

The impact of information and communication technology on human capital in Algerian companies

تأثير تكنولوجيا المعلومات و الاتصال على رأس المال البشري في المؤسسات الجزائرية

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Abstract:

The aim of this study is to investigate the impact of information and communication technology (ICT) in Algerian Companies' human capital (HC). The data was collected from 120 employees by means of a questionnaire. Statistical techniques such as descriptive statistics , ANOVA test, correlation and multiple regressions were employed. To confirm the suitability of data collection instrument Cronbach's Alpha was used. The present study found that the use of ICT will help the company to increase their human capital's performance . So the topic area of information and communications technology (ICT) has now become a regular feature in enhancing the role of human capital in the company .

Key words: Human Capital (HC), Information and Communication Technology (ICT), Algerian companies.

ملخص:

نحاول من خلال هذا البحث دراسة تأثير تكنولوجيا المعلومات والاتصالات (ICT) على رأس المال البشري (HC) في المؤسسات الجزائرية وذلك من خلال جمع البيانات من 120 موظف عن طريق استبيان و باستخدام أساليب إحصائية مثل الإحصاء الوصفي والاختبار واختبار ANOVA والارتباط والانحدار المتعدد. ولتأكيد ملائمة أداة جمع البيانات تم استخدام ألفا كرونباخ. و قد توصلت الدراسة الحالية إلى أن استخدام تكنولوجيا المعلومات والاتصالات سيساعد المؤسسة على زيادة أداء رأس المال البشري حيث أصبح موضوع تكنولوجيا المعلومات والاتصالات (ICT) الآن السمة الأساسية في تعزيز دور رأس المال البشري في المؤسسة.

الكلمات المفتاحية: رأس المال البشري – تكنولوجيا المعلومات والاتصال – المؤسسات الجزائرية.

1. INTRODUCTION

The standard approach in labor economics views human capital as a set of skills/characteristics that increase a worker's productivity. One of the most important ideas in labor economics is to think of the set of marketable skills of workers as a form of capital in which workers make a variety of investments.

The role of human capital has grown and has become increasingly important in the knowledge economy, which is being developed by the acceleration of technological development.

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From here the information and communications technology sector has been a pioneer and a powerful catalyst in addressing the needs and interests of low-income communities in developing countries.

Through the growing impact of information and communication technology (ICT) in the promotion of human capital and the tendency of enterprises to develop their human capital. So , what is the impact of ICT in enhancing human capital in Algerian companies?

To answer the main question, we ask the following sub-questions:

-what is the mean of information and communication technology.

-what is does human capital mean?

-what is the role of ICT in enhancing human capital in the Algerian companies.

In this paper, we discussed the importance of ICTs and their essential role and impact in promoting human capital using an empirical study . The hypotheses of the study:

Hypothesis1: There is a positive relationship between the consideration of human capital and the use of ICT in the Algerian companies .

Hypothesis2:Human capital is positively influenced by the use of ICT in the Algerian companies

2. LITERATURE REVIEW

2.1 Information and Communication Technology :

2-1-1 Definition :

In the knowledge era , the use of computers and technology has become the most important used resource to the operation of organizations and society. Today, information is carried at phenomenal speeds within and across various communication networks known as information and communication technology networks (ICT). (Ina Freeman I et al ,2010: p2) ICT has no universal definition .However, there is many definitions of ICT , in this part we will try to cite the most of them .

ICT is a field of work and study that “includes technologies such as desktop and laptop computers, software, peripherals, and connections to the Internet that are intended to fulfil information processing and communications functions. (Statistics Canada , 2008) . According to UNESCO (2002), ICT is “the combination of informatics technology with other, related technologies, specifically communication technology. (Freeman. I et al ,2010: p5) . So information technology is the process of information using new technology.

Ann Latham (2011) defined ICT as technologies that enable recording, processing, retrieving and the transmission of information or data, also describe ICT as technologies that support the communication and co-operation of human beings and their organizations and the creation and exchange of knowledge , and considers ICT as a range of technologies that allow the gathering, exchange, retrieval, processing, analysis and transmission of information. In order words, ICT can be described as any tool that facilitates communication, process and transmit information and share knowledge through electronic means .(Latham A,2011:p4) While Agwu M.Edwin al (2014) offers

another definition, ICT is a generic term referring to technologies which are used for collecting, storing editing and passing information in various forms. (Agwum. E , 2014:p1589) . Information and communication technologies (ICT) are defined as technologies used to convey, manipulate and store data by electronic means (Open University, nd). This can include e-mail, SMS text messaging, video chat (e.g., Skype), and online social media (e.g., Facebook).(Harry O et al, 2010 :p67)

Information and Communication Technology has been defined as a broad based technology (including its methods, management and application) that supports the creation, storage, manipulation and communication of information.(Oni, N et al , 2013 :p2) Sukanta Sarkar (2012) Demonstrates that Information and Communication Technologies consist of the hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services.(Sukanta S , 2012:p31) . ICT plays a critical role in achieving the goals of the company in the use and sharing of information using modern tools Today .

