A Confirmatory Study of the Knowledge Economy in the Context of Moroccan Economic Growth: Analysis, Comparison and Solutions

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ABSTRACT

The knowledge economy drives growth. It increases overall productivity, affecting competitiveness, market share and, most importantly, economic growth. The objective of this research is to study the impact of the knowledge economy on economic growth in Morocco. It will also study and present the causes of the bottlenecks currently facing the Moroccan economy. Our starting point for this study is a literature review, which will constitute the anchor point of our project and will allow us to position ourselves in relation to these studies and to define the different concepts used in this research work. This part is necessary to present the contours of models of endogenous growth which constitutes an improvement of the first models developed by neoclassical theorists and will allow us to identify indicators and to present their impact on economic growth. The realisation of this study was based on neoclassical orthodoxy founded on a positivist approach employing hypothetical-deductive methods. From a methodological point of view, the approach employed will be a quantitative approach based on inferential statistics and particularly econometric studies of panel data. Our empirical findings indicate that the impact of human capital variable is not significant. Furthermore, the innovation variable shows a positive and insignificant impact on economic growth. In addition, information and communication technology has insignificant effect on Morocco's economic growth. Finally, governance quality has a positive impact on economic growth. Our results explain the weak impact of the knowledge-based economy on Morocco's economic growth, and this weakness does not change regardless of the country's wealth level. This allows us to conclude that despite the multiple reforms and the enormous investment made by Morocco, they benefit little from the competitive advantage and the effects on growth that this economy make it possible to create.

Keywords: Knowledge Economy, Indicators, Development, Research

1. Introduction

In a context marked by increasing global competition and the continuous development of regional and international alliances, Morocco, on pain of losing its competitive advantages and sources of competitiveness, has embarked on a process of upgrading its general environment, its legal arsenal, all the components of its economy and its political and economic alliances. The aim of all these measures was to create the necessary conditions for solid and sustainable economic growth, capable of generating the wealth necessary to absorb high levels of unemployment and high levels of debt. It also aimed to establish political stability and social

cohesion based on a better distribution of wealth, an effective fight against poverty and to create incentive mechanisms for the development of investments and exports. The achievement of these objectives also requires the establishment of a policy of development and modernization of all aspects of economic, social and institutional life. Conversely, Morocco has been confronted in recent years with the loss of momentum of its development model and a questioning of the relevance of government choices in terms of sectoral development strategies. Faced with all these observations, Morocco was obliged to renew its development model and explore other ways for modernizing its economy, hence the creation in November 2019 of a special commission on the development model responsible for presenting a new vision of Morocco's sources of development. In May 2021, the NMD Special Commission issued its report, which devoted part of its investigations to strategic axes of transformation and identified four axes oriented towards the economy, solidarity, social inclusion, human capital and territory and sustainability. All these axes aim to identify strategic priorities capable of meeting the challenges of modernizing the national economy while improving its competitiveness and ensuring the well-being of its population. The report also insisted on the importance of economic growth as the foundation of any development strategy and explained, "*by exploiting all its potential, Morocco will be able to accelerate its economic growth, which is one of the foundations of the New Development Model. Stronger growth with better distribution of benefits is essential to improve the standard of living of the population, provide employment opportunities for young people, generate resources to invest in human capital and finance social needs*" (SCDM, (2021, p. 82)). He also noted the importance of developing a number of variables, partly related to KBE, which can form the basis of the strategy to stimulate economic growth in Morocco in the coming years. Indeed, exploring indicators related to KBE is one of the choices that Morocco will have to study given their ability to improve economic growth indicators and identify a new dynamic allowing wealth creation based on an inexhaustible source "*knowledge*". Consequently, this article aims to participate in the current debate around the relevance of choices in terms of strategic development axes and will allow through modeling and testing the contribution of several variables, in particular those related to KBE, on economic growth in Morocco. Thus, the central question of this research is:

To what extent do knowledge-based economies influence economic growth in Morocco?

