IMPACT OF UPGRADE PROGRAMMES ON THE COMPETITIVENESS: CASE OF THE ALGERIAN COMPANIES

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Abstract. Faced to a socio-economic environment that is marked by globalization of trade and competitiveness, Algeria is committed, like its neighbours, to do upgrade programmes which aim to support the dynamic of restructuring process, the industrial integration and growth. The strategic goal is to upgrade to the requirements of the free trade to take advantage of the positive effects of liberalization and strengthen the production capacity, sales and export. This general target will lead the Algerian companies to achieve two ambitions: to become competitive in price / quality, innovation, and to be able to survive and control the evolution of the technology and the markets. Achieving these ambitions requests from the Algerian companies a major effort, i.e., to adapt and change their organisational methods and practices, especially in technology, innovation, cost control and quality supervision, training, products and markets, sales policies, management, openness to technical and commercial partners. The present paper describes the impact of upgrade programmes on the competitiveness of Algerian companies. For this reason, a model has been developed that analyses the competitiveness of a company across several dimensions (commercial, financial, technical, human, as well as social & managerial). To process the data collected in the survey, an exploratory factor analysis, confirmatory analysis and structural equation methods have been used. The results of the research have confirmed the main hypothesis that upgrading has a positive impact on the overall competitiveness of companies that have initiated and finalised an upgrade programme.

Keywords: *Algeria; competitiveness; programme; upgrade*.

JEL Classification: G34, L25, O28, G39

INTRODUCTION

In developing countries in general and in Algeria in particular, companies are considered one of the engines of economic development and a major contributor to the creation of sustainable jobs and the increased added value.

But then, if today an economy should be based on productive companies, but these companies are seeing their fields of intervention reduced due to irreversible globalization.

Some of these companies are simply endangered in their own market because of tariff dismantling and another set of measures to come imposed by both the

Association Agreement with the European Union and the future accession of Algeria to the WTO.

Consequently, the upgrade is necessary to make sure that Algerian companies will survive and be sustainable in the face of global competition; the effects are already starting to be felt. This upgrade will also enable these companies to grow more effectively in this new geopolitical chessboard.

To be ready and adapt to business challenges of this new context, various upgrade programmes have been launched in Algeria and other developing countries (Ghomari & Berrached, 2014).

The goal of the research is to identify if different programmes of upgrade implemented by the Algerian government with or without the help of various actors (the European Union, UNIDO etc.) are able to make Algerian companies more competitive. In other words, the goal is to evaluate the impact of upgrade programmes on the competitiveness of Algerian companies that have finalised these programmes.

The paper is structured as follows: After a theoretical presentation of the need for competitiveness and a description of the concept, the paper presents the context and the fundamentals of the upgrade in general and in the context of Algeria. Then the empirical validation of the research is provided based on results of a survey conducted on a sample of Algerian companies spread throughout the Algerian territory and owned by different business areas having already completed their upgrade plans. Last section is devoted to the discussion of the results obtained in order to determine if these companies have managed to become more competitive and to assess the effectiveness of the device.

1. LITERATURE REVIEW

The goal of the research is to identify if different programmes of upgrade implemented by the Algerian government with or without the help of various actors (the European Union, UNIDO etc.) are able to make Algerian companies more competitive. In other words, the goal is to evaluate the impact of upgrade programmes on the competitiveness of Algerian companies that have finalised these programmes.

In addition of being a hot topic, the research theme covers several areas related to economic and social dimensions. It has also a double importance: theoretical and empirical.

The theoretical interest of the study concerns, first of all, the conceptualization of the concept of competitiveness, a notion theoretically ambiguous and empirically complex. It is a concept that has no really clear theoretical references; moreover, several researchers in management and economy (Chursin & Makarov, 2015; Debonneuil & Fontagné, 2003; Feurer & Chaharbaghi, 2003; Hchaichi & Ben Ghodbane, 2014; Krugman, 1994; Lafuente et al., 2020; Lesca, 2004; Li, 2000; Liashevska *et al.*, 2019; Markusen, 1992; Martinet, 1984; Mucchielli, 2002; Siroën, 1993; Tambovceva & Tambovcevs, 2014) do not agree unanimously about the definition of the concept. Each study has an important contribution to the

understanding of the sources of excellence of some companies both nationally and internationally.

The second theoretical contribution of the paper is the study of the concept of upgrade. Very few theorists have focused on explaining the concept of upgrade, but all agreed on the relationship of the upgrade with the competitiveness sought by companies (Amdaoud & Zouikri, 2019; Bouraoui, 2005; Filimonova et al., 2014; Golubetskaya *et al.*, 2017; Golubetskaya, 2017; Lamiri, 2003a; Mariesse & Filipiak, 2003; UNIDO, 2002).

In addition, the empirical interest of the research responds to a need to demonstrate and quantify the impact of upgrade programmes on the overall competitiveness of Algerian companies that have followed and benefited from this type of programme. This evaluation involves the exploitation of data relating to the implementation of the upgrade programmes in Algeria.

It is to be highlighted that in Algeria few studies have addressed the issue of upgrading the Algerian industrial fabric. This mainly concerns work carried out, seminars and study days often dealing with descriptive approaches to the process and programmes of upgrading and the quantitative presentation of the results recorded.

Only the works of Amroune (2014), Azouaou (2011) and Bennaceur *et al.* (2007) examined the impact of upgrade programmes on the competitiveness and performance of Algerian companies. However, in these studies, the authors simply analysed the impact of the upgrade on competitiveness and financial performance. The present study analyses the competitiveness of a company across several dimensions (commercial, financial, technical, human, as well as social & managerial).

1.1. From the Imperative for Competitiveness

The survival of the company, key player in the economy, not only depends on the economic laws but also on its competitiveness, which has become with the globalization an imperative or even survival condition for every company.