2-1-2 The benefits of ICT in the company:

Presently, the extensive use of ICT is changing the way people or companies work. ICT is a very important tool for innovation in this present era. The benefits of ICT for a firm includes saving of inputs, general cost reductions, higher flexibility and improvement in product quality . (Latham A ,2011:p3) Bloom et al. (2009) ascertain that ICTs play a major role in networking and communication as firms use these technologies to facilitate communication among employees and reduce co-ordination costs. According to Hanna (2003), The reorganization of production and distribution around ICT has enabled the adoption of new processes, procedures, and organizational structures, which in turn, have led to sustainable gains in productivity, quality, and responsiveness (Amr H, 2007: p4) . The use of ICTs enables to reduce the cost of producing services and product . It contributes in promoting the performance of the company . On the other hand, ICT operates to reduce costs, especially those related to contacts, and those related to the distribution. (Boutkhil G et al , 2019 :p 4) . Computers and communication technologies allow individuals to communicate with one another in ways complementary to traditional face-to-face, telephonic, and written modes. They enable collaborative work involving distributed communities of actors who seldom, if ever, meet physically. (Konsbruck R:p4)

2-1-3 The component of ICT :

The United Nations report (1999) argue that ICT covers internet service provision, telecommunication equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centers, commercial information providers, network-based information services, and other related information and communication activities. ICTs can be divided into two components ,Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize those (Internet, voice, mail, radio, and television), and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing, and presentation. (Sukanta Sarkar,2012:p30)

ICT includes:

- a. media of communication (Radio, TV, Tapes, CDs), Information Machines (Computers, Tablets), Telecommunication Technologies & Equipments (GPRS, Satellite Phones & Mobiles).
- b. CAL refers to Computer Aided Learning making use of computers, internet and smart boards.
- c. Communication is a basic prerequisite of all human performances & interaction between two or more people in the form of transmission of thoughts, information & commands by employing the different infrastructure available – verbal (oral) or non-verbal (technological).

Harry et al (2010) consider that ICT coming together of information technologies (computer, consumer electronics, telecommunications) and gadgets (PC, TV, telephone), leading to a culmination of the digital revolution in which all types of information (voice, video, data) will travel on the same network". The creation and utilization of *smart phones* (e.g., BlackBerry, iPhone) is a key example of convergence, where one device has multiple functions and different applications, bringing technologies such as social networking, email, video recording, and traditional cellular telephone service into one's pocket. (Harry et al ,2010:p71) ICT includes computers, satellite and wireless technology and the Internet. These different tools are now able to work together, and combine to form networked world – a massive infrastructure of interconnected telephone services, standardized computing hardware, the internet, radio and television, which reaches into every corner of the globe. (Boukhatem .N ,2015:p 1359) In general , ICT can be considered to be built on the 4C's : computing , communication , content and Human capacity .

2-2 The use of ICT:

In this part , we will demonstrate the use of information and communication technology in the world in general and Algeria specifically:

2-2-1 The use of internet in the world : The figure (1) shows the internet users in the world by geographic regions , as it seen from this figure , the use of internet is greater in the Asian and European countries with portion 50.3% in Asian countries and 15,9 % in European countries. It is also clear from the figure(2) the increasing popularity of the various technologies, certainly demonstrating the maturing of the field. The maturity explains the slowing of the growth in the developing countries , so the internet world penetration rates is fast in the developed countries(North America and Europe) and slow in developing countries .