On the other hand, the purpose of this article is not to outline the main lines proposed by the SCDM as presented, but an opportunity to explore the contribution of a number of variables, in particular, those belonging to the KBE, adopted by the said commission on Morocco's economic growth. Thus, after a brief overview of these economies, their history, their foundations, their measurement indicators and the main growth models, we will try to present and test their impact on Moroccan economic growth and to provide an answer to the hypothesis of the existence of a possible positive link between these economies and economic growth in the Moroccan context. Given the purpose of this research work, which is naturally identified with economics and precisely with macroeconomics, the epistemological positioning that will be adopted to validate or invalidate the research hypothesis will thus be specific to economics and particularly to neoclassical orthodoxy. In addition, the methodological approach used will be a quantitative approach based on inferential statistics and particularly econometric studies of panel data. This study will be spread over a period from 1996 to 2019. The results of this study will provide a better understanding of the sources of economic growth for the Moroccan case and estimate the level of integration and influence of KBE in the Moroccan context.

2. Literature Review

The history of economic growth was always marked by periods of crisis, local or global, leading to a slowdown in economic activities and exchanges. These crises had varied origins and led to disastrous consequences on populations, on prices, on the availability of products and raw materials, on investments, on employment, on the internal stability of countries, on their neighborly relations and on the normal functioning of public affairs. The persistence of the threats of economic crises has led States to anticipate signs of their economic models running out of steam and to set up a strategic watch capable of dealing with any risk leading to the appearance or proliferation of these crises and ensuring sustainable development. This has also led States to question, among other things, the effectiveness of their scientific research and technological innovation systems, their capacity to create, innovate and exploit the results obtained, the efforts needed to develop their competitiveness and the means capable of generating a competitive advantage promoting the country's development. Improving people's well-being and meeting the challenges of trade liberalization and international competition. As a result, several countries have decided to orient their growth, development and economic upgrading strategies towards KBE, which are beginning to gain importance, in particular, following developments by Solow, Harrod and Domer. In addition, from the 1960s, an awareness of the strategic importance of this relationship began to conquer specialists, especially sociologists and economists, who began to define its contours and foundations. Moreover, the publication in 1996 by OECD of a report entitled "*The knowledge-based economy*" led to the dissemination and popularization of the concept. Then, author such as Foray (2018) defend the idea of the presence of knowledge at all phases of human history and he add the relationship between knowledge and development. Foray explain that, "*Knowledge has always been at the heart of economic development, and many works [...] testify to this presence*" (Foray, 2018, p. 22). This author concludes, on the other hand, that the current world is experiencing a new transformation of the capitalist model, based on knowledge and digitalization. This change puts an end to the old periods characterized by the processes of accumulation of physical capital.

The complexity that any research work on this subject can face lies in the measurement of knowledge, since the definition of indicators for measuring the knowledge economy remains a difficult task because knowledge itself is particularly difficult to quantify. Thus, Paillard (2001, p. 11) conclude, "*Theoretical developments that have allowed a finer approach to innovation activities encounter many measurement problems since most phenomena relating to knowledge are not directly observable*". This finding is also confirmed by the OECD (1996), which, in its report on KBE, explains that efforts are only just beginning to quantify and map the channels of diffusion of knowledge and innovation in the economic field. Therefore, in order to better understand this new discipline and to better master the objective of this research work, it would be important to define these economies, to present their objectives and theoretical foundations while trying to identify their measurement indicators.