Beyond the idea of trying to be the best, competitiveness is subject to different interpretations by those who seek it. Below multiple definitions of its key concepts are provided and the new model of competitiveness is proposed.

Competitiveness: A Complex Concept

There are many definitions of competitiveness, which demonstrate the diversity of notions related to this concept. In dictionaries, the emphasis is mainly placed on the notion of competition.

The majority of these studies tended to attribute the reasons of success to one particular source and explained the competitiveness of certain firms by a single factor. This factor could be the price or non-price, plenty of inputs, the organisation and effective management system. But when it comes to capture a phenomenon as complex as competitiveness, multiple explanations are most realistic. This type of approach, which is similar to systems analysis consecrated by Porter (1986) for explaining international competitiveness, seems to be most appropriate even for

understanding the phenomena other than economic, or to explain the sources of success when there is a lute, contest or competition.

Success is never explained by a phenomenon individually, but by all the phenomena that have contributed to this success. Competitiveness is therefore perceived as a complex concept, with imprecise and poorly defined outlines (Ussahawanitchakit, 2012).

Most definitions of competitiveness at that time insisted on the same aspects. For some, it is an ability to compete with competitors and to get ahead of them; for others, it is to produce at low-cost, sell at low prices while maintaining quality.

Currently, the study of competitiveness is being performed at all levels; it is the concern of various international organisations. For example, Price-water-house-Coopers Development (2002) defines competitiveness as being "the ability of a company at any given time to withstand the competition. Competitiveness is therefore a potential which is characterised by an advantage over competitors in its market. Profitability and productivity are only partial measures of a much larger set called competitiveness".

In this sense, Feurer & Chaharbaghi (2003) argue that for some firms, competitiveness is "the ability of a company to convince consumers to choose its services rather than those offered by competitors", while other companies see it as "the ability to continuously improve the offer".

According to Dwyer and Kim (2003), for a company competitiveness means "creating new growth opportunities that create value for partners and shareholders". According to Crouch and Ritchie (1999), the complexity of the concept of competitiveness is due to the analysis unit and the views of those who study it. Politicians perceive competitiveness as an economic interest first and foremost. The industry rather seeks for the good and development of their own industry. Contractors and business leaders see its benefits to the market in which they operate. The competitiveness therefore has implications and various meanings depending on the professional actors who are looking for it.

Permanence and Renewal of the Concept of Competitiveness

Competitiveness, often confused with its financial translation, profitability or productivity, is the ability of a company at a given moment to withstand the competition. Competitiveness is thus a potential which is characterised by an advantage over competitors in the market. Profitability and productivity are only partial measures of a much larger set called competitiveness.

The productivity of a firm is the ratio of production to the capital or labour required for production.

The competitiveness of a company expresses its long-term performance that is to say essentially its growth (Mucchielli, 2002). It is related to its products, its price positioning. In relative terms, it introduces a dimension of comparison among competitors. It can be defined as the ability of the company to achieve above average performance (gain market share). The company's competitiveness depends on the internal management of the company, the investment capacity, adaptability to demand and to the environment.

By analogy, the competitiveness of a nation was, at least until Krugman, addressed in terms of sales performance. In this approach, a country proves competitive with other competing countries if it is able to maintain its market share or to gain additional market share, which implies to diversify, to conquer markets where it was absent or marginal, defend its positions in its traditional export markets (United Nations Conference on Trade and Development, 2002).

To stay competitive in a competitive environment, it must pursue ongoing efforts of companies, such as modernisation of the economic environment.

No overall unitary concept really emerges. It is therefore appropriate to consider different types of competitiveness:

1) Price competitiveness: It expresses the structure of prices and costs of an economy relative to that of its trading partners and does not reflect all the characteristics allowing the sale of a product. It is partly based on the exchange rate, but also on internal costs, such as labour costs;

2) Non-price competitiveness: It expresses the ability of an economy to capture demand due to factors other than price and adapt to changes in demand (reflecting the quality of specialisation). It is mainly based on investment, flexibility and flexibility in the allocation of factors and innovation.

It may also cover technological competitiveness and structural competitiveness:

- The technological competitiveness implies, in line with the concerns of authors such as Schumpeter and Marshall, "a form of competition between firms and countries, rather than operate through prices and costs (as it is the case in the market analysis), focuses on the products themselves. It refers to research, innovation, accumulation of technological knowledge and competence" (Nezeys, 1993);

- As for the structural competitiveness, it could express the internal capacities of production and marketing in general. This concept highlights all the "structural" factors that might inhibit or stimulate production (bottlenecks, financing capacity, management, structuring of the sector, etc.). Chesnais (1990) assigns the function to give the nation an active role to firms. Thus, "structural competitiveness can express the idea (...) if the competitiveness of companies reflects the effectiveness of the company's management practices, it also stems from the consistency and efficiency of productive structures of the national economy, the long-term trend rate and the structure of investment in the country, its technical infrastructure and other factors that determine the external advantages which can support companies".

Here we find the characterisation of the role of the nation as a factor of competitiveness of firms developed by Porter, as discussed below.

Moreover, the concept of competitiveness refers to two time frames:

- Short-term competitiveness in time t, compared with the performance of competitors;

- Long-term competitiveness, as preparation process of structural conditions for improving the country's competitiveness.

Non-price competitiveness joins the temporal approach to competitiveness. Initially, there is the idea that international competitiveness depends not only on the relative costs (labour costs and exchange rate movement), as it cannot be maintained only by the chronic compression of wage costs or through a series of competitive devaluations.

In the long term, competitiveness requires sustained progress in productivity. It is therefore necessary to stress the importance of structural factors affecting the long-term competitiveness of an economy: public investment, trade protection, investment in human capital, etc.

More recently, the concept of sustainable income has been introduced in the reflections on the competitiveness, being considered as the ability of companies, industries, regions, nations or supranational groups to generate sustainable income and a relatively high level of employment, while being and remaining exposed to international competition (Linsi, 2020).