2-2-2 The use of the other components of ICT :

According to International Telecommunication Union, the use of the various components of ICT (fixed telephone , mobile cellular ...) are developed over the span of 2010 to 2019 in the world (figure 3) .Finland was the OECD leader with 23.5 GB of monthly mobile data use per subscription, followed by Austria (19.1 GB), Latvia (16.9 GB), Lithuania (13.6 GB), Estonia (12.3 GB), Iceland (11.3 GB), Chile (9.9 GB) and Denmark (9.6GB). Other countries had significant growth of 45% and above in data usage between 2018-19 (e.g. Australia, Belgium, Mexico, Iceland, Italy and Slovak Republic). On average, users downloaded each month 5.8 GB per subscription in 2019

compared to 4.7 GB in 2018. (<https://www.oecd.org/internet/broadband-statistics-update.htm> accessed in September, 16, 2020)

Also from the report of OECD (2019), the developing countries used the cable modem more than the other types of fixed broadband and used the voice and data in the mobile broadband. (figure 4)

2-2-3 Use ICT tools in business:

It is clearly demonstrated the high penetration of the Internet within business in many countries, albeit not all. The appearance of these countries as opposed to other emerging countries is a testament to the value of ICT for the propagation of business. Figure 5 showed that the enterprises in the world use the various tools of ICT to facilitate their activities, with a highest utilization of broadband, website and social media. Whereas previously ICT was seen as the purview of business, it is now obvious that it has become commonplace and routine in daily life. This is concomitant with the emerging recognition of Human Rights and the place of the individual within business. (Freeman I et al, 2010:p10)

2-3 ICT in Algeria :

2-3-1 Internet in Algeria:

Algerian government has mandated the Ministry of Post and IT to implement and manage the national ICT policy. At the same time the government has also initiated collaboration with a number of international agencies to enhance the ICT status in the country. In 2002 the World Bank also cooperated with the ministry to develop and implement projects for the creation of the enabling environment and improving access to ICT while making it affordable for all. (Amr Hamdy, 2007:p4) According to the figure 7, the number of the user of internet is increased in the period 2005 to 2019, this means the increased interest to the ICT tools especially the internet as an initial component of ICT in Algeria which has today 40 million of Internet users representing 55% of the national population against 1 million in 2005. The number of Internet subscribers has reached 1.6 million in which 1.3 million are affiliated to Algeria Telecom (ADSL) and average 300.000 via the mobile.

2-3-2 The mobile sector in Algeria :

The mobile sector in Algeria has introduced the entry of 3G mobile services. So, the number of subscribers in the third generation according to the statistics of the Control Authority in December 2014 rose to 8 million and 231 thousand subscribers, and that the total subscriber density (GSM + 3G) was 115.1% for a population of 39.5 million. The total mobile phone holder reached about 3.65 million subscribers in 2016, an increase of 8.41% compared to the previous year. (LAHMAR A et al, 2019 :p152) (see Table 1)

2-4 Human capital:

Human capital is defined in the Oxford English Dictionary as The skills, knowledge, and experience possessed by an individual or population, viewed in terms of their value or cost to an organization or country. Human capital is a measure of the [economic value](#) of an employee's skill

set. This measure builds on the basic production input of labor measure where all labor is thought to be equal. The concept of human capital recognizes that not all labor is equal and that the quality of employees can be improved by [investing](#) in them; the education, experience and abilities of employees have economic value for employers and for the economy as a whole. In Gary Becker's Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, published in 1964 (and preceded by his 1962 Journal of Political Economy article, "Investment in Human Capital"), Becker notes that he hesitated to use the term "human capital" in the title of his book and employed a long subtitle to guard against criticism. Schultz's article (1961) demonstrates the importance of the concept of human capital in explaining various economic anomalies. (Goldin C.,2014:p 2) . Human capital is viewed as a knowledge that groups and people possess, such as the capacity to generate it, which it is useful for the mission of the organization. (Sandra M et al ,2007:p)

Furthermore ,Mayo (2000) shows that the human capital is capability, knowledge, skill, experience and networking with the ability to achieve results and the potential for growth. Edvinsson and Malone(1997) define Human capital as employees and managers and what they can do individually and collectively Brooking (1996) called human capital as Human-centered Assets which comprise the collective expertise, creative and problem solving capability, leadership, entrepreneurial and managerial skills embodied by the employees of the organization. They also include psychometric data and indicators, such as in a team or under stress. We promote a view–point that we are not only looking at an individual, in order to perform a particular job function, but view the individual as a dynamic entity who may fit into a variety of jobs over time. It is the job of a good manager to ensure that each human asset has access and opportunity to mechanisms, which enable the employee to achieve their full potential within the organization. (Brooking A,1996:p7)

2-5 The impact of ICT on the human capital :

