

# Determinants of National Economies' Competitiveness Based on Per Capita Income

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Currently, economic theory is highly interested in the definition and the measurement of competitiveness as is the case of empirical studies that diverged about issues related to determination, specification, and estimation techniques. The present article aims to propose a synthetic indicator for national competitiveness through empirical analysis. For data collected from World Economic Forum report (2014), a principle component analysis has been conducted in order to identify competitiveness' key explanatory variables. The Partial Least Squares (PLS) estimation shows that the importance of the variables in the construction of the competitiveness index differs according to the level of development of the country. These results indicate to policy makers the most effective instrumental variables that could affect their national economies' to make improvements.

*Keywords:* measurement of national competitiveness, synthetic indicator, PLS regression

## Introduction

Economic literature highlighted the issue of national competitiveness considering its primary role in measuring gains and structural performances realized by national economies. Historically, the study of indicators and characteristics of competitiveness goes back to A. Smith (1776) who classified countries according to their competitiveness or absolute advantages. Nowadays with the development of new theories of international commerce and precisely with Krugman's work (1994), the concept of "international competitiveness" was reconsidered. This reconsideration concludes that national competitiveness is a mistaken connotation of the notion of productivity. As a result, the latter concept became the motto of economic policies in most countries.

The study of different works treating the concept of competitiveness such as that of Berthou and Crozet (2012), Couttarde and Mazier (1999), and Ketels (2006) notes the absence of a well elaborated theoretical framework in the field. In fact, empirical studies dealing with measuring competitiveness in various countries have neither borrowed the same theoretical base, nor adopted the same explanatory variables.

In this paper, a paragraph was dedicated to considering the multitude of definitions on competitiveness and the concept's evolution. In this respect, it also highlights the integration of the dimension "economic openness" with that of performance in terms of productivity and well-being.

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Then, the paper focuses on measuring competitiveness such as provided by the WEF. After a presentation of the adopted methodology and a critique of the existing measures, a principle component analysis was conducted in order to identify competitiveness' key explanatory variables. From a sample of 123 countries, three clusters were formed. The Partial Least Squares (PLS) estimation techniques helped identify different important variables in the three clusters. This result will help issue a recommendation for specific treatment and targeted action policies in order to increase the competitiveness of national economies.

## **Literature Review**

### **Competitiveness: Productivity, Well-Being and Openness**

As indicated above, despite the age of the concept of “competitiveness” and its significance, it keeps indicating new aspects and having different significations. In order to illustrate this view, several quotations inspired from a literature review, which have been quoted in an old article of Aiginger published in 1998, are provided below.

Uri (1971) defines competitiveness as the capacity to create conditions for high salaries. According to Orłowski (1982), it is the possibility to sell. According to Fagerberg (1988), it is “ability of a country to realize central economic policy goals, especially growth in income and employment without running into balance of payment”. According to Krugman and Hatsopoulos (1987), the criterion of competitiveness is not only the capacity of a country to balance its foreign trade, but also to improve the standard of living.

In the 1990s, the emergence of the competitiveness theory advanced by Porter (1990) stipulated that the only significant concept of national competitiveness is national productivity. Oughton and Whittam (1996) define competitiveness as “the long-term growth of productivity and therefore the increase in the living standard and the maintenance of full employment”. Aiginger (2006) proposes to define competitiveness as “the capacity of a country to create well-being”. In order to measure it, we need to conduct a complete evaluation of production and its process.

The evaluation of the process (capacity screening) implies an analysis of the production and technology functions and an integration of the role of qualitative elements such as strategies and capacity of a given country.

All the above presented definitions focus on either structural or real competitiveness; however, one should not forget price competitiveness. The latter touches upon external sales and therefore implies that one's gains are others' losses. The “productivity to competitiveness” approach stipulates that the reinforcement of a country's competitiveness does not necessarily result in weakening one or many other countries. Cooperation between developed countries in terms of policies of well-being enhancement has positive implications on different countries.

The World Economic Forum (2014) considers that competitiveness is a set of institutions, policies, and factors that determine the level of productivity of a country. The latter is considered as a determinant of the sustainable level of prosperity that a country can attain.