1.2. Background and Foundation of Upgrading Companies

Background of the Upgrade

The concept of upgrading companies was born from the Portuguese experience. Initiated in 1988 as part of the accompanying measures for the integration of Portugal in Europe, PEDIP (strategic program of revitalisation and modernisation of the Portuguese economy) aims:

1) to accelerate the modernisation of support infrastructure to the industrial sector;
2) to strengthen the foundations of vocational training;
3) to direct funds towards productive investment companies, especially SMEs;
4) to improve the productivity and quality of the industrial fabric.

The success of the PEDIP, which resulted in the emergence of new industries, the development of high value-added activities and job creation, inspired upgrade initiatives in developing economy contexts. Such initiatives were launched by the Maghreb countries (Ghomari *et al*., 2015) and some countries of the East (Jordan, Egypt, and Syria) in support of free exchange agreements in the MEDA programmes (established in 1995 after the conference in Barcelona, the MEDA programme is the main financial instrument of the European Union at the service of the Euro-Mediterranean partnership. It provides financial and technical accompanying measures for the reform of economic and social structures of the Mediterranean partners. The programme is open to the States, their regional and local authorities as well as actors of their civil society).

Thus, in the context of liberalisation, adjustment and economic recovery, the upgrade has become for most developing countries and transition economies priority programmes to promote and develop a competitive industrial sector with capacity, institutional and human skills (Chrysostome & Molz, 2014).

In response to the many requests from these countries, UNIDO (United Nations Industrial Development Organization) has implemented a comprehensive and multidisciplinary approach integrating comprehensive industrial company and its environment.

In the UNIDO, programme "upgrade" or "modernisation" is designed as a subset of more global programmes called "integrated programmes". These programmes have common features but also, depending on the context, many specifics. Upgrading or modernisation of industry programmes has already been implemented with the support of UNIDO and various donors in Eastern Europe (Poland, Romania), Kazakhstan, Latin America (Colombia, Argentina), Sri Lanka, North Africa, and the Middle East.

The approach takes into account the experience gained by the UNIDO in the implementation of several projects of industrial restructuring in recent years (Chile, Korea South, Mexico, Portugal, Turkey). The lessons that emerge from this experience mainly concern the importance of the safeguard and support measures agreed in close consultation with the operators directly concerned and carried out before and during the implementation of the industrial adjustment and restructuring programmes. The strategic choice of liberalisation, desired and implemented in these countries, was not one of "wild" liberalisation, but progressive, measured and for a transitional period accompanied by a programme of support and appropriate aid to main industries. Transition periods are necessary to give companies more time to adjust to the full market opening. It should be the same for industrial companies operating in developing countries that have enjoyed strong protection and need, at the risk of disappearing, to adapt, integrate and face international competition under the best possible conditions. Indicatively, we mention that the area agreement free exchange between countries of the Southern Mediterranean region (Algeria, Egypt, Jordan, Lebanon, Morocco, and Tunisia) and the European Union is planning customs dismantling of inputs and industrial products in a progressive and time-bound manner with a view of achieving effective free trade.

Notions of Upgrading

Few theorists focus on explaining the concept of upgrade, but all agree on the relationship of the upgrade with the competitiveness sought by companies.

Upgrade – manufacture better products, produce more efficiently, or change to more profitable activities – has often been used in research on competitiveness linked with innovation (Golubetskaya *et al*., 2017; Kaplinsky & Readman, 2001).

Piertrobelli & Rabellotti (2006) define upgrading as the company's ability to innovate in order to increase its added value. According to the authors, companies use the upgrade for various reasons, namely: the penetration of new markets and/or to engage in a new production line.

According to Lamiri (2003b), "the upgrade is a benchmarking operation that involves raising the company's productivity to the level of its best competitors".

The upgrade is also characterised by the establishment in the company of a management control system even simplified, through the systematic use of the information, the renovation of production processes and the installation of quality management systems, the use of decision support process and the development of innovation management (Filimonova *et al*., 2014; Manader, 2004).

According to UNIDO economists (2002), "the upgrade is great dynamic designs and achievements of major changes in a global environment. It is an

ongoing process that aims to prepare and adapt the company and its environment to the requirements of free exchange".

Thus, the upgrade is translated by a dual ambition for an industry / company (Amroune, 2016a):

1) being competitive in terms of price, quality, innovation;
2) being able to follow and master the evolution of techniques and markets.

The concept of upgrade (based on two main ideas: the progress and calibration) is very controversial; for some it is an impossible mission; for others it is a reductive concept or still a vague concept whose contours are not yet specified (Amdaoud & Zouikri, 2019).

We do not want to engage in a theoretical debate, and in the present study the upgrade concept is taken in the direction of a constant search for competitiveness.

Today there is no assured market share or product that lives indefinitely. As soon as the company adapts to a situation, it evolves into a more complex situation, requiring new adaptation efforts. The company must move from a logic of adaptation to a logic of anticipation: to project itself in time and to program voluntarily the pace of change that it imposes on itself.

This is why an upgrade programme nowadays primarily meets the imperative of improving competitiveness. It is no longer the matter of industrialisation but rather modernisation of companies and the economic environment in the context of globalization, directly inspired by the Portuguese experience; it covers different objectives and methods aimed at improving the competitiveness of the industrial fabric and the business environment.

The successful upgrade affects economic development or the creation of tens of thousands of jobs. The challenge is huge. There is a risk that the fashion effect will take precedence over the rigor and requirements of the concept.

Upgrade Context in Algeria

The transition from a protected economy to a market economy was accompanied by a wide range of legislative, regulatory and institutional reforms, the purpose of which is to lay the foundations of an economy open to the international environment and having strengths to compete on both the local and external markets (Harrar & Ghomari, 2018).

This internationalisation process has been accelerated by the free exchange agreement signed between Algeria and the European Union agreed to lead the establishment of a free exchange area between the two parties and the total lifting of all customs tax on the importation of products from the countries of the European Union (Mosbahi & Debili, 2014).

