encouraged technological innovation, carried out many reforms over the years, and formed a partnership with foreign investors. It ranked (89) in 2018, and became the third largest market in Africa in the field of communication technology in 2019. Entrepreneurs have turned to using (ICT) to reduce their burdens in order to increase their profits, as the number of small and medium enterprises increased from (843,243) in 2013 to (1,201,800) in 2019. In the same year, the number of emerging institutions was estimated at (84) institutions. The number of entrepreneurial projects also doubled during the pandemic period (2020-2021), as their number reached (28) small and medium enterprises for every (1,000) people, as most of them are active in the field of marketing and distribution. However, the use of information and communication technology by contractors for various types of their projects, but there is still The variability in ICT usage is due to several reasons, which raises the following question**:**

What are the factors influencing Algerian contractors' acceptance of ICT usage in light of the Technology Acceptance Model (TAM) theory?

To answer this question, we must rely on an explanatory theoretical foundation, represented by the Technology Acceptance Model (TAM), based on the following hypotheses.

- Hypothesis 1: In the Algerian business environment, entrepreneurs' use of information and communication technology varies.
- Hypothesis 2: According to the Technology Acceptance Model (TAM), the determinants influencing entrepreneurs' acceptance of ICT use include external (environmental) determinants, which influence internal (behavioral) determinants, such as perceived ease of use and perceived usefulness, which influence attitude and intention to use, which directly influence actual use

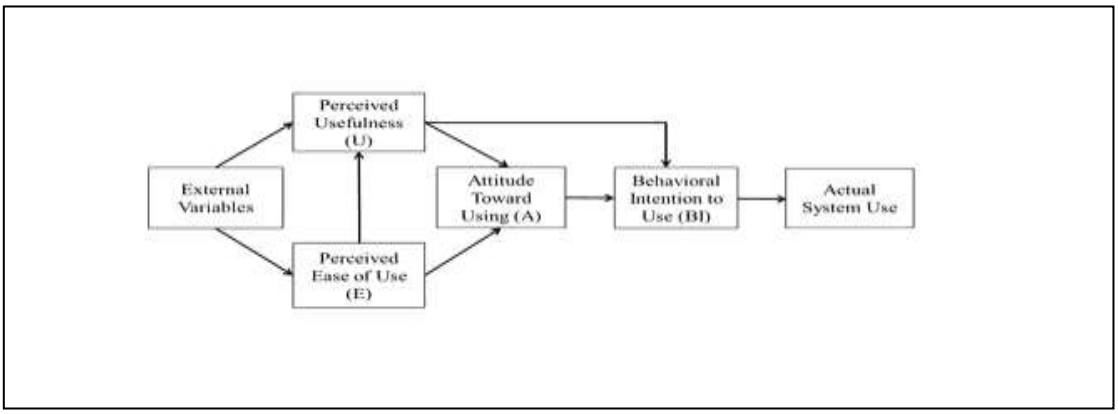
I. Cadre Conceptuel :

- **Technology Acceptance Model: TAM**

The theory was established by researcher Fred Davis in December 1985, when he presented the theory as part of his doctoral dissertation at the University of Massachusetts College of Technology in the United States. He attempted to create a theoretical model that explains the impact of the characteristics of computer information systems on users. He called this model the Technology Acceptance Model, as shown in Figure (1-1) below: [1]

Figure No. (1-1):Technology Acceptance Model

[1] Henderson, R. and Divett, M.J., 2003. « **Perceived usefulness, ease of use and electronic supermarket use ».** International Journal of Human-Computer Studies, 59(3), Australia, p 384



المصدر : Davis Fred and al, 1989, " User acceptance of computer technology: a comparison of two theoretical Models " , Article, Journal of management science, USA, P 985

(Davis, 1989)explain the components of the model from external variables (VE) such as design (systems, devices) and certain methods of using technology, which affect the two main determinants, which are perceived usefulness and perceived ease of use, which affect the actual use of technology. The attainment of perceived usefulness is achieved through perceived ease of use in addition to the external variables.[2]

- **Digitization in the world of business management:**

(Schwebel, 2020)defines it as "a dynamic process through which organizations use ICT in most of their activities." According to (Storhaye, 2016)keep his organization competitive for as long as possible to an organization, regardless of its size, is the one who makes the decision to move towards digitization. That is, the degree of the manager's knowledge of the extent of the perceived benefit of using information and communication technology, whether full or partial reliance, is what motivates him to make decisions regarding the shift towards digitize؛[3]".

- **Manifestations of digitization in Algeria**

- **Internet use**: According to the regulatory authority (ARPCE) in its report for the fourth quarter of 2021, the number of 3G and 4G subscribers reached about (45) million subscribers, an increase estimated at (9)% compared to the year 2020 (41) million, and the number of mobile phone subscribers reached about (47.02) million subscribers, an increase estimated at (4)% compared to the year 2020 (45) million‹4. Knowing that the number of the country's civilly registered population is estimated at 43.85 million people.However, most of the uses of the Internet in Algeria are for [5] communication rather than innovations, and the number of active users of mobile Internet reached 97.9% of the total number of active subscriber[6].

[2] Davis, F, 1985, Op Cit P 11
[3] Storhaye, P., 2016. "**Transformation. RH et Digital"**, Paris: EMS Management et Société. Paris, P1.
[4] APPCE, https://www.arpce.dz/ consulter 22/04/2021
[3] https://www.banquemondiale.org/fr/country/algeria Consulter le 22/04/2021
[4] https://data.worldbank.org/indicator consulter le 22/04/2021
[6] https://gs.statcounter.com/social-media-stats/all/algeria consulter le 22/04/2021

According to the website (DATAREPORTAL, 2022), the average speed of fixed internet use in Algeria was 9.78 megabits per second (Mbps) in January 2022, an increase of 6.16 megabits per second (+170%) compared to the same period in 2021, while for mobile internet it was 11.44 megabits per second, an increase of 3.58 megabits per second[7] .