2.1. Historical Evolution of KBE

Our analysis, at the level of this first part, will be oriented towards the presentation of the debate bringing together a group of theorists interested in the study of the appearance and evolution of this discipline as well as the impact it exerts on economic development. Thus, two stages can be identified to trace the evolution of the concept of knowledge through time and its use in the economic sphere. These steps can be summarized in Figure 1.
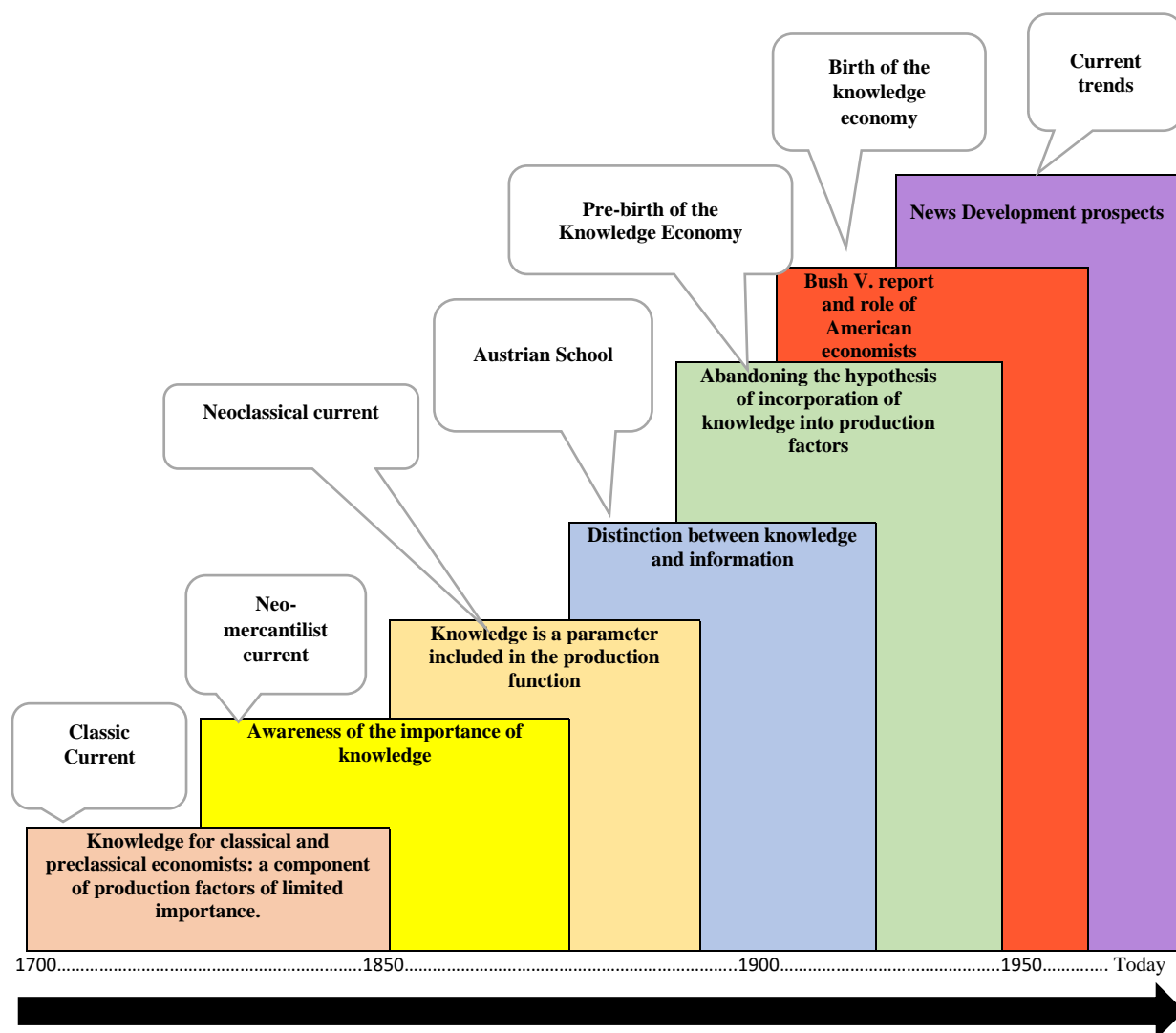
Figure 1. Historical evolution of the knowledge economy
Note: Authors' own conception