Other binding events, the Algeria's imminent entry into the WTO and its corollary of concessions will also result in stricter rules of free trade. As a result, it is easy to predict the consequences of these new measures. Local companies can be expected to lose a little more of their domestic market share because they have not been able to compete in trade competition and free trade.

It is in this context that the Algerian government has set up an upgrade facility for the national companies (Amroune *et al.*, 2016b). This system, initiated by the Ministry of Industry with the assistance of UNIDO and UNDP (United Nations

Development Program), aims at acting on endogenous and exogenous constraints to Algerian companies to enable them to achieve the following objectives:

1) to adapt to new market conditions;
2) to access better competitiveness;
3) to acquire an ability to export and integrate activities;
4) to generate capacity of accumulation and growth.

Thus, what is called "upgrade" of companies is beyond the sole ambition to prepare Algerian companies to withstand a shock of increased external competition and to limit the damage that can result, even if this goal is a priority, with or without free exchange agreement. At that time, the government, professionals and researchers were motivated to deepen this question, especially since we already felt the need to explore new ways that would allow these companies to strengthen their presence in the national and international scene. It is indeed a question of repositioning Algerian industrial companies so that they can successfully face the challenges that confront the current and potential markets and more precisely the European markets.

In order to promote the competitiveness of this important industrial fabric, the Algerian public authorities have implemented a variety of upgrade programmes. "These programmes are independent of each other and operate in the absence of any defined national framework and coordinated by the government" (Azouaou, 2011).

It is also important to note that these different upgrade programmes are initiated by several executives and separate institutions.

The upgrade first appeared with the pilot project of UNIDO and the Ministry of Industry and restructuring programme. Then the Ministry of SMEs and craft mapped development support programmes for SME, in cooperation with foreign partners, namely: UNIDO, World Bank, AFD (French Development Agency), the European Commission (MEDA) and GTZ (German Cooperation Agency) (Ghomari & Benhabib, 2016).

2. METHODOLOGY

2.1. Definition of Variables and Items

The empirical work of this paper is based on simple indicators of competitiveness and upgrading. The goal is to use simple variables in order to induce as little bias as possible in the choice and construction of indicators.

Independent Variable

Few studies have looked at the process and actions for upgrading businesses. Only the work of UNIDO (2002) provides a frame of reference from which we extract upgrading actions. These represent the items of our independent variable

that we want to measure. A total of 26 indicators of the upgrading process emerged from the treatment.

The "upgrade" variable first brings together items relating to the modernisation of: production equipment, storage handling equipment, laboratory equipment, metrology equipment, etc.

The following items reveal the importance of the organisational structure and the management system within a company. These are items relating to the hierarchical organisation, the introduction of new management concepts, information, decision and control systems, the value system as well as the culture of the company; aspects relating to the management of financial resources (access to financing resources, opening up of capital) are also included.

The third category of items essentially tells us about the quality of the production function within a company. These items relate to the productivity of machines and labour, product and process innovation, economies of scale generated in addition to the flexibility of the productive apparatus.

Other items correspond to the importance given to the level of qualification, training and learning in a company. These items also cover aspects relating to the training of resources and skills within a company.

The fifth category of items tells us about the company's level of commitment to quality. These are items relating to the adoption of standards, the establishment of quality assurance and / or management systems according to the ISO family of standards and certification.

Then we study all the items relating to the management of the product / market in a company (identification and anticipation of customer needs, prospecting and customer loyalty, customer satisfaction, study of the competition and monitoring commercial).

Finally, the last items relate to relationship management in a company. These are items relating to the company's relations in its upstream and downstream market, relations with subcontractors, research bodies and financial institutions.

The evaluation of the implementation of the upgrade variables is indicated by a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Without Opinion, 4 = Agree, 5 = Strongly Agree).

Dependent Variables

Based on the published research on competitiveness (BCG, 1984; Bienaymé, 2006; Feurer & Chaharbaghi, 2003; Lesca, 2004; Martinet, 1984; Mucchielli, 2002; Sharples & Milham, 1990) in general and on the work of Meier (2018) in particular, we measure the overall competitiveness of a company through its performance potential and its strengths and weaknesses in different areas, namely: commercial, financial, technical, human & social and managerial.

The dependent variables of the study thus correspond to different areas of competitiveness mentioned above.

A total of 64 competitiveness indicators (The list of indicators was drawn up on the basis of two criteria: their relevance to the question studied and the availability of information) are used during our empirical study. They allow us to assess changes in performance after initiation of upgrade programme. These have

been distributed in five distinct dimensions of competitiveness: commercial, financial, technical, human & social and managerial. Various competitiveness indicators are assessed perceptually in order to show the change encountered following the upgrading process. The author of the paper operationalized various indicators by using clear statements and, if necessary, adding definitions to better guide the respondents.

The company's competitiveness was assessed using a 5-point Likert-type scale, from 1 to 5. The continuum ranged from 1 "strongly decreased" to 5 "strongly increased" and 3 being "remained stable". The author of the paper also grouped the indicators included in each of the dimensions studied to allow statistical tests to be carried out.

Finally, a grouping of all the variables was made to assess the overall competitiveness of the company in all the spheres of competitiveness that were retained.

More precisely, it was tested whether the upgrade made it possible to increase the commercial, financial, technical, human & social and managerial competitiveness of the companies studied.

2.2. Data and Methodology

To carry out the empirical study, it was decided to build a non-existent database in Algeria of companies that had followed the upgrade programmes.

For this reason, the author gathered data through interviews and research documents of the Ministry of Industry, SMEs and Investment Promotion, National Center of the Register of Commerce, the Ministry of Finance, reports of consulting offices, documents relating to the upgrade operation, as well as internal documents of some companies.

