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Explanatory Factors Determining of ICT Adoption Level in Tunisian Textile Companies

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Abstract The objective assigned by this article is to show that the adoption of ICTs is not only influenced by the traditional factors of the technological distribution but also by the organizational factors and néo--schumpeteriens. From a sample of 110 companies of Tunisian textile sector, we study, in the first place, the level of adoption of ICTs the companies of textile industry while most of the recent studies favored measures of the stock of IT capital or the automation of the tasks. In the second place, our econometric analysis concerns, besides the traditional factors quoted by the epidemic models and the probit, two groups of factors identified recently by the theory of the complementarity and the theory néo-schumpetérienne. Our empirical method handles the biases usually met in the equations of technological adoption as well as in the tests of the organizational complementarity. Our results, further to our questionnaire, show that the distribution of information technologies and communication depends more on organizational factors and néo-schumpetériens than on classic factors.

Keywords: *ICT, factors, Tunisian textile companies*

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1. Introduction

Since the famous paradox of Solow (be seen everywhere computers except in the productivity statistics), there is a rise in both the theoretical and empirical literature to solve. The first work facts on the United States, and then on the rest of the developed countries [1] have highlighted the positive impact of the diffusion of ICT (information and communication technologies) on economic performance and this at all levels: macro and micro. More particularly, the micro-economic analyzes have been more conclusive and more explanatory of the paradox of Solow. The contribution of ICT to productivity improvement is assessed through the increase of the total factor productivity (Solow residual).

Jorgensen and Stiroh [2] and Oliner and Sichel [3] show that the productivity gains in the United States are of 0.6 point between the first half and the second half of the years 90. These productivity gains are of the order of 0.4 for the sectors of ICT users and 0.2 for the ICT producing sectors.

These works indicate that the investment in ICT has a positive impact on the performance of enterprises, but it must be accompanied by other types of complementary investment especially in matters of organizational innovations and human capital. If, however, the paradox of Solow has found several solutions in the developed countries, the knowledge of the state of adoption of ICTs and their impact on economic performance in developing countries is limited and deserves to be further studied. In this framework, several works have shown [4] that ICT can play an important role in the improvement of the performance of Tunisian enterprises. Other works also indicate [5] that ICT have an opportunity for developing countries to improve their competitiveness, to catch the developed countries and to enter in the knowledge economy based on ICT [6].

There is now a clear consensus on the determinants of the diffusion of technologies, in particular on the determinants of the dissemination or the adoption of ICT. On the one hand, the literature on technological diffusion has demonstrated the existence of effects of rank, of stock-order and epidemic [7]. On the other hand, the theory of supermodularite [8] provides an interpretation very robust of the adoption of ICT in the explaining by an effect of complementarity with the organizational practices and strategic. By crossing these two theoretical approaches, several empirical studies have proposed equations of adoption incorporating a comprehensive set of potential determinants of technological choice (i.e. Karshenas and Stoneman, (1993) or Bocquet *et al.*, 2007).

Therefore, it is very interesting to study the determinants of the adoption of ICT in developing countries in order to broaden the dissemination of these technologies, to catch up with the developed countries and to enter to the knowledge economy based on ICT.

Our work is concerned with the determinants of the diffusion of ICT in the business sector of Tunisian textile. Our contribution in this chapter is to identify the

determinants of the diffusion of ICT in the Tunisian economy which are to our knowledge little known. Compared to a few work facts on the Tunisian economy, our work is distinguished by the timeliness of the data for technologies very sensitive to the time factor especially for the developing countries, as well as by the large number and variety of determinants integrated in the analysis. Our econometric methodology is designed to treat the bias usually encountered in the equations of technology adoption as well as in the tests of the complementarity of organizational practices.

The article will be organized in the following manner, we present in the first section a review of literature on the determinants of the diffusion of ICT (section II). Section III will be reserved for the presentation of our data base, of econometric model and empirical results. Finally, in section IV, we will end up with some conclusions and remarks on the determinants of the adoption and use of ICT.