The historical evolution of KBE took place in two phases; a first stage extends from the 18th century to the middle of the 20th, while the second links this last period to today. The definition of these two stages was essentially linked to the interest of economists in the concept of knowledge and its level of appropriation in the economic sphere, which, from the middle of the 20th century, became an object of study. Thus, classical economists consider that knowledge plays a limited role in the economic sphere and consider it a component of the factors of production of limited importance. This importance developed with the Industrial Revolution, which led the neo-mercantilist current to explain England's domination over its rivals by the advances it recorded in the economic, industrial and technical fields. In contrast to the classical conception of knowledge, that neoclassicists consider knowledge embodied by technological progress to be a component of the production function. Some authors such as Nonaka and Takeuchi (1995) argue in criticizing this current that the only important knowledge in this current is that related to prices and their formation and that it gives little importance to knowledge in particular tacit knowledge. Concerning the Austrian school, in particular Machlup (1993), she explains that uncertainty and ignorance remain inevitable at every stage of production and that "*the uncertainty of knowledge in the whole field of 'causal links of production', i.e. technology*" (Machlup, 1993, p. 112) is a source of economic uncertainty, therefore, progress in this type of knowledge largely influences economic growth. Moreover, Bush (1945) report the forms of the basis for the studies of Drucker or Machlup and their

contributions to the birth of KBE. This report was presented to Presidents Roosevelt and Truman and formed the basis of the United States' strategy for scientific research and innovation throughout the postwar period. The development of these economies was also made possible thanks to the contribution of American economists, in particular, Nelson (1959) who emphasized the role of government in financing R&D and its relationship to the development of knowledge. Arrow, K., through two scientific publications in 1962, stressed the importance of directing funding towards knowledge and knowledge production activities and those related to human capital. Romer (1986), presented the foundations of endogenous growth theory, subsequently improved by Barro and Lucas, it constitutes an improvement and renewal of neoclassical growth models and especially the model of Solow. On the other hand, the term CFE first appeared in the work of " *Drucker in 1969 to designate all "knowledge-intensive" sectors and activities*" (Azuelos, 2016, p. 12). Drucker (1992; 1993) adds that knowledge has become the only source that counts today beyond other sources or factors of production (capital, labor and land) which, without disappearing, contribute less and less to progress. Regarding recent developments in this concept, Foray (2018) presents the recent transformations of KBE, the first is that related to the sectors described by Baumol (1967) as stagnant sectors (health and education) and their shift towards the progressive part of the economy. The second concerns the decentralization of its standards to include individuals. Finally, the third transformation is related to digitalization and its impact on economic development.

2.2. Definition and Key Concepts of KBE

Defining KBE has always been a major challenge for all specialists, as Smith (2002, p. 7) argues, "*The weakness, or even complete absence, of definition is pervasive in the literature... This is one of the many vagueness that make the notion of the 'knowledge economy' so rhetorical rather than analytical.*" The starting point for attempts to define KBE is linked to the work of Arrow (1962) who, according to Azuelos (2016), presents them as "*an activity of knowledge production from skilled labor and capital and whose final product is in the form of information exchanged on a market*" (Lagzouli and Lakhal, 2020, p. 107). Paillard (2001), based on studies by Arrow explains that part of the staff dedicated to R&D and public or private laboratories specialized in the production of knowledge that was at the origin of the development of a new discipline dedicated to this function. Moreover, the term "*Knowledge Economy*" was first used by Drucker, P. who attributes the intellectual authorship of this concept to Machlup (1962), following Azuelos (2016). Paillard (2001, p. 10) explains that Machlup (1962) identifies in this sector "education, communication activities, information processing equipment, information services and other activities associated with information". This finding is confirmed by the OECD (1996, p. 7), which presents these economies as those "*that are directly based on the production, dissemination and use of knowledge and information*". The OECD (1996) cited by Paillard et al. (2001, p. 10) therefore, includes in this sector "*high- and medium-high technology manufacturing industries and two main categories of services: community, social and personal services and banking, insurance and other business services*". In the context to understand this discipline, it is important to complete the detailed presentation above with the work carried out on the measurement of this new branch of the economy through the analysis of the contribution of the theory of human capital and that of endogenous growth.

2.2.1. Contribution of Human Capital Theory

Mankiw (1995) distinguishes between "*human capital" and "knowledge*" and explains that knowledge is the sum of all scientific and technological discoveries and that human capital is

a resource spent to enable the transmission of knowledge to working populations and, therefore, it is knowledge, for this author and not human capital, which is at the origin of economic growth. Becker (1993) adds that knowledge diffusion is responsible for increasing returns and positive externalities, which allow human capital accumulation to play an essential role in economic growth.

