

## FACTORS INFLUENCING INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION IN SMALL AND MEDIUM ENTERPRISES IN JIJEL, ALGERIA

**Chaima Laridja, Ahcène Tiar\***

*Department of Management, Faculty of Economics, Commerce and Management,  
Université Mohamed Seddik Ben Yahia- Jijel, Jijel city, Algeria*

*Department of Management, Faculty of Economics, Commerce and Management,  
Université 20 Août 1955-Skikda, Skikda city, Algeria*

[chaimalrdj@gmail.com](mailto:chaimalrdj@gmail.com)

[a.tiar@univ-skikda.dz](mailto:a.tiar@univ-skikda.dz)

**Abstract:** *The adoption of ICT can provide small and medium enterprises (SMEs) with a competitive advantage by enhancing quality, reducing costs, and increasing information flow. This study aims to identify the factors that influence the adoption of various information and communication technologies in Small and Medium Enterprises (SMEs) located in Jijel province in Algeria. A research model based on the Technological-Organizational-Environmental (TOE) framework extended to Individual context was proposed. Seven independent variables were selected (relative advantage, compatibility, top management support, competitive pressure, government support, owner/manager innovativeness and owner/manager ICT knowledge). The dependent variable, adoption of information and communication technology, was measured as the degree of adoption of six information and communication technologies by SMEs. Ordered logistic regression was utilized to analyze the collected data. The results showed that owner/manager ICT knowledge and government support are the primary factors that substantially influence most IC technologies. Relative advantage, compatibility and competitive pressure have all been found to affect one ICT. The remaining two factors, top management support and owner/manager innovativeness had no impact on any ICT. The study has significant consequences for scholars, practitioners and policymakers.*

**Keywords:** ICT, Adoption, SMEs, TOE framework, Ordered Logistic Regression, Algeria.

**JEL classification:** L25, M15, O33

### 1. Introduction

The introduction of information and communication technology (ICT) has completely changed how business is conducted (Jaganathan et al., 2018; Tan et al., 2009; Taylor, 2005). Research indicates that ICT has an impact on economic growth, productivity, employment, competitiveness and company performance (Kossai et al., 2020; Taruté and Gatautis, 2014; Al Busaidi et al., 2019; Giotopoulos et al., 2017). It has been demonstrated that ICT improves firm performance in terms of productivity, profitability, market value and

---

\* Corresponding author: Ahcène Tiar

Cite as:

Laridja, C., and Tiar, A., 2025. Factors Influencing Information and Communication Technology Adoption in Small and Medium Enterprises in Jijel, Algeria. Oradea Journal of Business and Economics, 10(1), pp.53-65.

market share, as well as intermediate performance measures like customer satisfaction, cost savings, organizational and process flexibility and process efficiency (Bayo-Moriones and Lera-Lopez, 2007). Moreover, ICT is a crucial tool for enhancing information generation and processing and effectively managing and transmitting information (Jere and Ngidi, 2020). The adoption of ICT can give small and medium enterprises (SMEs) a competitive edge by improving quality, lowering operating costs and increasing information flow (Shahadat et al., 2023). However, SMEs adopt ICT more slowly than large companies (AlBar and Hoque, 2015; Consoli, 2012) because SMEs have fewer resources, competencies and technology (Consoli, 2012). SMEs still face several obstacles in implementing ICT, because of their small size, lack of supply chain support, inadequate infrastructure, lack of resources and training, lack of vision and ongoing weak security measures (Olatokun and Bankole, 2011). In Algeria, the adoption of ICT in SMEs remains modest. According to 2009 research conducted by the Centre for Applied Economic Research for Development (CREAD), 44.66% of SMEs incorporated ICT, with ICT product investments at 6.72%. Another study conducted in 2011 found that just 46.33% of surveyed entrepreneurs employed ICT, with only 53.1% aware of it. However, research of National Agency for SME Development (ANDPME) conducted in 2011 discovered that only 15% of Algerian SMEs adopted ICT (Djelti, 2016). Furthermore, according to Sidlo et al. (2020), the majority of Southern and Eastern Mediterranean (SEMED) countries have low adoption of digital applications for core business management functions, with fewer firms using ERP and CRM software. Despite the abundance of research on factors influencing ICT adoption in SMEs, there have been few studies undertaken in Algeria (Atik and Ramdani, 2018; Diouani et al., 2023; Houache et al., 2020; Houari and Medjedel, 2009; Mezaour and Chadli, 2022; Sedkaoui and Khelfaoui, 2024). These studies did not account for individual aspects of SMEs' owner/manager such as owner/manager ICT knowledge and owner/manager innovativeness, which have been shown in previous research to be important in ICT adoption decisions in SMEs, particularly in developing countries (AlBar and Hoque, 2017; Alroussan et al., 2020; Elbaltagi et al., 2013; Thong and Yap, 1995). This study aims to address this highlighted gap by studying the factors of ICT adoption in SMEs in a province of Algeria based on the technology-organization-environment (TOE) framework by focusing on individual factors aspects such as owner/manager ICT knowledge and owner/manager innovativeness.

## 2. Literature review

Various theories and models have been employed to study the adoption and use of ICT in SMEs, including the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT). At the firm level, the Diffusion of Innovation (DOI) theory and the Technological, Organisational and Environmental (TOE) framework are commonly used, with some research incorporating multiple theories.