Algeria ranks (141) with a jump of 30 ranks in the latest classification (speed test, 2022) that was determined for October 2021 regarding fixed broadband internet speed, as it jumped from (171) rank in 2020 to (141) rank globally in 2021.[8].

- **E-commerce in Algeria**: is still in its infancy, as the only active focus is electronic marketing[9]. With the spread of smartphones in Algeria and the use of the fourth generation4G[10] 'and Social media, as well as marketing and educational sites, have been available to participating individuals and institutions since 2006, when the Ouedkniss website appeared as a virtual market by young engineers in computer science, where consumer goods and vehicles were displayed. The idea of advertising through social media began to grow gradually, and commercial sites such as Jumia appeared in parallel in 2014, which contributed to the emergence of the beginnings of online commerce, but cash transactions remained through current postal accounts.

- **Transactions in e-commerce**: Cash transactions in Algeria are still in their traditional form, i.e., "liquidity," whether in cash or via postal current accounts, and transactions are often conducted primarily via social media (Facebook), as well as online marketing platforms (Zawwali, Batolis, Dzboom, etc.). However, with the pandemic in 2020, "electronic payment" was launched as part of the diversification of electronic payment services and products, and the high penetration rate of smartphones (111%) in Algeria. Launched by GIE Monétique, it was linked to the interbank network to enable transactions to be debited to the Interbank (CIB) card or the one of Algeria Post Gold (Edahabia). This electronic payment method concerns local payment transactions (in physical retail locations) based on smart barcodes (QR)[11].

- **Aspects of the use of ICT by Algerian entrepreneurs**: Among the axes of the Digital Algeria Project (2008-2013), the second basic axis stipulates supporting the adoption of information and communication technology by small and medium enterprises through[12]:

  ✓ Periodically surveying the information and communication technology (ICT) needs of small and medium-sized enterprises (SMEs);
  ✓ Providing financial incentives for SMEs to adopt ICT and guide them toward digitization.
  ✓ Supporting SMEs in acquiring equipment and encouraging and mentoring engineers in software development.

II. LITERATURE REVIEW

[7] https://datareportal.com/ consulter le 02/04/2022
[8] https://www.speedtest.net/global-index consulter le 02/04/2022
[9] HADDAD Sofiane, 2020," **Le E-Commerce en Algérie : Enjeux et défis à surmonter** " Article, Journal Of Dirassat lama wa itisalia, université Alger3, Algérie, p 01.
[10] https://www.jumia.dz/sp-a-propos/ consulter juillet 2020.
[11] https://giemonetique.dz/acteurs/le-gie-monetique/ consulter 05 octobre 2021
[12] E-Algerie 2013, Rapport, p 19.

There are several studies that have focused on identifying external determinants and measuring their impact on internal determinants based on the TAM model. We find the study (Diouani, 2021) that aimed to measure the impact of external determinants on the intention of owners of small and medium enterprises to adopt e-commerce in the western Algerian region. The study concluded that there is a direct impact for each of the access determinants, access cost, and time cost on perceived benefit, and a direct impact for each of the access determinants and subjective standards on perceived ease of use, while there was no impact for the condition's determinant. Facilitation, on the other hand, had a strong and direct effect of the perceived usefulness determinant on the attitude towards adoption, and also for ease of use on the intention to adopt, as well as a strong and direct effect of the intention determinant on actual use. For his part, (Jaziri, 2019) and others studied the factors that affect contractors' intention to use information and communication technology as a tool for fundraising. Through the results of this study, a set of factors were identified, represented by perceived risks with the service, perceived financial risks, plagiarism risks, the contractor's personal characteristics, the information system, and perceived monitoring. The results showed a strong and direct effect of external determinants on the adoption of crowdfunding platforms as a primary tool for fundraising, for each of the determinants of the (TAM) model, where it was concluded that there is a negative effect of plagiarism risks on the intention to adopt crowdfunding. For his part, (Yusoff, 2021) presented a study focusing on contractors' intention to adopt e-commerce through the influence of the contractor's personal determinants, represented by risk, the need for achievement The study concluded that the personal determinants of the need for achievement and risk have a direct and strong impact on the determinants of perceived usefulness and perceived ease of use. Both determinants, perceived usefulness and perceived ease of use, also had a strong direct impact on the perceived intention to adopt e-commerce by micro-entrepreneurs. Therefore, the study confirmed the strength of the model in explaining and predicting the intention to adopt foreign trade for micro-entrepreneurs active in Malaysia. During the pandemic period, Sardar (2021) and others presented a measure of the degree of entrepreneurs' tendency to use information and communication technology (ICT) during the pandemic period. The study concluded that there is a direct and strong impact of the use of ICT through its determinants, represented by using virtual applications and tools, to increase the effectiveness and efficiency of active micro-entrepreneurs to save themselves from bankruptcy and face competition. There is an impact of perceived usefulness on direct selling, and there is an impact of perceived ease of use on entrepreneurial self-efficacy.