2.2.2. Contribution of the Theory of Endogenous Growth

Unlike neoclassical growth theory, which identifies a single source of growth centered on the accumulation of physical capital, endogenous growth theory identifies several factors of economic growth summarized by Azuelos (2016, p. 3) in "*investment in physical capital, public capital, and human capital, but also learning by doing, the division of labor, as well as research and technological innovation*". The theory of endogenous growth also differs from the theory of exogenous growth, which identifies technical progress dependent on the accumulation of physical capital as the source of this growth. The exogenous theory gives few explanations for the origin of the technical progress that resides for the endogenous theory in a whole series of factors.

2.3. KBE and Economic Growth: Evolution of Models

The economic history of countries has always been marked by the search for sustainable economic growth ensuring their development and the well-being of their citizens. This has led to a renewed interest in understanding the determinants of economic growth. Several models were then developed in order to understand the mechanisms for creating and maintaining significant levels of growth, historical analysis of these shows that interest in the development of economic growth models is very recent. It goes back, according to Sadigh (1996) to the years 1947 – 1948 and particularly to the work of Domar and Harrod.

In this second point, we will try to present a summary analysis of the main models that have influenced the development history of growth theories and that have allowed the emergence of endogenous growth models.

2.3.1. The Keynesian Model of Domar, E and Harrod, R

The model of Harrod, R. and Domar, E. is the first formalization of economic growth. It is inspired by the general theory of Keynes, J.M. which constitutes the foundation of modern macroeconomics and which develops its analyses based on the critique of classical theory and particularly the idea of the spontaneous regularity of the market economy allowing to achieve full employment without intervention of the public authorities. The analyses of Domar (1942) and Harrod (1948) and contrary to Keynes's conception of growth, J.M. take a long-term perspective and consider, according to Beitone et al. (2018), that investment plays a fundamental role in the process of capital accumulation, an important stage of economic growth. Domer, E.'s model focuses its analysis on investment, which is considered by this author as an expenditure allowing not only the creation of income thanks in particular to the multiplier effect, but also it allows the accumulation of capital and the increase of production capacities. Beitone et al. (2018) explain that for Domar investment first creates short-term demand related to the increase in the need for capital goods. Beyond the short-term effect on demand, investment, according to its rhythms, makes it possible to generate long-term income and increase production capacity and, according to the analysis conducted by these authors on the model of Domar, E. to create unemployment. Moreover, these authors add that for the Domar model, E. economic growth depends not only on the level of investment but also on its level of increase. It aimed to present the necessary conditions for demand to keep pace with the growth in supply created by investment. Muet (1993, p. 14) explains that the purpose of the

Domar model can be summarized as follows: "*under what conditions is the increase in demand compatible with the increase in productive capacity resulting from investment*"? Unlike Domar, who considered the growth rate of capital and output constant, Harrod, demonstrates the instability of economic growth and, according to Muet (1993, p. 15), poses two problems that summarize his model "*one is the stability of balanced growth, the other is the possibility of maintaining full employment*". Beitone et al. (2018) explain that Harrod develops its model based on that of Domar, and add that Harrod identifies three growth rates that must be equal, according to this author in order to ensure balanced growth allowing full employment this situation is summarized by Harrod thanks to the following equality g = n = s/v with:

- g is the justified or guaranteed growth rate that refers to the long-term equality between firms' investment decisions and households' saving decisions and also, according to Beitone, A. et al. (2018), refers to the profits that firms anticipate and the adjustments they make in investments according to their expectations.
- n is the natural rate of growth, considered by this economist as exogenous to the economy, and it is obtained from the active population.
- s/v is the real or effective growth rate; It is a function of the multiplier effect of the investment.

The "*Keynesian neo-Cambridgian*" school, which criticized the neglect of the influence of income distribution, in particular, corporate profits or savings, on growth, presented the first criticisms of the model of Domar and Harrod second and most important wave of criticism has been formulated by the neo-classicists and particularly Solow (1988, p. 5) who considers that "*The doubts came from their assumption of fixity of the three elements - saving rate, growth rate of labor power and capital coefficient - which were considered as data*". This author justifies this position by the fact that these rates may vary independently and sporadically in view of their nature.

