Journal of Economics, Finance and Management (JEFM)
ISSN: 2958-7360
Vol. 4, No. 2, April 2025


# Analysis of the impact of ICT strategy on organizational performance using structural equation modeling: the case of Moroccan LMC

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**Abstract :** The objective of this article is to contribute to the academic and managerial debate on the issue of the impact of adopting an ICT strategy in improving organizational performance by presenting a theoretical model of Moroccan companies that highlights this relationship. To this end, a review of the state of the art allowed us to choose the most appropriate approaches to operationalize the theoretical constructs of our synthetic model. Then, we tested our theoretical model of structural equations developed from the literature review by confronting it with the data of an empirical study on Moroccan Large and Medium companies (LMC). The tool used during this study for data collection is the questionnaire. As for the validity and reliability analyses of the measurements of each of the theoretical dimensions of the research model, we used confirmatory factor analyses (CFA) using AMOS.

The results of structural equation modeling show that ICT strategies such as practicing technology monitoring or implementing ICT architecture alone can increase organizational performance.

**Keywords :** ICT strategy; Organizational performance; Structural equation modeling; Moroccan LMC.

**Digital Object Identifier (DOI):** https://doi.org/10.5281/zenodo.**15287529**

## 1. Introduction

For more than three decades, many researchers have tried to understand the relationship between ICT and organizational performance.

The evaluation of the performance and impacts of ICT on organizations has long been expected to be positive. But since Solow raised the *productivity paradox*, which claims that ICT is seen everywhere except in productivity statistics[1]. The debate on the analysis of the impact of ICT on business performance has continued to grow. "The merit of this expression has been to initiate a lot of research that has highlighted the difficulty of measuring the diffusion of these technologies as well as their effects in terms of productivity and performance"[2].

In this regard, the literature review shows the existence of two currents[3]:

- A first stream of studies which attempted to show that ICT do not contribute to improving the productivity of companies because they create dysfunctions in organizations given their lack of reliability, require heavy investments in training and generate private use on the part of their users (Blinder, 1997);
- And a second stream of researchers have tried to explain the Solow paradox by indicating that there is a significant time lag between the moment an innovation appears and the moment when this innovation results in an improvement in productivity (David, 1990).

In trying to explain the "Solow paradox", divergent and sometimes contradictory results have emerged. The results on performance are therefore of major interest insofar as they justify investments in ICT. The interest of this research is to study the ICT strategy and not only the effect of introducing ICT without a strategic vision. To this end, the literature review led us to adopt a theoretical perspective consisting of evaluating the impact on organizational performance of an ICT strategy as a technological deployment implemented by organizations. Technological deployment is "a concept that was first presented by Das et al."[4] to be then used by a large number of authors, particularly Canadian[5], in their empirical studies. In other words, the purpose of this research is to contribute to the academic and managerial debate on the issue of the impact of adopting an ICT strategy in terms of improving organizational performance by presenting a theoretical model of Moroccan companies that highlights this relationship. This model aims to answer the following main question:

**Are Moroccan LMC adopting an ICT strategy more efficient than those that do not?**

The research model proposed in this research study the link between ICT strategy and organizational performance and **aims to verify the following hypothesis** in the context of Moroccan LMC:

[1] Kalika. M, "TIC et performance" in "le e-management quelles transformations pour l'entreprise ?", Liaisons edition 2003, page 155.

[2] Chedia K, "Alignement des technologies de l'information : déterminant de la performance (cas des entreprises tunisiennes)", Global Journal of Management and Business Research, Volume 12 Issue 5 Version 1.0 March (2012), page 14.

[3] Ibid.

[4] Croteau A. M, Bergeron F, Raymond L, "Stratégie d'affaires et déploiement des technologies de l'information: alignement et performance", Proceedings of the AIM conference, 2000, page 2.

[5] Bergerons et Raymond (1995), Croteau (1998a), Croteau (1998b), Croteau et Bergeron (1999), Croteau, Bergeron et Raymond (2000), Milva (2001).

**H: An ICT strategy is associated with better organizational performance.**

So the "ICT strategy" seems to be a condition for Moroccan LMC concerned about their performance. Therefore, to answer the issue of our study, we have divided this article into three parts. First, a literature review is spread out in order to choose the most suitable approach to operationalize the theoretical constructs of our theoretical model. In the second point, the research methodology chosen to conduct the empirical study among Moroccan LMC is presented. Then, a last point is devoted to the presentation of the main results obtained through modeling by structural equations following the test of our theoretical model of structural equations developed using the literature review by confronting it with the data of our empirical study. The tool used during this study for data collection is the questionnaire. As for the validity and reliability analyses of the measurements of each of the theoretical dimensions of the research model, we used confirmatory factor analyses (CFA) according to the maximum likelihood method by AMOS.

## 2. ICT strategy and organizational performance: state of the art

The literature review concerning the field of ICT shows the abundance of research studies dealing with ICT strategy and its impact on performance. In this research, we opted for the measurement of the causal link between ICT strategy and organizational performance. Therefore, we will spread the different approaches adopted in the literature to conceptualize and measure ICT strategy and organizational performance. The aim behind this state of the art review is to choose the most appropriate approaches to measure these key concepts in order to develop a theoretical model of Moroccan LMC (Immassi R, Daoui D, 2024).

### 2.1 ICT strategy

The approach taken in this study to measure ICT strategy is to assess ICT strategy as a technological deployment implemented by organizations. Technological deployment is "a concept that was first presented by Das et al."[6] to be subsequently used by a large number of authors, particularly Canadian, in their empirical studies.

Several researchers have attempted to identify the components of technological deployment. Thus, if for Das et al. (1991), technological deployment has four dimensions and this grouping is conceptual, others have been able to identify the dimensions of technological deployment through factorial analyses, this is the case of Bergeron and Raymond (1995), Croteau (1998a), Croteau (1998b), Croteau and Bergeron (1999), Croteau, Bergeron and Raymond (2000), Milva (2001).

In this research, we have taken up the framework of Das et al. (1991) and added the elements integrated by these authors to arrive at a new ICT strategy construct adapted to the purposes of our research. In short, ICT strategy is defined as the set of actions implemented at the ICT level by companies. ICT strategy is composed of four dimensions: the strategic role of the IT department, technology monitoring, ICT architecture and ICT evaluation.

### 2.2 Definitions and approaches to measuring organizational performance

There are two approaches to defining and measuring organizational performance: the objective approach and the subjective approach:

- The objective approach refers to the financial data provided by the company such as financial result, labor productivity indicators, etc.;

[6] Croteau A. M, Bergeron F, Raymond L, "Stratégie d'affaires et déploiement des technologies de l'information: alignement et performance", Proceedings of the AIM conference, 2000, page 2.