2. Theoretical Framework and Specification of Assumptions:

For Karshenas and Stoneman [7], and Geroski [9], the adoption of technologies is influenced by the effects of rank, of stock-order, epidemic and organizational innovation. The effects of rank are associated with the heterogeneity of firms which generates the differences in the benefits related to the adoption. In effect, the decisions of adoption are determined primarily by arbitration between the additional profits expected thanks to the adoption and the costs of the change in technology.

However, the costs and the benefits of technological change are specific to each firm and therefore depend on major variables that differentiate them: the size, pricing policies and services of the suppliers, the legal status and capital-intensive of the business, the nature of its competitive environment and its capacity for learning and change. These costs of learning and of " *switching"* are determined mainly by the qualification and experience of employees of the firm but also by the age and the degree of specialisation of its capital stock. As well, the size of the enterprise affects positively the intensity of adoption of ICT, the implantation of Web sites, the adoption of computers, and the adoption of EDI, e-mail, and access to data in lineages.

In contrast, some authors show that the number of employees who have access to the Internet, the number of users of computers and the e-mail by employee are negatively related to the size. The effect of the *status of* firms is not also without ambiguity. Some studies [10] show that the membership to a multinational group has a positive impact on the adoption of ICT. Bayo-Morionesa and Lera-Lopez [11] demonstrate that the adoption of computers, the number of users of the computers, the Intranet and the web pages are positively related to belonging to a multinational group and the number of units belonging to the company.

A *sectoral effect* on the adoption of ICT is also emphasized by the empirical studies. The organizations of different sectors are distinguished in a significant way in terms of adoption of ICT and that after the ICT sector, the health services are the leaders in this regard. In our case the sectoral effect is excluded from our work since we are interested only in a single sector[12].

H1: the level of adoption of ICT in a business depends on the effects of rank.

In their theory of the supermodularite (theory of complementarity), Milgrom and Roberts (1990, 1995) that link the dissemination of ICT to the emergence of new modes [13] ***of organization of firms*** characterized by processes of decision more decentralized, strong incentives to the improvement of the quality, and close relationships with customers and suppliers. This implies that the diffusion of ICT is stimulated by the adoption of new organizational practices complementary. In fact, Milgrom and Roberts [13] suggest that even if the factors identified by the approach of the dissemination are important, the firms are not interested in the adoption of ICTS if they have not adopted other *strategic practices* and organizational *relating* to the new system of flexible production:

A) Production geared to the economies of range more than the economies of scale;
B) Frequent improvements of products and processes;
C) Segmentation of markets instead of marketing in mass ;
D) Of high qualifications ;
E) Decentralization of the decision-making process;
F) Focus on the cost and the quality more than on the volume;
G) Low stock ;
H) High responsiveness to the demands of consumers;
I) reliance on external suppliers.

Formally, the theory of the supermodularite is based on a reformulation of the production function of the firm integrating, next to the traditional factors, capital and labor, inputs consisting of organizational practices and strategic. When this production function is enlarged supermodulaire, an exogenous shock having a positive influence on the adoption of the practice *yj* will lead to the adoption of all other complementary practices, even if this shock does not have direct influence on them. Accordingly, the supermodularite is reflected by a correlation of practices and techniques adopted. It is therefore possible to adopt an empirical strategy based on the revelation of preferences: if the firms choose their technologies and practices by optimization, and if there are complementarities between these last few, the adoption of ICTS should be positively influenced by the adoption of organizational practices and complementary strategic.

Empirically, a study made on the Spanish manufacturing firms'[11] shows that the adoption of computers and the intranet depends positively on the application of ISO 9000 and the continuation of a strategy of differentiation. The use of Web pages and video conferencing is positively correlated to the development of teams by project and the ISO 9000 certification. Similarly, the study demonstrated that the adoption of computers, the Internet, extranet, and the e-mail is positively related to the number of skilled workers. Similarly, the computer applications as the DAA (data access and Analysis), the ERP and the PSI (process support and improvement) have a major influence on the ability of the firm to maintain a level of very high quality. More recently, a study done on the Colombian firms also shows a positive link between the organizational innovations and the intensity of adoption of ICT [14].