III. METHODOLOGY

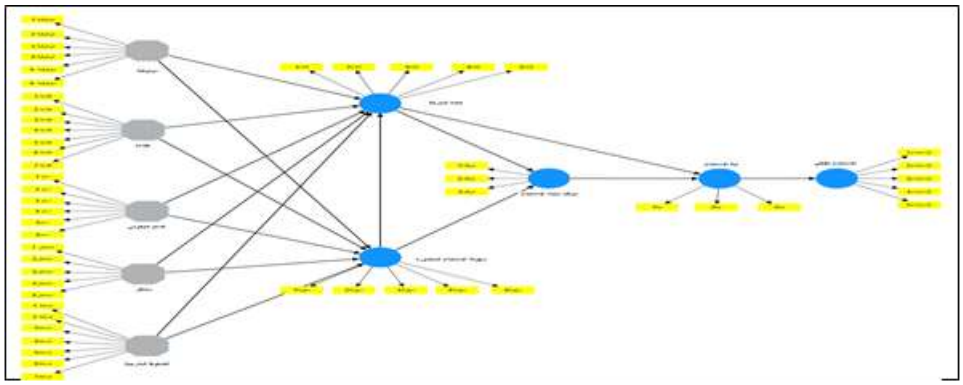
We chose structural equation modeling, which is one of the most important statistical methods used in the field of business management, as researchers focus on structural equations to extract the causal relationships affecting the independent and dependent variables, using the partial least squares method with minimal requirements. It also allows measuring the relationships between the buildings (independent and dependent) separately without separating them from the overall model. In this study, we will measure the impact of the determinants driving the use of ICT by contractors through the Technology Acceptance Model (TAM), using the Smart PLS04 statistical tool, where we will use the internal determinants of the model, represented by: perceived ease of use, as well as perceived usefulness, attitude and intention, leading to actual use. As for the external

determinants, they were derived from a survey study of previous literature, then we searched for the extent to which the proposed structural model was satisfied and matched with field data, proving its validity in predicting the extent to which the contractor uses information and communication technology in the Algerian reality.

1- Measurement Model :

A measurement model is defined as the structure of an instrument's scale and subscale, along with the procedure used to create scale and subscale scores.

Figure N° (3-1) TAM Model of study



Source : Made by Doctor with Smart PLS V4.0

1- Testing the reliability and validity of the relationships between the determinants :

At this stage, reliability is tested by measuring each of external loadings, average variance, and composite reliability[13]:

- **Outer Loadings:** According to the threshold of (0.708),

From the modeling test, we find that there are values for the external loadings of the indicators that exceed the threshold value (0.70), which reflects the achievement of sufficient levels of saturation that require maintaining them. It is also worth noting that all values were greater than (0.40), which expresses their availability at the minimum levels of reliability, while there are other coefficients whose values appeared less than the threshold value (0.70), as they will be dealt with in stages where they will be deleted as required by the calculation process, in order to maintain the largest number of indicators that fall within the range [0.40, 0.70], to obtain the credibility of the obtained structural model, considering that it is based on the technology acceptance theory (TAM). Accordingly, the indicators that have loading coefficients that do not meet sufficient levels of saturation were deleted, while the values of both reliability (2) and reliability (4) were not deleted, due to the increase in their values after deleting the value of the reliability index (6), which had the weakest value. Accordingly, we have (49) indicators reflecting the study variables

[13] F. Hair Jr, J., Sarstedt, M., Hopkins, L. and G. Kuppelwieser, V., 2014. **Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research**. European business review, 26(2), p 111.

- **Average variance extracted AVE**

The mean measures the variance of loadings according to the threshold (0.50), meaning that we can say that the model construction explains 50%, and all values greater than the threshold are considered, while the determinants less than the threshold are deleted. The results of the values of the average variance extracted were within the range (0.561 and 0.927), and are greater than the value (0.50). They are statistically significant values, indicating that each latent variable explains more than half of the variances of its indicators. In other words, the average variance of the indicators associated with the building is greater than the average variance of the measurement error of the indicators for the same building. Therefore, convergent validity is achieved through the criterion of the average variance extracted.

- **Composite reliability :**

All composite reliability coefficient values are significant and statistically significant, ranging between 0.850 and 0.948, i.e., greater than 0.70. This indicates a consistent fit between the indicators representing the latent variables. This proves the reliability of the model used. Therefore, we conclude that the indicators have internal consistency, and convergent validity is achieved through the composite reliability criterion.

From the previous results obtained according to the three criteria (external loadings OL, average variance AVE, and composite reliability CR), we conclude that the indicators are consistent with the variables they reflect and are reliable. This means that the data possesses internal consistency for the indicators that comprise the internal structure of the model. Therefore, the convergent validity test is valid for the study data.

2. Discriminante validity :

Discriminant validity can be defined as "a measure of the degree of constraints of the variables that are supposed to be measured."[14]

2.1. Cross Loadings : The results of the cross-loading test show that the values of the indicators for each determinant are greater than the rest of the indicators Other, the ranges of values of each indicator were as follows:

- Reliability of ICT use by the contractor: Its index values range between 0.735 and 0.905;
- Contractor's efficiency in using ICT: Its index values range between 0.712 and 0.901;
- Government support for the contractor's use of ICT: Its index values range between 0.739 and 0.902;
- Contractor's risk in using ICT: Its index values range between 0.777 and 0.968;
- External pressures driving ICT use: Its index values range between 0.727 and 0.904.
- · Perceived usefulness: Its values range between 0.724 and 0.782;
- · Perceived ease of use: Its values range between 0.866 and 0.940;

[14]Bagozzi, R.P., Yi, Y. and Phillips, L.W., 1991. **Assessing construct validity in organizational research.** Administrative science quarterly, USA,p 02.

- · Attitude toward use: Its values range between 0.757 and 0.885;
- · Intent to use: Its values range between 0.947 and 0.975;
- · Actual use: Its values range between 0.878 and 0.970.