- The subjective approach appeals to the respondent's perception (the assessment of managers). Thus, based on some dimensions of organizational performance, the respondent must evaluate how he compares his organization to its competitors.

For our part, we will limit our analysis to studies that have focused on the ICT-performance relationship. To this end, it appears that the dimensions often used to define and measure organizational performance are sales growth and profitability (Venkatrarman instrument). In this sense, organizational performance reflects the effectiveness and efficiency of the elements that can influence sales growth and the profitability of the company. Sales growth refers to the growth rate of the company's sales and market share. Profitability, on the other hand, looks at the rate of return on invested capital, gross profit margin, net profit rate, and financial liquidity of the company.

Having clarified the definition retained in this research of the concept of organizational performance and the dimensions composing it, it now remains to answer the question of how to measure it: objective or subjective approach?

Comparative studies of organizational performance measurement conducted by Dess and Robinson[7](1984); Venkatraman and Ramanujam[8](1987) ; Bergeron and Raymond[9](1995); Tallon et al.,[10](1998); indicate that neither the objective nor the subjective approach is superior to the other.

Since the subjective approach provides results equivalent to those collected using the objective approach. The subjective approach will be used in this study to measure organizational performance using the Venkatrarman instrument that uses the respondent's perception of sales growth and profitability of his company. This instrument has already proven itself in many empirical studies: Bergeron and Raymond (1995), Solomon (1998), Croteau (1998a), Croteau (1998b), Bergeron et al. (1998), Croteau and Bergeron (1999), Bergeron et al. (1999), Croteau et al. (2000), Croteau et al. (2001), Milova (2001), Bergeron et al (2002) etc.

### 2.3 Towards a theoretical model of Moroccan LMC

After a review of the literature and the choice of approaches retained to define and measure our key concepts, it is now a question of proposing a research model in order to meet the expectations of Moroccan companies by providing elements of response to the question of whether adopting an ICT strategy is associated with better organizational performance.

#### 2.3.1 Synthetic model: research hypothesis

Our research model postulates that ICT strategy has a positive impact on organizational performance. It is as follows:

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[7] For more details see, Dess GG, Robinson RB, "Measuring organizational performance in the absence of objective measures: the case of the privately-held firm and conglomerate business unit", Strategic Management Journal, 1984.

[8] For more details, see Venkatraman N, Ramanujam V, "Measurement of business economic performance: an examination of method convergence", Journal of Management, Vol. 13, No. 1, 1987.

[9] For more details, see: Bergeron F, Raymond L, "The contribution of IT to the bottom line: a contingency perspective of strategic dimensions", Proceedings of the Sixteenth International Conference on Information Systems, Amsterdam, December 10-13, 1995.

[10] For more details see, Tallon PP, Kraemer KL, Gurbaxani V, "Fact or fiction: the reality behind executives perceptions of IT business value", Working Paper, Center for Research on Information Technology and Organizations (CRITO), University of California, Irvine, 1998.

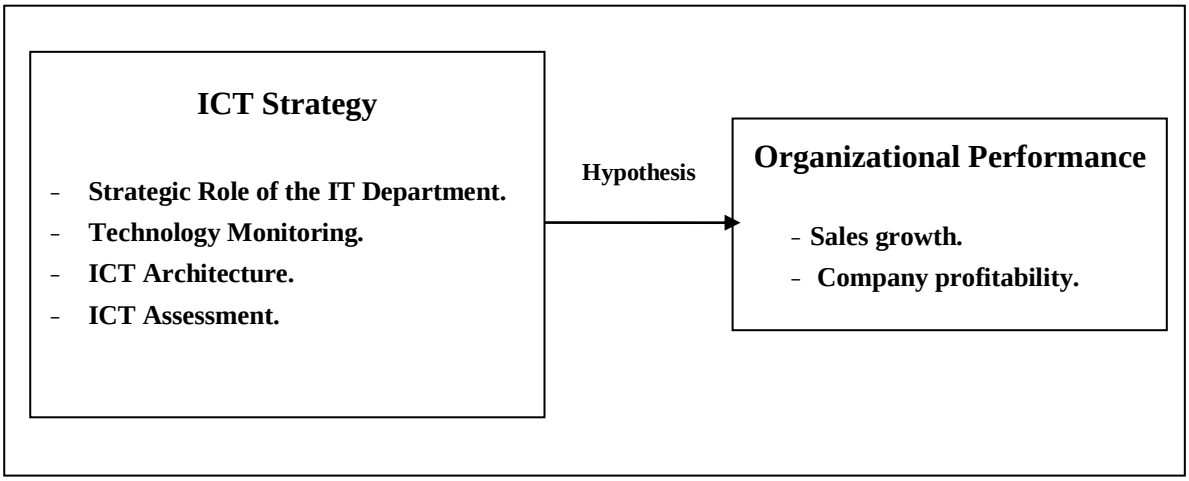


**Figure 1:** Research model

**Source:** Author

This model is developed with the aim of answering the following main question:

**Are Moroccan LMC adopting an ICT strategy more efficient than those that do not?**

**The research model proposed** in this research **study the link** between **ICT strategy** and **organizational performance** and **aims to verify the following hypothesis** in the context of Moroccan LMC:

**« An ICT strategy is associated with better organizational performance ».**

### 2.4 Definition of the variables of the theoretical model

The independent variable of the research model is ICT strategy, while organizational performance is the dependent variable of the model.

#### 2.4.1 The independent variable of the research model

ICT strategy is the independent variable of the research model. The approach adopted in this study to measure ICT strategy is to evaluate ICT strategy as a technological deployment implemented by companies. ICT strategy is composed of four dimensions: the strategic role of the IT department (RSDI), technology monitoring, ICT architecture and ICT evaluation. This construct is operationalized using the instruments of Bergeron and Raymond (1995), Croteau (1998), Croteau et al. (2000) with a scale[11] Likert scale ranging from 1 to 5 (strongly disagree to strongly agree).

[11] The studies conducted by Bergeron and Raymond (1995), Croteau (1998), Croteau et al. (2000), used a Likert scale ranging from 1 to 7 (Strongly disagree to strongly agree).