H2: the adoption of ICT in a business depends on the organizational practices.

The learning capacity of enterprises and their capabilities (capabilities) technology are added to the various factors mentioned in the previous approaches by Bocquet and Brossard [15]. In the approach of complementarity, the limited knowledge and the inadequate skills inhibit the adoption of technologies, but they are considered as exogenous factors, the consequences of a possible endogenous learning are ignored. In contrast, the approaches and evolutionists neoschumpeteriennes [16,17] offer a dynamic conception of learning, or the firms the limited knowledge can at a certain time the increase. Learning is an adaptive capacity which always increases the authority to select the important technologies. The important point is that the process does not always require the adoption of the entire menu of ICT. But, on the contrary, it requires a *technological capability* that allows the firm to select only the most important technologies. This capacity depends on, among other things, the level of human capital (qualification, training, motivation) of the experience in the old technologies, of the export capacity, R-D.

Studies made on the developed countries [Battisti, G., and Stoneman, P., (2003), Hollenstein, H., (2004)] show that the absorption capacity (measured by the level of qualified employees, the orientation of the training, the innovative behavior of firms, the age of the firm, the presence of R-D, the share of exports) of knowledge from other firms and institutions and the experience in the old technologies, influence positively the time and the intensity of adoption of ICT. This positive effect of the absorption capacity is also confirmed by some of the work made in the context of developing countries such as Tunisia [Ben Youssef, W. Hadhri, and H. M'henni (2010)].

H3: the adoption of ICT in a business depends on its ability to learn.

3. Data, Variables and Verification of Assumptions

3.1. The Data

3.1.1. The Sample

The sampling phase of the empirical research is an essential step which is to verify that the population has been correctly identified. This is the first step in the process of sampling. The parent population is the basis of determination of the sample to investigate. It can be defined as "the set of objects possessing the desired information to meet the objectives of a study" [18].The target population [19] includes110 enterprises of textile-clothing in several specialties (embroidery, garment, spinning, Finishing, Knitting). The companies are of type totally exporting and other than totally exporter. The majority of our sample and concentrated dan the area of Monastir (Jamel, kaser-hellel,etc.) or se palace the large part of the textile sector Tunisian. In addition, it was tested to enrich our sample by companies in the industrial area of Sfax, as well as companies that will place in Mahdia.

Depending on the strength of their staff, this sample is composed of very small businesses (61, 8 %), small businesses (10 %), medium-sized enterprises 5,5 %) and large companies (22.7 %).

3.1.2. Characteristic of Field of Search

Our field of research has been focused on the sector of textiles and clothing since it presented on the global plan, as on the national plan the factor of economic growth the more relevant. In fact, the textile and clothing sector is a key sector for the Tunisian economy. In fact, the textile sector in Tunisia, which is almost entirely geared toward the export, represents the most important industrial sector because it represents one of the sectors headlights of economic growth. It is in this context that in recent years, the sector has made significant investments in the research and development of new manufacturing processes that have proved effective tools. What has allows subsequently businesses to conduct incessant innovations relating to the design and production process.

3.1.3. Data Collection

The collection of data is realized by by a questionnaire. The choice of this mode of collection of the information returns to the fact that such a tool would enable to question the individuals on the information desired, that it therefore allows to obtain accurate information and to deal with statistically to interpret by the suite [20]. Such features make the questionnaire an appropriate tool for this research.

The questionnaire is constructed on the basis of report of the Statistical Commission of the United Nations in 2007, "*key ICT indicators", which contains* a set of 41 core indicators.

