Impact of Computer Networks on the Productivity of Algerian Companies

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ملخص:

أصبح من الواضح أن استخدام تكنولوجيا المعلومات والاتصالات من قبل المؤسسات الجزائرية ضرورة. ومع ذلك، يبقى مدى تأثيره على إنتاجية هاته المؤسسات مطروح للدراسة، وخاصة استخدام شبكات الإعلام الآلي ، لذلك تهدف هاته الورقة البحثية إلى الإجابة على السؤال التالي: هل استخدام شبكات الإعلام الآلي في المؤسسات الجزائرية ساهم في زيادة إنتاجيتها؟ من أجل الإجابة على هذا السؤال، أجريت دراسة ميدانية. وقد وزع استبيان على ستة عشر مؤسسة جزائرية كبيرة الحجم. وأظهرت النتائج أن استخدام شبكات الإعلام الآلي لا يؤثر على إنتاجية المؤسسات الجزائرية.

1.Introduction:

Since the 1990s, the use of information and communication technologies (hereafter ICTs) is essential for all companies, especially after the numerous studies that have shown the positive impact of these tools on productivity of company users. However, previous studies in this area were interested in developed countries, which is undeniable as they are the producers of these technologies.

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Recently, researchers attempt to study this phenomenon in less developed countries, including algeria. Indeed, Algeria made the transition to this new model of economic development under the effect of a liberal policy and a global diffusion of ICTs. This compulsory transfer is indispensable to its integration into the global economy[1]. This is tangible through the establishment of policy and program that allow it to reduce the digital divide, and benefit quickly and maximally from ICTs. A multi-sectoral plan called "2013 E-Algeria Strategy" was set up (in December 2008[2]) to establish the objectives and actions to be implemented over a period of five years. This plan is based on thirteen major axes. For each axis, an inventory was developed followed by a definition of major and specific objectives to be achieved during this period, and a list of actions for implementation. Amongst these axes, we cite, the B-axis on the integration of ICTs in the economic sector and support the appropriation of ICTs by the companies. For this axis, it is visible that the initiators of this plan are aware that the developed instruments of management and governance around ICTs, especially the Internet are the only guarantors of the survival of companies in today's globalization. The B-axis has three objectives: Support for the appropriation of ICTs by the Algerian SMCs (Small and Medium Companies); application development for the improvement of company performance; development and supply of services online. [3]In addition, a program to support SMCs / SMIs (Small and Medium Industries) and the management of ICTs (SMC II), was introduced by Algeria and the European Union in 2009 in order to contribute to the modernization and development of Algerian SMCs. The SMC II attaches a particular importance to the establishment of quality assurance and the use of ICTs... it caters for companies having modernization programs and subject to a number of target sectors aiming at disseminating good practices to the rest of the SMCs in the sector.[4] However, the extent of the impact of information and communication technologies on the productivity of Algerian companies, particularly in computer networks remains rare. This leads us to think about the raised question. In this perspective, our study has identified a number of Algerian companies using large computer networks. The present paper is structured in three sections. The first section presents a literature review on ICTs and their impact

on companies' productivity. The second section traces the research methodology used. The final section presents the results and discussions.

2.Literature Review

The research undertaken in this field isbased on the definition of these technologies. According to BIALES[5], « les TIC peuvent être répertoriées en trois groupes :

- L'informatique (les matériels et les services connexes produits par les entreprises),
- L'électronique (fabrication des composants et de certains appareils),
- Et les télécommunications (activités de services et fabrication d'appareils) ».[6]

The National Statistical Information Council of France[7] argues that « Les produits T.I.C sont les instruments qui permettent de visualiser, traiter, stocker et transmettre de l'information par des moyens électroniques. »[8]

It is noted that there is no consensus on the definition of information and communication technologies. However, their impact on the economy through companies is becoming more interesting. Indeed, ICTs with their characteristics increase the capacity and flexibility of the communication system, with lower prices and costs of traditional modes of transmission. This progress has stimulated the demand for equipment and software of ICTs, making small real growth sector industries.ICTs has contributed to the proliferation of new applications such as mail and electronic commerce, which have further stimulated investment in ICTs and allowed the realization of new business processes, some of which are associated with significant productivity gains.[9]