In the extension of works on the WEF, competitiveness is defined as the capacity of a geographical entity to improve the living standard of its inhabitants while being subject to a free-exchange system. This definition is distinguished from that of Porter (1990) as a new dimension is adopted next to productivity. It is about integrating commercial and economic openness as a pre-requisite to competitiveness. Currently, the conception that measures competitiveness of a nation by the development of its population and the openness of its commercial frontiers is widely disseminated by governments and international organizations (OECD, EU, World Bank).

### **Measuring National Competitiveness**

Competitiveness has quantitative as well as qualitative aspects. Its measurement is subject to some challenges such as the simultaneous integration of quantitative and other qualitative variables. Some studies have already tried to measure it in a general way such as Mucchielli (2002) who was interested in defining the competitiveness of a nation and more particularly in its structural aspect. Debonneuil and Fontagné (2003) assert that the evaluation of a country's competitiveness has to be based on performance indicators and requires a prior study of its determinants.

Measuring competitiveness according to the "ex-post" approach basically retains indicators pertaining to international exports which points to "price" and "non-price" competitiveness. As to measures based on the "ex-ante" approach, the retained variables are those linked to internal origins of competitiveness (Debonneuil et al., 2003).

### **Determinants of National Competitiveness**

Porter (2000) introduced a new theory of competitiveness based on the "diamond" model. According to Porter, the countries have more chances to succeed by focusing on industries and sectors of activity with the national "diamond" as the most favorable.

Later, Porter (2000) distinguished two sets of factors that could have impacts on competitiveness. In addition to macro-economic indicators, he highlighted competitiveness' macroeconomic factors that have been previously neglected.

Thus, the proposed diamond is summed in the quality of the business environment that is key to sharing the fruit of competitiveness among a large number of actors. According to Porter, all the countries present specific factors that could determine their competitiveness. These factors differ according to the degree of development reached by the national economy in question.

The empirical studies of Moon, Rugman and Verbeke (1998) suggest, as Porter's diamond model (1990), that some elements are estimated as important in the global competitiveness of a nation. However, according to the above writers, this model has its own limitations as it does not include multinational activities. Moon et al. (1995), Cho (1994), Cho and Lune (2000) propose to extend this initial "diamond" model to reach a "double generalized diamond" model as it integrates multinational activity.

The more or less larger definitions of countries' competitiveness have delineated the areas of analysis and helped elaborate composite indicators such as those provided by Balzaravičienė and Pilinkienė (2012) and by the World Economic Forum (ICG). These indicators adopt several explanatory variables of competitiveness.

## **Research Methods**

### **Presentation of the Global Competitiveness Index "GCI"**

Since 2005, the WEF based its analysis of competitiveness on the Global Competitiveness Index (GCI). This index measures the micro- and macro-economic foundations of national competitiveness. It is worth reminding that this viewpoint includes all institutions, policies, and factors that determine the level of productivity of a country. The level of productivity equally determines the performance rates obtained by investors in an economy which form the fundamental factors of growth (WEF, 2014).

The study of the GCI consists in developing explanatory factors of competitiveness as well as strengths and weaknesses of each country. The present work strives to classify both variables and countries.

The WEF approach uses logic with variable weights depending on the development of various countries. The weights associated to each factor vary according to the growth of the GDP per capita in the country in question. Yet the WEF approach has been criticized by many and comprises shortcomings mainly on the level of planning the statistical method.

The founding variables of this indicator are chosen *ad-hoc* and without any solid econometric justification (Chiappini, 2012). There has been no empirical verification conducted by these institutions to confirm the choice of their weights. It is thus important to note that superficial multiplication of variables systematically results in redundancies.

The statistics published in the WEF report indicate that the selection of variables results in several statistical tests and that the choice of weights applied to each variable is the result of these tests. However, no empirical verification has been conducted by these institutions to confirm their choice of weights which limits the governments' interpretation of these indices (Onsel, Ulengin, Ulusoyb, Aktas, Ozgur Kabak, & Ilker, 2008).

In order to overcome the limitations and the criticism addressed to the GCI, firstly, it proposes to follow the method of Jovan and Martinović (2014), which consists in reducing the number of variables with a factorial analysis (PCA) in order to just retain the determining factors of global competitiveness. Second, an empirical analysis was conducted, applying PLS regressions. This data analysis method presenting a colinearity problem and will allow us to identify the most important variables in the construction of the global competitiveness index.