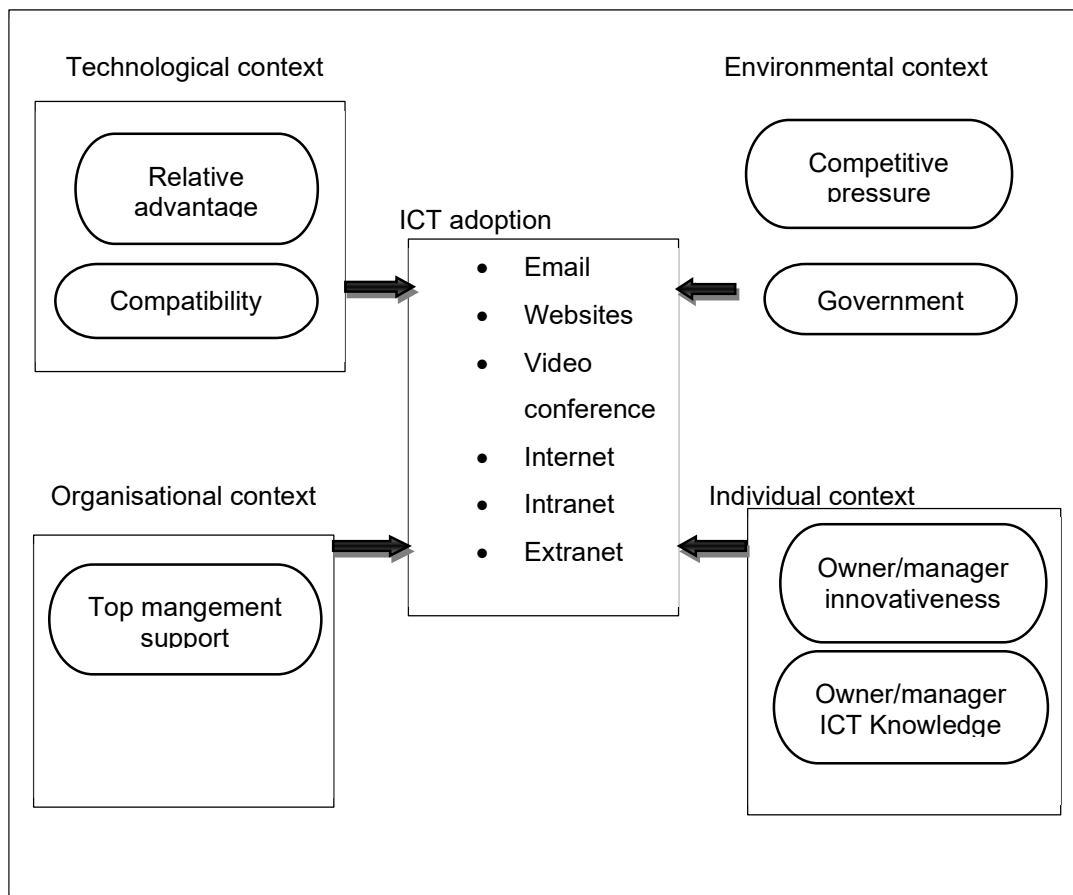
Among these theories and models, the TOE framework offers a comprehensive theoretical framework for analyzing ICT adoption at the firm level. It has been extensively tested and validated in various studies (Albar and Hoque, 2019; Al-Qirim, 2007; Anjum, 2019; Hassan and Ogundipe, 2017; Huda and Lestari, 2018; Ifinedo, 2011; Jere and Ngidi, 2020; Kuan and Chau, 2001; Nawaz and Gunapalan, 2015; Premkumar and Roberts, 1999; Rahayu and Day, 2015; Ramdani and Kawalek, 2009; Shahadat et al., 2023; Skafi et al., 2020).

According to the literature, SMEs' adoption and usage of ICT are influenced by several factors. According to Juniarti and Omar's (2021) review of the literature on technology adoption in SMEs, which is based on the TOE framework, prior studies have divided the factors that influence technology adoption into four groups: individual, organizational, environmental, and technological contexts

- **Technological Context:** includes relative advantage, compatibility, complexity, trialability, and observability.
- **Environmental Context:** contains government/regulatory assistance, competitive pressure, external support, image, pollution, and industry.
- **Organisational Context:** involves top management support, financial resources, ICT knowledge, organizational scale, information, competitive advantage, organizational innovation culture.
- **Individual/Management Context:** covers owner/manager innovativeness, ICT expertise, attitude, innovation, age, gender, and education.

### 3. Framework and hypotheses development

This research will use the TOE framework to develop a model, which is shown in Figure 1, that can predict the determinants of the decision to adopt ICT in SMEs located in the province of Jijel in Algeria. The model is based on earlier research that used the TOE framework extended to individual factors (AlBar et al., 2017; Alroussan et al., 2020; Thong and Yap, 1995).



**Figure 1:** Research framework

Source: Authors' analysis /processing based on own data

### **Relative Advantage**

Relative advantage, as defined by Roger (1983), refers to the perceived superiority of an innovation over its predecessor. It is a crucial factor in determining innovation uptake, distinguishing adopters from non-adopters (Shahadat et al., 2023). Studies have demonstrated that relative advantage significantly influences the adoption of ICT in SMEs (Albar and Hoque, 2019; Alroussan et al., 2020; Huda and Lestari, 2018; Ifinedo, 2011; Nawaz and Gunapalan, 2015; Premkumar and Robers, 1999; Ramdani and Kawalek, 2009; Shahadat et al., 2023; Tan et al., 2009). Therefore, this hypothesis is formulated :

H1: Relative advantage has a positive influence on ICT adoption in SMEs.