The initial goal was to build a diverse sample of companies that had followed the upgrade programme (the pilot programme of UNIDO, the MIR programme, the programme of EDPME, the programme of ANDPME), but because of the extreme restriction of access to information, the author focused on the programme carried out by the MIR since 2003.

Empirically, it was explored whether the companies benefited from the upgrade programmes of the Ministry of Industry of SMEs and promoting investment (MIPMEPI). The companies selected are public and private Algerian companies of different size and belonging to different branches of activity that initiated the process of the upgrade and finalised it at least 3 years ago.

Of the 123 companies surveyed, 69 questionnaires (Annex 1) were used for the purpose of the research (i.e., a 56 % response rate). These companies, therefore, represent 56 % of the population of companies upgraded by the MIR.

A review of the information collected (Annex 2), with regard to the companies and upgrade programme, has shown the characteristics defined in Fig. 1.
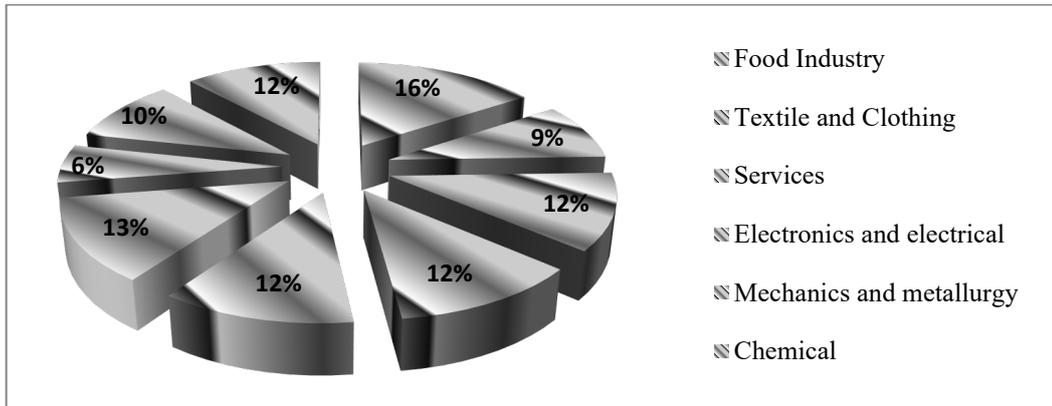
Fig. 1. Sectoral distribution of the sample (in %).

The breakdown of the companies surveyed by industry shows that companies in the food industries take the big share accounting for 16 % of the companies surveyed, followed by the chemical industry with a share of 13 %. Then the electronics and electrical industries, mechanical and metallurgy, various industries and services come with an equal share of 12 %. Moreover, public buildings and works sector companies account for 10 % of the companies surveyed, followed by textile and clothing companies with a share of 9 %. The final position is taken by the companies in the furniture industry and interior design with a share of 6 % of the sample firms.

The largest number of surveyed companies is located in the west (38 %), followed by the companies in the centre (36 %), in the east (20 %) and in the south of the country (6 %).

The size criterion chosen is the number of employees; the sample is distributed in a proportion of 30 % of small businesses, 39 % of medium-sized and 31 % of large companies.
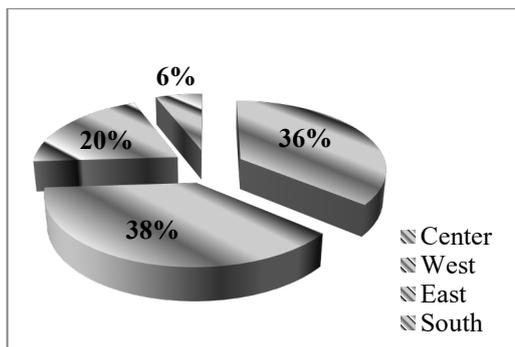

Fig. 2. Geographical distribution of companies (in %).
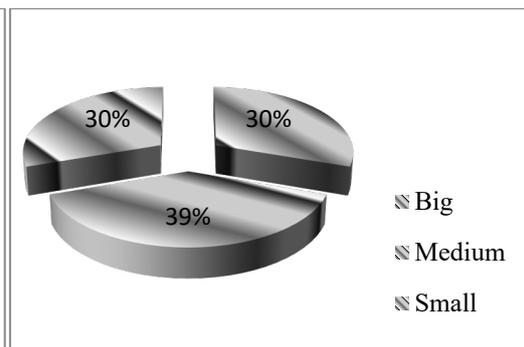
Fig. 3. Breakdown of the sample by the type of company (in %).

Like many management researchers and because of the uniqueness of the proposed solution, the measuring instrument method presented by Churchill (1979)

was used in the study. This is a principal component factor analysis, which makes it possible to purify the scales and to avoid multi-collinearity phenomena.

Using an exploratory factor analysis is not mandatory as part of a hypothetico-deductive approach. However, the small number of studies, in which the variables of our research model are operationalised, leads the author of the paper to develop an exploratory approach for the construction of measurement scales.

It was also necessary to perform the analysis of the reliability of the factors resulting from the factorial analysis using Cronbach's alpha. In this context, the properties of measurement scales and the constituent elements were studied.

Subsequently, and in order to confirm the scales, the method of confirmatory factor analysis was used. The use of structural equation methods makes it possible to test the validity of the content of a questionnaire and to determine the best factor structure in terms of fit to empirical data.

Thus, both exploratory and confirmatory methods were used in the construction of the measurement scales.

For the treatment of the collected data, the author used an exploratory factor analysis (Statistica 8 software), through which the variables were reduced, the dimensionality of the scale was checked, as well as the reliability of the dimensions was tested by calculating Cronbach's alpha.

The exploratory analysis was followed by a confirmatory analysis (in SPSS 20 software) that allowed for the confirmation of scales. The use of structural equation methods made it possible to test the validity of the contents of a questionnaire and to determine the best factorial structure in terms of adjustment to the empirical data.