### Sources and Type of Data

The data are taken from the WEF report regularly elaborated since 2005 and publishing a global competitiveness index (GCI). This index is based on 12 competitiveness pillars. Each pillar is made of several variables. The report contains detailed profiles highlighting the strengths and weaknesses of competition for each of the 142 retained economies. The data used in the report are obtained from opinion questionnaires on the perceptions of several thousands of entrepreneurs regarding national competitiveness-related topics.

This paper is based on data from the WEF report published in August 2014. Some data used in the report are provided on a scale from 1 to 7, other variables are provided on a scale from 0 to 10 while others are nominal and taken from international institutions.

Table 1

#### *Classification of the Variables Retained by the WEF*

Variables on a scale from 1 to 7	Variables on a scale from 0 to 10	Nominal variables
81 variables	2 variables	29 variables

It concludes that the data are not homogeneous. Harmonization is therefore necessary. There was a need to transform the variables' scales<sup>1</sup> from 0 to 10 to a scale from 1 to 7 to finally retain only two groups of variables : those on a scale from 1 to 7 and nominal ones.

Then data were grouped in two sub-groups to test the sensitivity of factorial analysis as well as its strength.

<sup>1</sup> The two following variables are distributed over a scale of 1 to 10: the variable legal rights index (8.08) and the variable strength of investor protection (1.21).

### Research Results

#### Estimations

The analysis of the covariance matrix shows that for some variables there are high correlations. Purification has therefore been conducted by eliminating the highly correlated variables (correlation coefficient superior to 0.8), then a PCA analysis was proceeded.

Before the application of the PCA, two indicators have to be verified:

- The KMO index that has to have a value superior to (0.50).
- Bartlett's sphericity test that has to provide a significant probability at a threshold of 5%.

The test results of the KMO index and Bartlett sphericity are indicated in Table 2.

Table 2

*KMO Index and Bartlett Test*

First Group			Second group		
Measurement of precision of the sampling of Kaiser-Meyer-Olkin.	0.931		Measurement of precision of the sampling of Kaiser-Meyer-Olkin	0.788	
Test of Approximated Khi-deux	4,267,294		Test of Approximated Khi-deux	1,821,306	
sphericity of ddl	630		sphericity of ddl	210	
Bartlett Significance de Bartlett	0.000		Bartlett Significance de Bartlett	0.000	

The KMO test confirms that the data are factorable after elimination of variables:

- With contributions superior to (0.30) to several factors;
- Having no contribution at least equal to (0.50) to one of the retained factors;
- Having no contribution superior to or equal to (0, 50) to one of the main identified axes.

As shown in Table 3, the Principle Component Analysis (PCA) produces 12 principle components as well as the variables that compose it. This result was based on Kaiser's criterion according to which only components with "initial clean value" exceeding the unit (1) have to be retained. These results correspond exactly to the number of factors defined in the WEF report.

By retaining the factors reached by the factorial analysis, the GCI can be represented by the following equation:

$$ICG = \sum_{i=1}^{12} \beta_i F_{1i}$$

Recent studies on global competitiveness as well as the definition attributed to it confirm that the causes of competitiveness are generally attributed to effects of several factors rather than the impact of one factor.

The aim is to look for the most important factors in the construction of the GCI of a nation out of the ones that resulted from the factorial analysis taking into consideration interactions between the different factors that intervene in the construction of this index.

PLS (Partial Least Squares) regression is the retained method. The reason behind this choice is originally the complexity of competitiveness as a concept that has to be apprehended taking into account several simultaneous factors.

PLS regression derives from an iterative use of ordinary least squares variables. The originality of PLS regression, according to Bastien, Vinzi, and Tenenhaus (2005) is to preserve the asymmetry in the relation

between dependent and independent variables contrary to other techniques that treat them as symmetrical.

Table 3

*Factors of Global Competitiveness: Principle Component Analysis*

Factor 1: environment of the business infrastructure and innovation	Factor 2: institution and governance
11.02 Qualities of the local suppliers	1.08 Wasting of the public expenditure
11.01 Availabilities of the local suppliers	1.04 The confidence of the politicians near the public
11.06 Controls international distribution	
12.06 Availability of the scientists and engineers	6.04 Effect of the taxation on the incentives to invest
12.02 Quality of the institutions of scientific research	
11.04 Nature of the competitive advantage	7.09 Capacity of the country to attract competences
6.15 Degree of the orientation customer	
	1.11 Effectiveness of the legal framework in the difficult regulations
12.01 Capacity of innovation	
	12.05 Government, acquisition of products of state-of-the-art technology
6.02 Extents (size) of the market	
	8.05 Venture capital available
2.01 Quality of the total infrastructure	
	8.04 Accessibility to the loans (debt)
2.05 Quality of the infrastructure of air transport	
	6.08 Cost of the agricultural policy
9.01 Availability of last technologies	
	1.12 Transparency of the policies of the government
2.02 Quality of roads	
	7.01 Co-operations in the relations employers'-employer
2.03 Quality of the railway infrastructure	
10.01 Cuts interior market	