### **Compatibility**

Compatibility refers to how well an invention aligns with potential users' values and needs (Roger, 1983). High compatibility reduces resistance to new technology adoption in firms (Nawaz and Gunapalan, 2015). Studies have shown that compatibility affects positively the adoption of ICT in SMEs (Nawaz and Gunapalan, 2015; Prekumar and Roberts, 1999; Tan et al., 2009). Hence, the following hypothesis is suggested :

H2: Compatibility has a positive influence on ICT adoption in SMEs.

### **Top management support**

Top management support in SMEs is crucial for the adoption of ICT. It involves understanding the nature and functions of ICT and supporting its adoption through communication and reinforcement of ideas (Nawaz and Gunapalan, 2015). Top management plays a direct role in the ICT adoption process, making decisions for operations and investments (Ghobakhloo et al., 2011; Jere and Ngidi, 2020). Previous studies have shown that top management support influences ICT adoption in SMEs (AlBar and Hoque, 2017; Alroussan et al., 2020; Jere and Ngidi, 2020; Nawaz and Gunapalan, 2015; Premkumar and Roberts, 1999; Ramdani and Kawalak, 2009; Shahadat et al., 2023; Skafi et al., 2020). Thus, the following hypothesis is proposed:

H3: Top management support has a positive influence on ICT adoption in the SMEs.

### **Competitive pressure**

The adoption of technology by a company can be influenced by its business partners and competitors (Kuan and Chau, 2001). Competitive pressure has been found a significant factor in determining ICT adoption in SMEs in various studies (Ifinedo, 2010; Kuan and Chau, 2001; Nawaz and Gunapalan, 2015; Premkumar and Roberts, 1999; Shahadat et al., 2023; Zhu et al., 2003). Therefore, the following hypothesis is suggested :

H4: competitive pressure has a positive influence on ICT adoption in the SMEs.

### **Government support**

Government support is crucial in promoting the adoption of ICT in businesses, particularly for SMEs. Governments play a significant role in SMEs' growth, as they are often resource-constrained and require government assistance (Jere and Ngidi, 2020). Government-funded training programs can help SMEs adopt technology and establish the necessary technological infrastructure (Shaikh et al., 2021). Shahadat et al. (2023) indicate that government assistance for ICT adoption is vital for preparing the country for fundamental changes in facilities, including technical infrastructure, trained human resources, legal and policy support and financial infrastructure. Studies have shown that government support positively impacts the adoption of ICT in SMEs and this relationship is supported by various studies (Anjum, 2019; Ifinedo, 2010; Kuan and Chaud, 2001; Premkumar and Roberts, 1999; Shahadat, 2023). Hence, it is proposed the following hypothesis :

H5: Government support has a positive influence on ICT adoption in the SMEs.

### **Owner/Manager innovativeness**

The innovativeness of owners and managers significantly influences ICT adoption decisions in SMEs, as they are more willing to accept innovations like technology (AlBar and Hoque, 2017; Jaganathan et al., 2018; Thong and Yap, 1995). This relationship has been confirmed by numerous studies, indicating that a more innovative owner or manager is more likely to adopt such innovations (AlBar and Hoque, 2017; Anjum, 2019; Elbeltagi et al., 2013; Rahayu and Day, 2015; Shahadat et al., 2023; Thong and Yap, 1995). Therefore, the hypothesis is the following :

H6: Owner/manager innovativeness has a positive influence on ICT adoption in the SMEs.

### **Owner/Manager ICT knowledge**

SMEs often lack technical skills and specialised IT knowledge (Thong and Yap, 1995), but knowledgeable owners/managers are more likely to use ICT (Ghobakhloo et al., 2011, Jaganathan et al., 2018). The owner's current ICT usage abilities, knowledge, skills and experience positively impact ICT adoption (AlBar and Hoque, 2017). Previous research such as (AlBar, 2017; Alroussan, 2020; Elbeltagi et al., 2013; Rahayu and Day, 2015; Thong and Yap, 1995) has found a significant positive influence of owner/manager ICT knowledge on ICT adoption in SMEs. Thus, this hypothesis is proposed:

H7: Owner/manager ICT knowledge has a positive influence on ICT adoption in the SMEs.

## **4. Methodology**

### **4.1 Instrument and Scale Development**

A survey was performed to evaluate the study's presented hypotheses. An Arabic-language version of a self-administered questionnaire served as the research tool. There are three sections to the survey questionnaire. The information about the sample characteristics is covered in the first part. The second and third parts contain the items for the dependent and independent variables respectively.

The dependent variable (ICT adoption), considering the quantity and diversity of technologies concluded in ICT, was measured by the degree of adoption of each one of six information and communication technologies (email, websites, videoconference, Internet, Intranet and Extranet) (Al-Qirim, 2007; Bayo-Moriones and Lera-Lopez, 2007; Kurnia et al., 2015; Premkumar and Roberts, 1999; Osorio-Gallego et al., 2016) using a five-point Likert scale ranging from 1 (don't use) to 5 (always used). The independent variables were adopted from several studies, namely (Alroussan et al., 2020; Ifinedo, 2011; Moore and Benbasat, 1991; Premkumar and Roberts, 1999; Thong and Yap, 1995) and each item was measured on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

### **4.2 Sample and Data Collection**

The population of this study consists of all private SMEs located in Jijel province, which is estimated at 7220 by the end of 2023. To collect the needed information, and given the absence of a framework for the targeted population, 84 questionnaires were distributed to a convenience sample through personal interviews, and 76 questionnaires were retrieved, of which 3 were excluded due to the missing data. The valid response rate is 86.9%.