The questionnaire is divided into set parties dealing successively:

- Use of computer and computer networks;
- Access and use of the Internet;
- Data Transmission.
- Automatic Exchange of information within the company;
- Electronic Commerce ;
- Organizational change and strategic primer the adoption of ICTS;
- Training in ICT.

3.2. Definition of variables Used

3.2.1. The Dependent Variables

Our survey data describe several ICT that can be adopted by the companies. We asked our respondents if their company had access to the Internet; an Intranet network; a network Extranet, a local area network (LAN) ; of a system of electronic data interchange (EDI) ; a management software package (ERP); a software of eve ; of a dedicated Internet site to customers and suppliers (INTC). Some of these technologies are presented in most businesses. This is the case of access to Internet, LAN, Intranet or Extranet. Others, on the contrary, font figure of exception in our sample (intelligence software). In this case, their probability of adoption cannot be estimated correctly. That is why; we have decided to focus our study on the adoption of EDI systems, management software packages and Internet sites dedicated to customers and suppliers. These variables are respectively designated by

EDI, ERP, and INTC. Their value is 0 if the technology is not present in the enterprise and 1 if it is present in the company at the time of the investigation.

3.2.2. The independent variables

The independent variables are chosen in reference to our literature review and the assumptions made in the first section of this chapter. Thus, we distinguish three groups of variables that influence the process of diffusion of ICTS. A first group defines the variables of a structural nature (the effect of rank). A second group is linked to the organizational variables. And finally, a third group concerned the variables characterizing the absorption capacity.

- *The effect of ranking:*

The two traditional variables to measure the effect of rank are INDER, EFFS and ME. INDEP takes the value of 1 if the establishment questioned is independent and 0 if it belongs to a group. EFFS is an indicator of size and refers to the number of employees of the establishment and ME 0 if it is a mono-establishment, 1 if not.

- *The organizational arrangements:*

Our questionnaire has allowed us to describe the main organizational arrangements adopted by the undertakings aimed at:

A) formalize relations with customers and suppliers;

B) create incentives for motivating employees;

C) introduce the process of decentralized decision.

This is one of the three types of organizational arrangements considered as essential in the theory of the supermodularite. The three variables CCCF, EOW and DEC correspond as well to the organizational arrangements present in the firms studied. We have introduced in the form of variables by cross-pairs. We tested all possible combinations between these three variables. For example, the variable DEC ×EOW is equal to 1 if the firm has at least one device foster the decentralization of the decision-making process *and* a device encouraging the motivation of employees.

- *The learning capacity*:

This capacity depends on, among others, of the :

- Level of human capital : ICT training, share of graduates in the workforce total of employees
- The experience in the old technologies,
- The export capacity,
- Process of innovation in enterprises (RD).

The Table 1 below summarizes the dependent and independent variables. The identification of explanatory factors for the adoption of different levels of ICT by businesses will be based on the analysis of the results of the econometric estimation of the model type of logistic regression whose variables are presented in the table below.

Table 1. Variables in the model of identification of explanatory factors the level of adoption of ICT by enterprises of textile

Variable	***Definition***
Dependent Variables	
Information and Communication Technologies	
INTC	= 1 If an Internet site dedicated to customers and suppliers has been Adopted (=0 in the opposite case)
EDI	= 1 If the EDI technology has been adopted (=0 in the opposite case)
ERP	= 1 If a management software package (ERP) has been adopted (=0 in the case Contrary)
The independent variables	
Variable to rank	
INDEP	= 1 If the establishment is independent (= 0 otherwise)
EFFS	= 0 If the strength of the establishment is less than 50; = 1 if including Between 50 and 100; = 2 if between 100 and 500 ; = 3 greater than 500 Employees
ME	0 If it is a mono-establishment, 1 if not.
Organizational Practice	
CCCF2	= 1 If the establishment has at least a practice of contractualisation With its suppliers and customers (=0 in the opposite case)
ETRETAT	= 1 If the establishment has at least one organizational practice Process-focused incentives (= 0 in the opposite case)
DEC	= 1 If the establishment has at least one organizational practice Centered on the process of decentralization of decisions (= in the Otherwise)
Learning Capacity	
FTIC	= 1 If the companies in fact a training related to the ICT for its personal (= 0 otherwise)
RD	= 1 If the companies made of R-D (= 0 otherwise)
EXP	= 1If the business is exporting (= 0 otherwise)
UORD	(%) of computer users