**Comparative Study Per Cluster of Countries**

An analysis per cluster of countries is necessary to help us give a comparative analysis of the GCI of a nation compared to its counterparts.

The distribution of economies per GNI per capita, as done by the World Bank, is as follows:

- Low income country: at least 1,035 dollars (USD).
- Lower-middle income country: from 1,036 to 4,085 dollars (USD).
- Upper-middle income country: from 4,086 to 12,615 dollars (USD).
- High income country: 12,616 dollars plus.

In this classification, countries of the sample (123) are divided into three groups/clusters of countries.

A first group formed by the 36 highest income countries;

A second group containing 67 middle-income countries;

A third group containing 20 low income countries.

On the one hand, the analysis is conducted for all the countries of the sample. It indicates a strong link between the Global Competitiveness Index (GCI) and the first factor "institutions, infrastructure, and innovation". It also observes a strong positive correlation between the GCI and the seventh factor "human capital and access to information". On the other hand, the graphs show a positive correlation between independent variables.

The analysis per cluster of countries shows that the structure of relations between the explanatory variables and the variable to explain is not the same in the four clusters of countries. The graph in Figure 1 also shows a correlation between the explanatory variables to explain which proves that global competitiveness is

determined by a variety of complex factors.

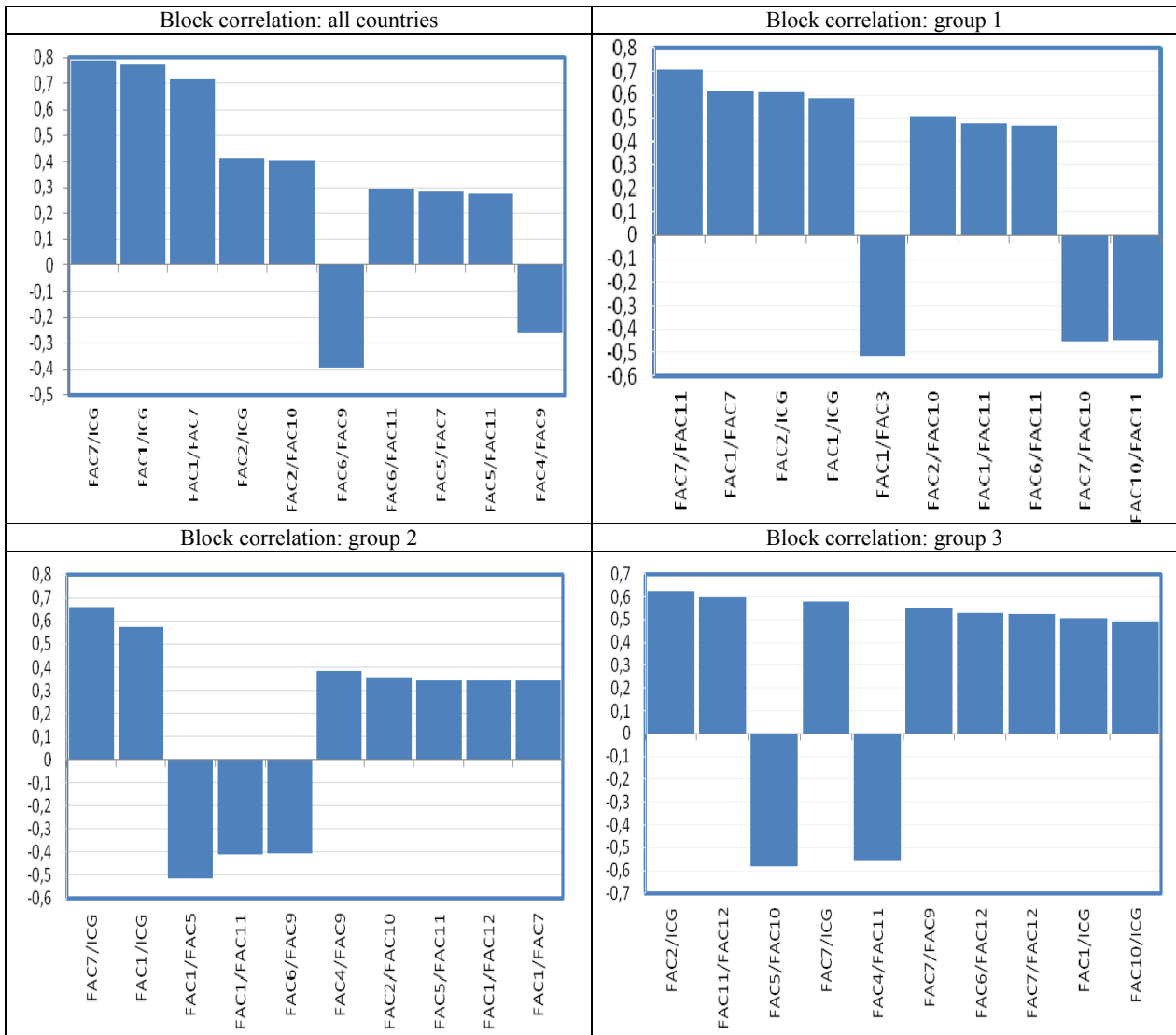


Figure 1. Correlations graph. Source: authors' calculations.

The graph in Figure 1 shows that factor 10 “health” is highly correlated with other factors regardless of the group of countries. The weight in the regression is also associated with this factor proving the importance of health in determining competitiveness for both high- and middle-income countries, but it remains low for low income countries.

**Identification of Factors Determining the Competitiveness Index**

The quantity VIP (Variable Importance for Prediction) was used, that helps classify the variables in terms of their capacity to explain variable Y (competitiveness). The graph in Figure 2 classifies the factors by order of importance in the construction of the global competitiveness index.