## **5. Results**

### **5.1 Sample characteristics**

Table 1 shows the demographics of respondents and their firms. Most of the respondents were male (83.6%), over thirty years old (91.6%) and highly educated (72.6%). yet most of

the respondents were managers and owner/managers (46.6% and 37.0%, respectively), while only 16.4% were owners. Furthermore, the data indicate that the majority of SMEs were micro and small businesses (80.8%), operated in industry and services (82.2%) and served both local and national markets (82.2%).

**Table 1:** Descriptive statistics of sample characteristics

| Respondent characteristics | Number of respondents (n=73) | Percentage (%) |
|----------------------------|------------------------------|----------------|
| <i>Gender</i>              |                              |                |
| Male                       | 61                           | 83.6           |
| Female                     | 12                           | 16.4           |
| <i>Age</i>                 |                              |                |
| 30 years and less          | 06                           | 08.2           |
| 31-40                      | 25                           | 34.2           |
| 41-50                      | 22                           | 30.1           |
| 51 years and above         | 20                           | 27.3           |
| <i>Education</i>           |                              |                |
| Secondary and less         | 08                           | 11.0           |
| Graduate                   | 46                           | 63.0           |
| Postgraduate               | 7                            | 09.6           |
| Other                      | 12                           | 16.4           |
| <i>Occupation</i>          |                              |                |
| Owner                      | 12                           | 16.4           |
| Manager                    | 34                           | 46.6           |
| Owner/manager              | 27                           | 37.0           |
| <i>No of Employees</i>     |                              |                |
| 1-5                        | 23                           | 31.5           |
| 6-49                       | 36                           | 49.3           |
| 50-250                     | 14                           | 19.2           |
| <i>Activity sector</i>     |                              |                |
| Industry                   | 36                           | 49.3           |
| Commerce                   | 13                           | 17.8           |
| Services                   | 24                           | 32.9           |
| <i>Market scope</i>        |                              |                |
| Local                      | 27                           | 37.0           |
| Regional                   | 1                            | 01.4           |
| National                   | 33                           | 45.2           |
| International              | 12                           | 16.4           |

Source: Authors' analysis /processing based on own data

## 5.2 Validity and reliability

To assess the construct validity and reliability of the various factors, Cronbach's alpha and factor analysis were used.

Cronbach's alpha was used to evaluate the constructs' reliability. Table 2 shows that all constructs had appropriate alpha values (>0.6).

**Table 2:** Result of construct reliability

| No of Item | Variable           | No of items | Cronbach's alpha |
|------------|--------------------|-------------|------------------|
| 1          | Relative advantage | 4           | 0.883            |
| 2          | Compatibility      | 3           | 0.901            |

|   |                              |   |       |
|---|------------------------------|---|-------|
| 3 | Top management support       | 3 | 0.944 |
| 4 | Competitive pressure         | 3 | 0.857 |
| 5 | Government support           | 3 | 0.864 |
| 6 | Owner/manager innovativeness | 4 | 0.833 |
| 7 | Owner/manager Knowledge      | 3 | 0.920 |

Source: Authors' analysis /processing based on own data

Factor analysis was used to determine convergent and discriminant validity. Using principal components analysis and varimax criteria to rotate the result, seven factors were discovered as explaining the phenomena under examination in the current research (with eigenvalues greater than 1). The results are summarized in Table 3.

Table 3 shows that items load strongly (>0.5) on their linked factors and each item loads more strongly on its corresponding factor than any other factor, so convergent and discriminant validity were confirmed and validated (Kuan and Chau, 2001).

**Table 3.** Result of factor analysis

|      | Factor1 | Factor2 | Factor3 | Factor4 | Factor5 | Factor6 | Factor7 |
|------|---------|---------|---------|---------|---------|---------|---------|
| RA1  |         | 0.766   |         |         |         |         |         |
| RA2  |         | 0.889   |         |         |         |         |         |
| RA3  |         | 0.862   |         |         |         |         |         |
| RA4  |         | 0.861   |         |         |         |         |         |
| CM1  |         |         |         | 0.867   |         |         |         |
| CM2  |         |         |         | 0.928   |         |         |         |
| CM3  |         |         |         | 0.856   |         |         |         |
| TMS1 |         |         | 0.881   |         |         |         |         |
| TMS2 |         |         | 0.888   |         |         |         |         |
| TMS3 |         |         | 0.857   |         |         |         |         |
| CP1  |         |         |         |         |         | 0.847   |         |
| CP2  |         |         |         |         |         | 0.853   |         |
| CP3  |         |         |         |         |         | 0.855   |         |
| GS1  |         |         |         |         | 0.733   |         |         |
| GS2  |         |         |         |         | 0.904   |         |         |
| GS3  |         |         |         |         | 0.940   |         |         |
| OMI1 |         |         |         |         |         |         | 0.637   |
| OMI2 |         |         |         |         |         |         | 0.933   |
| OMI3 |         |         |         |         |         |         | 0.914   |
| OMK1 | 0.849   |         |         |         |         |         |         |
| OMK2 | 0.878   |         |         |         |         |         |         |
| OMK3 | 0.851   |         |         |         |         |         |         |
| OMK4 | 0.811   |         |         |         |         |         |         |

Source: Authors' analysis /processing based on own data

Pearson correlation matrix and Variance Inflation Factor (VIF) were calculated to assess the Multicollinearity problem.

Table 4 indicates that the maximum squared correlation among the independent variables was less than 0.8 (Al-Qirim, 2007).