2.3.2. Neoclassical Theory of Growth (Solow Model)

The model of Solow constitutes a critique and an evolution of the Keynesian model developed by Harrod, R. and Domar, E. and a overcoming of the limits of their model. The starting point of Solow's model is the neoclassical growth model based on the assumption of a production function characterized by a diminishing marginal return. Boulhol et al. (2008) explain that Solow's model has been widely used to explain growth through its flexibility and simplicity. Add that, "*the empirical version of the model is sufficiently general to be consistent with some endogenous growth models (Arnold et al., 2007)*" (Boulhol et al, 2008, p. 314). The simplicity of Solow's model is linked, for these authors, to the use of a simple function and the performance of technological progress that this author considers constant. According to Boulhol et al. (2008), this simplicity has made it possible to make comparisons between countries' strategies and levels of development. The starting point for the 1987 Nobel Prize winner's model, Solow is his paper entitled "*A contribution to the theory of economic growth*" published in 1956. His model is a response to the criticisms levelled at the model of Domar and Harrod, in particular, the miraculous nature of their balanced growth. Solow's model is based on several assumptions that naturally refer to the neoclassical model. These assumptions can be summarized as follows:

- The substitutability of factors of production: Solow admits the long-run substitution between factors of production (labor and capital), according to their relative costs;
- The homogeneity of the factors of production: Solow considers that these factors are of the same nature and can be infinitely divisible;

- Capital is characterized by decreasing marginal productivity: Solow considers, while assuming a given volume of labor, which the growth of capital leads to a decrease in output and, in the end, the accumulation of capital that forms the basis of this model becomes less and less efficient. Solow identifies this situation of regular state where the growth of production costs more than it produces;
- Savings are fully invested: this is one of the postulates of the neo-classical current, which considers that savings are totally invested and that its level determines the level of investment;
- The production function of Solow is a Cobb-Douglas function;
- Exogenous parameters: Solow cited by Avallone and Nicolas (2002), considers as exogenous the rates of technological progress, population change and savings.

Solow, R.M. part's model of an economy with two inputs, labor (denoted L) and capital (denoted K). Both factors are compensated according to marginal productivity. This economy allows the production of a single good that Avallone and Nicolas (2002) consider as "*composite*" allowing both investment and consumption. These authors conclude that, the long-run growth rate in the model of Solow depends entirely on the rate of population growth and of technical progress, which makes growth dependent on an exogenous factors while excluding the influence of economic behavior with the exception of saving which continues to play a central role in growth and this role ceases when growth reaches it equilibrium. Despite the progress made thanks to the model of Solow, the latter has been the subject of several criticisms related in particular to the treatment it reserves for technological progress, which is considered by Solow as exogenous. This led to the abandonment of studies oriented towards economic growth for several years. Indeed, Sadigh (1996) concludes that the inability of Solow's model to integrate technological progress into its model is "*one of the reasons for the dormancy of the study of economic growth for several decades*" (Sadigh, 1996, p. 1). It was therefore necessary to wait until the years 1986 – 1988 to breathe new life into theories of growth and especially the work of Romer (1986) and Lucas (1988) who developed models to integrate technological progress or human capital as explanatory variables of economic growth, giving rise to models of endogenous growth.

2.3.3. Endogenous Growth Theory: A New Breath for Theories of Economic Growth

From the 80s, studies on growth began to gain importance. Indeed, following the economic crises of the 70s caused by an international environment permeated by the Cold War and the two oil shocks of 1973 - 1974 and 1979 - 1980, economists began to take an increasing interest in issues related to growth. Consequently, the studies carried out at that time naturally started from the model of Solow, but economists encountered several questions including the problem of the exogeneity of technical progress, the decreasing yield of the factors of production, the dependence of the long-term growth rate on the rate of population growth and productivity gains and the evolution of economic growth towards a steady state in the sense of Solow. The theories of endogenous growth were born thanks to the work of two economists, Romer, who published in 1986 his article "*Increasing Returns and Long-Run Growth" and Lucas, R.E. who wrote in 1988 his article* "On the Mechanics of Economic Development". These two articles, thus, constitute the foundations of endogenous growth theories. Theories of endogenous growth attempt, following the work of Ruttan (1998) inspired by Artus (1993) and others, to provide a number of clarifications:

- On the one hand, explain the problem of convergence of growth rates between countries and clarify the discrepancies between growth rates and wealth between countries. Avallone and Nicolas (2002) also add that these theories demonstrate the explanation lies in "the

absence of externalities, spillovers and other sources of increasing returns" (Avallone and Nicolas, 2002, p. 9);

- On the other hand, to improve the fundamental hypothesis of the neo-classical current relating to perfect competition in the market and the diminishing return of the factors of production and in particular capital. Baumont (1994) concludes that the endogenous of technical progress has led to an evolution in the conception of economic growth. Indeed, this author explains that it "*is no longer only quantitative (it is an ever greater accumulation of quantities of factors of production), but it is now invested with a qualitative dimension through the analysis of knowledge phenomena. Of course, the implementation of this qualitative dimension is always carried out through measures (increase in human capital, innovations, product diversification, productivity gains induced by capital, etc.).* (Baumont, 1994, p. 4). Figure 2 presents the endogenous growth model and distinguishes it from the model of Solow.
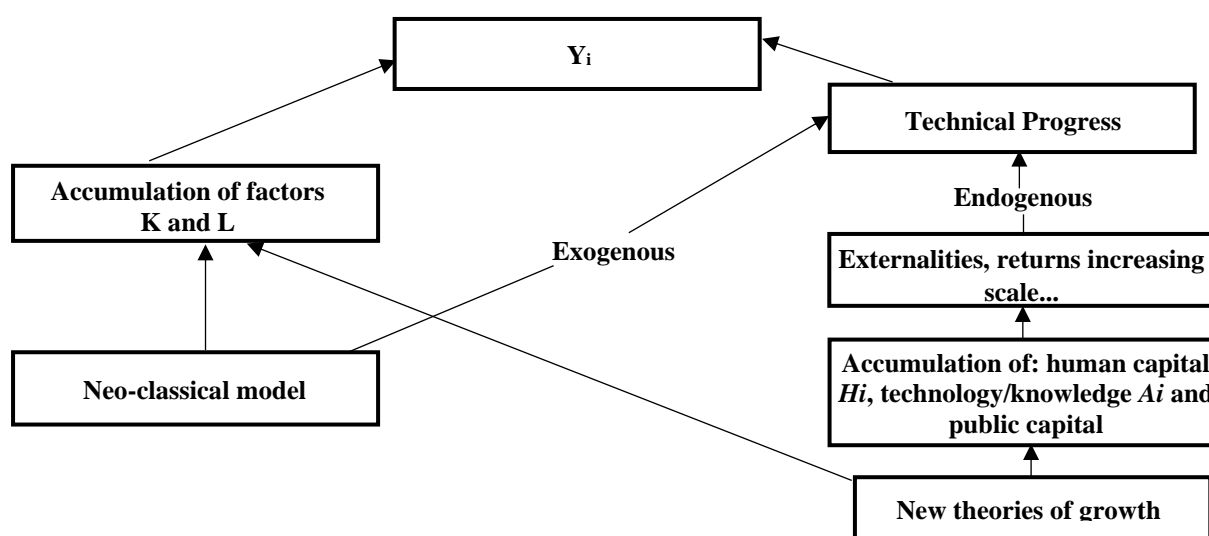

Figure 2. Presentation of growth according to endogenous growth models and that of Solow, R.M.
Note: Avallone, N. and Nicolas, F. (2002, p. 14)

Therefore, Guellec and Ralle (2003) conclude that the neoclassical current identifies "*the increase of physical capital*" as the sole source of growth. While for endogenous design, the sources of growth are multiple "*investment in physical capital, public capital, human capital; learning by doing; division of labor; research and technological innovation*" (Guellec and Ralle, 2003, p. 47). Several endogenous growth models, integrating different explanatory variables, have been developed, the so-called founding models of this current remain those developed by Romer, Lucas, and Barro who have breathed new life into the models of analysis of economic growth thanks to the integration of different explanatory variables such as, technology, scientific research, human capital or public goods.