Source: (Author's contributions)

4. Econometric Model and Verification of Assumptions

The identification of explanatory factors for the adoption of different levels of ICT by businesses will be from the analysis of the results of the econometric estimation of the logistic regression model. To verify our assumptions we will handle the result of estimation of each group of independent variables (effect of rank, organizational practice and learning capacity) and their effect on the three levels of adoption of ICT (EDI, ERP, and NICT) to share.

Let us now the robustness of the three models. By mobilizing the procedure of WHITE (1982), we treat the potential heteroskedasticity problems. In fact, there was a need to assess the statistical significance of the estimated coefficients of the independent variables retained in order to ensure that each contributed to better predict P(y) as a model which does not include. To do this, we rely on the Wald statistic. The latter illustrates the difference in the model before and after the addition of each variable. We calculate, for each of the models, the percentage of correct predictions: more than 70 % of the predictions are correct in all of the systems of choice and in all specifications. The pseudo-R2 and log-likelihoods are also to satisfactory levels. These results allow us to conclude at the good explanatory power of our model. In following the direction of the coefficients *b* and Exp (b) indicate the direction of the relationship.

4.1. Effect of rank and the Levels of Adoption of ICT

The classification table shows that the prediction based on the most common category allows you to correctly classify 77.3 % of participants for the three levels of ICT (EDI, ERP, and INTC) .The percentage of prediction is higher than 70% therefore our model to a good explanatory power for all levels of ICT.

Table 2. Results of the estimation of the model of explanatory effect of rank and level Adoption of ICT in the textile firms

		B	S. E.	Wald	Sig.	Exp(b)	95% C. I. for EXP(B)	
							Lower	Upper
EDI	**ME**	0,751	0,491	2.339	0,126	2.119	0,810	5.545
	EFFS	1.931	0,601	10.340	0,001*	6.897	2.126	22.378
	INDEP	0,243	0,197	1.525	0,217	1.276	0,867	1.877
ERP	**ME**	0,849	0,488	3.025	0,082	2.338	0,898	6.089
	EFFS	1.421	0,497	8.172	0,004*	4.142	1.563	10.975
	INDEP	-0,105	0,180	0,341	0,559	0,900	0,632	1.282
INTC	**ME**	-0,338	0,571	0,352	0,553	0,713	0,233	2.182
	EFFS	1.714	0,520	1.887	0, 017**	5.041	1.737	11.651
	INDEP	0,171	0,197	0,753	0,386	1.186	0,807	1.744

**.significant at 5% and *.significant at 10%.
Source: (Author's calculations).

The result of estimation of model with the variables of the effect of rank, shows a high level of independence decreases significantly the probability of adoption of EDI and ERP for the variable INDEP. In fact, the independent companies are faced with costs of research and learning more important than the companies which belong to a group. The latter can, in fact, acquire information and knowledge, benefit from the financial support and logistics for the mother house. The independent companies also face more risks, which slowed down the adoption. This negative effect is consistent with the results of HANNAN and MC DOWELL (1984). The size of the firm has a positive and significant effect on all levels of use of ICT. In fact, for our sample, the firms are to low or medium intensity technological and consequently the report of workers non-graduates/graduates workers increases with the size of the enterprise. Since this are the graduates who use the Internet, and as their proportion decreases with the size therefore this last to a negative effect on the democratization of the internet in the company. In effect, the characteristics of the business in the sector of textile which is us sector leader in the Tunisian economy do not have a significant effect on the increase in the level of use of ICT that partially.