**Table 4.** Correlation matrix of the research variables

| Variable | RA | CM | TMS | CP | GS | OMI | OMK |
|----------|----|----|-----|----|----|-----|-----|
|----------|----|----|-----|----|----|-----|-----|

|     |       |        |       |       |       |       |   |
|-----|-------|--------|-------|-------|-------|-------|---|
| RA  | 1     |        |       |       |       |       |   |
| CM  | 0.306 | 1      |       |       |       |       |   |
| TMS | 0.353 | 0.390  | 1     |       |       |       |   |
| CP  | 0.188 | 0.199  | 0.328 | 1     |       |       |   |
| GS  | 0.050 | -0.017 | 0.011 | 0.199 | 1     |       |   |
| OMI | 0.104 | 0.123  | 0.256 | 0.127 | 0.089 | 1     |   |
| OMK | 0.227 | -0.048 | 0.369 | 0.337 | 0.357 | 0.331 | 1 |

Source: Authors' analysis /processing based on own data

Table 5 displays the findings from the VIF analysis. All the VIF values are below 5 (AlQirim, 2007). Consequently, no indication of a multi-collinearity issue is seen.

**Table 5.** Variance inflation factor (VIF) values

|     | RA    | CM    | TMS   | CP    | GS    | OMI   | OMK   |
|-----|-------|-------|-------|-------|-------|-------|-------|
| RA  |       | 1.160 | 1.184 | 1.221 | 1.221 | 1.220 | 1.195 |
| CM  | 1.284 |       | 1.194 | 1.329 | 1.384 | 1.338 | 1.235 |
| TMS | 1.528 | 1.392 |       | 1.534 | 1.533 | 1.559 | 1.419 |
| CP  | 1.237 | 1.216 | 1.204 |       | 1.220 | 1.236 | 1.185 |
| GS  | 1.191 | 1.188 | 1.159 | 1.175 |       | 1.191 | 1.056 |
| OMI | 1.161 | 1.151 | 1.150 | 1.161 | 1.162 |       | 1.080 |
| OMK | 1.610 | 1.504 | 1.482 | 1.576 | 1.458 | 1.530 |       |

Source: Authors' analysis /processing based on own data

### 5.3 Hypotheses testing

The Ordered (ordinal) logistic regression was used to evaluate the hypotheses. This statistical method was used since the dependent variable was ordinal (Lal, 1999). The results are shown in Table 6.

The findings of Table 6 indicate statistical significance ( $p < 0.01$ ) across all six ordered logistic regressions. The results of Table 6 show also that owner/manager ICT knowledge and government support are the primary variables that substantially impact most IC technologies. Relative advantage, compatibility and competitive pressure have all been found to affect one ICT. The remaining two variables, top management support and owner/manager innovativeness had no impact on any ICT.

**Table 6.** Results of ordered logistic regression

| Variable       | Email    | Websites | Videoconference | Internet | Intranet | Extranet |
|----------------|----------|----------|-----------------|----------|----------|----------|
| RA             | 1.115*   | 0.476    | 0.267           | -0.628   | -0.284   | -0.891   |
| CM             | 0.275    | 1.186*   | 0.013           | 0.508    | 0.301    | 0.395    |
| TMS            | -0.089   | 0.417    | 0.596           | 0.581    | -0.166   | 0.605    |
| CP             | -0.457   | 0.167    | 0.458           | 0.897    | 0.731    | 1.189**  |
| GS             | 1.359**  | 1.995**  | 0.713**         | 0.313    | 0.908**  | 0.798**  |
| OMI            | -0.116   | -0.161   | 0.016           | 0.127    | 0.294    | 0.091    |
| OMK            | 1.417**  | 0.844    | 1.099*          | 1.963**  | 1.098*   | 1.117*   |
| Log-likelihood | 158.038  | 146.252  | 143.584         | 96.196   | 158.481  | 169.567  |
| Chi-square     | 51.595** | 64.434** | 29.336**        | 36.958** | 38.349** | 45.830** |



Note. \*  $p < 0.05$ ; \*\*  $p < 0.01$

Source: Authors' analysis /processing based on own data

## 6. Discussion

The study explores the factors influencing ICT adoption in SMEs in Algeria's Jijel province, revealing that government support and owner/manager ICT knowledge are the primary influences.

The study found that owner/manager ICT knowledge significantly influences the adoption of ICT in SMEs, impacting all IC technologies except websites. This aligns with previous research, (AlBar and Hoque, 2017; Alroussan et al., 2020; Elbaltagi et al., 2013; Thong and Yap, 1995). This can be explained by the fact that the owners and managers are more likely to undertake ICT projects if they believe it will benefit their company financially and in other non-tangible ways (Thong and Yap, 1995). AlBar and Hoque (2017) argue that most decisions in SMEs, in Arabic states, particularly in Saudi Arabia, are made by the owner-manager, including whether to implement ICT in the firm.

The study found also that government support is a crucial factor in determining ICT adoption, affecting all IC technologies except the Internet. This aligns with previous research (AlBar and Hoque, 2017; Alroussan et al., 2020; Elbaltagi et al., 2013; Thong and Yap, 1995). The no significance of the Internet technology can explain by that the respondents may believe SMEs widely use certain EC technologies such as the Internet and hence do not require government support (Alam and Noor, 2009). This result may be due to the role played by the government's financial incentives and facilities in Algeria, such as the creation of specialized technical centers, national upgrading and PME II programs, in encouraging SMEs to adopt ICT (OECD/EU/ETF, 2014).