Since the cross-values of the indicators of the internal and external variables are higher than the rest of the indicators reflecting the other determinants, this indicates that the indicators are related to the determinant they express and are distinct from the rest of the indicators. This indicates that each building (the determinant and its indicators) is distinct from the rest of the other buildings that make up the standard model .

2.2 Fornell and Larcker:

From the results of the obtained matrix, the correlation value of each construct in the model with the other constructs in the same model is clarified and then compared with the square root of the Average Variance Extracted (AVE) for the construct itself.

Based on the results, the square root of the AVE for the construction representing the variable "Technology Usage Reliability" with itself is estimated at (0.826), and the weakest correlation was with the "Efficiency" variable, estimated at-0.198). For the variable "Contractor's Efficiency in Using ICT," the square root of the AVE for the construction itself is estimated at (0.828), and the weakest correlation was with the "External Pressure" variable, with an estimated value of (-0.281). The square root of the AVE for the construction representing the "Government Support" variable with itself is estimated at (0.829), and the weakest correlation was with the "Perceived Ease of Use" variable, with an estimated value of (-0.299).

For the "Risk" variable, the square root of the AVE for the construction itself is estimated at (0.888), and the weakest correlation was with the "Perceived Benefit" variable, with an estimated value of (-0.178). The square root of the AVE for the construction representing the "External Pressure" variable itself is estimated at (0.816), and the weakest correlation was with the "Perceived Ease of Use" variable, with an estimated value of (-0.072).

As for the internal variables, it is noted that the square root of the AVE for the construction representing the "Perceived Benefit" variable with itself is estimated at (0.749), and the weakest correlation was with the "Perceived Ease of Use" variable, with an estimated value of (-0.230). The square root of the AVE for the construct representing the "Perceived Ease of Use" variable itself is estimated at (0.904), and the weakest correlation was with the "Actual Use" variable, with an estimated value of (-0.093).

For the variable "Attitude Toward Use," the square root of the AVE for the construction representing "Attitude" with itself is estimated at (0.809), and the weakest correlation was with "Actual Use," with an estimated value of (0.197). The square root of the AVE for the construction representing the "Contractor's Intention to Use" variable with itself is estimated at (0.963), and the

correlation with "Actual Use" was estimated at (0.788). As for the "Actual Use" variable, the square root of the AVE for the construct with itself is estimated at (0.931).

From the obtained results, it can be concluded that the latent variables are distinct from one another and that there is no overlap between the constructions (i.e., the latent variable and its indicators) in the model. Therefore, this instrument demonstrates discriminant validity for the measurement model in this study.

2.3 Heterotrait-monotrait :

All values of the Heterotrait-Monotrait Ratio (HTMT) criterion were below the threshold of 0.850, indicating statistical significance. The highest recorded value was for the relationship between the contractor's intention to use ICT and actual use, estimated at (0.813), while the lowest value was found between the contractor's perceived risk of using ICT and actual use, estimated at (0.061).

These results indicate that there is no overlap among the various reflective indicators of the latent variables, which demonstrates discriminant validity among the studied variables. Each indicator reflects only its associated variable and not any other.

Based on the results of the tests — including Cross Loadings (CR), the Fornell-Larcker criterion, and the HTMT criterion — all values were statistically significant. Therefore, we conclude that discriminant validity is established. This implies that the tested data is reliable and internally consistent, thus supporting the validity of the hypothesis testing.

IV. RESULTS AND DISCUSSION

1- **Assessment of Structurel Model** the hypotheses will be tested

1-1. **For the variable "Reliability of ICT Use" among entrepreneurs:**

1. Path: "Reliability → Perceived Benefit":

The **P-Value** is **0.026**, which is less than the threshold of **0.05**, indicating a **statistically significant effect** between the two variables: reliability and perceived benefit. The **t-value** for this path was **2.220**, which is greater than the critical value of **1.96**, confirming statistical significance. The **path coefficient (β)** was **0.137** (positive), indicating a **positive and statistically significant effect**. This means that a one-unit change in ICT reliability leads to a change of **0.137** in the perceived benefit. Therefore, we **accept the hypothesis** that supports the presence of an effect of **ICT reliability** on its **perceived benefit** among entrepreneurs at a significance level of **0.05**, and accordingly, we accept the hypothesis:

H3.1: There is a statistically significant effect of ICT reliability on its perceived benefit among entreprenrs.

2. Path: "Reliability → Perceived Ease of Use":

The **P-Value** is **0.486**, which is much higher than the threshold of **0.05**, indicating that there is **no statistically significant effect** between the variables: reliability and perceived ease of use. The **t-value** for this path is **0.697**, which is less than the critical value of **1.96**. Although the **path coefficient (β)** is **0.036** (positive), the results indicate **no statistically significant effect** between the two variables. Therefore, we **accept the null hypothesis** which states that there is **no effect** of ICT reliability on perceived ease of use among contractors at the 0.05 level. Thus, we **reject the hypothesis**:

H3.2: There is a statistically significant effect of ICT reliability on its perceived ease of use among entrepreneur.

Based on these findings, we confirm the existence of an effect of ICT reliability among contractors in the Wilaya of Ouargla on perceived benefit. This result is consistent with the study by **(Bachtiar, 2019),** which found a positive effect of trust in technology use on perceived benefits among companies in Indonesia[15]. It is also consistent with **(Fahma, 2020)** who found a strong positive impact of trust on the adoption of e-payment systems and perceived benefits16 among SMEs.

Furthermore, the current study aligns with **(Jaziri R. &., 2019)** who found that trust in ICT use positively affects contractors' intentions and attitudes in Tunisia[17]. Similarly, **(Al Rahbi, 2017)** concluded that ICT reliability is a key factor in the external environment for SMEs to adopt e-commerce in Oman[18].