4.2. Organizational Practice and the Levels of Adoption of ICT

For the variables of organizational practice the classification table shows that the prediction based on the most common category allows you to classify correctly more than 86% of participants for the three levels of ICT (EDI, ERP, and INTC).

Table 3. Results of the estimation of the explanatory model of organizational practice and the level of adoption of ICT in enterprises of textile

		B	S. E.	Wald	Sig.	Exp(b)	95% C. I. for EXP(b)	
							Lower	Upper
EDI	**ETRETAT**	3.496	0,584	35.777	0,000**	32.981	10.490	103.694
	CCCF2	0,919	0,606	2.301	0,129	2.507	0,765	8.220
	DEC	1.302	0,623	4.369	0,037*	3.675	1.084	12.456
ERP	**ETRETAT**	1.261	0,464	7.391	0,007**	3.529	1.422	8.761
	CCCF2	-0,178	0,470	0,143	0,705	0,837	0,333	2.102
	DEC	1.788	0,472	14.348	0,000**	5.979	2.370	15.084
INTC	**ETRETAT**	1.604	0,612	6.874	0,009*	4.972	1.499	16.490
	CCCF2	0,062	0,494	0,016	0,900	1.064	0,404	2.804
	DEC	0,525	0,499	4.106	0,029*	3.691	1.035	11.501

**.significant at 5% and *.significant at 10%.
Source: (Author's contributions).

Our results also show the significant effect of two practices cross-organizational, DEC and Etretat, on the adoption of the three levels of ICT. The high level of adoption of ICT are well explained by the level of organizational change and the absorption capacities of new work organizations. The companies introducing a

high number of new organizational practices and software are more to expand their use of technology.

In accordance with the theory of *complementarity*, the intensity of use is positively influenced by the variables organizational and strategic. It is the firms that have the number of practices innovative organizational and the degree of consistency between the ICT strategy and the overall strategy of the company (strategic alignment) the more senior who have the highest probability to intensify their use of ICT. However, they also suggest that the adoption of ICT in link with the search for complementary practical is an empirical phenomenon complex. In effect, all the practices "innovative" are not necessarily complementary to all types of ICT [15].

- *Learning capacity and the levels of adoption of ICT*

The classification of predictions for the variable of learning capacity allows you to correctly classify 90% of the participants for the levels of ICT, this that leads us to say that our model explains well the adoption of ICT in our sample.

Table 4. Results of the estimation of the explanatory model of learning capacity and the level of adoption of ICT in the textile firms

		B	S. E.	Wald	Sig.	Exp(b)	95% C. I. for EXP(B)	
							Lower	Upper
EDI	UORD	2.976	0,671	19.680	0,000**	19.613	5.266	73.047
	RD	0,667	0,847	0,619	0,431	1.948	0,370	10.251
	QAL	1.755	0,773	5.156	0,023**	5.781	1.271	26.285
	EXP	-0,006	0,010	0,335	0,563	0,994	0,975	1.014
	FOR	1.721	0,922	3.484	0,062	5.591	0,917	34.076
ERP	UORD	1.466	0,557	6.922	0,009*	4.332	1.453	12.910
	RD	- 1.447	0,803	3.245	0,072	0,235	0,049	1.136
	QAL	1.617	0,518	1.417	0,022**	5.854	1.071	25.121
	EXP	-0,013	0,009	2.303	0,129	0,987	0,970	1.004
	FOR	1.375	0,655	1.327	0,037*	4.455	1.403	12.257
INTC	UORD	1.775	0,678	6.844	0,009*	5.898	1.561	22.289
	RD	0,602	0,635	0,899	0,343	1.826	0,526	6.344
	QAL	1.837	0,548	2.332	0,027	4.309	1.789	22.761
	EXP	-0,001	0,008	0,007	0,935	0,999	0,984	1.015
	FOR	0,319	0,614	0,270	0,603	1.376	0,413	4.583