3. RESULTS AND DISCUSSION

3.1. The Exploratory Analysis

As part of the reduction of the items, a first Principal Component Analysis (PCA) was performed with all levelling indicators (14 upgrade items were retained from 26) and other PCA for each dimension (35 upgrading items were chosen out of 64).

As part of the PCA, first, the author focused on commonalities. Then, the author proceeded to the elimination of indicators having a commonality considered too low.

1. Item Reduction

The first PCA was carried out with all the upgrading indicators, as well as other PCAs for each dimension of competitiveness. Within the framework of these first PCAs, the author was interested in the communities. The indicators with a commonality deemed too low were eliminated.

Annex 3 provides all the indicators used (the indicators emerging from the exploratory factor analyses in each dimension) for each variable, namely: upgrading, commercial competitiveness, financial competitiveness, technical competitiveness, human & social competitiveness and managerial competitiveness.

Then other PCAs are performed in order to statistically measure the quality of the measurements, their validity and reliability.

From these PCAs, it is advisable to check whether the data are metric and factorizable. The Barlett's and Kaiser-Meyer-Olkin (KMO) tests measure the suitability of the sample for factor analysis and verify the ability of the data to be factored.

2. KMO and Barlett's Tests

In terms of the study, the results of the Bartlett's test of sphericity are very significant because significance (Sig.) of all dependent and independent variables tends to 0.000 (see Table 1). Thus, we can reject the null hypothesis that our data are from a population for which the matrix is an identity matrix.

For the KMO index variable "Upgrade", it is 0.719. This is quite satisfactory and means that the choice of the initial variables is relevant.

In terms of the variable "Commercial competitiveness", the KMO index scale is 0.706. It means that the factor analysis is possible.

The value of KMO index is 0.797 for the variable "Financial competitiveness". The index thus gives satisfactory results.

The KMO test variable "Technical competitiveness" is 0.854. It can be described as excellent or praiseworthy. It shows that the correlations among the items are of good quality.

Table 1. Results of Factor Analysis and Reliability

Variables	**KMO**	**Bartlett**	**Cronbach's alpha**
Upgrade	0.719	0.000	0.776
Commercial competitiveness	0.706	0.000	0.788
Financial competitiveness	0.797	0.000	0.871
Technical competitiveness	0.854	0.000	0.917
Social & human competitiveness	0.744	0.000	0.729
Managerial competitiveness	0.663	0.000	0.694

In terms of the variable "Human and social competitiveness", the KMO test is 0.744, indicating high capacity data to be factored.

Finally, the KMO index variable "Managerial competitiveness" is 0.663. Items can be factorizable when the value exceeds 0.5 KMO.

3. Cronbach's Alpha Reliability

At the end of the CPA, the reliability of retained factors is measured by Cronbach's alpha. The first factor of the upgrade of the company presents an alpha equal to 0.776.

The following factors, namely, trade competitiveness, financial competitiveness, technical competitiveness, social & human competitiveness and managerial competitiveness, respectively, have the following alphas: 0.788, 0.871, 0.917, 0.729 and 0.694.

The Barlett's test, the KMO and Cronbach's alpha reliability give satisfactory results.

3.2. The Confirmatory Analysis

In this step, the Confirmatory Factor Analysis (CFA) is carried out by the method of structural equations for each dimension, then for the global model, to check if the model fits well the empirical data. It is necessary, first, to check the normality of the variables to choose the estimation method.

Thus, this confirmatory analysis (conducted using the Statistica.8 software) validates the measurement model defined by the exploratory analysis of the data.

1. Evaluation of the Quality of Fit of the Model

Overall, the review of the indicators for the scale indicates an average fit of the model to the data (see Table 2).

Table 2. The Model Fitting Indices

Categories for clues	Retained indices	Model values
Absolute indices	GFI	0.306
	AFM	0.246
	PNNI	0.000
	RMSEA	0.179
	gamma 1	0.403
	gamma 2	0.351
Incremental indices	NFI	0.200
	NNFI	0.206
	IFC	0.239
	Bollen's Rho	0.165
	Bollen's Delta	0.246
Parsimony index	PNFI	0.192

2. Evaluation of Symmetry and the Flattening of the Model Data

All symmetry indices (skewness<1) and kurtosis (kurtosis between −2 & 2) do not violate the normality assumption, which allows deducing that the conditions required to perform the analysis are respected.

3. Equations of the Structural Model

As the fit of the model to the data is satisfactory, it is possible to proceed to the estimation of the measurement model and the structural model.

Any analysis model tested is divided into two parts: the measurement model and the structural model. The first specifies the indicators or variables observed (UPG1, UPG2, …, CC1, CC2…) of each latent variable (UPG, CC…).

Each indicator is defined either theoretically by the designer of the analysis model or by using the factor structure of the scale that appeared at the end of an exploratory factor analysis of the PCA type.

The second model concerns the assumptions of linear relationships between latent variables and corresponds to the relationships defined a priori by the designer of the analysis model.

Each of these models must be translated into equations whose general form is:

Measurement model: $V_i = \lambda i \cdot F_a + E_i$;

Structural model: $F_a = \beta_{ab} \cdot F_b + \beta_{ac} \cdot F_c + \ldots + \beta_{ap} \cdot F_p + D_a,$

where: V_i – observed variable i (indicator or item); F_a – latent variable A (construct, factor like CM, CC,....); E_i – measurement error of i; D_a – perturbation of A (the set of *Zeta* measurement error of the latent variable); λ_i – factorial contribution to be estimated of i on the latent variable A; β_{ab} – regression coefficient to be estimated indicating the strength of the influence of the latent variable P on the latent variable A.

It is necessary to perform the analysis of the factor contributions of the manifest variables on the latent variables and estimate the measurement error. This analysis allows checking whether the factorial weight of each indicator and the associated t test ($t > 1.96$ at the 5 % error threshold) are significant.

This will, therefore, confirm the existence of a positive link between the indicators and the latent variables. The results of the analysis are, in general, satisfactory.