Therefore, these productivity gains (that of capital and labor) are mainly produced by ICTs which positively affect the economy by an increasing growth. According to BIATOUR et al.[10], in their study of the impact of ICTson productivity, these producing sectors of ICTs users are distinguished. The authors identify three transmission channels of production and distribution of ICTs on productivity growth. First, the growth of total factor productivity (TFP) in the producing areas of these technologies: development of ICTs

production, especially the production of semiconductors enabled the production of more efficient equipment with the same quantities of production factors, which consequently increases the productivity of ICTs equipment production sectors and the productivity of the overall economy. In addition, to lower ICT sales prices encouraging other sectors to invest in these technologies. Then, the TFP growth in ICT-using sectors: These investments increasingly growing in ICTs, ICTs user sectors streamline and register themselves of technical progress and improve (gradually) their own TFP, for example, thanks to automation of production, development and corporate network scanning the exchange. Providing the integration of ICTsto be accompanied with a reorganization of company functions and additional intangible investments to train the workforce in the use of ICTs (for it to be maximized) and the new work organization. Finally, the substitution of capital factor to the factor labor or capital deepening, which are based on the continuous and rapid improvement in performance and falling prices of ICTs (the law of MOORE) pushes the accumulation of ICTswhich substitutes for other forms of capital and, thus, the earnings growth of productivity in the user sectors of ICTs.

In addition, the work of DESQ et al., Cited in BELLAAJ[11], who based their study on a synthesis of a 1018published articles from 1977 to 2001 noted that the dominant field of research in Information Systems focuses on the issue of evaluation of information technologies. They found that the concern to investigate the relationship between IT and the company performance is permanent, although it has undergone changes over the years. The author recalls that the objective of economic theory was to find the form of the economic function (mathematical function) that explains the variance of output and that suits information technology and communication. The majority of empirical studies, according to this perspective, have used productivity as a measure of performance. The study of STRATOPOULOS and DEHNING[12]is also a part of this logic of global analysis, and specific understanding of the link between information technologies and the financial performances of the company. After an empirical analysis of a list of 100 companies having succeeded inthe use of IT in 1993, the authors find that the companies, which invest in IT, are usually good IT users and,

therefore, a financially better performance is realized. Also, the empirical results of the study of HITT and BRYNJOLFSSON[13], of 370 large companies over the period 1988-1992 show that ICTs investment has a significant impact on the company results. Moreover, a rise in the use of computer networks as an ICT elementleads to greater interest. Because, nowadays, these computer networks are increasingly developed to meet four main reasons[14]:

- Resource Sharing: by enabling resource availability such as software, databases, printers ... in spite of the geographical distance users. This is observable, for example, at a multinational company which shares with all its employees (in all subsidiaries that may be on several geographical sites) its commercial data.
- Increased reliability and performance: allowing duplication of vital files in a project in a company (a backup is available in case of problems). The performance increase can also be observed when adding a computer or over the network system.
- Cost reduction: the use of personal computers (on the network) becomes much cheaper than large centralized systems.
- Access to information and mail: with the use of networks including the Internet, access to all sorts of information is easy and fast which is very essential today. Furthermore, the possibility of transmitting and receiving real-time mail.

Indeed, a survey of the major trends of reorganization of companies from 2003 to 2006, conducted by KOCOGLU and MOATTY[15], led the authors to identify the major network equipment in companies, they are:

- The Internet;
- The website;
- Intranet;
- The local network (LAN);
- Extranet;
- The electronic data interchange (EDI).

According to the authors, these tools respond to the needs of general exchange (website open to all), or are intended for a restricted use to members of the organization, whether they are in the same physical location (local area network) or no (intranet). Finally, there is the opportunity to be reserved for external partners chosen for recurring and formalized exchanges (EDI or extranet). In addition, these tools differ in their degree of technicality and their investment costs and

usage, as well as their distribution stages, which are very varied, and not omitting the use of the internet.

