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Diagnosis the Obstacles Influencing the Integration of the NICT in the Industrial Companies (Case Study)

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Abstract—***According to the technological development and the race of competitiveness which involves the search of the total quality and the cost cutting, the industrial world evolved to a flexible and virtual world which removes the concepts of time and dimension. The exploitation of the NICT (New Information & Communication Technologies) in the various services of the company has a positive impact on the performance of the productivity of the company.***

In this paper, we present a study on the use of the NICT in the Tangier Free Zone (TFZ), then we present various projects NICT established in the area, and the future projects, also the impact of these technologies on improving industrial performance, while locating the main obstacles that influence the start as the integration of the NICT projects in different companies located in the TFZ.

Keywords — NICT, Industrial performance, impact, obstacles.

I. Introduction

During these 20 last years, the NICT were integrated by the companies as their availability. Nowadays, they became essential tools in the creation of companies which want to be modern and productive. These technologies present an asset for the development and to have a market share which is in strong competition.

Our study is based on the use of New Information and Communication Technologies in the industrial companies of the free zone of Tangier (TFZ Tangier Free Zones), while locating the state of place of the NICT, like their impacts on the performance of the company, and the obstacles that influence the start as the integration of the NICT projects in the TFZ.

II. GENERAL CONTEXT

A. Definition of fields of study

The New Information and Communication Technologies (NICT) are defines as: "together of technologies resulting from the convergence of the data processing and the advanced techniques of the multimedia and telecommunications which allowed the emergence of more effective means of communication, by improving the treatment, the setting in memory, the diffusion and the exchange of information" [4] According to this definition, one notices the fitting of two types of technologies:

- Those of information which make it possible to hold, to reach, develop and transform information, with for example, a graphics tablet, a PDA (Personal DIGITAL Assisting), a computer,…
- Those of communication which make it possible to communicate, to exchange information, while basing itself on several types of networks: Internet, Intranet, Extranet…

A study carried out in Small and medium-size companies (SME) on the use of new information and Communication technologies [3] made it possible to raise four forms of use distinct from the NICT:

- Regular, normal (e-mail, search for information,)
- Running (competing day before, download,)
- More elaborate (online shoppings, teleworking, groupware,)
- Marginal (e-Learning, use of platforms of work,).

Ermine gives a classification of the NICT in the form of cartography [17] according to four main axes (communication, coordination, share information and resource sharing,) making it possible to establish an organized space and bringing together the principal families of tools NICT.

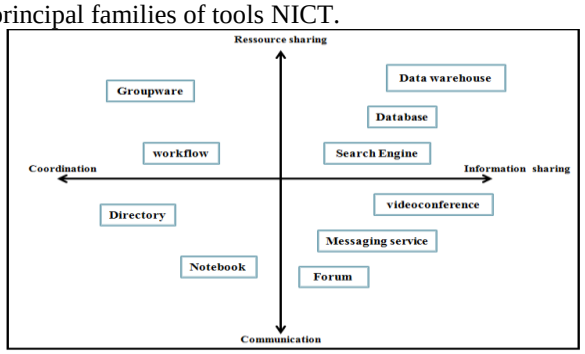

Fig.1: *Cartography of the NICT according to the axes corresponding [17]*

The integration and the use of the NICT within an organization generate several effects, as well positive as negative, whether they are technological impacts, economic or organisational.

Many studies was worked out for goal to locate the impacts of the NICT in the organization and more particularly its impact on the productivity by the improvement of the productivity of the employees and cost cutting (of work, of equipment,…) [9], also that on the saving in organization by the improvement of the relations between firms [14], as well as the financial optimization of the spots and of accounting [11].

The integration of NICT present an organisational impact by the improvement of the structure of company (modification of the organization and the interactions in the services) [16] [13], also that decision-making aid [12] by the integration of the assistance systems to co-operative work (SATC) like the Groupware and Workflow [15], which modifies the bonds hierarchical with an aim of directing towards the concept of under total group instead of organization (improvement of group work).

Our work consists in locating its impacts in a field study in the park industrial of TFZ (Tangier Free Zones) in order to model the obstacles which influence the integration of these technologies.

III. The case study

The Free zone of Tangier is an industrial park which contains about 475 companies of any size exits of foreign investments coming from the European Union, the United States of Americas, and the Middle-East… It contains various industrial sectors: car industries and aeronautics, joinery aluminium, textile, mechanics, Electronics, Electricity, Construction, clothing…

The TFZ was classified sixth better zone of the future for the year 2012-13, according to the world classification published by prestigious FDI (Foreign Direct Investment) magazine [2], after the free zone of the airport of Dubai, followed by Dubai Financial Center, of the zone of Shanghai Waigaoqiao, the Malaysian zone of Iskandar and the zone émiratie of Dubiotech [2].