**Table 1: Operationalization of the ICT strategy**

| Items | Codification |
|---|---|
| **Strategic role of the IT department (6 items)** | **RSDI** |
| - The IT department plays a strategic role within our company. | rôle1 |
| - The IT department contributes to the growth of our company. | rôle2 |
| - The IT department staff develops applications that allow our company to differentiate itself from its competitors. | rôle3 |
| - Information and communication technologies (ICT) are used as a source of greater competitiveness by our company. | rôle4 |
| - The IT Manager participates in meetings that concern our entire company (e.g., the steering committee, executive committee, etc.). | rôle5 |
| - The IT department staff develops applications that reduce our company's operating costs. | rôle6 |
| **Technological monitoring (4 items)** | **Veille** |
| - IT department staff are continually acquiring new knowledge about IT technologies and applications. | vt1 |
| - IT department staff regularly read ICT newspapers and specialist magazines. | vt2 |
| - Learning how to integrate ICT is continually encouraged by our company. | vt3 |
| - IT department staff participate in professional IT associations. | vt4 |
| **ICT Architecture (6 items)** | **Architecture TIC** |
| - The IT department integrates ICT according to an open architecture. | v41 |
| - The IT department contributes to the efficient use of our company's information resources. | v42 |
| - The IT department promotes the implementation of a flexible and efficient telecommunications infrastructure. | v43 |
| - ICT infrastructure meets our business needs | v44 |
| - The IT department improves information security and control. | v45 |
| **ICT Assessment (2 items)** | **Evaluation TIC** |
| - ICT productivity is measured. | v46 |
| - The effectiveness of ICT is measured. | v47 |

**Source:** Produced by the author based on several readings

### 2.4.2 The dependent variable of the research model

The approach adopted in this study to measure organizational performance is the subjective approach using the Venkatrarman instrument, which uses the respondent's perception of sales growth and the profitability of his company. This instrument has already proven itself in many empirical studies on strategic alignment: Bergeron and Raymond (1995), Solomon (1998), Croteau (1998a), Croteau (1998b), Bergeron et al. (1998), Croteau and Bergeron (1999), Bergeron et al. (1999), Croteau et al. (2000), Croteau et al. (2001), Milova (2001), Bergeron et al (2002) a Likert scale [12] ranging from 1 to 5 (Very dissatisfied to very satisfied) will be used for this construct.

**Table 2:** Operationalization of organizational performance

| Items | Codification |
|---|---|
| **Sales growth (3 items)** | |
| - Our sales growth rate compared to our main competitors. | cv1 |
| - My satisfaction with our sales growth rate. | cv2 |
| - The growth rate of our market share compared to that of our main competitors. | cv3 |
| **Profitability (5 items)** | |
| - Our rate of return on investment compared to that of our main competitors. | rent1 |
| - My satisfaction with our rate of return on investment. | rent2 |
| - My satisfaction with our gross profit margin. | rent3 |
| - The net profits achieved by our company compared to those of our main competitors. | rent4 |
| - Our financial liquidity compared to that of our main competitors. | rent5 |

**Source:** Produced by the author based on several readings

### 2.5 Implementation of the theoretical model

The approach chosen for the operationalization of the variables of our model is the item approach. Thus, a test of the questionnaires aimed at assessing the applicability of the research, in particular the relevance and inadequacies of the constructs in the field, was conducted with managers of seven Moroccan companies of different sizes and operating in different sectors of activity. The results obtained allowed us to adapt our data collection tool and to begin the confirmatory phase of our strategic alignment model.

## 3. Research methodology

Our research is part of a positivist position following a hypothetico-deductive reasoning which consists of constructing a hypothesis and variables from previous work and then confronting them with the reality in order to validate or reject it. We chose the quantitative investigation method for data

[12] With the exception of Solomon's (1998) study which used a Likert scale ranging from 1 to 5, all the empirical studies cited in our literature review which used Venkatraman's instrument used a Likert scale of 1 to 7.

collection by means of a questionnaire . The preferred method for sending the questionnaire was self-administration (or door-to-door) in order to reach the greatest number of respondents possible and in a short period.

### 3.1 . Sample presentation

140 Moroccan private sector companies were targeted by this study. Each company had to have more than 50 employees, thus reaching only large and medium-sized companies. Each company also had to have an IT department. As for the sector of activity, no consideration was made concerning them. The respondent targeted for the first questionnaire, on organizational performance, was the marketing/sales director or a member of top management, while the one targeted by the second questionnaire, on ICT strategy was the director of the IT department or a senior information system manager.

Of the 140 Moroccan companies contacted for the purposes of this research, only 43 returned the questionnaires, giving a response rate of 30.71%. Although one of the basic criteria was to contact large and medium-sized companies with 50 or more employees, one of the responding companies had to be removed from the sample, since they did not meet this criterion, thus bringing the sample to 42 companies.

Of the new sample of 42 companies, four other companies were removed because the items corresponding to organizational performance almost all had one or more missing values. This therefore brought the final sample to 38 companies which, consequently brings the response rate to 27.14%.

### 3.2 Structural Equations Methods: Verification of the Latent Dimensions Measure (CFA)

It is recognized that confirmatory factor analyses (CFA) are confirmatory in nature since they involve testing a theoretical model of structural equations developed a priori by the researcher by comparing it with empirical data[13].
Structural equation models[14] allow us to measure the correspondence between a theoretical construct and its operationalization through the introduction of the notion of "latent variable [15]". The theoretical dimensions of the model of the present research are latent:

- **ICT strategy:** Second-order latent variable composed of four first-order latent variables: RSDI, Technology monitoring, ICT architecture and ICT evaluation.
- **Organizational performance:** Second-order latent variable composed of two first-order latent variables: Sales Growth and Profitability.

The CFA will allow testing the reliability and validity of their measures on the one hand, and on the other hand to evaluate the overall adjustment of these measures to empirical data.

Before presenting the results of the confirmatory factor analysis, it is necessary to specify the conditions of its implementation. Basically, there are four steps to follow:

**Step 1 : Choosing the appropriate method for performing CFA**

[13] Roussel P et al., "Méthodes d'équations structurelles : Recherche et applications en gestion", Economica edition, 2002, page 91.

[14] For more details on these models, see: Shin Im K, V. Grover, "The use of structural equation modeling in IS Research: review and recommendations", Idea Group Publishing, 2004.

[15] According to Roussel P et al., (Page 10): " a latent variable is a concept or construct that is not directly observable and that requires a set of indicators to be collected in order to be measured . "

The analysis was carried out using AMOS software. However, our data present a bias: the size of our sample is small (n = 38) which generates *analysis biases*[16]. It should be noted that " *no single criterion allows us to determine the number of observations required*. However, *a ratio of at least five observations per estimated parameter is recommended* "[17]. A condition satisfied [18]in this research.