3. Methodology

To answer our question, we have conducted a quantitative survey. A questionnaire has been administered to a sample of very large Algerian companies.
The number of companies that responded to our questionnaire is 16. They are characterized as follows:

Property type companies	10 public 2 mixed 4 private
Creation date of companies	11 before 90 1 between 90 and 2000 4 after 2000
Activity sector of the companies	3 industry 10 Service 2 BPWH (Building, Public Works and Hydraulics) 1 Commerce

3- Results and discussions

In conducting the linear regression analysis and considering the productivity of Algerian companies as a variable that depends on the independent variable computer networks; we obtained the results summarized in the table below, calculated by SPSS 20.0 that we interpreted.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,105[a]	,011	-,060	1,218	,011	,156	1	14	,699

a. Predictors: (Constant), varréseauxinformatiques

The results indicate that the p is not significant (0.699> 0.05). Consequently, computer networks do not influence the productivity of Algerian companies.

The explanation of these results make use of the work in accordance with the theme. However, **studies on the impact of computer networks on companies' productivity are rare**; the reason goes back to the fact that these computer networks usually are included in TICs elements. The OECD report on economic growth has analysed the key role of computer networks. It is noted that some ICTs could explain the improvement of companies' performances more than others could. Notably, it is the case of computer networks, which offers a company the opportunity to outsource certain activities to work more closely with its customers and suppliers and to better integrate its activities on the entire value chain. Therefore, it is considered that, generally, these technologies have network effects or benefits. In recent years, the OECD could have more data on these technologies. Regarding the United States, for example, a supplement to the Annual Survey of Manufactures provides information on the use of computer networks. This OECD report comes to cite studies on the subject. It cites the study of ATROSTIC and NGUYEN[16], which is the first detailed study showing a direct link between the use of computer networks (both the electronic data interchange (EDI) and the Internet) and productivity. The authors find that the average labor productivity is higher in plants with networks and the impact of networks is positive and significant after taking into account a range of factors related to the production and characteristics of the company. According to the specifications of the model, they believe that computer networks participate in the work productivity increase approximately to 5% of employment.

The report on the perspectives of information technology OECD 2008 quote, again, the work of ATROSTIC and NGUYEN who manage to show some divergent effects of different types of network use. They also exhibit new evidence confirming the positive link between computer networks and the productivity. In particular, logistic chain activities online-based on communications networks, such as stock management, order tracking, transportation management and logistics, have consistently positively related to productivity, and impacts productivity are generally stronger in

recent plants, generally equipped with faster and more efficient communication networks.

4.Conclusion

The purpose of this paper was to study the impact of computer networks on the productivity of Algerian companies in a very large type of company. The methodology adopted in this study is of a quantitative type. A questionnaire has been conducted and administered to sixteen Algerian big companies. The results of this study were obtained by linear regression and the non-significance of the model concluded that computer networks do not influence the productivity of Algerian companies. However, we do not infer these results. Other variables with a larger sample might influence the productivity of Algerian companies in computer networks and hence might improve the results of studies in this field.

5. References

[1]CHETTAB Nadia, « Économie, tic et bonne gouvernance en Algérie », 2004, p 03, http://www.drdsi.cerist.dz/SNIE/chettab.pdf, downloaded on March 9th, 2010.

[2]E-COMMISSION, « Synthèse « E-Algérie 2013» », december 2008, http://www.algerianembassy.ru/pdf/e-algerie2013.pdf, downloaded on May 3rd, 2010.

[3]MPTIC, « Élaboration de la Stratégie e-Algérie 2013 », p 01, http://www.mptic.dz/fr/docs/e-Algerie2013/e-Algerie_2013.pdf , downloaded on May 3rd, 2010.