The emerging in the new economy based knowledge has replaced the old factor by new concepts based on information technology which replaced not just the manual methods of working, but has also enabled the creation of new services which were not previously possible. Examples include international banking services supported by modern telecommunications, credit card transaction of all types and even the booking of airline travel. Also the information technology has create new concepts like flex work in which employees have changed the way in which they work. Some do not even have a place of work anymore, but instead they work from their homes, communicating with their managers and colleagues via the information highway. These teleworkers enable the enterprise to reduce costs and time . To provide such services; we have produced employees with new skills. Organizations depend on people who use computers as a part of their day-to-day job. Their know-how is frequently used in making decisions. The information technology enables the employees to communicate with customers and deliver products and services. Databases tell us what products and services to sell a particular customer and record his buying history, product preferences and so on. (Bouguesri S,2016p:7) Companies with a higher likelihood of investing in training of their workers are those with a larger number of workers, a higher level of qualification of employees, more stable labor relations, greater participation foreign

capital, and also, have a higher level of technological uses, carries more technological partnerships with other organizations and has a more intense innovative activity. BATALLA-BUSQUETSJ M & VASILEIOS M,2015:p250).

3-RESEARCH METHODOLOGY:

The dependent variable in the study was human capital which was measured using three items. All items were measured with a five-point Likert-type scale. The questionnaire was validated through academics and professional professors in different Algerian universities.

There were 17 Algerian companies or international companies that have a branch in Algeria like Pepsi,Coca Cola. The entire population was chosen to explore the topic of intellectual capital, thus negating any need for sampling. The survey unit of analysis was composed of all employees of our Population . Financial information was also collected from annual reports, journals, books, and trade magazines.

3-1 Data Collection :

The questionnaire contained statements to which respondents indicated the extent of their agreement on a 5-point Likert scale (1 = strongly disagree and 5 = strongly agree). Our sample of this research was including: Banks, Industrial Goods and Services, Insurance , Telecommunications .(Table 2)Most of the respondents are situated in the medium level of the companies mentioned in the table 3 .

The response rate was 67.3 per cent. A description of the respondents is represented in the table 4 mentioned bellow .Very few concerns regarding the meanings of the questions were reported. About 60% of the respondents were from financial services (Banks) and the remaining 40% were from nonservice industries (e.g., production). See Table 2 for descriptive information. Data will be collected through quantitative survey approach. This data will be collected through field survey. The questionnaires is distributed to 130 employees that work in different companies . In this study, the responses and information collected from the various statistical methods will be used to analyze the data that we will collect from the 120 respondents. The Statistical Package for the Social Sciences (SPSS, version 17.0) package.

3-2 Respondents Profile :

The data for the study were collected from 120 respondents from various Algerian organisations. The data set covers various aspects of intellectual capital and business performance. As per the table-3 demographic profiles of the respondents consist of small, medium, and large organisation, where respondents from large organization constitute almost half of the total population in the study. Male participants in the study was one third where as Female participants consisted of two third of the total population. Age wise distribution depicts 31-40 age group dominates in the study consisting of more than 40% of the total sample , The almost of the

respondent have the license diploma ,it consists 75%. . The respondents having less than 5 years of experience at current organisation is very well present in the study consisting of 59.2%.

3-3 Descriptive analysis :

3-3-1 Reliability test :

In order to test for the reliability Cronbach's alpha was used to test the reliability of the measures. All variable and sub-variable items were confirmed valid since their factor loading values were more than 0.7.; as shown in the table 4.

Table 5 depicts the mean scores of each variable and its corresponding construct. Generally speaking, all items scored in the affirmative (1 = strongly disagree, 5 = strongly agree, with 3 the mid-point) with mean values greater than 3.0.

3-4 Testing hypothesis :

The hypotheses for the study is described as follows:

Hypothesis1: There is a positive relationship between the consideration of human capital and the use of ICT in the Algerian companies .

Since the population for the study is heterogeneous, a stratified random technique has been adopted to select the respondents for the study, 120 respondents were selected randomly from different levels of Algerian organisation. A linear regression model was drawn to explain the relationship between ICT and human capital.

Table 6 represents a correlation matrix across all variables are statistically significant ($p < 0.01$), it is evident from this table that there is a positive relationship between ICT and human capital with $R (0,391)$, this means the reject of the null hypothesis and the accept of the alternative hypothesis . There is a positive relationship between the use of ICT and the human capital but with a weak correlation .