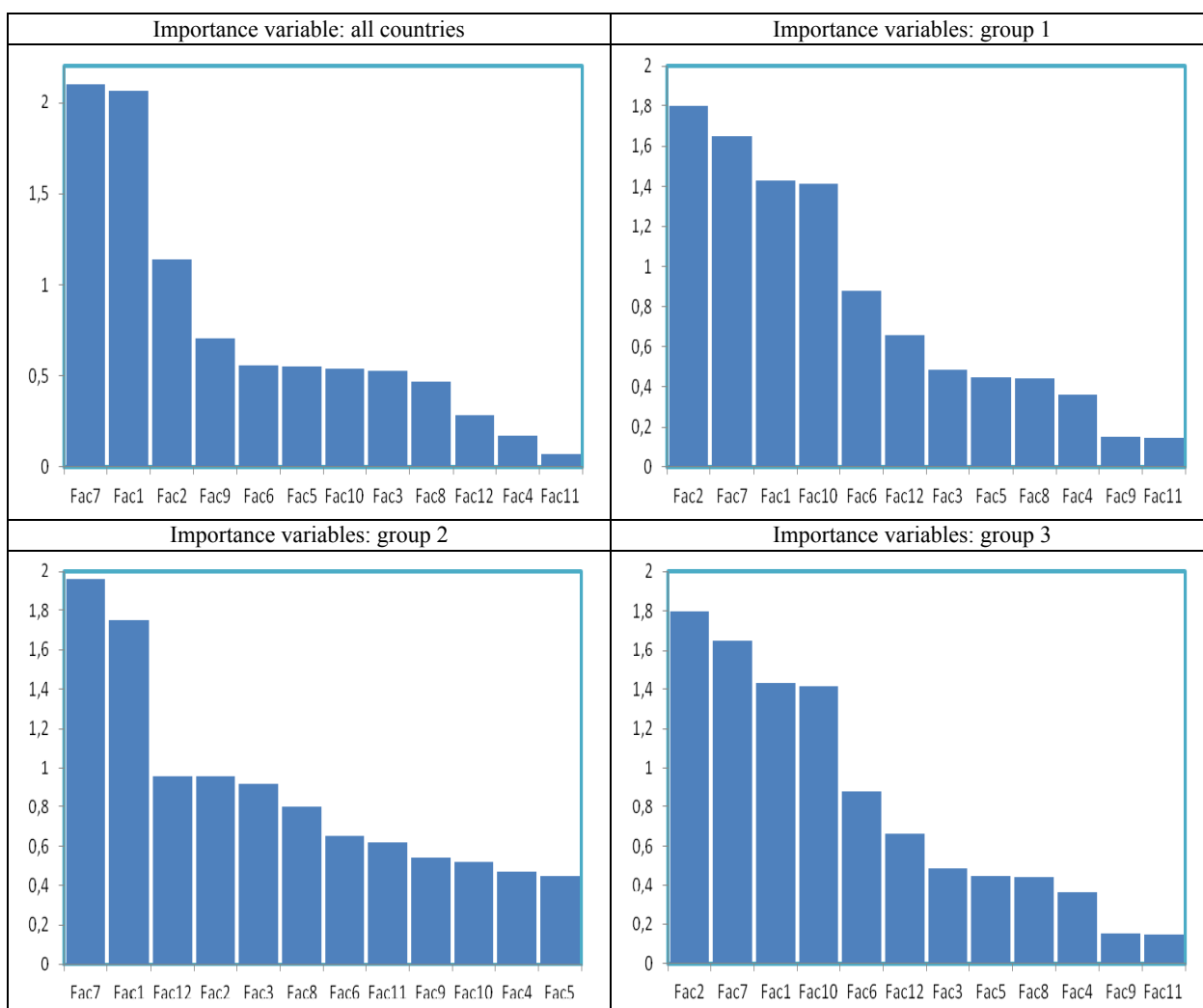


Figure 2. VIP. Source: authors' calculations.

VIP helps prioritize the factors according to their power to explain the target variables. The bigger the value, the more interesting it is (Wold, 1983). It simply says that a variable is to be considered closely as soon as (VIP ≥ 0.8). Table 4 summarizes the results.

It deduces from results provided in Table 4 that the importance of factors in the construction of a nation's competitiveness index differs from a group of countries to another.

Table 4

*Variable Importance for Prediction (VIP) Per Cluster of Countries (\*)*

Group of country	Fac. 1	Fac. 2	Fac. 3	Fac. 4	Fac. 5	Fac. 6	Fac. 7	Fac. 8	Fac. 9	Fac. 10	Fac. 11	Fac. 12
All	2.0680	1.1365	0.5245	0.1771	0.5493	0.5551	2.1013	0.4663	0.7105	0.5383	0.0768	0.2855
G1	1.57995	1.72275	0.675899	0.477156	0.711733	0.800	1.087	0.590	1.156	0.695	0.861	0.7814
G2	1.7490	0.9536	0.91568	0.4683	0.4455	0.6570	1.9600	0.8005	0.5422	0.5229	0.6158	0.9564
G3	1.4302	1.7959	0.4842	0.3595	0.4491	0.8802	1.6472	0.4405	0.1561	1.4125	0.1509	0.6623

Note. (\*) the figures in reds indicate the importance of the variable in the construction of the index. Source: Estimated by SIMCA-P: 10.



From the obtained results, the first factor (business environment, infrastructure and innovation), the seventh (human capital and access to information), and the second factor (institution and governance) are the most important in terms of explanatory power for all the countries. In fact, the values associated to these factors are above the unit. Yet an analysis per cluster of countries shows that classifying the importance of these variables varies according to the class to which a group of countries belongs.

As to high-income countries, besides factors 1 and 7, factor 9 (procedure and bureaucracy), grouping only two variables, seems to be significant in explaining the global competitiveness index. It needs to note that factor four (classic economic factors) is not at all significant in explaining the dependent variable and that applies to all clusters of countries.

Factor 3 (FDI attraction) does not seem to be significant in explaining the GCI except in the case of middle-income countries.

The results in Table 5 that groups results of the PLS regression on all countries show that all the factors are statistically significant except factor FAC5 and FAC11 ( $p$  value > 0.05).