[4]Ministère PME, « Programme d'Appui aux PME/PMI et à la Maîtrise des Technologies d'Information et de Communication (PME II) », http://www.algerie-pme2.dz/?-Le-PME-II- , downloaded on February 6th, 2010.

[5]BIALÈS Christian, « LA NOUVELLE ÉCONOMIE EN QUESTIONS », Montpellier, France, 2001, p 03, http://www.christian-biales.net/documents/Nouvelleeconomie.pdf , downloaded on June 15th, 2007.

[6]Our own translation "ICTs can be categorized into three groups:
- Computer science (materials and related services produced by companies)
- Electronic (manufacturing of components and certain equipment)
- And telecommunications (services activities and manufacturing equipment). "

[7]National Statistical Information Council, « rapport du groupe de travail sur l'observation statistique du développement des technologies de l'information et de la communication et de leur impact sur l'économie », February 2001, http://www.cnis.fr/doc/stockage%20rapports/rapport%2063.pdf , p 05, downloaded on January 17th, 2005.

[8]Our own translation "ICTs products are the instruments that allow visualizing, processing, storing and transmiting information by electronic means."

[9]OCDE, « Une nouvelle économie ? Transformation du rôle de l'innovation et des Technologies de l'information et de la communication», op. cit., p54.

[10]BIATOUR Bernadette, FIERS Jeroen,KEGELS Chantal, « R&D, TIC et croissance économique en Belgique : analyse sectorielle », Bureau Fdéral du Plan, Belgique, p 6, http://www.awt.be/contenu/tel/ebu/route_lisbonne_biatour_fiers_kegels.pdf , downloaded on February 10th, 2010.

[11]BELLAAJ Moez, « Technologies de l'information et performance organisationnelle : différentes approches d'évaluation »,Manuscript of the author, published in "LA COMPTABILITE, LE CONTRÔLE ET L'AUDIT ENTRE CHANGEMENT ET STABILITE, 2008, France, p 02-03, http://halshs.archives-ouvertes.fr/docs/00/52/23/42/PDF/p45.pdf, downloaded on February 15th, 2014.

[12]STRATOPOULOS, T. et B. DEHNING, « Does Successful Investment in Information Technology Solve the Productivity Paradox? », Information and Management, vol. 38, no 2, 2000, p. 103-117, http://www.sciencedirect.com/science/article/pii/S0378720600000586, downloaded on April 11th , 2010.

[13]HITT Lorin M. and BRYNJOLFSSON Erik, « Productivity, Business Profitability, and Consumer Surplus: Three Different Measures of Information Technology Value », MIS Quarterly, Vol. 20, No. 2 (Jun., 1996), pp. 121-142, p 136, http://home.business.utah.edu/actme/7410/Productivity.pdf , downloaded on August 12th , 2014.

[14]NERUDA Pablo, RIGAUD Philippe, « les Réseaux », CRGE, 2007, Grenoble, p 05, http://www.ac-grenoble.fr/ecole.entreprise/CRGE/cteressources/docs2007/brassage/Reseaux.pdf downloadedon January 08th, 2012.

[15] KOCOGLU Yusuf et MOATTY Frédéric, « Diffusion et combinaison des TIC : Les réseaux, la gestion des données et l'intégration par les ERP », Networks, 2010/4 n° 162, p. 33-71. DOI : 10.3917/res.162.0033, p 43, http://www.cairn.info/resume.php?ID_ARTICLE=RES_162_0033 , downloaded on February 15th, 2012.

[16]ATROSTIC, B.K. et S. NGUYEN, « Computer Networks and US ManufacturingPlant Productivity: New Evidencefrom the CNUS Data »,Center forEconomic Studies, Working Papers, n°. 02-01,2002, selon OCDE, « Comprendre la croissance économique », 2004, p 94, http://e-booksland.com/Economie-et-finance/comprendre-la-croissance-economique-analyse-au-niveau-macroeconomique-au-niveau-sectoriel-et-au-niveau-de-lentreprise.html , downloaded on September 11th, 2011.