Unfortunately, the study reveals that competitive pressure, relative advantage and compatibility significantly influence the adoption of only one IC technology. Competitive pressure affects the Extranet. This result is consistent with Al-Qirim's (2007) findings, in which he argues that competition drives the adoption of Extranet in SMEs, as fast, secure access to remote databases is crucial for market competition. Relative advantage has a significant impact on email, which is consistent with previous research such as (Ghobakhloo, Arias-Aranda and Benitez-Amado, 2011; Prekumar and Roberts, 1999) findings. Compatibility affects significantly websites, which is similar to (Al-Qirim, 2007; Ghobakhloo, Arias-Aranda and Benitez-Amado, 2011; Teo et al., 1998) findings.

Surprisingly, the study found no significant impact of top management support and owner/manager innovativeness on ICT adoption in SMEs. This contradicts previous research but aligns with some ones such as (Anjum, 2019; Hassan, 2017) for top management and (Alroussan, 2020; Jaganathan et al., 2018; Shahadat et al., 2023) for owner/manager innovativeness. This result can be explained by the fact that top management engages only when technology incurs expenses (Hassan, 2017) and Managers may lack the innovative understanding necessary to effectively adopt ICT (Shahadat et al., 2023) or traditional innovation differs from technical innovation due to the need to change an SME's entire system and decision-maker's willingness to take risks when implementing new technology (Alroussan, 2020).

## 7. Conclusion

This study examined the factors influencing the ICT adoption in SMEs in Algeria's Jijel Province. The TOE framework was used to identify these factors. Based on the ordered logistic regression, the results of the study have identified two important determinant factors namely, owner/manager ICT knowledge and government support. However, compatibility,

top management, competitive pressure and owner/manager innovativeness were found to be not significant in influencing the adoption of most or all the IC technologies.

These findings contribute significantly to the literature on ICT adoption particularly in ICT adoption among SMEs in developing countries such as Algeria. On the other hand, the study's findings can help managers and policymakers to develop a plan for increasing ICT adoption among SMEs. The findings suggested that the role of the owner/manager's ICT knowledge and government support is essential in developing and promoting the adoption of ICT in Algerian SMEs.

However, this study suffers from some limitations. The study was conducted in only one province and adopted the convenience sampling technique which may hinder the generalization of the findings. Therefore, further studies with a larger representative of all regions, using probability sampling technique are suggested.

## References

- Alam, S.S. and Noor, M.K. M., 2009. ICT adoption in small and medium enterprises: an empirical evidence of service sectors in Malaysia. *International Journal of Business and Management*, 4(2), 112-125. <https://doi.org/10.5539/ijbm.v4n2p112>
- AlBar, A. M., and Hoque, M. R., 2019. Factors affecting cloud ERP adoption in Saudi Arabia: An empirical study. *Information Development*, 35(1), 150–164. <https://doi.org/10.1177/0266666917735677>
- Al Busaidi, N. S., Bhuiyan, A. B. and Zulkifli, N., 2019. The critical review on the adoption of ICTs in the Small and Medium Enterprises (SMEs) in the developing countries. *International Journal of Small and Medium Enterprises*, 2(2), 33-40. <https://doi.org/10.46281/ijsmes.v2i2.437>
- Al-Qirim, N., 2007. The adoption of e-commerce communications and applications technologies in small businesses in New Zealand. *Electronic Commerce Research and Applications*, 6(4), 462–473. <https://doi.org/10.1016/j.elerap.2007.02.012>
- Alrousan, M. K., Al-Adwan, A. S., Al-Madadha, A. and Al Khasawneh, M. H., 2020. Factors Affecting the Adoption of E-Marketing by Decision Makers in SMEs: Evidence from Jordan. *International Journal of E-Business Research*, 16(1), 1-27. <https://doi.org/10.4018/IJEBr.2020010101>
- Anjum, A., 2019. Information and communication technology adoption and its influencing factors: A study of Indian SMEs. *Humanities and Social Sciences Reviews*, 7(5), 1238-1253. <https://doi.org/10.18510/hssr.2019.75163>
- Atik, L., and Ramdani, B., 2018. SMEs Adoption of ICT: Evidence from Algeria. *Algerian Business Performance Review*, 13, 337-344.
- Bayo-Moriones, A. and Lera-López, F., 2007. A firm-level analysis of determinants of ICT adoption in Spain. *Technovation*, 27, 352-366. <https://doi.org/10.1016/j.technovation.2007.01.003>
- Chandavarkar, N. D. and Nethravathi, P. S., 2023. Analysis of Challenges faced during Adoption of ICT by Small and Medium Enterprises in India. *International Journal of Management, Technology, and Social Sciences (IJMTS)*, 8(2), 1-21. <https://doi.org/10.47992/IJMTS.2581.6012.0267>
- Consoli, D., 2012. Literature analysis on determinant factors and the impact of ICT in SMEs. *Procedia – Social and Behavioral Sciences*, 62, 93-97. <https://doi.org/10.1016/j.sbspro.2012.09.016>
- Diouani, H., Graa, A. Bechelaghem, K., 2023. Digital marketing adoption factors in Algerian small and medium enterprises: A TAM approach. *Management & Marketing*, 21(1), 134-150. [https://www.mnmk.ro/documents/2023\\_1/8-9-1-23.pdf](https://www.mnmk.ro/documents/2023_1/8-9-1-23.pdf)
- Djelti, M., 2016. *Apport des TIC et d'Internet dans le developpement des entreprises algériennes : Etude de cas*. Ph. D. Université oran 2.