The regression results of the structural relations show that the constants are significant. For the Beta values, their significance was checked by making sure that the Student's test value would be greater than 1.96 in absolute value and that the probability of error would be less than 5 %.

Table 3. Regression Coefficient of Structural Relations

Variables latentes	Parameter Estimate β*i*	Standard Error ξ	Statistic *T*	Prob. Level *P*
(UPG)-99->(CC)	0.937	0.021	4.490149E+01	0.000
(UPG)-100->(CF)	0.892	0.029	3.068230E+01	0.000
(UPG)-101->(CT)	0.821	0.039	2.100694E+01	0.000
(UPG)-102->(CH)	0.728	0.056	2.290408E+00	0.000
(UPG)-103->(CM)	0.384	0.122	3.161221E+00	0.002

Table 4. D_i Disturbances of Structural Relations (known as *Zeta*)

Les perturbations Entre *V* latente	Parameter Estimate *Zeta*	Standard Error ξ	Statistic *T*	Prob. Level *P*
(ZETA1)-94-(ZETA1)	0.123	0.039	3.141639E+00	0.002
(ZETA2)-95-(ZETA2)	0.205	0.052	3.955240E+00	0.000
(ZETA3)-96-(ZETA3)	0.326	0.064	5.081343E+00	0.000
(ZETA4)-97-(ZETA4)	0.471	0.082	5.738137E+00	0.000
(ZETA5)-98-(ZETA5)	0.837	0.000	2.337239E+00	0.000

4. TESTING HYPOTHESES

The estimation of the structural model provides with results that allow verifying the hypotheses made on the relations between the variables of the model proposed.

After several AFC on the variables of each dimension, and on the global model, it is possible to obtain the equations of the structural model presented in the table below.

Table 5. The Equations of the Structural Model

Commercial competitiveness	$CC = D_1 + \beta_1 \cdot UPG$ $CC = 0.123 + 0.937 \cdot UPG$
Financial competitiveness	$CF = \beta_2 \cdot UPG + D_2$ $CF = 0.892 \cdot UPG + 0.205$
Technical competitiveness	$CT = \beta_3 \cdot UPG + D_3$ $CT = 0.821 \cdot UPG + 0.326$
Social & human competitiveness	$CHS = D_4 + \beta_4 \cdot UPG$ $CHS = 0.471 + 0.728 \cdot UPG$
Managerial competitiveness	$CM = \beta_5 \cdot UPG + D_5$ $CM = 0.837 + 0.384 \cdot UPG$

Before proceeding to the verification of the validity or invalidity of the hypotheses relating to the study model, an overview is presented on the causal relationships that exist between the latent variables of the structural model, as well as the results obtained from the modelling structural equations are provided.

In the figure below, the variables of the global model and their correlations are presented. Values (β) placed above each solid arrow indicate the strength of the influence of the independent variable on the dependent variable.
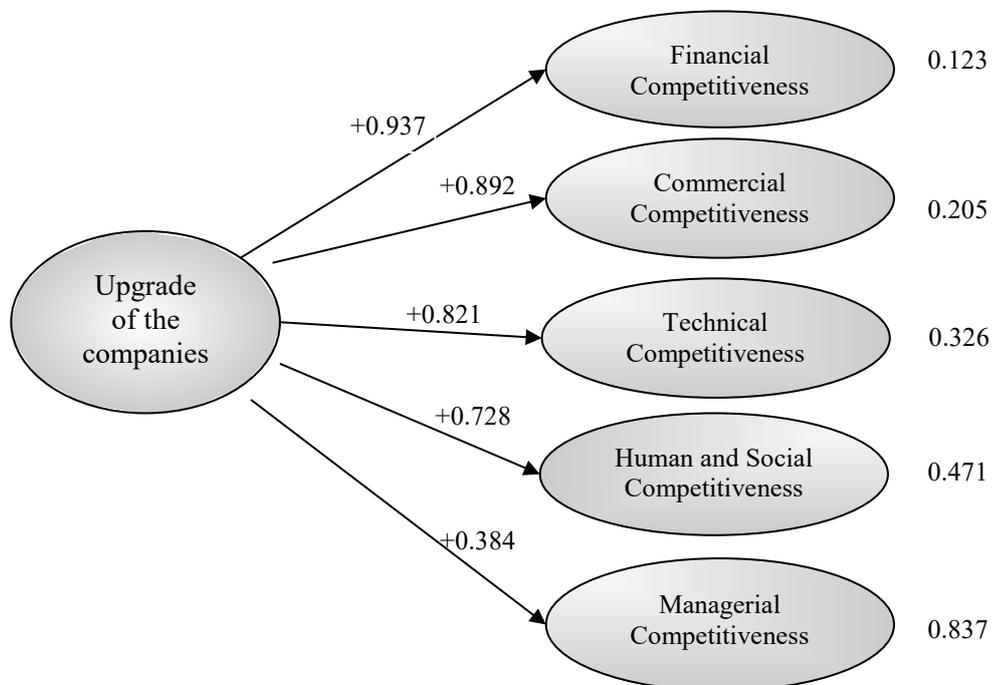

Fig. 4. Variables of the global model and correlations.

It is also found that all the (β) are positive and above (0.7) apart from the value in upgrading and managerial competitiveness, which is (0.384).

It should also be noted that the results across all Zeta measurement errors of each latent variable are acceptable (those are the numbers joining the dependent variables across dashed arrows). These results confirm the important influence of the independent variable on the dependent variable because the more values (β) are moving away from zero, the greater the impact.

For each of the research hypotheses, the author confirms or rejects the hypothesis according to the statistical results obtained. The results are represented by modelling the hypotheses enriched by the regression coefficient and its significance.

The first hypothesis aims at showing the positive influence of upgrading programmes on commercial competitiveness. The verification of this hypothesis was carried out by means of the equations of the structural model.