On the other hand, the **absence of a significant effect** of ICT reliability on perceived ease of use is in line with the findings of (Lai, 2013) who found no significant relationship between trust and perceived ease of use in the context of e-booking applications.[19].

1-2. Regarding the variable entrepreneur ' Efficiency in Using ICT:

1-1. Path: "Contractors' Efficiency → Perceived Benefit":

The **P-value** is **0.028**, which is below the threshold of **0.05**, indicating a **statistically significant effect** between the two variables: contractors' efficiency and perceived benefit. The **t-value** for this path was **2.202**, which exceeds the critical value of **1.96**. The **path coefficient (β)** was

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[15] Suhaeli, D., & Bachtiar, N. K. (2019). "**Why do (not) woman entrepreneurs jump into technology based business?".** Bizinfo (Blace) Journal of Economics, Management and Informatics, 10(2), 95-109.

[16] Najib, M., & Fahma, F. (2020). **"Investigating the adoption of digital payment system through an extended technology acceptance model: An insight from the Indonesian small and medium enterprises**". International Journal on Advanced Science, Engineering and Information Technology, 10(4), 1702-1708.

[17] Jaziri, R., & Miralam, M. (2019). "**Modelling the crowdfunding technology adoption among novice entrepreneurs: an extended TAM model**". Entrepreneurship and Sustainability Issues, 7(1), 353.

[18] Al Rahbi, H. S. A. (2017). "**Factors influencing social media adoption in small and medium enterprises (SMEs)"** (Doctoral dissertation, Brunel University London).

[19] Lai, Y. H., Huang, H. C., Lu, R. S., & Chang, C. M. (2013). "**The effects of website trust, perceived ease of use, and perceived usefulness on consumers' online booking intention: Evidence from Taiwan B&B sector**". Life Science Journal, 10(2), 1516-1523.

estimated at **0.108** and is positive, indicating a **positive and statistically significant effect**. This means that a one-unit change in perceived benefit results from a change in efficiency by **0.108**.

Therefore, we **accept the hypothesis** that supports the existence of a significant effect of contractors' efficiency on their **perceived benefit** from using ICT, at a significant level of **0.05**. Accordingly, we accept the hypothesis:

H3.3: There is a statistically significant effect of entrepreneur' efficiency in using ICT on its perceived benefit.

1.2- Path: "Contractors' Efficiency → Perceived Ease of Use":

The **P-value** is **0.000**, which is lower than the threshold of **0.05**, indicating a **statistically significant effect** between the variables: contractors' efficiency and perceived ease of use. The **t-value** for this path was **4.025**, which is well above the critical value of **1.96**. The **path coefficient (β)** was estimated at **0.176**, and since it is positive, it indicates a **positive and statistically significant effect**. This implies that a one-unit change in perceived ease of use results from a change in efficiency by **0.176**. Accordingly, we **accept the hypothesis** that supports the existence of an effect of contractors' efficiency on their **perceived ease of use** of ICT, at the 0.05 significance level. Thus, we accept the hypothesis:

H3.4: There is a statistically significant effect of entrepreneur' efficiency in using ICT on its perceived ease of use.

These findings are consistent with the study by (**Wiradinata**, 2017)**)**, which found a **direct and positive effect** of contractor efficiency on **perceived ease of use**. However, it differs from that study in its rejection of the hypothesis stating there is **no effect** of efficiency on perceived benefit among contractors entering electronic markets in Indonesia[20].

The current results also align with the findings of (Wiradinata, 2017; Sardar T. J., 2021) who found that efficiency has a **direct and positive impact** on both **perceived benefit** and **perceived ease of use** in the use of information technology, especially in the context of the pandemic[21]. Moreover, the study aligns with earlier findings by (Ndubisi, 2005), who The findings suggest that contractors' efficiency enhances their inclination to increase the use of technology, particularly when they receive training that improves their computer usage skills..[22]

1.3- Regarding the Government Support Variable:

1. Evaluation of the path "Government Support → Perceived Usefulness" :

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[20] Wiradinata, T. (2017). "**Nascent entrepreneurs in e-marketplace: the effect of founders' self-efficacy and personality**". International Journal of Electronic Business, 13(2-3), 163-182.
[21] Sardar, T., Jianqiu, Z., Bilal, M., & Syed, N. (2021). "**Impact of ICT on entrepreneurial self-efficacy in emerging economy: Sustaining lock-down during COVID-19 pandemic**". Human Systems Management, 40(2), 299-314.
[22] Nelson Oly and al 2001 ، Op Cit

The **P-value** is **0.000**, which is significantly lower than the threshold of **0.05**, indicating a statistically significant effect between the two variables — government support and perceived usefulness. Additionally, the **t-value** for this path is **12.009**, which is higher than the critical **t-value** of **1.96**.

Given that the **path coefficient (β)** is **0.663**, a positive value, this indicates a **significant positive effect**. This means that a one-unit change in perceived usefulness originates from a change in government support by **0.663**.

Accordingly, we accept the hypothesis that supports the existence of a significant effect of **government support for ICT usage** on its **perceived usefulness** by contractors in the **Wilaya of Ouargla**, at a significance level of **0.05**. Therefore, we accept the hypothesis which states:

H3.5: There is a statistically significant effect of government support for contractors in using ICT on its perceived usefulness.

2. Evaluation of the path "Government Support → Perceived Ease of Use"

The **P-value** is **0.000**, which is significantly below the **0.05** threshold, indicating a statistically significant effect between government support and perceived ease of use. The **t-value** for this path is **4.195**, which is greater than the critical value of **1.96**.Given that the **path coefficient (β)** is **0.174**, which is a positive value, this suggests a **significant positive effect**. That is, a one-unit change in perceived ease of use results from a change in government support by **0.174**.