In this zone, we summons ourselves interested in three branches of industry:

- Sector of wiring, electronics and electricity (E.E.C.).
- Sector of construction, manufacturing and aeronautics (C.F.A)
- Sector of textile, leather, and clothing (T.C.H)

The classification of the companies probed according to their branches of industry gives us a general vision of the performance of each sector with regard to the use of the NICT and their impacts on the performance.

Our work consists in modelling the impact of the NICT on the performance of the companies according to a statistical study of ground, and locating the various obstacles that influence the integration as the start of different NICT projects in the TFZ.

A. The methodology of study

A.1. the realization of the questionnaire paper:

Our relative study with new Information and Communication technologies in the TFZ was carried out in the form of a questionnaire. It was subjected to the various companies located the zone with a sampling of 5%, and was composed in two parts:

- *Use of the NICT in the TFZ:* This part aims to give a a report on the places on various projects NICT located the zone, classified, to know the people in charge of projects NICT with regard to the management and the maintenance of the latter.
- *Impact of the NICT on the performance of the companies of the area:* The purpose of this phase is to locate the influence of the NICT on the development and the improvement of the performance of the companies of the TFZ.
- *Obstacles that influence the start as the integration of these technologies in the TFZ:* this phase locates the main obstacles influence the integration of NICT tools in companies, and the start of new NICT tools in the area.

A.2.the modelling under sphinx plus^{2}V5:

For the treatment of questionnaire, we used the software Sphinx Plus2 V5 like numerical model and the data analysis [7]. Indeed this software makes it possible to assist in each of the three great stages of realization of an investigation; the following figure presents the process of analysis under Sphinx plus2 V5.

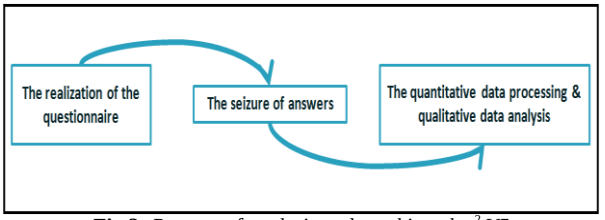

Fig.2: *Process of analysis under sphinx plus^2 V5*

The first phase (design of the questionnaire) aims to define the data which have wants to analyse according to the questionnaire, with regard to the seizure of the variables, the means of answer (answers closed, multiple answers…). Once the digital questionnaire was designed, the second phase aims to seize the answers coming from the companies concerned. The third stage is determining phase of this tool. It aims to treat the quantitative information and to give statistics for all the questions concerned with our study in the form of a detailed instrument panel, also to carry out qualitative analyses of the data, and the relations of interaction between the studied variables.

IV. Analysis of the results

A. The use of the NICT in the TFZ:

In an average manpower of 450 people, 80 of them use a computer regularly, which represents a percentage of use of 17.4%. This last is diverged according to the three studied industrial sectors. The sector of Construction, Manufacturing and Aeronautics, is at the head with a percentage of use of 36%, followed by the sector Wiring, Electronics, and Electricity with

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a percentage of 26%, finally, the sector of Textile, Leather, and Clothing with a percentage of 5.6%.

For the sector of textile, leather and Clothing, the use of the computer tools is limited in the administrative management, of resources human, the business service.

For the two other sectors, the use of the computer tools touches of another services of the companies such as service method, the production control, service of sale, marketing…

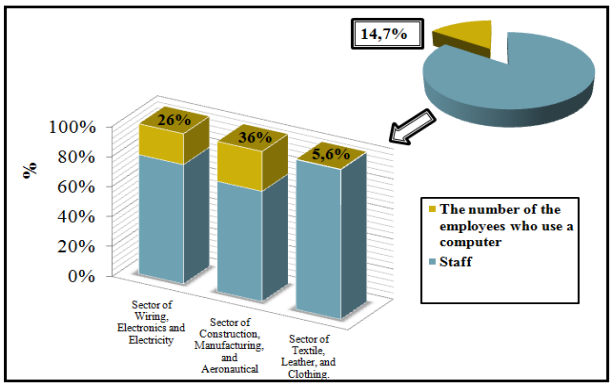

Fig.3: *The use of the NICT in the TFZ and by sector of activity*

Figure 4 illustrates us the number of tools NICT located the zone, one can say that the use of the NICT is generalized, namely that more than 66% of the companies use more than 15 tools NICT, 25% of the companies use between 10 and 14 tools, finally 8.3% of the companies which use less than 10 tools.