Hypothesis2:Human capital is positively influenced by the use of ICT in the Algerian companies

The equation for business performance was expressed in the following equation:

$$Y = \beta_0 + B_1X \text{ Where,}$$

$$Y = \text{ICT}$$

$$B_0 = \text{constant (coefficient of intercept)}$$

$$X = \text{Human capital}$$

Table (7) showed the results of the regression analysis and the impact of ICT to the human capital . To predict the goodness-of fit of the regression model, the multiple correlation coefficient (R), coefficient of determination (R^2), and F ratio were examined. First, the R of independent

variables on the dependent variable (human capital, or Y) is 0,391, which showed that the use of ICT had positive correlation with the human capital. Second, the R^2 (correlation between human capital and ICT) is 0,153, suggesting that more than 15% of the variation of ICT was explained by the human capital. Last, the F ratio, which explained whether the results of the regression model could have occurred by chance, had a value of 21,316 ($p=0.000$) and was considered significant. that means the reject of the null hypothesis and accept the alternative hypothesis.

4- RESULTS AND DISCUSSION:

The present study found that the use of information and communication technology in the companies has a positive impact on human capital. Human capital exhibited weak relationship with ICT. The relationship between human capital and ICT become statistically significant in the study with weakness relationship. Since individuals form the basis of organisational level of learning and knowledge accumulation and institutionalization of knowledge and knowledge sharing is lowly encouraged in Algerian industries. These results refer the necessary to increase the awareness of the manager to the importance of the human capital in result to increase the business performance through the ICT.

5-CONCLUSION :

The topic area of information and communications technology (ICT) has now become a regular feature in enhancing the role of human capital in the company. The purpose of the study is to investigate the impact of information and communication technology (ICT) in Algerian Companies' human capital (HC). The data was collected from 120 employees by means of a questionnaire. Statistical techniques such as descriptive statistics, -test, ANOVA test, correlation and multiple regressions were employed. To confirm the suitability of data collection instrument Cronbach's Alpha were used.

The present study found that the use of ICT will help the company to increase their human capital's performance. The relationship between ICT and HC become statistically significant in the study with weakness relationship. The use of ICT should be taken into serious consideration when formulating the companies' strategy. Finally, these results refer the necessary to increase the awareness of the manager to the importance of human capital in result to increase the performance and the productivity of the company. This study showed that human capital presents the poorest performance, showing that Algerian firms give little prominence to human resource management. The importance of human capital as a critical component of any development initiative is widely acknowledged. A central goal of human resource development involves increasing the knowledge, skills, and capacities of all the people in a society as well as the promotion of their well-being through economic growth and development. This can be achieved through a number of means, including the use of ICT which can facilitate the flow of the information and knowledge between the different levels in the company.

The E-Algeria program could be an effective instrument of the strategy for the implementation and use of ICT in different sectors. It should be revised and based on serious studies

to reinforce the local and national policy in this domain. Finally, more attention should be paid to specific roles of ICT promoting the performance of the human resource which due to the creating value and achieving a competitive advantage .

Appendices: Figures and Tables :

Figure 1 :

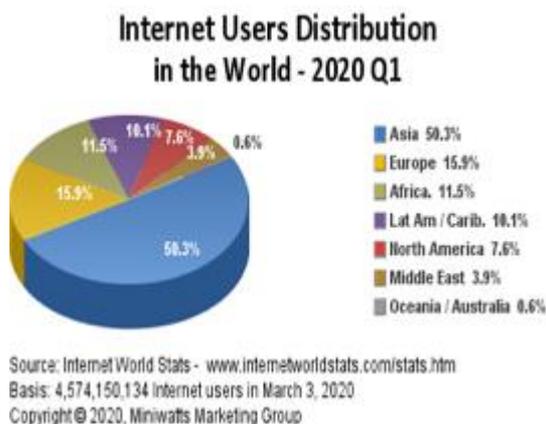


Figure 2 :