By analysing the results presented, it can be observed that the influence of the upgrade on commercial competitiveness is strongly significant and positive (H1: $\beta = +0.937$, $T > 1.96$, $p < 0.05$). Thus, with a $\beta = +0.937$ we see that the upgrading programmes play a capital role in improving the commercial competitiveness of companies.

The second hypothesis is also proven, i.e., the upgrading programmes have a positive and very significant impact on the financial competitiveness of companies (H2: $\beta = + 0.892$, $T > 1.96$, $p < 0.05$). This shows that the upgraded companies experience good progress in their financial capacities. The upgrade thus enabled these companies not only to maintain financial balance but also to face the associated risks.

Just like the second hypothesis related to financial competitiveness, upgrading has a positive influence on technical competitiveness (H3: $\beta = + 0.821$, $T > 1.96$, $p < 0.05$). Thus, upgrading considerably improves the capacity of enterprises to have good production and research potential.

According to the fourth hypothesis, upgrading has a positive and significant influence on the human and social competitiveness of companies that have completed an upgrading programme (H4: $\beta = + 0.728$, $T > 1.96$, $p < 0.05$). This confirms the idea according to which the upgrading programme contributes to improving the optimisation of the output of human resources, the degree of retention of the best employees, as well as promotes the company's capacity to ensure a strong attractiveness towards employees with high potential.

The fifth hypothesis to be tested considers that an upgrade programme positively influences managerial competitiveness. According to the analysis performed, this relationship is less significant than the previous ones (H5: $\beta = + 0.384$, $T > 1.96$, $p < 0.05$). This shows that upgrading has a moderate influence on the capacities of managers to manage and promote their organisations. The settings are all significant. All assumptions from H1 to H5 are, therefore, supported by the data and the proposed theoretical model is verified.

5. DISCUSSION OF RESULTS

Based on the confirmation of the research hypotheses, it can be concluded that the upgrade programmes have a positive impact on various dimensions of competitiveness, namely: commercial dimension, financial, technical, human & social and managerial competitiveness. These results confirm and extend the existing contributions in the literature (UNIDO, 2002; Mariesse & Filipiak, 2003; Bouraoui, 2005) on the link and influence of upgrade programme on the competitiveness of companies that adhered and finalised these programmes.

Upgrading has a very important influence on the first type of competitiveness, i.e., "business competitiveness" with $\beta = 0.937$. It has been particularly established that the companies that have finalised an upgrade programme have performed better in terms of growth in sales, improved brand image, increased loyalty rate of customers.

Regarding the dimension "financial competitiveness", like the study by Azouaou (2011) and Bennaceur *et al.* (2007), the upgrade has a positive and significant effect ($\beta = +0.892$) on the company's ability to maintain financial equilibrium, address the risks associated therewith, and create value.

This strong influence is explained by the financial aid granted by the Algerian ministries (MIPMEPI and MPMEA) and other organs of support and funding to upgrade Algerian companies (UNIDO, EDPME, ANDPME etc.).

Moreover, the estimation results of the upgrade impact on "technical competitiveness" show that the upgrade programme has a positive and significant impact ($\beta = +0.821$) on improving company's ability to hold good potential for production and research. This finding reflects the contribution of the upgrade programme in modernising the means of production, adaptation of new technologies and strengthening the ability of companies to innovate.

In terms of "human and social competitiveness" ($\beta = +0.728$), it has been established that the upgraded companies have managed to maintain and retain the best employees, to ensure a strong attractiveness towards the best employees and to maintain a good social climate. These results show that these companies have taken advantage of structural actions in the upgrade programme in order to establish healthy human and social policies of their resources.

Finally, the upgrade has a positive but average impact on "managerial competitiveness" ($\beta = 0.384$). According to the study, skills of managers to develop and manage their organisations have moderately improved. These skills include anticipation and foresight, leadership, coordination and control, internal communication and external and delegation of certain decisions and information to employees.

CONCLUSION

Faced with rapid changes in the socio-economic environment (internationalisation, globalization phenomena, better training and information for individuals, dominance of communication) and many requirements that these involve (efficiency, competitiveness, adaptability, innovation, creativity,

flexibility, speed) companies face the challenge of improving their current operations while shaping their future. They need to start thinking about organisation and management tools to optimise the human and material potential available to them to better serve their customers and to face competition.

The literature review conducted allowed considering the issue of competitiveness and company upgrade, and promoted the development of the research model and the formulation of the hypotheses.

Exploratory and confirmatory methods were combined to construct the measurement scales. To test the research hypotheses, the author used the methods known as second generation, namely, the structural equations. Given the good results of the measurement model, it was possible to test and confirm systemically all research hypotheses of the model.

The results of the study demonstrated that the real contribution of the upgrade programme to the overall competitiveness of companies was conducted primarily through trade competitiveness and financial competitiveness. Technical competitiveness was found to be above the human and social competitiveness. The last position was taken by the managerial competitiveness, the impact of which on the upgrade programme was average and lower than other types of competitiveness.

Thus, it can be stated that there is a positive impact of the upgrade programme on the competitiveness of companies that joined and finalised this type of programme.

The implications of the research are theoretical and then managerial. At the theoretical level, the interest of the study concerns, first of all, the conceptualisation of the concept of competitiveness, a notion theoretically ambiguous and empirically complex. The second theoretical contribution of the study is the examination of the concept of upgrading, a recent notion in the economic literature. Very few theorists have focused on explaining the concept of upgrade, but all agreed on the relationship of the upgrade with the competitiveness sought by companies (Bouraoui, 2005; Lamiri, 2003a; Mariesse, 2003; UNIDO, 2002).

From a managerial point of view and through the validation of the hypotheses, there is the necessity of readjusting the behaviour of economic actors to anticipated shocks of the programmed commercial opening and the changes in the international business environment. As part of the upgrade, managers should treat the intangibles (training, culture) more seriously.

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