According to Govaere, tools NICT can be broken up into four types [8]:

- The communication: family of tools in which the electronic communications, Internet, Intranet, Extranet…
- The management of the data: family of tool in which we place dated it Warehouse, the GEIDE, EDI…
- Material integration: family of tools in which we place the ERP (Enterprise Resource Planning), the Groupware...
- The modelling of tasks or know-how: family of tools in which Workflow and Knowledge Management are placed…

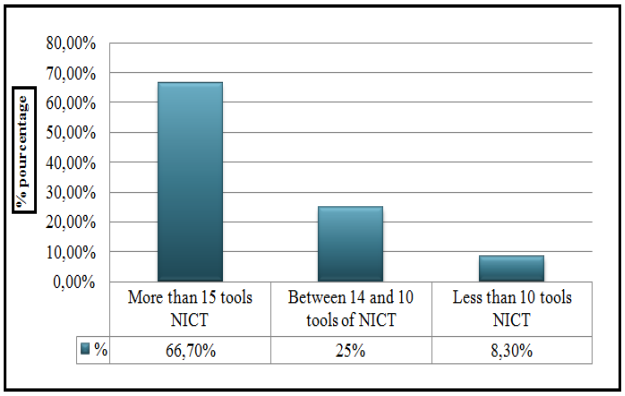

Fig.4: *The use of the NICT in the TFZ and by sector of activity*

We broke up these tools according to their use into four types, those of generalized use, use spread, fairly widespread use, and finally of use slightly widespread. The table.2 accords to famous NICT tools following their type of use.

NICT Tools	type of use
- Wifi (wireless fidelity) - Network Intranet / Extranet / - Internal Messaging - Computer Security Tools - Communication, creation of various electronic media-CD-DVD - Website - Electronic Document Management	Generalized uses
- External messaging via internet - Equipment Access Control - Videoconferencing - Communication and Internet advertising.	Widespread uses
- Software control / command - Remote monitoring - Mobile terminals (PDA, electronic order entry box) - E-Learning (distance learning) - Voice over IP (Internet Phone) - E-commerce (e-Commerce)	Fairly widespread uses
- Knowlege management - Measuring Equipment Wireless (counters, RFID ...) - System (delivery, shopping ...) - 3D (virtual reality, augmented reality ...) - Geographic Information System (GIS)	Slightly widespread uses

Tab.1: *Different NICT tools located in the TFZ according to their use*

- *Generalized uses* (more than 80% of the companies use these tools). They are "standard" tools rather used by any type of companies, whatever are the size and the sector.
- *Widespread uses* (between 50 and 80% of the companies use these tools). These tools significantly improve the performance of a company. Used especially in the sectors of (Construction, Manufacturing and Aeronautics), and (Wiring, Electronics and Electricity).
- *Fairly widespread uses* (between 30 and 50% of the companies use these tools). In fact powerful technological tools accelerate the development of the companies
- *Slightly widespread uses* (less than 30% of the companies use these tools). They are tools known as "high tech".

Vis-a-Vis this variety of tools, and according to our study, we found that the management and work of maintenance related to tools NICT established in the TFZ are entrusted to specialists in data processing at the internal level in the company. Indeed, in 75% of the companies, the computer department deals with spots NICT. For 33%, the management of the NICT is entrusted to an employee. 25% of the companies are addressed to an external person receiving benefits. Lastly, 8.3% the leader of the company which deals with spots NICT. (Figure.5) the management of the NICT within the company is allotted, generally, at the internal level. For this reason, the principal people who have in load the NICT are specialists in the fields in data processing and telecommunication.

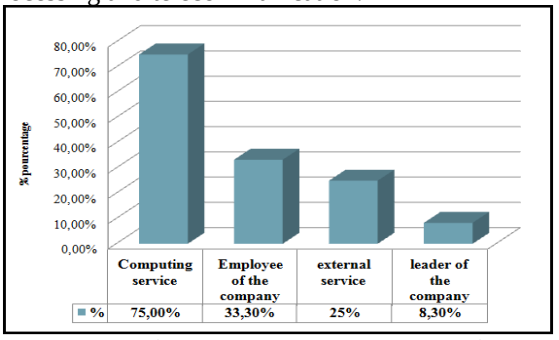

Fig.5: *The use of the NICT in the TFZ and by sector of activity*

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B. Impact of NICT in the TFZ:

In each sector of activity in the free zone of Tangier, the NICT have two types of influences, is positioned in internal (within the company) called impact intra-company, and another is positioned in so-called external impact cross-company.