- Elbeltagi, I., Al Sharji, Y., Hardaker, G. and Elsetouhi, A., 2013. The role of the owner-manager in SMEs' adoption of Information and Communication Technology in the United Arab Emirates. *Journal of Global Information Management (JGIM)*, 21(2), 23–50. <https://doi.org/10.4018/jgim.2013040102>
- Ghobakhloo, Arias-Aranda, D. and Benitez-Amado, J., 2011. Adoption of e-commerce applications in SMEs. *Industrial Management & Data Systems*, 111(8), 1238-1269. <https://doi.org/1108/02635571111170785>
- Ghobakhloo, M., Sabouri, M. S., Hong, T. S. and Zulkifli, N., 2011. Information technology adoption in small and medium-sized enterprises; An appraisal of two decades literature. *Interdisciplinary Journal of Research in Business*, 1(7), 53-80.
- Giotopoulos, I., Kontolaimou, A., Korra, E. and Tsakanikasd, A., 2017. What drives ICT adoption by SMEs? Evidence from a large-scale survey in Greece. *Journal of Business Research*, 81, 60-90. <https://doi.org/10.1016/j.jbusres.2017.08.007>
- Hassan, H., 2017. Organisational factors affecting cloud computing adoption in small and medium enterprises (SMEs) in service sector. *Procedia Computer Science*, 121, 976-981. <https://doi.org/10.1016/j.procs.2017.11.126>
- Houache, H., Binti Abd Rahima, N. H., Mohamed Razi, M. J. and Shah, A., 2020. Factors Influencing the adoption of e-commerce by Small and Medium-Sized Enterprises (SMEs) in Algeria: a qualitative study. *International Journal on Perceptive and Cognitive Computing*, 6(2), 8-17. <https://doi.org/10.31436/ijpcc.v6i2.147>
- Huda, n. N. and Lestar, Y. D., 2018. Determinants of information and communication technology (ICT) adoption: A study of Indonesian small and medium enterprises (SMEs). *International Research Journal of Engineering and Technology (IRJET)*, 5(7), 2674- 2678.
- Houari, M. and Medjedel, A., 2009. The perception and attitudes of SMEs managers towards e-commerce in Southern Algeria: With special reference to the Ghardaia county. *Les cahiers du CREAD*, 25(90), 79-105.
- Ifinedo, P., 2011. An empirical analysis of factors influencing Internet/e-business technologies adoption by SMEs in Canada. *International Journal of Information Technology & Decision Making*, 10(4), 731–766. <https://doi.org/10.1142/S0219622011004543>
- Jaganathan, M., Ahmad, S., Ishak, K. A., Nafi, S. N. M. and Uthamaputhran, L., 2018. Determinants for ICT adoption and problems: Evidence from rural-based small and medium enterprises in Malaysia. *International Journal of Entrepreneurship*, 22(4), 1-13.
- Jere, J. N. and Ngidi, N., 2020. A technology, organisation and environment framework analysis of information and communication technology adoption by small and medium enterprises in Pietermaritzburg. *South African Journal of Information Management*, 22(1), 1-9. <https://doi.org/10.4102/sajim.v22i1.1166>
- Juniarti, R. P. and Omar, A., 2021. Technology Adoption in small and medium enterprises (SMEs) current issues and future research avenues. *Advances in Economics, Business and Management Research*, 193, 91-101. <https://doi.org/10.2991/aebmr.k.211115.013>
- Kossai, M., Lapa de Souza, M. L., Ben Zaied, Y. and Nguyen, P., 2020. Determinants of the Adoption of Information and Communication Technologies (ICTs): the Case of Tunisian Electrical and Electronics Sector. *Journal of the Knowledge Economy*, 11, 845-864. <https://doi.org/10.1007/s13132-018-0573-6>
- Kuan, K. K. Y. and Chau, P. Y. K., 2001. A perception-base model for EDI adoption in small businesses using a technology-organization-environment framework. *Information & Management*, 38(8), 507-521. [https://doi.org/10.1016/S0378-7206\(01\)00073-8](https://doi.org/10.1016/S0378-7206(01)00073-8)