As for the method highlighted for carrying out the CFA, we opted for *maximum likelihood* itch is the *method recommended for a small number of observations*[19].

**Step 2 : Specification of the model to be estimated**

This step consists of determining the latent variables that influence the model as well as the different operationalization variables to measure them. In this research, this step is based on the literature review. While in other studies, the literature review can be completed by a series of exploratory factor analyses.

**Step 3 : Choosing the parameters to calculate**

At this level, it is a question of identifying the model by specifying the parameters to be calculated and comparing their numbers with those of available observations. It is necessary at this stage to impose constraints on certain parameters. Therefore, certain conventions[20] are taken by assigning specific values to certain parameters: setting one of the indicators measuring each of the latent variables at least to 1, and the variances of the indicators representing the sole measurement of a latent variable to 0.

**Step 4 : Estimation of model parameters**

This last step consists of checking whether the model fits the empirical data either at the global level or at the level of each estimated parameter:

- **Assessment of the overall goodness of fit of the model**

The assessment of the overall goodness of fit of the theoretical model to the empirical data is done through several types of indices. Each of them certainly has advantages but also has weaknesses. Thus, and to have a more detailed and complete analysis of the fit of the data, it is recommended to combine several of them. The table below shows the main fit indices frequently used in empirical research, as well as the acceptability thresholds or key values required for each index.

[16] The results obtained must be interpreted with caution; replication of the research is in this case undoubtedly useful.

[17] Gotteland D, Boulé J-M, "L'état de l'environnement industriel français est-il objectivement mesurable ?", Research Papers, September 2004, Page 9

[18] For full details see appendices.

[19] According to a large number of authors such as. Hair JF et al., or Hu L and Bentler PM cited by Gotteland D, Boulé JM, "L'état de l'environnement industriel français est-il objectivement mesurable ? ", Research Papers, September 2004, Page 9.

[20] Roussel P et al., "Méthodes d'équations structurelles : Recherche et applications en gestion", Economica edition, 2002, pages 51

**Table 3:** Indices retained for the evaluation of the overall quality of the adjustment of the model

| Indices | Key values |
|---|---|
| **Parsimony index** | |
| $\chi^2 / dl$ | As low as possible, between 1 and 2 or 3; even 5, according to the authors |
| **Absolute indices** | |
| $\chi^2$ | None (associated p) |
| GFI | > 0.9 or 0.8 depending on the authors |
| AGFI | > 0.8 or 0.7 depending on the authors |
| RMR | Closest to 0 /0.05/ or 0.08 according to the authors [0-1] |
| **Incremental index** | |
| CFI | > 0.9 |

**Source:** Produced by the author based on several readings

- **Evaluation of the measurement model fit indices**

The assessment of the overall goodness of fit of the measurement model to the empirical data is carried out by estimating the reliability and the convergent and discriminant validity of each latent variable of the research model.

**Table 4:** Measurement model fit indices

| Type of estimate | Indices retained for the evaluation |
|---|---|
| **Estimation of the reliability of latent variables** | The two indicators classically used to measure the reliability of a latent variable are *Cronbach's Alpha and Rho. from Jöreskog* . However, according to our literature review, Jöreskog's *Rho* seems to be more suitable for structural equation methods [21]. |
| **Estimation of the convergent validity of latent variables** | Convergent validity aims to "verify whether the items supposed to measure the same phenomena are correlated"[22]. It is assured if:<br>- *Student* T test associated with each of the factor contributions (significant link between a latent variable and one of its indicators) is greater than 1.96;<br>- Each indicator shares more variance with the latent variable than with its measurement error[23]. In other words, the levels of variance explained [24] by the constructs must be greater than or equal to 50%. |
| **Estimation of the discriminant validity of latent variables** | "Discriminant validity seeks to verify whether items, supposed to measure different constructs, are effectively and weakly correlated "[25]. One approach to ensuring discriminant validity " consists of verifying whether the latent variable shares more variance with its measures than with the other latent variables "[26] . This is equivalent to the fact that the variance shared between the latent variables must be less than the variance shared between the latent variables and their indicators.<br>*The shared variance between latent variables is determined by the squared correlation between them*[27]. |

**Source:** Produced by the author based on several readings

[21] Cronbach's alpha assumes that all items have the same reliability, which is rarely verified in reality. It is also very sensitive to the number of items making up the latent variable. Jöreskog's rho allows these two limitations to be removed.

[22] Evrard Y et al. cited by Gurviez P, Corchia M, "Proposition d'une échelle de mesure multidimensionnelle de la confiance dans la marque", Research and Applications in Marketing, vol. 17, n° 3/2002, page 12.

[23] Criterion proposed by Fornell C and Larcker CJ cited by Bécheur A,. Gollety M, "Validation d'une échelle de mesure du profil de lead user", Revue Francaise du Marketing, February 2006, page 8.

[24] This means that almost more than 50% of the variance of the indicators specified in the model is explained by the constructs.

[25] Gotteland D, Boulé JM, "L'état de l'environnement industriel français est-il objectivement mesurable", Research Papers, September 2004, Page 11.

[26] Gotteland D, Boulé JM, "L'état de l'environnement industriel français est-il objectivement mesurable?", Research Papers, September 2004, Page 11.

[27] Jaziri F, " Du co-alignement des technologies et systèmes inter-firmes : application à la relation prestataires des services logistiques-clients ", Doctoral Thesis, Paris-Dauphine University, Paris, France, March 15, 2004, page 305.

For each of the theoretical dimensions of the research model "ICT strategy" and "organizational performance", a confirmatory factor analysis (CFA) will be carried out in order to test a posteriori the reliability, convergent and discriminant validity of each dimension by taking into account each factor constituting it. However, if the results from the confirmatory factor analyses are unsatisfactory, we will turn to another type of factor analysis called *exploratory* . The solutions obtained, by this type of analysis, will then be examined through new confirmatory factor analyses.

Finally, given that the number of items affects the threshold of acceptance of the structural equation model by the AMOS processing software, we conducted *separate analyses* for each of the theoretical dimensions of the research model.

## 4. Results and discussions

### 4.1 Confirmatory factor analysis (CFA) of the variables "ICT strategy" and "organizational performance"

The results obtained indicate that the research model developed through the literature review by comparing it with the data from our empirical study required an adjustment at the level of the two constructs ICT strategy and organizational performance (and this in order to target measurement properties such as reliability and convergent and discriminant validity).

The CFA certainly show the existence of two variables in our research model (ICT strategy and organizational performance), but this only partially confirms what the theory proposes.