Table 5

*Results of the PLS Regression*

ICG	Coeff. sc	Std. err	$p$	Conf. int	VIP (CUM)
Constant	4.0625	0.0121277	0	0.0239915	
FAC1	0.301334	0.0222468	1.11484 e-026	0.0440095	2.06801
FAC2	0.210514	0.0140609	3.71433 e-030	0.0278158	1.13658
FAC3	0.092391	0.0124878	1.47409 e-011	0.0247039	0.5245
FAC4	0.314134	0.0134496	0.0210293	0.0266065	0.285582
FAC5	0.02126	0.016539	0.201288	0.0327477	0.549304
FAC6	0.0821611	0.0161396	1.2123 e-006	0.0319279	0.555136
FAC7	0.29479	0.0232238	1.43141 e-0.24	0.0459423	2.1013
FAC8	0.0544891	0.013743	0.00012017	0.0271871	0.466347
FAC9	-0.0678886	0.0164084	6.24161 e-005	0.0324599	0.710551
FAC10	0.106086	0.0143524	1.5303 e-0.11	0.0283926	0.538349
FAC11	-0.0139747	0.0142558	0.328746	0.0282013	0.07689
FAC12	-0.0361177	0.0125423	0.00465179	0.02488118	0.285582

N = 144       $Q^2 = 0.938$       Cond. no. = 3.981

DF = 131       $R^2 = 0.957$       RSD = 0.1455

Conf. lev = 0.95

Coefficients scaled and centered

Regression per cluster of countries shows that factors 5 and 11 are statistically non-significant except in the regression of group 3; therefore, factor 12 is statistically insignificant (groups 1 and 2) (see Table 6)

As expected, the first, second, and seventh factors (that group more variables) impact the GCI the most. The impact of these factors is more significant in the first group of high-income countries and less significant in the second group of middle-income countries.

Table 6

*Regression Per Cluster of Countries*

Group of country	Fac. 1	Fac. 2	Fac. 3	Fac. 4	Fac. 5	Fac. 6	Fac. 7	Fac. 8	Fac. 9	Fac. 10	Fac. 11	Fac. 12
All countries	0.301	0.210	0.09	0.314	0.021	0.082	0.294	0.054	-0.067	0.106	-0.013	0.036
Group 1	0.346	0.301	0.134	0.053	-0.007	0.101	0.158	0.053	-0.035	0.127	0.018	0.041
Group 2	0.226	0.164	0.115	0.04	0.035	0.088	0.223	0.069	-0.048	0.061	0.010	-0.03
Group 3	0.124	0.175	0.057	0.041	0.048	0.060	0.138	-0.006	0.013	0.097	-0.017	0.02

Source: Estimated by SIMCA-P 10.1.

In the regression of all countries, the attraction of the third factor (FDI attraction) does not seem significant; however, in the case of the regression per cluster of countries, the weight attributed to this factor shows the significance of FDI in determining the GCI.

### Discussion

In light of the results of the PLS regression applied to the three clusters of countries, it can note that the first factor (1) (infrastructure-innovation and business environment), the second factor (institution and governance), and the seventh factor (human capital and access to information) are the most significant in the construction of the GCI (judged from the VIP index and the coefficient of the PLS regression). Nevertheless, it has note that these factors contirbuted differently to the construction of the GCI according to the level of development of the country.

In fact, the first factor (1) (business environment, infrastructure and innovation) comprises 15 variables, four of which are linked to infrastructure (global quality of infrastructure, quality of the infrastructure of air transport, quality of roads, quality of rail transport), four variables are linked to innovation (innovation capacity, availability of the latest technologies, availability of scientists and engineers, quality of scientific research institutions), and seven variables are linked to business environment (number of local suppliers, quality of local suppliers, control of international distribution, nature of the competitive advantage, degree of client orientation, extent of market domination, index of internal market size).

The principle component analysis conducted in this study helped us group these three sub-groups into one. This could be explained by an interaction between the latters. In fact, the business environment is tightly linked to competences and technological innovations though substantial gains could be achieved by improving infrastructure. In this context, previous studies have been interested in competitiveness with respect to innovation and technological progress following a neo-Schumpeterian approach<sup>2</sup>, also following Cantwell (2003), Fagerberg and Srholec (2007). In this respect, the factors supposedly influence competitiveness can be under the rubric of resources or capacities of institutions mainly education, the financial system, the markets or conditions of demand, and inter-companies networks that are necessary for the evolution of technological and non-technological products founded on a notion of competence and know-how.