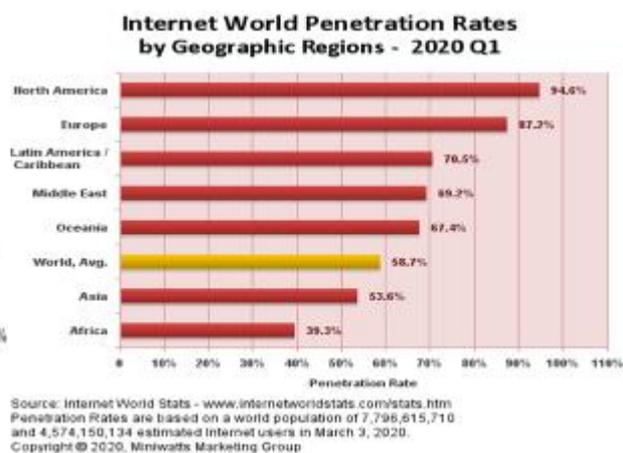
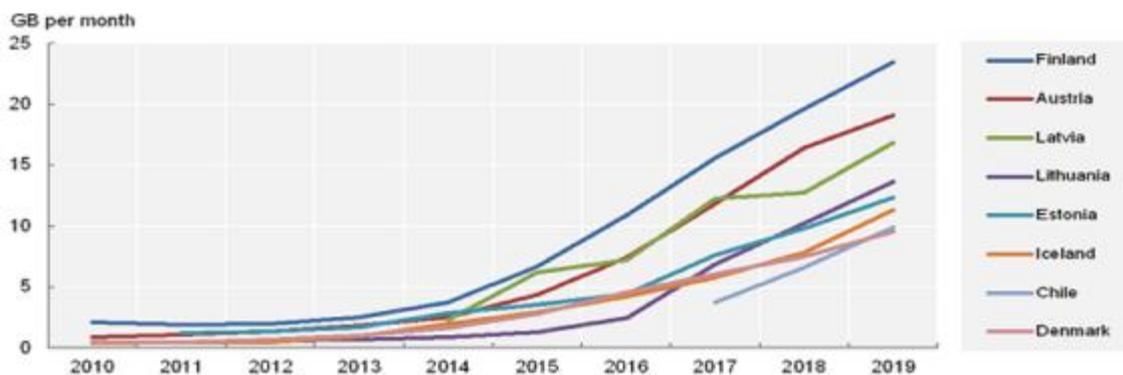
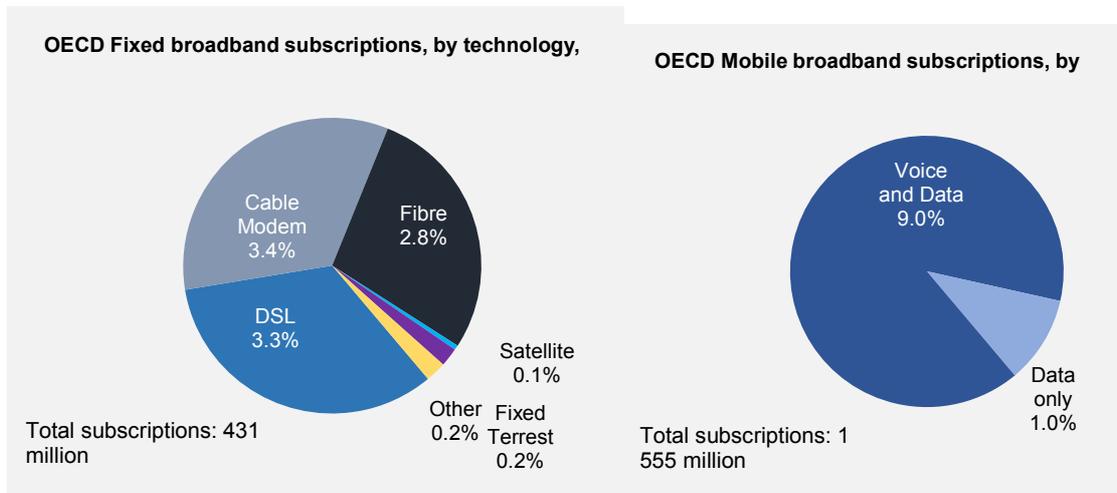


Figure 3: Top eight countries in mobile data usage per mobile broadband subscription



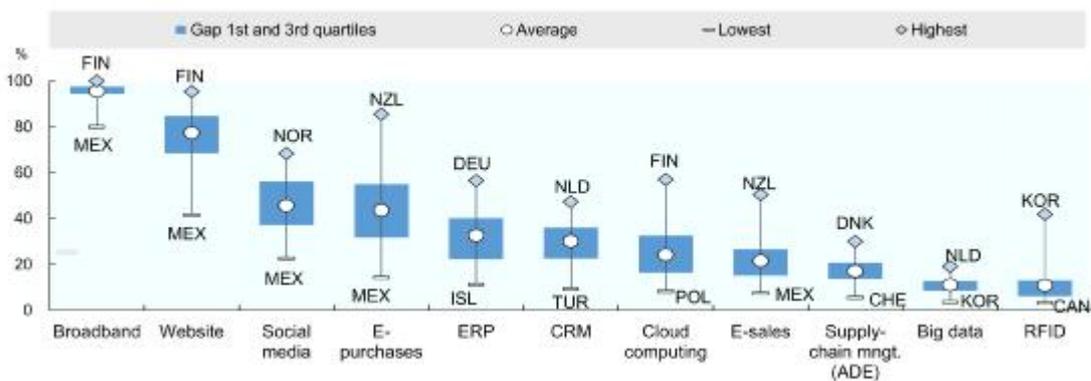
Source : <https://www.oecd.org/sti/broadband/broadband-statistics>