Indeed, some adjustments had to be made to the ICT strategy, more significant changes had to be made. But this was predictable since this variable was, from the start, a crossbreeding of other constructs, and not an exact reproduction of an instrument already tested in the past. Confirmatory factor analysis does not give any satisfactory results, so it was necessary to turn to exploratory factor analysis(EFA). But, even the constructs obtained by exploratory factor analysis could not be validated by confirmatory factor analysis. Which led us to deduce that these were more types of ICT strategies than first-order constructs forming a single second-order latent variable. This latter solution, on the other hand, made it possible to identify three significant and promising types of ICT strategies. As for organizational performance, given that confirmatory factor analysis did not produce any results, it was therefore necessary to turn to exploratory factor analysis (EFA). On the other hand, the EFA allowed us to identify a single latent variable with the removal of two items.

It therefore follows that the research model, as previously proposed, required an adjustment at the level of two constructs: ICT strategy and organizational performance. The research hypothesis is kept the same. Our new research model is schematized as follows:

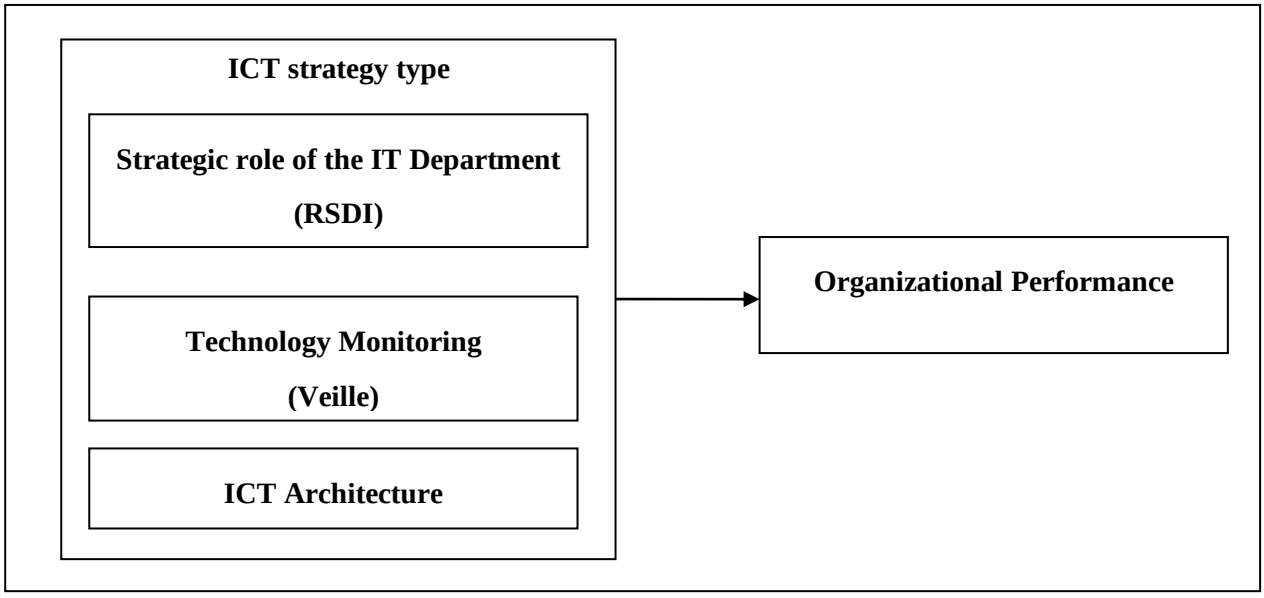


**Figure 2:** Revised search model

**Source:** Author

Thus, the research hypothesis retained in our study remains the same but three models of analysis of the causal link between a type of ICT strategy as an explanatory variable and the "Performance" dimension as an explained variable will be tested:

- The causal analysis model between the “RSDI” dimension as the explanatory dimension and the “Performance” dimension as the explained dimension.
- The causal analysis model between the “Technology Monitoring” dimension, as an explanatory dimension, and the “Performance” dimension, as an explained dimension.
- The causal analysis model between the “ICT Architecture” dimension as an explanatory dimension and the “Performance” dimension as an explained dimension.

### 4.2 Testing the hypothesis of the causal link between "ICT strategy" and "organizational performance"

#### 4.2.1 Impact of RSDI on Performance

The causal analysis model between the "RSDI" dimension as an explanatory dimension and the "Performance" dimension as an explained dimension leads to generally acceptable results.

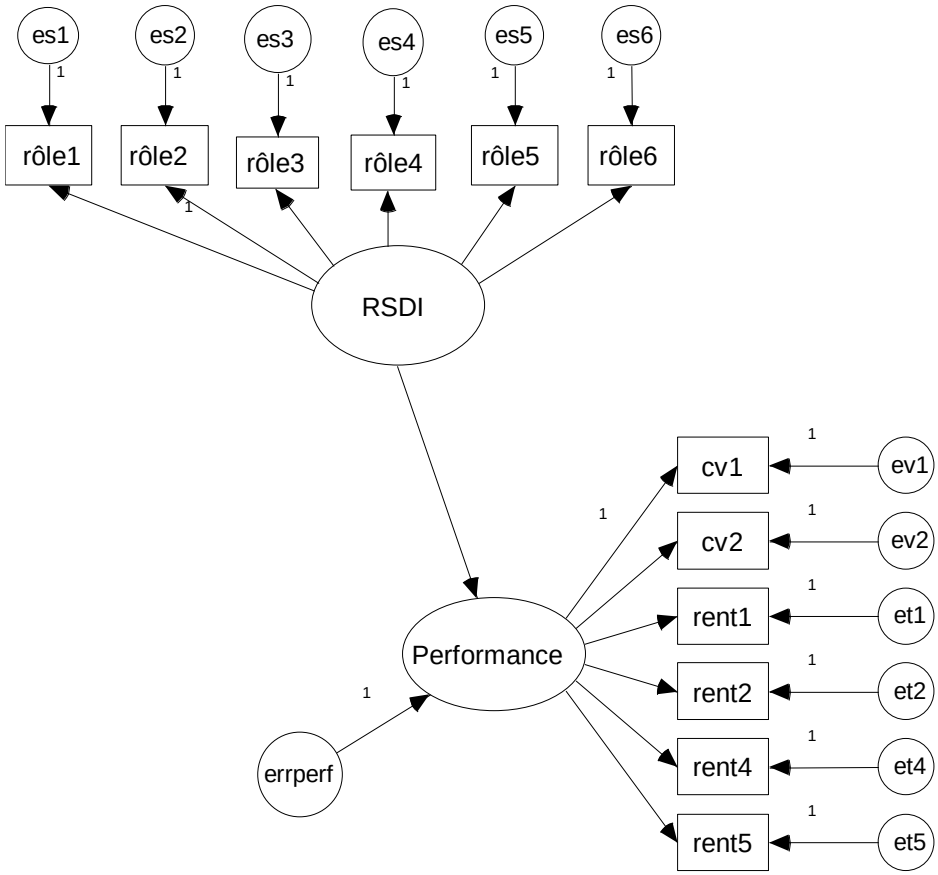


**Figure 3:** RO model

**Source:** Author

The evaluation of the global adjustment indices of this model to the empirical data leads to the results presented in the table below:

**Table 5:** Overall fit indices of the RO model

| Indices | Cmin/ddl | RMR | GFI | AGFI | CFI |
|---|---|---|---|---|---|
| **Values** | 1,468 | 0.098 | 0.776 | 0.670 | 0.899 |

**Source:** Author

Except for the first indicator which corresponds to the most stringent acceptability threshold of 2, the other indicators remain acceptable even if they do not reach the mandatory consensus standards. Furthermore, the value of the *Chi-Square statistic is 77.779* with 53 degrees of freedom and a probability of adjustment to the empirical data of p = 0.015.

In this model, 23.5% of the total variance of the "RSDI" dimension is taken into consideration to explain 0.5% of the variance of the "Performance" dimension. ***Hypothesis H is not verified since there is no significant causal link (T < 1.96) between RSDI and performance.***

**Table 6:** Estimation and significance of the regression coefficients of the RO model

| Regression coefficients | Unstandardized estimate | CR | Standardized estimate |
|---|---|---|---|
| Performance <----- RSDI | 0.075 | 0.411 | 0.074 |
| rôle1 <-------- RSDI | 1,000 | | 0.775 |
| rôle2 <-------- RSDI | 1,580 | 6,049 | 0.922 |
| rôle3 <-------- RSDI | 1,362 | 3,999 | 0.642 |
| rôle4 <-------- RSDI | 1,151 | 3,403 | 0.556 |
| rôle5 <-------- RSDI | 1,162 | 4,731 | 0.742 |
| rôle6 <-------- RSDI | 1,598 | 5,248 | 0.808 |
| cv1 <----- Performance | 1,000 | | 0.666 |
| cv2 <----- Performance | 1,236 | 3,791 | 0.698 |
| rent1 <----- Performance | 1,256 | 4,583 | 0.880 |
| rent2 <----- Performance | 1,056 | 4,401 | 0.833 |
| rent4 <----- Performance | 1,500 | 4,338 | 0.819 |
| rent5 <----- Performance | 1,406 | 3,795 | 0.699 |
| **Variance "RSDI"** | | 2,728 | 0.235 |

**Source:** Author

We notice that rôle4 has the lowest factor contribution, we eliminate this indicator to improve the fit of the measurement model to the empirical data.

The evaluation of the global adjustment indices of this new model to the empirical data leads to the results presented in the table below:

**Table 7:** Global adjustment indices of the RO model, second CFA

| Indices | Cmin/ddl | RMR | GFI | AGFI | CFI |
|---|---|---|---|---|---|
| **Values** | 1,499 | 0.092 | 0.796 | 0.687 | 0.907 |

**Source:** Author

We see a slight improvement in the CFI and GFI. In a word, these values remain acceptable. The value of the *Chi-Square statistic is* also *64.465* with 43 degrees of freedom and a probability of fitting the empirical data of p = 0.019.

In this model, 23.4% of the total variance of the "RSDI" dimension is taken into account to explain 0.4% of the variance of the "Performance" dimension. ***We reach the same conclusion, the hypothesis H is not verified (the causal link between RSDI and performance is not significant (T < 1.96)).***

**Table 8:** Estimation and significance of the regression coefficients of the RO model, second CFA

| **Regression coefficients** | **Unstandardized estimate** | **CR** | **Standardized estimate** |
|---|---|---|---|
| Performance <------- RSDI | 0.065 | 0.353 | 0.064 |
| rôle1 <------- RSDI | 1,000 | | 0.774 |
| rôle2 <------- RSDI | 1,578 | 5,970 | 0.920 |
| rôle3 <------- RSDI | 1,333 | 3,884 | 0.627 |
| rôle5 <------- RSDI | 1,160 | 4,696 | 0.739 |
| rôle6 <------- RSDI | 1,626 | 5,327 | 0.822 |
| cv1 <------- Performance | 1,000 | | 0.666 |
| cv2 <------- Performance | 1,236 | 3,793 | 0.698 |
| rent1 <------- Performance | 1,256 | 4,585 | 0.880 |
| rent2 <------- Performance | 1,056 | 4,404 | 0.834 |
| rent4 <------- Performance | 1,499 | 4,338 | 0.818 |
| rent5 <------- Performance | 1,405 | 3,795 | 0.698 |
| **Variance "RSDI"** | | 2,718 | 0.234 |

**Source:** Author

### 4.2.2 Impact of Technology Monitoring on Performance

The causal analysis model between the "Technology Monitoring (veille)" dimension, as an explanatory dimension, and the "Performance" dimension, as an explained dimension, achieved generally satisfactory results.