#### Factor 2: Institution and governance

This factor composed of 11 variables linked to the institutional environment reflects the administrative framework in which individuals, companies, and governments interact to generate wealth. In this respect, the

<sup>2</sup> Cantwell, J. (2003). Innovation and Competitiveness Revised Version (August 2003) of Chapter 21 for *Handbook of Innovation* edited by J. Fagerberg, D. C. Mowery, and R. R. Nelson, Oxford University Press, forthcoming.

quality of institutions has a high impact on the country's competitiveness and growth. In the same vein, the role of administrative obstacles was studied by several economists in order to demonstrate their impact on commercial activities. Morisset and Lumenga (2002) studied the importance of administrative obstacles in a sample of 32 developing countries. They concluded that governments impose significant administrative costs on companies that want to establish and operate business in their countries. Although some procedures are necessary, others are not and their costs considerably vary depending on the country.

The empirical analysis shows that the VIP index of this factor and the coefficient of the PLS regression are important regardless of the cluster of countries. This result corroborates the theoretical and empirical studies mainly those of Rugman, Verbeke, and Luxmore (1990) and Porter (1994; 2000) who give particular importance to the role of the government in determining national competitiveness<sup>3</sup>.

#### Factor 7: Human capital and access to information

In this study, factor 7 (human capital and access to information) is assessed by variables linked to the rates of school enrolment in primary, secondary, and tertiary education as well as by variables linked to access of information notably internet users, fixed high-speed internet memberships and fixed telephone lines.

In fact, workers with little education can only perform simple manual tasks. On the one hand, basic education improves the efficiency of workers who are able to adapt to advanced production processes. On the other hand, higher education and quality training are particularly crucial to economies that want to move with their value-added chain beyond simple production processes, particularly globalized economy. That being said, countries have to take special care of the workers who are able to perform complex tasks and rapidly adapt to change in their environment and to do so, a solid and large telecommunication network helps a rapid flow of information and increases the global economic efficiency.

Recent works have been dedicated to the study of the role of the tertiary education system and training in improving the countries' competitiveness which proves the inter-dependence between the quality of the educational system and training and the level of competitiveness of a country. Sekuloska (2014) concluded that the lack of competitiveness of East European countries is due to the quality of the educational system. In the same vein, Schultz (1993) proves that the human capital is a key factor in increasing and maintaining a competitive advantage. Rastogi (2002) underlines that human capital is an important element in increasing productivity.

#### Factor 3: Attraction of FDI

These results show the importance of factor 3 (FDI attraction) in the construction of the GCI for middle-income countries (group 3). The latter is measured using 3 variables only which are: financial stability of banks, foreign ownership, FDI and technological transfer. In fact, this factor is interconnected with the other competitiveness factors. The quality of institutions and infrastructure affects the decision on FDI location particularly in developing countries (Blonigen, 2005). In addition, FDI is attracted by fundamental economic characteristics of the host country. Our result shows that this indicator presents a VIP index that is more significant in middle-income countries than in high- and low-income ones. This means that the latter is more significant in the construction of the competitiveness index in middle-income countries. Thus, several empirical

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<sup>3</sup> The government variable was presented in Porter's Diamond Model and it represents the country's main competitiveness factor and is considered exogenous in Porter's unique model (1994) is incorporated as endogenous (1994) in the 9-factor model. Rugman and Verbeke (1990) consider that governments practice interventionist trade and industrial strategies to improve their competitiveness.

studies showed the impact of FDI on economic growth mainly on employment and transfer of technology (Markusen & Venables, 1998), even though the empirical literature is controversial and FDI externality and impacts on productivity is not always positive (De Mello, 1997).<sup>4</sup>

These results reinforce the idea that competitiveness disparity between developing countries and developed ones is due to the low investment level. This conclusion raises two questions to governments in developing countries, precisely Tunisia, so that they increase investment and act on the most efficient instrumental variables of their national economies. In other words, these countries can focus on FDI to improve the quality of education infrastructure, crucial factors in the passage to a higher level of development, namely innovation-based development.

### Conclusions

The objective of this article is to conduct an empirical analysis to determine the factors that are judged important in the construction of the GCI. From the study of the latter, it concluded that the determinants of global competitiveness of a nation change depend on the latter's level of development.

The results imply that major differences between the countries follow their classification depending on the income level. The importance of variables in the construction of the global competitiveness index is different in the four groups of countries.

The most powerful impact on global competitiveness, in all the countries, is that of business environment—infrastructure and innovation, institution and governance, education and telecommunication. The interest of these results lies in better targeting factors for action towards a better competitiveness of national economies.

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