Figure 4: ICT tools subscriptions



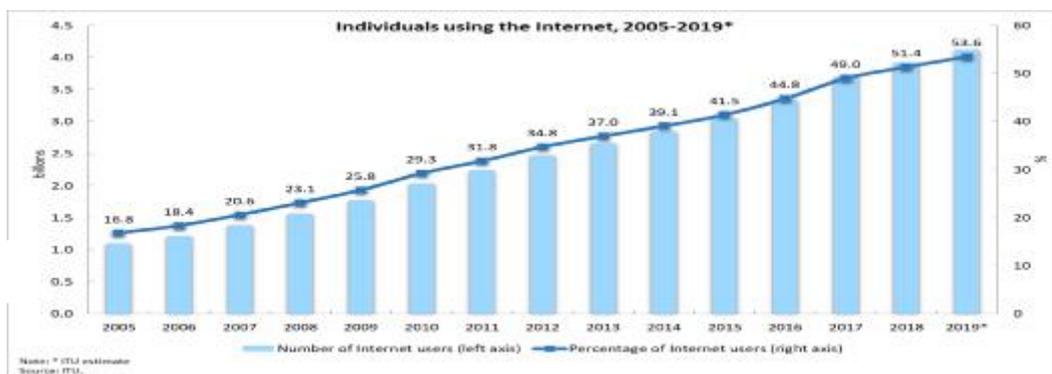
Source :OECD report 2019

Figure 5 : Diffusion of selected ICT tools and activities in enterprises, 2016



Source : OECD report

Figure 6



Source : International Telecommunication Union (ITU) report www.Internetworldstats.com/stats.htm septembre 2.2020.

Table 1 : Mobile Telephone Density according to Regulatory Authority for Telecommunications (R A T) report , 2014)

Population density (million)	39.500
Telephone Density	94,3%
Telephone Density (3rd generation 3G)	20.8 %
Total telephone density (mobile + 3G generation)	115,1 %

Source : Lahmar A & Benzidane H; *ICT in Algeria: Reality and Prospects. Strategy and Development Review* Volume: 09 / N°: 16,2019, p 154

Table 2 : List of the companies used as sample in the study

Company	The Sector
Pepsi , Coca Cola	Drinks
Mobilis ,Djezzy, Ooredoo	Telecommunications
Touring Voyage Algérie	Tourism
CNEP ; NATIXIS ;BD; CPA	Banks
Eriad-SBA Moulin BeniChougrane , Lu A Sancellia ,Nestle ,LU ,La Vache Qui Rit	Foods

Table 3 :Respondents Profile

Parameter	Group	#	%
Sex	Female	80	66.7
	Male	40	33.3
Age	20-30	27	22.5
	31-40	54	45
	41-50	19	24,2
	>50	20	8.3
Education	Secondary	27	22.5
	License	90	75

	Post Graduation	3	3
Profession	General manager	10	8.3
	Account	12	18.3
	Branch manager	20	16.7
	Others	78	65
Total Experienc	>5years	49	40.8
	< 5 years	71	59.2
Total		120	100

Source : from SPSS

Table 4: The test of the reliability

Items	Cronbach's alpha
Human capital	0.8117
ICT	0.8844

Source :From SPSS

Table 5: Statistical results of summary variables

Items	Mean	Std.Dev
Human capital	3.73	1.056
1-Learning and education	3.74	1.067
2- Experience and expertise	3.78	1.089
3- Innovation and creation	3.67	1.013
ICT	3.52	1.008
4- Systems and programs ..	3.56	1.070
5-. Research and development	3.58	1.097
6- Intellectual property rights.	3.42	0.857

Source : from SPSS

Table 6 : Correlation matrix

Variables	1	2	3	4	5	6	7	8
<i>1.Learning and education</i>								
<i>2.Employees satisfaction</i>	0.326							
<i>3.Innovation and creation</i>	0.313	0.12						
4.Human capital	0.330	0.11	0.200					
<i>5.Systems and programs</i>	0.45	0.438	0.407	0.587				
<i>6.Research and development</i>	0.325	0.545	0.563	0.551	0.386			
<i>7.Intellectual property rights</i>	0.123	0.324	0.416	0.463	0.539	0.694		
8.ICT	0.412	0.370	0.529	0.391	0.507	0.465	0.373	