Therefore, the hypothesis confirming the effect of government support on contractors' use of **ICT** and its **perceived ease of use** is accepted at the **0.05** significance level. Thus, we accept the hypothesis which states:

H 3.6: There is a statistically significant effect of government support for contractors in using ICT on its perceived ease of use in the Wilaya of Ouargla.

This result is consistent with the study by **(Nia, 2019)**, which confirms that government support plays a fundamental role in encouraging enterprises to adopt ICT in their entrepreneurial projects. However, in Indonesia[23], **trust** was found to be a more influential factor than government support in technology adoption among entrepreneurs.

It also aligns with the study by **(Nazir, 2022)** who emphasize the important role of government support in motivating contractors to use ICT for innovation and enhancing the efficiency of managers in small and medium-sized enterprises (SMEs).[24]

[23] Suhaeli, D., & Bachtiar, N. K. (2019).Op Cit.

[24] Nazir, M. A., & Khan, M. R. (2022). " **Identification of roles and factors influencing the adoption of ICTs in the SMEs of Pakistan by using an extended Technology Acceptance Model (TAM)** ". Innovation and Development, 1-27.

Additionally, the study by **(Fahriawan, 2020)** confirms that government support has a **direct and positive effect** on the use of ICT by SMEs[25].

2. Regarding the Risk variable:

2.1 Evaluation of the path "Risk → Perceived Usefulness" via hypothesis testing:

The **P-Value** is **0.633**, which is greater than the threshold **0.05**, meaning there is **no statistically significant effect** between risk and perceived usefulness. **t-statistic** is **0.487**, which is lower than the critical **t** value of **1.96**. **path coefficient (β)** is **–0.023**, a negative value. Hence, we conclude that there is **no statistically significant relationship** between risk and perceived usefulness. We accept the null hypothesis and reject the alternative hypothesis at the 0.05 significance level. Thus we **reject** the hypothesis:

H3.7: There is a statistically significant effect of entrepreneur's perceived risk in using ICT on its perceived usefulness.

2.2- Evaluation of the path "Risk → Perceived Ease of Use" via hypothesis testing:

The **P-Value** is **0.000**, which is less than the threshold **0.05**, indicating a **statistically significant effect** between risk and perceived ease of use. **t-statistic** is **20.835**, much greater than **1.96**. **path coefficient (β)** is **–0.623**, a negative value. This indicates there is a **significant negative effect**: a one-unit increase in risk leads to a **–0.623** change in perceived ease of use. Accordingly, we accept the hypothesis that risk has a significant effect on perceived ease of use at the 0.05 significance level. Thus we accept:

H3.8: There is a statistically significant effect of entrepreneur's perceived risk in using ICT on its perceived ease of use in the Wilaya of Ouargla.

This result is consistent with the study by **(Yusoff M. N., 2021)**, who found a direct effect on perceived ease of use[26]، (though they found no effect on perceived usefulness). It also aligns with **(chafik, 2015)**, who concluded that risk influences perceived ease of use in adopting e-commerce among Moroccan contractors but did not find an effect on perceived usefulness[27]. It accords with **(Millicient, 2019)**, who found a negative correlation between perceived ease of use and cyberattacks or data breaches, though their study did not show an effect on perceived usefulness[28].

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[25] Fahriawan, M. R. (2020, October). "**Determinant factors of m-commerce adoption by sme in Indonesia: The tam model approach**". In SENABISMA: Prosiding Seminar Nasional Bisnis dan Manajemen (Vol. 5, pp. 37-49).

[26] Yusoff, M. N. H. B., Zainol, F. A., Hafifi Ridzuan, R., Ismail, M., & Afthanorhan, A. (2021). **"Psychological traits and intention to use e-commerce among rural micro-entrepreneurs in malaysia**". Journal of Theoretical and Applied Electronic Commerce Research, 16(5), 1827-1843.

[27] Chafik and Asmae, 2015, Op Cit.

[28] Millicient and al, (2019)." **Impact of technology adoption and its utilization on SMEs in Ghana**". International Journal of Small and Medium Enterprises, 2(2), 1-13.

3 Regarding the variable External Pressures:

3.1-. Evaluation of path "External Pressures → Perceived Usefulness":

The **P-Value** is **0.760**, greater than **0.05**, so there is **no statistically significant effect** between external pressures and perceived usefulness. **t-value** is **0.306**, less than **1.96**. **path coefficient (β)** is **0.019**. Therefore, we conclude that there is **no statistically significant effect**, accept the null hypothesis, and reject the alternative hypothesis:

H3.9: There is a statistically significant effect of external pressures from stakeholders on the perceived usefulness of ICT by contractors — **(rejected)**.

3.2- Evaluation of path "External Pressures → Perceived Ease of Use":

The **P-Value** is **0.420**, larger than **0.05**, indicating **no statistically significant effect** between external pressures and perceived ease of use. **t-value** is **0.806**, lower than **1.96**. **path coefficient (β)** is **–0.038** (negative). Thus, we conclude there is **no statistically significant effect**. We accept the null hypothesis and reject:

H3.10: There is a statistically significant effect of external pressures from stakeholders on perceived ease of use of ICT (**rejected)**.

Rejecting both hypotheses is consistent with (**KHALIL Rhaiem, 2014**), who found that networks of suppliers/customers do not influence ICT adoption in SMEs in Canada. However, it contradicts (**fahriwan**, **2020**) who showed external pressures as a key motivator for SMEs in Indonesia to adopt mobile commerce (m-commerce). In the present study, the lack of effect of external pressures may be attributed to the ambiguity in administrative and financial procedures; marketing activities are limited to social media, which are not considered formal. Yet during the pandemic, contractors were allowed to use virtual platforms, electronic marketing, e-payments for transactions and supply, etc.