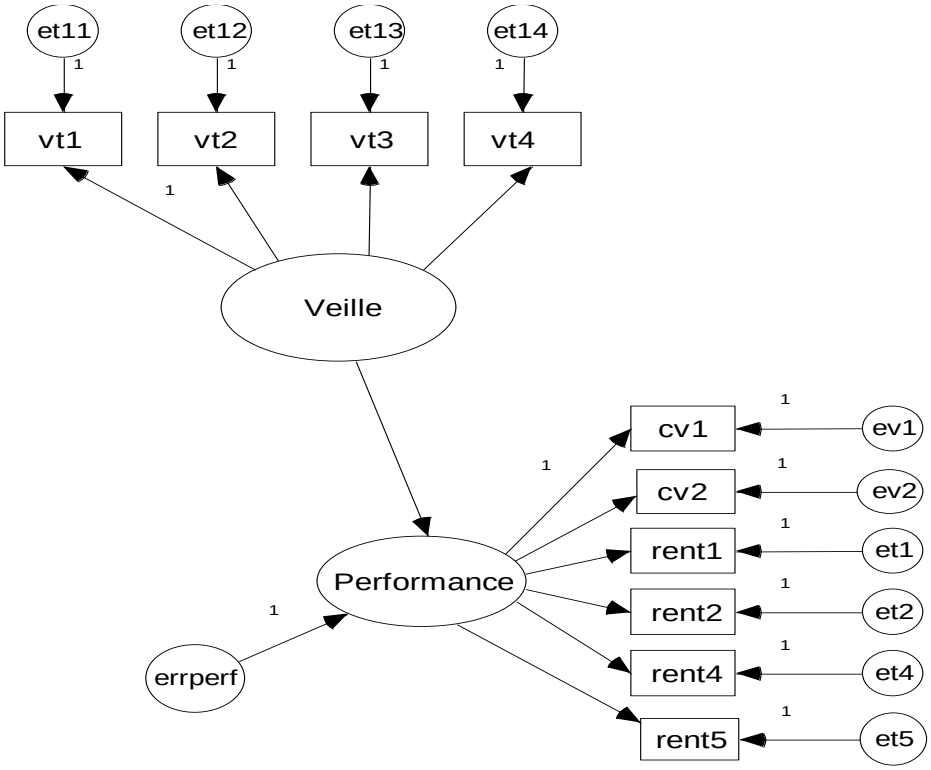


**Figure 4:** VO model

**Source:** Author

The evaluation of the global adjustment indices of this model to the empirical data leads to the results presented in the table below:

**Table 9:** Global adjustment indices of the VO model

| **Indices** | **Cmin/ddl** | **RMR** | **GFI** | **AGFI** | **CFI** |
|---|---|---|---|---|---|
| **Values** | 2,203 | 0.068 | 0.783 | 0.649 | 0.800 |

**Source:** Author

These values remain acceptable even though not all indicators have reached the most rigorous consensus standards. Furthermore, the value of the *Chi-Square statistic is 74.905* with 34 degrees of freedom and a probability of fit to the empirical data of p = 0.000.

In this model, 36% of the total variance of the "Technology Monitoring (veille)" dimension is taken into consideration to explain 27.9% of the variance of the "Performance" dimension. ***Hypothesis H is verified because the causal link between monitoring technology and performance is significant (T > 1.96).***

**Table 10 :** Estimation and significance of the regression coefficients of the VO model

| Regression coefficients | Unstandardized estimate | CR | Standardized estimate |
|---|---|---|---|
| Performance <------- Veille | 0.433 | 2,500 | 0.528 |
| vt1 <------- Veille | 1,000 | | 0.789 |
| vt2 <------- Veille | 0.928 | 4,049 | 0.723 |
| vt3 <------- Veille | 1,115 | 4,024 | 0.718 |
| vt4 <------- Veille | 1,050 | 3,506 | 0.621 |
| cv1 <------- Performance | 1,000 | | 0.664 |
| cv2 <------- Performance | 1,259 | 3,830 | 0.708 |
| rent1 <------ Performance | 1,253 | 4,547 | 0.874 |
| rent2 <------ Performance | 1,045 | 4,337 | 0.822 |
| rent4 <------ Performance | 1,523 | 4,364 | 0.828 |
| rent5 <------ Performance | 1,421 | 3,810 | 0.704 |
| **Variance " *Veille* "** | | 2,594 | 0.360 |

**Source:** Author

We find that vt4 and cv2 have the lowest factor loadings, we eliminate these two indicators to improve the fit of the measurement model to the empirical data.

The evaluation of the global adjustment indices of this new model to the empirical data arrives at the results presented in the table below:

**Table 11 :** Global adjustment indices of the VO model, second CFA

| Indices | Cmin/ddl | RMR | GFI | AGFI | CFI |
|---|---|---|---|---|---|
| ***Values*** | 1,435 | 0.052 | 0.865 | 0.745 | 0.941 |

**Source:** Author

We note an improvement in all indicators. These values are very satisfactory given their correspondence to the most rigorous acceptability thresholds. Furthermore, the value of the *Chi-Square statistic is 27.267* with 19 degrees of freedom and a probability of adjustment to the empirical data of p = 0.099. In this model, 42.1% of the total variance of the "Technology Monitoring (veille)"

dimension is taken into consideration to explain 16.9% of the variance of the "Performance" dimension. ***Hypothesis H is therefore still verified since the causal link between monotoring technology and performance is significant (T > 1.96).***

**Table 12 :** Estimation and significance of the regression coefficients of the VO model, second CFA

| **Regression coefficients** | **Unstandardized estimate** | **CR** | **Standardized estimate** |
|---|---|---|---|
| Performance <------- Veille | 0.300 | 2,010 | 0.411 |
| vt1 <------- Veille | 1,000 | | 0.853 |
| vt2 <------- Veille | 0.763 | 3,615 | 0.643 |
| vt3 <------- Veille | 1,105 | 4,052 | 0.769 |
| cv1 <-------- Veille | 1,000 | | 0.639 |
| rent1 <------- Performance | 1,344 | 4,385 | 0.903 |
| rent2 <------- Performance | 1,072 | 4,092 | 0.812 |
| rent4 <------- Performance | 1,559 | 4,111 | 0.817 |
| rent5 <------- Performance | 1,500 | 3,716 | 0.716 |
| **Variance " *Veille* "** | | 2,743 | 0.421 |

**Source:** Author

### 4.2.3 Impact of ICT Architecture on Performance

The causal analysis model between the "ICT Architecture" dimension as an explanatory dimension and the "Performance" dimension as an explained dimension gave satisfactory results.