**.significant at 5% and *.significant at 10%.
Source: (Author's calculations).

For the factors *neo-Schumpeterian processes vital*, we found for the case of the human capital that the rate of graduates increases the chances of a company to use the fully equipped of information technology and communication. The use of ICT is a significant factor which reinforces the existence of technological capabilities. These are defined as the ability of the enterprise to estimate, assimilate and apply new knowledge [21]. When a company wants to acquire and use this new knowledge, it must have a human capital to manipulate this knowledge, because the level of investment in ICT is positively affected by the percentage of employees trained [22]. In addition, the level of use of ICTS depends positively the level of computerization of the enterprise. What are the businesses using intensively the computers, software, and communication technologies that are more many to increase their level of Internet usage (communication, sale, purchase, web site, etc.).

This reflects the role of the experience, learning and culture ICTS among these companies in the ownership of the Internet tool by the workers. On the other hand, neither the level of R-D, nor the openings on the outside do not have an effect on the level of Internet usage. For the case of the R-D, we can explain the zero effect by the low intensity of this activity given that among the firms doing the R-D (either 20% of the companies surveyed) less than 5% spend a budget for R&D. Similarly, it can explain the insignificant effect of the opening on the outside by the high number of exporting firms working for donors of international order which therefore limit the use of interest to certain functions of coordination

5. Conclusion

In this article we have studied the effects of three groups of factors relating to three theoretical approaches to dissemination of innovation (structural characteristics of the firm, organizational characteristics and managerial and absorption capacity) on the intensity of use and adoption of ICT in the textile sector and in all the Tunisian economy. All go on as if the rate of equipment of economy overall followed the international standards, and that in parallel, their use remained limited to functions the most immediate and mechanical, without impact on the creative capabilities and exploratory of enterprises. The goal here is to generalize to all the Tunisian economy. In effect, we have developed the following proposals:

H1: the level of adoption of ICT in a business depends on the effects of rank.

H2: the adoption of ICT in a business depends on the organizational practices.

H3: the adoption of ICT in a business depends on its ability to learn.

In fact, our work shows that the assumptions made are partially confirmed and that everything depends on the

extent of ICT restraint. It has been shown that the absorption capacity and the organizational characteristics play a decisive role in both the intensification of adoption of ICTS that in increasing the level of these technologies. However, the effects of the other two groups of factors are limited. The structural characteristics of firms (effect of row) less influence the level of use of ICT in the business. In fact only the size of the undertaking which in a positive effect on the two first level of use of ICT (EDI, ERP), but it has no effect on the use of dedicated internet site to suppliers and customers (INTC).

The results relating to the assumption of complementarity we seem particularly interesting. They suggest that the supermodularite does not mean "*more of everything"* more of ICT with more strategic practices and innovative organizational. In terms of industrial policy, to be able to broaden the dissemination of ICT in the economic fabric tunisian and gain competitiveness, it is essential today to promote the organizational innovations. We must also understand that this should be the quality of skills and learning capacity of ICT users and not the number of employee's diplomas which determine the level of use of these technologies in the Tunisian enterprises. Then it is important to rethink the education and training systems in order to improve the quality of graduates and workers in general. In effect, the non-optimal use of ICT is due to the difficulties and obstacles which widens the gap between the adoption of ICT and their dissemination throughout the economy, not only for the sector of textiles.

The public authorities must be aware of the impact of new technology on the economy. The restructuring of value chains by the enterprise networks to enterprise may have implications and effects of considerable lock on small businesses. The centralizing effects of electronic trading networks may divert the resources of regions and rural areas, distant and in loss of speed and strengthen the concentration around the industrial and urban areas the most prosperous, thus accentuating the economic and social inequalities between the urban and rural populations. In developing countries, the public authorities must pay particular attention to the multiuser solutions to provide access to the network infrastructure, solutions that could also enable them to achieve their objectives in terms of access to the infrastructure.

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