Note: All correlation values are significant at the 0.01 level (two-tailed)

Source :From SPSS

Table 7: Regression results of ICT based on the dimensions (N=120) dependent variable

	R	Sig	R ²	F	Sig
Testing the hypothesis	0.391	0.000	0.153	21.316	0.000

p> 0.05

Y = 0.084 + 0.325 Source :From SPSS

Bibliography List:

Journal articles :

1. AGWUM E., *The Impact of Information Communication Technologies in the Strategic Management of Financial Institutions*, *International Review of Management and Business Research*, Vol. 3, Issue.3, 2014.
2. BATALLA-BUSQUETSJ M & VASILEIOS M ., *The impact of innovation and the use of ICTs on human capital development in Spanish industry*, *Intangible Capital* – <http://dx.doi.org/10.3926/ic.423>, 2015
3. BOUGUESRI S., *Intellectual capital ad business performance : New Model* , PhD fulfillment :Telmcen university ,2016
4. BOUKHATEM N. ,*The challenges of using ICT in Algeria* , 2-4 February 2015- Istanbul, Turkey *Proceedings of INTCESS15- 2nd International Conference on Education and Social Sciences*, 2015
5. BROOKING A., *Intellectual Capital: Core Assets for the Third Millennium Enterprise*, *International Thomson Business Press*. 1996.
6. FREEMAN I. & HASNAOUI A., *Information and Communication Technologies (ICT): A Tool to Implement and Drive Corporate Social Responsibility (CSR)*. HAL Id: hal-00495968, 2010<https://hal.archives-ouvertes.fr/hal-00495968> .
7. GHERBI M., *ICT and the reality in Algeria*, *Conference Topic: E-learning*, 2015 .available at <https://www.researchgate.net/publication/282662498>
8. GUEMIDE B, CHELLAL B & MAOUCHE S., *Integrating ICT-based Applications for Sustainable Tourism Development in Algeria*, *Joural of Tourism and Hospitality* , Vol. 8 Iss. 5 No 415,2019
9. GOLDIN C, *Human Capital*, *Department of Economics, Harvard University, National Bureau of Economic Research* ,2014.
10. HAMDYA, *ICT in Education in Algeria*, *Survey of ICT and education in Africa* , *Algeria Country Report*,2007.
1. HARRY O, TAYLOR J E., GLASS JON M, BRIAN E., *Information and Communication Technologies in Social Work*, *Advances in Social Work*, Vol. 11 ,No. 1, 2010.
2. LAHMAR A & BENZIDANE H ., *ICT in Algeria: Reality and Prospects*, *Strategy and Development Review*, Vol 09 , N°: 16 ,2019
3. LATHAM A., *An Evaluation of the Impact of Information and Communication Technologies: Two Case Study Examples*, *International Business Research*, Vol. 4, No. 3, 2011.
4. KONSBRUCK, *Impacts of Information Technology on Society in the new Century*.
5. ONI, N.O., RAJI, M.T., OLAYIWOLA, M.A., ADENIRAN, P.O. & FASASI , S.K., *The Impacts Of Information And Communication Technology (ICT) On The Teaching And Learning Science And Mathematics For Sustainable Development.*, *IOSR Journal of Computer Engineering (IOSR-JCE)*; Volume 12, Issue 1, 2013, pp 01-03.
6. SANDRA M, SANCHEZ–CNIZARES S,MUNOZ M and LOPEZ GUZMAN T.,*Organizational culture and intellectual capital: a new model*, *Journal of Intellectual Capital* ,Vol 8N° 3,2007.
7. SUKANTA S, *The Role of Information and Communication Technology (ICT) in Higher Education for the 21st Century*, *The Science Probe*, Vol. 1 No. 1, 2012.

Reports :

1. International Telecommunication Union (ITU) report www.Internetworldstats.com/stats.htm septembre 2.2020.
2. OECD report 2019
3. Statistics Canada. Information and communications technologies (ICTs), 2008, Accessed 15 April 2019 from <http://www.statcan.gc.ca/pub/81-004-x/def/4068723-eng.htm>.
4. World communication and information report 1999-2000.

Site webs

1. <https://www.oecd.org/internet/broadband-statistics-update.htm> acceded 16 September 2020
2. https://en.oxforddictionaries.com/definition/human_capital. seen 20march2018
3. <https://www.oecd.org/sti/broadband/broadband-statistics>
4. <http://www.investopedia.com/terms/h/humancapital.asp> acceded in February 2019.