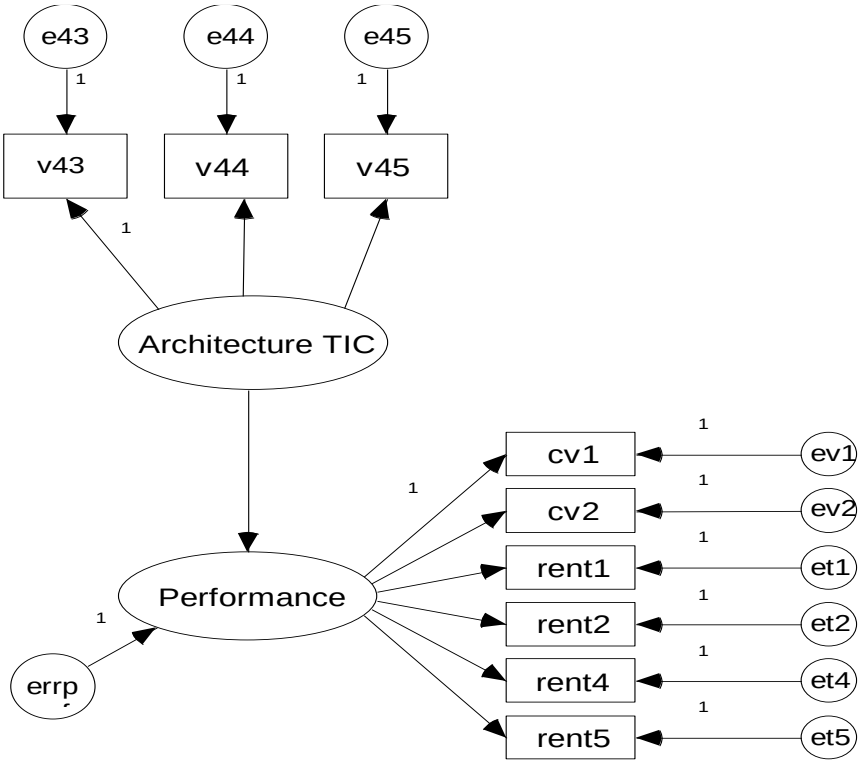


**Figure 5:** TO model

**Source:** Author

The evaluation of the global adjustment indices of this model to the empirical data leads us to the following results:

**Table 13:** Global adjustment indices of the TO model

| Indices | Cmin/ddl | RMR | GFI | AGFI | CFI |
|---|---|---|---|---|---|
| **Values** | 1,656 | 0.074 | 0.810 | 0.671 | 0.908 |

**Source:** Author

Apart from AGFI, the values obtained by the other indicators are satisfactory. Furthermore, the value of the *Chi-Square statistic is 43.061* with 26 degrees of freedom and a probability of adjustment to the empirical data of p = 0.019.

88.5% of the total variance of the "ICT Architecture" dimension is taken into consideration in this model to explain 16.4% of the variance of the "Performance" dimension. ***Hypothesis H is verified since there is a significant causal link (T > 1.96) between ICT Architecture and Performance.***

**Table 14:** Estimation and significance of the regression coefficients of the TO model

| Regression coefficients | Unstandardized estimate | CR | Standardized estimate |
|---|---|---|---|
| Performance <------- Architecture TIC | 0.212 | 2,124 | 0.405 |
| v43 <------- Architecture TIC | 1,000 | | 0.824 |
| v44 <------- Architecture TIC | 1,009 | 5,509 | 0.928 |
| v45 <------- Architecture TIC | 0.598 | 4,481 | 0.687 |
| cv1 <------- Performance | 1,000 | | 0.665 |
| cv2 <------- Performance | 1,258 | 3,840 | 0.709 |
| Rent1 <------- Performance | 1,231 | 4,505 | 0.862 |
| Rent2 <------- Performance | 1,040 | 4,333 | 0.819 |
| Rent4 <------- Performance | 1,541 | 4,420 | 0.840 |
| Rent5 <------- Performance | 1,423 | 3,825 | 0.706 |
| **Variance "ICT Architecture"** | | 2,849 | 0.885 |

**Source:** Author

### 4.3 Detailed interpretation of the research hypothesis

Research hypothesis H, examining the link between a given type of ICT strategy and organizational performance is rejected for companies adopting an RSDI type ICT strategy. Thus, having a department playing a strategic role within the company is not always synonymous with improved performance, even for our sample. On the other hand, practicing technology monitoring leads to increased performance. Thus, hypothesis H is verified for companies practicing technology monitoring. This consists of all the means allowing IT department staff to listen to new developments in the ICT field. For the companies that participated in this study, these means are:

- Allowing IT department staff to continually acquire new knowledge about IT technologies and applications;
- Regular reading of newspapers and specialist ICT journals;
- The company's encouragement of continuous learning of ways to integrate ICT.

Hypothesis H is also verified in the case of the implementation of an ICT architecture. Consequently, the implementation of an ICT architecture contributes to the growth of organizational performance. For the companies subject to our survey, the ICT architecture is characterized by:

- The implementation of a flexible and efficient telecommunications infrastructure;
- An ICT infrastructure that meets business needs;

- Improved security and control of information.

**Table 15 :** Results obtained for research hypothesis H

| **ICT strategy type** —— **H** ——→ | **Organizational performance** |
|---|---|
| **Strategic role of the IT Department (RSDI)** | **hypothesis H is rejected** |
| **Technology Monitoring(Veille)** | **hypothesis H is verified** |
| **ICT Architecture** | **hypothesis H is verified** |

**Source:** Author

## 5. Conclusion

This study has allowed us to verify several aspects at the theoretical and practical level. In general, the main conclusions we have reached are as follows:

- ICT strategies such as the practice of technological monitoring[28] or the implementation of an ICT architecture[29] alone enable organizational performance to be increased.
- While having an IT department that, among other things, develops applications that allow the company to differentiate itself from its competitors and reduce the company's operating costs, is not equivalent to an increase in organizational performance.

The results obtained in this research have a dual theoretical and managerial interest. On the academic level, through this study:

- It was possible to distinguish the situations in which organizational performance increased, taking into account the type of ICT strategy adopted by Moroccan LMC.
- Regarding the instruments used to measure the constructs of our research model, following the validity and reliability tests carried out on the results obtained, they are as follows:
  - Regarding Venkatraman's tool for assessing organizational performance, the latter required a slight modification;
  - At the level of ICT strategy, this study has identified three types of ICT strategies : RSDI, technological monitoring and ICT architecture.

[28] Technological monitoring, as we have defined it, consists of all the means allowing the IT department staff to keep up to date with new developments in the field of ICT. For the companies that participated in this study, these means are:

- Allowing IT department staff to continually acquire new knowledge about IT technologies and applications;
- Regularly reading newspapers and specialist ICT journals;
- The company's encouragement of continuous learning of ways to integrate ICT

[29] This ICT architecture is characterized by the implementation of a flexible, efficient telecommunications infrastructure that meets the needs of the company with particular concern for improving security and information control.

From a managerial perspective, the main conclusions we reached in this study imply managerial implications:

- Having an IT department that, among other things, develops applications that allow the company to differentiate itself from its competitors and reduce the company's operating costs, is not synonymous with an improvement in organizational performance.

This research is however characterized by a limitation related to the response rate. Indeed, although the response rate obtained is satisfactory, this does not prevent the sample size from being relatively small to be able to draw definitive conclusions. The results obtained by this research must therefore be interpreted with caution.

Regarding the main avenues of research, the same model could still be taken up, but based on retaining other approaches to conceptualize and measure ICT strategy and organizational performance.

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