-The Intra-enterprise Impact: These are the influences that affect the internal level (see fig.6), namely the optimization as regards the manufacturing (91.7 %), the administrative management, information, and logistics (83.3 %), the optimization of the communication (75 %), and finally the optimization of staff (50 %). (Figure 6)

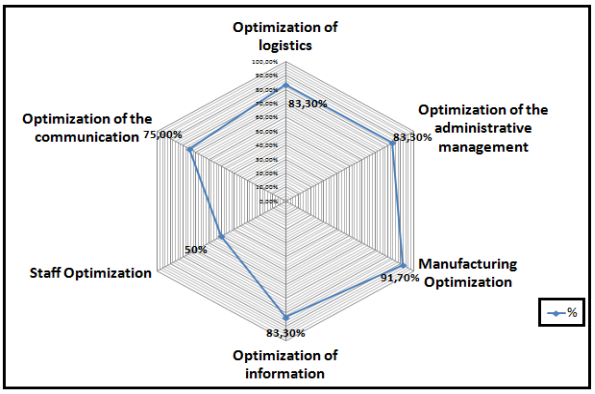

Fig.6: *The use of the NICT in the TFZ and by sector of activity*

-The External-enterprise Impact: In fact the influences position at the external level, the optimization of very of which relates to logistics (83.3%), the communication (75%), and the optimization of marketing (67%), the increase in the potential customer (58.3%), the development of the potential customer (50%), and the development with export (41.7%). (fig 7)

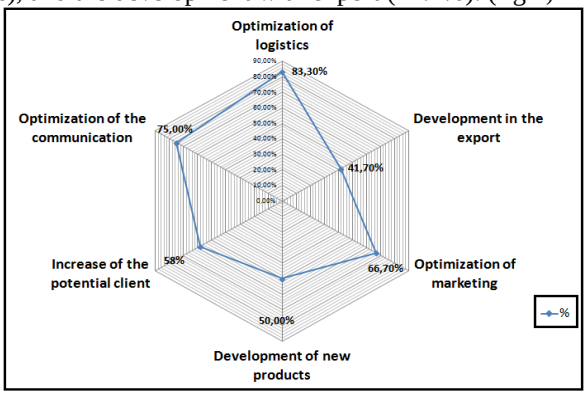

Fig.7: *The use of the NICT in the TFZ and by sector of activity*

One notices according to this radar which the impact of the NICT in the companies of the free zone of Tangier positions more in-house than into external; with an average of 77.8% for the business impact against only 36.1% for the impact between firms.

More particularly figures 8 and 9 illustrate us the impact of the NICT according to each branch of industry in the TFZ.

Indeed, for the sector Wiring, Electronics, and Electricity, the presence of the NICT makes it possible to optimize to the maximum the manufacturing process as well as the transmission of information, contrary this use of the NICT is generalized little into between firms what is reflected negatively on its potential of evolution.

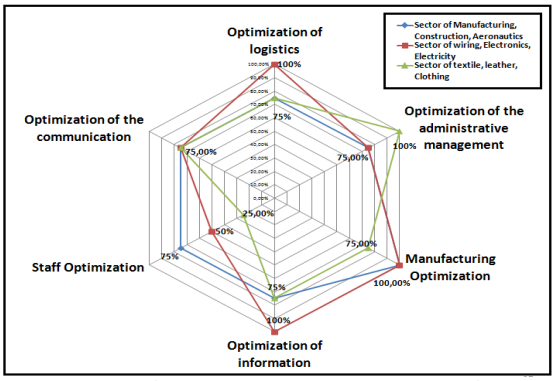

Fig.8: *The use of the NICT in the TFZ and by sector of activity*

More particularly the impact of use of the NICT at the level between firms is mitigated because, we can notice that the optimization of logistics, marketing, as well as the increase in the potential customer reach a maximum level, while there remains marginal with regard to the development of the new products, and with export.

For the sector of Construction, Manufacturing and Aeronautics this impact is generalized little at the level between firms then which it is relatively homogeneous into business.

Concerning the sector of Textile, Leather, and Clothing, the impact of the NICT at the business level (figure 8) key the level of administrative management, is relatively high rest concerning the other resources. Into between firms (Figure 9) the influence of the NICT is positively made feel on all the resources except for the development with export.