4 Regarding the Perceived Usefulness variable:

4-1 Evaluation of path "Perceived Usefulness → Attitude toward Use":

The **P-Value** is **0.000**, which is much lower than **0.05**, indicating a **statistically significant relationship** between perceived usefulness and attitude. **t-value** is **4.141**, greater than **1.96**. The **path coefficient (β)** is **0.255**, a positive value.This signals a **significant positive effect**: a one-unit increase in attitude comes from a **0.255** change in perceived usefulness. Hence, we accept:

H3.11: There is a statistically significant effect of perceived usefulness from ICT use on entrepreneur's attitude toward its use.

4.2- Evaluation of path "Perceived Usefulness → Intention to Use":

The **P-Value** is **0.000**, much less than **0.05**, so there is a **statistically significant effect** between perceived usefulness and intention to use. **t-value** is **4.971**, above **1.96**. **path coefficient (β)** is **0.446**, positive. This shows a **significant positive effect**: a one-unit change in intention to use comes from a **0.446** change in perceived usefulness. Thus:

H3.12: There is a statistically significant effect of perceived usefulness of ICT on entrepreneurs' intention to use it.

This result corresponds with **(Davis, 1989),** who posited a link between perceived usefulness and attitude toward using any information system. It also aligns with **(chafik, 2015)**who found that attitude toward e-commerce adoption among Moroccan SMEs is positively influenced by perceived usefulness, and with **(Xin, 2022**), who observed a positive relation between perceived usefulness of integrated systems and reactive attitudes in virtual kiosks. Also it matches (**Wiradinata, 2017**)who found that attitude toward use influences perceived usefulness even among new businesses in virtual markets. And it is consistent in magnitude of effect with **(Li, 2021)**who observed a shift among students toward using virtual media in entrepreneurial education.

5- Regarding Perceived Ease of Use:

5.1 Path "Perceived Ease of Use → Perceived Usefulness":

The **P-Value** is **0.000**, less than **0.05**, indicating a **statistically significant effect**. **t-value** is **4.520**, greater than **1.96**. **path coefficient (β)** is **0.112**, positive. Thus, we **reject** the null hypothesis and accept the alternative: perceived ease of use affects perceived usefulness positively. Accordingly:

H3.13: There is a statistically significant effect of perceived ease of use of ICT on its perceived usefulness among contractors in the Wilaya of Ouargla.

5.2-. Path "Perceived Ease of Use → Attitude toward Use":

The **P-Value** is **0.000**, much lower than **0.05**, showing a **statistically significant relationship** between ease of use and attitude. **t-value** is **7.543**, higher than **1.96**. **path coefficient (β)** is **0.443**, positive. This indicates a **significant positive effect**: a one-unit increase in attitude comes from a **0.443** increase in perceived ease of use. So:

H3.14: There is a statistically significant effect of perceived ease of use of ICT on contractors' attitude toward using it.

This result aligns with (Davis, 1989), which posits that perceived ease of use and perceived usefulness have a positive correlation in any information system usage. It also agrees with (chafik, 2015)and with **(sandra, 2020)**who, during the COVID-19 period, found that ease of use of technological media positively affected perceived benefits even in restricted real markets. It matches **(william, 2019)**in showing a strong positive effect of ease of use in empowering emerging firms to maximize perceived benefits of ICT, and aligns with **(Farah,** 2020), who found a strong effect of ease of use on perceived usefulness of electronic payment systems among SMEs in Indonesia.

6 Regarding Attitude toward Use:

6.1-Path "Attitude toward Use → Intention to Use":

The **P-Value** is **0.000**, much lower than **0.05**, indicating a **statistically significant effect**. The **t-value** is **3.854**, greater than **1.96**. **path coefficient (β)** is **0.230**, positive. Thus, there is a **significant positive effect**: a one-unit increase in intention to use arises from a **0.230** increase in attitude. We accept:

H3.15: There is a statistically significant effect of contractors' attitude toward ICT use on their intention to use it.

This outcome corresponds to **(Davis, 1989)** which posits a positive correlation between attitude toward use and intention to use in any information system—though the strength of the effect might differ. It also aligns in acceptance and effect magnitude with **(Juris, 2018),** who found no strong effect of attitude on intention among students in e-entrepreneurship courses in tourism, and with **(Batra, 2015)**who indicate that environmental/regulatory constraints affect the orientation of small/medium enterprises in Canada, which in turn influence their intention to use ICT. However, it conflicts with **(chafik, 2015**)in their study, where they rejected a hypothesis of attitude's effect on intention to use.

7. Regarding Intention to Use:

7.1-Path "Intention to Use → Actual Use":

The **P-Value** is **0.000**, much lower than **0.05**, indicating a **statistically significant effect** between intention and actual use. **t-value** is **18.906**, much greater than **1.96**, **path coefficient (β)** is **0.788**, positive. This signals a **strong positive effect**: a one-unit change in actual use results from a **0.788** change in intention to use. So:

H3.16: There is a statistically significant effect of contractors' intention to use ICT on its actual use.