- Kurnia, S., Choudrie, J., Mahbubur, R. M. and Alzougool, B., 2015. E-commerce technology adoption: A Malaysian grocery SME retail sector study. *Journal of Business Research*, 68(9), 1906-1918. <https://doi.org/10.1016/j.jbusres.2014.12.010>
- Lal, K., 1999. Determinants of the adoption of information technology: A case study of electrical and electronic goods manufacturing firms in India. *Research Policy*, 28, 667–680. [https://doi.org/10.1016/S0048-7333\(99\)00014-1](https://doi.org/10.1016/S0048-7333(99)00014-1)
- Looi, H. C., 2005. E-commerce adoption in Brunei Darussalam: Quantitative analysis of factors influencing its adoption. *Communications of the Association for Information Systems*, 15, 61-81. <https://doi.org/10.17705/1CAIS.01503>
- Mezaour, A. and Chadli, C., 2022. Determinants of use of ICTechnologies by SMEs in the HassiMessaoud region by using the technology acceptance model (TAM). *Journal of business and finance economy*, 7(2), 821-830.
- Moore, G. C. and Benbasat, I., 1991. Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research* 2(3), 192-222. <https://doi.org/10.1287/isre.2.3.192>
- Nawaz, S. and Gunapalan, S., 2015. Evaluating the adoption of enterprise applications by small and medium enterprises in Sri Lanka. *European Journal of Business and Management*, 7(4), 324-334.
- Olatokun, W. and Bankole, B., 2011. Factors Influencing Electronic Business Technologies Adoption and Use by Small and Medium Scale Enterprises (SMEs) in a Nigerian Municipality. *Journal of Internet Banking and Commerce*, 16(3), 1-26.
- Oliveira, T. and Martins, M. F., 2011. Literature review of information technology adoption models at firm level. *The Electronic Journal of Information Systems Evaluation*, 14(1), 110-121.
- Osorio-Gallego, C. A., Londoño-Metaute, J. H. and López-Zapata, E., 2016. Analysis of factors that influence the ICT adoption by SMEs in Colombia. *Intangible Capital*, 12(2), 666-732. <https://doi.org/10.3926/ic.726>
- Premkumar, G. and Roberts, M., 1999. Adoption of new information technologies in rural small businesses. *Omega*, 27(4), 467–484. [https://doi.org/10.1016/S0305-0483\(98\)00071-1](https://doi.org/10.1016/S0305-0483(98)00071-1)
- Rahayu, R. and Day, J., 2015. Determinant factors of e-commerce adoption by SMEs in developing country: Evidence from Indonesia. *Procedia: Social and Behavioral Sciences*, 195, 142–150. <https://doi.org/10.1016/j.sbspro.2015.06.423>
- Ramdani, B., Kawalek, P. and Lorenzo, O., 2009. Predicting SMEs' adoption of enterprise systems. *Journal of Enterprise Information Management*, 22(1), 10–24. <https://doi.org/10.1108/17410390910922796>
- Rogers, E. M., 1983. *Diffusion of innovations*. 3rd ed. New York: Free Press.
- Sedkaoui, S. and Khelfaoui, M., 2024. Challenges for marketing analytics application in Algerian enterprises: An empirical analysis. *Review of socio-economic perspectives*, 9(1), 99-108. <https://doi.org/10.19275/RSEP178>
- Shahadat, M. M. H., Nekmahmud, M., Ebrahimi, P. and Fekete-Farkas, M., 2023. Digital technology adoption in SMEs: What technological, environmental and organizational factors influence in emerging countries?. *Global Business Review*, 1-27. <https://doi.org/10.1177/09721509221137199>
- Shaikh, A. A., Kumar, A., Syed, A. A. and Shaikh, M. Z., 2021. A two-decades literature on challenges faced by SMEs in technology adoption. *Academy of Marketing Studies Journal*, 25(3), 1-13.
- Sidlo, K. W., Karunska, K., Salmeri, C., Bieliei, S. and Albinyana, R., 2020. *Digitalisation of small and medium enterprises (SMEs) in the Mediterranean*, European Committee of the Regions. <https://data.europa.eu/doi/10.2863/206606>

- Skafi, M., Yunis, M. M. and Zekri, A. A., 2020. Factors influencing SMEs' adoption of cloud computing services in Lebanon: An empirical analysis using TOE and contextual theory. *IEEE Access*, 20, 79169-79181.
- Tan, K. S., Chong, S.C., Lin, B. and Eze, U. C., 2009. Internet-based ICT adoption: evidence from Malaysian SMEs. *Industrial Management & Data Systems*, 109(2), 2009. <https://doi.org/10.1017/CBO9780511761942>
- Tarutè, A. and Gatautis, R., 2014. ICT impact on SMEs performance. *Procedia-Social and Behavioral Sciences*, 110, 1218-1225. <https://doi.org/10.1016/j.sbspro.2013.12.968>
- Taylor, P., 2015. The importance of information and communication technologies (ICTs): An integration of the extant literature on ICT adoption in small and medium enterprises. *International Journal of Economics and Management*, 3(5), 274-29.
- Teo, T. S. H., Tan, M. and Buk, W. K., 1997. A contingency model of Internet adoption. *International Journal of Electronic Commerce*, 2(2), 95-118. <https://doi.org/10.1080/10864415.1997.11518310>
- Thong, J. Y. and Yap, C. S., 1995. CEO characteristics, organizational characteristics and information technology adoption in small businesses. *Omega*, 23(4), 429-442. [https://doi.org/10.1016/0305-0483\(95\)00017-1](https://doi.org/10.1016/0305-0483(95)00017-1)
- Tornatzky, L. G., and Fleischer, M., 1990. *The processes of technological innovation*. Lexington: Lexington Books.
- Zhu, K., Kraemer, K. L. and Xu, S., 2003. Electronic business adoption by European firms: A cross-country assessment of the facilitators and inhibitors. *European Journal of Information Systems*, 12, 251-268. <https://doi.org/10.1057/palgrave.ejis.3000475>
- OECD/The European Commission/ETF, 2014. SME Policy Index: The Mediterranean Middle East and North Africa 2014: Implementation of the Small Business Act for Europe, OECD Publishing. <http://dx.doi.org/10.1787/9789264218413-en>

### Bio-note

Dr. Chaima Laridja is a lecturer in the Department of Management, Faculty of Economics, Commerce and Management, at the Université Mohamed Seddik Ben Yahia- Jijel. She obtained his Ph.D. in Management from Université 20 Août 1955-Skikda in 2023. His core research areas are information technology adoption and entrepreneurship.

Prof. Dr. Ahcène Tiar is a Professor in the Department of Management, Faculty of Economics, Commerce and Management, at the Université 20 Août 1955-Skikda. He obtained his Ph.D. in Management from Université Badji Mokhtar-Annaba in 2011. His areas of interest include quantitative methods, information technology and artificial intelligence. He has presented and published many research papers related to the areas mentioned above.