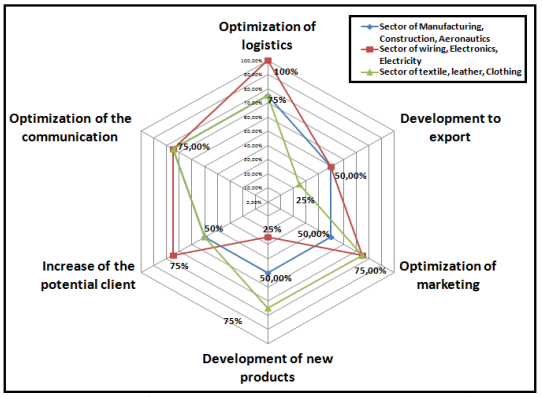

Fig.9: *The use of the NICT in the TFZ and by sector of activity*

The business impact facilitates the integration of new tools NICT. Indeed, 41.2% of the companies stated that among projects NICT in priority is software package CMMS (Computerized Maintenance Management System), (see figure.10)

According to Fawaz, the CMMS is a computer software organized around a database making it possible to program and follow under the three aspects technique, budgetary and organisational [1].

Its features make it possible the companies to manage their industrial plants well, their staff of maintenance, the inventory control of the spare parts, as well as the management of the purchases. [5]

17.4% of the companies which use this software package for the management of the maintenance of their equipment and which is interviewed, us declare that this software package is

registered among the projects of improvement of the productivity and more particularly, the improvement of the manufacturing by the restoration of the division of information of verbal with computerized, the control of the associated costs to work of maintenance, and the relief of the equipment of production by the minimization of their load factors, as well as the reform of availability of the equipment of production. The figure.10 presents various projects NICT in priority in the TFZ.

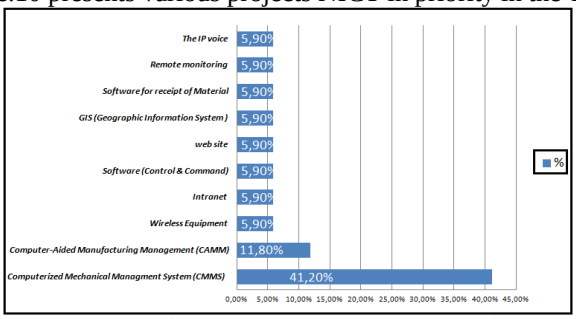

Fig.10: *The use of the NICT in the TFZ and by sector of activity*

The integration of the CAMM (Computer-Aided Manufacturing Management) makes it possible the industrial companies to manage their production activities in a flexible and interactive way [18], which increases the effectiveness of planning and the follow-up of production. (11.8% of the companies need this tool. (fig.10))

Certain tools NICT can improve different entrepreneurial resources significantly, such as the optimization of information and the communication (Voice on IP, Intranet, remote monitoring…) remain marginal in the companies of the zone (5.9%).

C. Obstacles of the start as the integration of NICT in the TFZ

Some obstacles can affect the integration or the start of new NICT tools. (See fig.11)

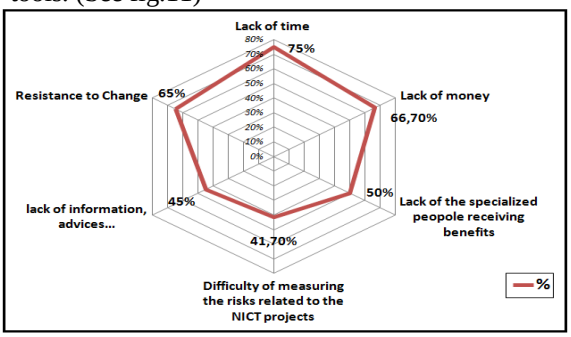

Fig.11: *The obstacles influencing the integration and the start of the NICT projects*

Lack of time and money is positioned at the top of obstacles affecting, with percentages close (75% and 66.70%), followed by resistance to change with a percentage of 65%, the lack of specialized service (50%) , lack of information about NICT tools (45%) and the difficulty in measuring the risks of ICT with a percentage of 41.7%.

This radar that locates the main problem is the lack of information about these tools we notice after.

The industrial process, store and transmit more information. Their information technology becomes more decentralized and communicating, which requires a strategic vision for change, which transforms the traditional policy towards more flexible and interactive policy.

V. Conclusions

The NICT are Technologies which can transform the classical company towards a virtual company [6] the integration of these technologies has different positive impact that it is on the internal or external resources company. Certain difficulties can slow down the achievement of these projects. These difficulties generally related to the lack of time, of financial resources, also that lack of advices and information for certain companies, as well as the difficulty of measuring the risks related to the NICT. The companies must remove these obstacles, by the integration of a vision based on the control of the change (change towards the nimble one) [19], that it is in their processes, their structures like on the level of competences human.

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