This result aligns with **(Davis, 1989)**, which posits a strong positive relationship between intention and actual use of any system. It also matches **(Diouani, 2021)**, who found that SMEs in northwestern Algeria's intention to adopt modern ICT significantly influenced actual use, and **(KHALIL Rhaiem, 2014),** who found that SMEs' intention to use ICT strongly and directly affects its actual use in the industrial sector in Canada. From the hypothesis testing results, we conclude that in the structural model of this study (focusing on determinants influencing ICT use by contractors in the Wilaya of Ouargla), there are **10** determinants underlying **16** hypotheses. **12** of those hypotheses are statistically significant and accepted (covering **6 internal determinants** and **6 external determinants**). Conversely, **4** hypotheses are not significant and thus are rejected.

2-Measuring the Predictive Power of the Model

1. Measuring the Coefficient of Determination (R^2)

The coefficient of determination (**R^2**) is used to assess how well the model can predict the relationships between internal variables. It is calculated by squaring the correlation between actual and predicted values of the endogenous variable. The R^2 value ranges between **0 and 1**, where:

- Values **closer to 1** indicate **high predictive accuracy**,
- Values **closer to 0** indicate **low predictive power**.

Chin (1998) proposed the following interpretation scale for R^2 in the context of complex models to guide measurement and avoid bias:

- **$R^2 > 0.67$** → High explanatory power
- **$0.33 < R^2 \leq 0.67$** → Moderate (or medium) explanatory power
- **$0.19 < R^2 \leq 0.33$** → Low explanatory power
- **$R^2 \leq 0.19$** → Unacceptable or weak explanatory power

R^2 Values in This Study:

- Perceived Usefulness: $R^2 = 0.537$, which falls within the range (0.33 – 0.67], indicating moderate explanatory power.
- Perceived Ease of Use: $R^2 = 0.531$, also within the range (0.33 – 0.67], indicating moderate explanatory power.
- Attitude Toward Use: $R^2 = 0.209$, within the range [0.19 – 0.33], indicating low explanatory power.
- Intention to Use: $R^2 = 0.284$, also within the range [0.19 – 0.33], indicating low explanatory power.
- Actual Use: $R^2 = 0.620$, which falls within the range (0.33 – 0.67], indicating moderate explanatory power.

Given that the adjusted R^2 values are close to the R^2 values, we conclude that the structural model used in this study has an acceptable level of explanatory and predictive power regarding the adoption of ICT by entrepreneur.

3-Goodness of Fit (GOF) – Model Predictive Fit Assessment

This coefficient aims to assess whether the structural model obtained can be reliably used for predictive purposes.According to Tenenhaus et al. (2005), the GOF index measures the overall predictive adequacy of the model. It is calculated as the geometric mean of both R^2 and AVE values. For a model to be considered predictive, the GOF value must be greater than 0.00.

On the other hand[29]، Wetzels et al. (2009) proposed that the GOF index evaluates the model's predictive fit quality based on the following scale:

[29] Hair Jr, J.F., Matthews, L.M., Matthews, R.L. and Sarstedt, M., 2017. **"PLS-SEM or CB-SEM: updated guidelines on which method to use**". International Journal of Multivariate Data Analysis, 1(2) USA , p 112

GOF Interpretation Thresholds[30]:

- GOF < 0.1 → The model lacks predictive adequacy
- 0.10 < GOF < 0.25 → The model has low predictive adequacy
- 0.25 < GOF < 0.36 → The model has moderate predictive adequacy
- GOF > 0.36 → The model has high predictive adequacy

$$\mathbf{GOF=\sqrt{(0.729\ x\ 0.436)} = 0.563}$$

From the result obtained, we find that **GOF > 0.36**, which indicates that the model has a high level of predictive adequacy. According to the criterion set by Wetzels and Van (2009), this means the model is highly suitable for predictive purposes.

Therefore, the structural model obtained in this study demonstrates a high predictive fit according to the GOF index, and is thus highly valid for use in predictive measurement regarding the adoption of ICT.

Conclusion

Information and Communication Technology (ICT) by entrepreneurs, and based on the Technology Acceptance Model (TAM), a set of recommendations can be proposed to promote ICT adoption among entrepreneurs.

The results of the Structural Equation Modeling (SEM) indicate that the structural model demonstrates an acceptable level of fit with the field data. This was achieved after applying necessary modifications using the SmartPLS v4.0 software, confirming the model's validity for predicting the acceptance of ICT use by entrepreneurs.

The main findings of the study can be summarized as follows:

1. There is a significant effect of ICT reliability on its perceived usefulness among entrepreneurs.
2. There is no significant effect of ICT reliability on its perceived ease of use.
3. There is a significant effect of entrepreneurs' ICT competence on its perceived usefulness.
4. There is a significant effect of entrepreneurs' ICT competence on its perceived ease of use.
5. There is a significant effect of governmental support on the perceived usefulness of ICT.
6. There is a significant effect of governmental support on the perceived ease of use of ICT.
7. There is no significant effect of perceived risk on the perceived usefulness of ICT.
8. There is a significant effect of perceived risk on the perceived ease of use of ICT.
9. There is no significant effect of external pressures (from stakeholders) on the perceived usefulness of ICT.

[30] Wetzels, M., Odekerken-Schröder, G. and Van Oppen, C., 2009. **Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration.** *MIS quarterly*, Netherlands p.187

10. There is no significant effect of external pressures (from stakeholders) on the perceived ease of use of ICT.
11. There is a significant effect of perceived usefulness on the entrepreneur's attitude toward ICT usage.
12. There is a significant effect of perceived usefulness on the entrepreneur's intention to use ICT.
13. There is a significant effect of perceived ease of use on the perceived usefulness of ICT.
14. There is a significant effect of perceived ease of use on the entrepreneur's attitude toward ICT usage.
15. There is a significant effect of the entrepreneur's attitude toward ICT usage on their intention to use it.
16. There is a significant effect of the **entrepreneur's intention to use ICT** on their **actual usage** of the technology.

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