3. Materials and Methods

The development of the role of modelling in economics is one of the developments that have marked these disciplines in recent years. Indeed, Le Gall (2008) explains that the use of modeling in economics has allowed this discipline, on the one hand, to better broaden its field of study and its borders, on the other hand, to build "*a hard social science*" capable of endowing it with an experimental framework similar to that of the natural sciences. Haavelmo (1944, p. 14), quoted by Le Gall (2008, p. 211) explains that models refer to "*experiments that we would like to carry out in order to see whether certain real economic phenomena, when artificially*

isolated from 'other influences', verify certain hypotheses". Lucas (1988, p. 5) adds, moreover, that any model is a description of "*a mechanical, artificial world, populated by interacting robots that the economy typically studies, and capable of revealing a behavior whose broad strokes resemble those of the real world.*" At the level of this third point, which represents the empirical framework of this study, we will try to present a model allowing, in the medium term, to test the impact of KBE on economic growth through the analysis of the different hypotheses of our problem.

We will base ourselves on the panel data technique and the identification of a model that will follow a structured sequence in two stages, the first step will allow us to identify all the sources (explanatory variables) of economic growth (variable explained), the second step will allow us to better test the impact of these variables and particularly those specific to KBE. In addition, the study period initially set between 1990 and 2019 has been modified and reduced to the period between 1996 and 2019 because of the unavailability of information for certain variables included in this study. Indeed, information on one variable in particular, governance, is only available and regular for the period 1996-2019, which led us to exclude from our study the period between 1990 and 1995. The consequences of the Covid-19 pandemic also force us to exclude the period between 2020 and 2021 because of its temporary effects on global economic growth. For the realization of the practical part, two software were used, the Stata software which is a generalist statistical software that facilitated the manipulation of the databases used during this study and to conduct a wide variety of econometric analyses. The second software is SPSS used to apply the principal component analysis (PCA) needed to calculate the values of the composite indicator of governance.

3.1. Presentation of Variables

3.1.1. The Explained Variable of the Conceptual Model: Economic Growth

Economic growth is the variable that is sought to be explained in this model based on endogenous growth theories. This concept has undergone significant evolutions and the conceptual models devoted to its study remain varied and have all contributed to the emergence of the endogenous conception of growth. Our conceptual model aims to explain economic growth at the level of Morocco, through the test of influence of several factors, in particular, those identified by the knowledge economy. In our model, growth will be represented by the logarithm of GDP (denoted LnGDP) and will be expressed in constant 2010 dollars.

Our objective will therefore make it possible to study the importance for Morocco to open up more to knowledge-based economies and to establish the necessary conditions for their development. Thus, our central hypothesis that we will try to verify at the level of our study is: "*the knowledge economy contributes positively to Morocco's economic growth*".

Vérez (2009, p. 18) explains that the confirmation of this hypothesis is old among economists. Indeed, this author, by analyzing the work of several economists (Marx, Marshall, Schumpeter, Arrow), affirms the key role that these economies play in growth. Moreover, several approaches have attempted to demonstrate this hypothesis, the first developed by Lucas (1988) which bases his model on knowledge and the accumulation of human capital and confirms the hypothesis of the positive impact of knowledge on growth. The model of Mankiw et al. (1992) and that of Azariadis and Drazen (1990), also confirm this observation.

3.1.2. The Explanatory Variables of the Conceptual Model

Work on the study of the determinants of economic growth has been one of the main links in economic studies and research since the mid-80s. This work has been improved by the progress

brought about by the work of Romer (1986) and Lucas (1988) on endogenous growth and by the work on econometrics applied to economic growth and, in particular, the work on the convergence hypothesis of developed economies by Barro (1991); Barro and Sala-i-Martin (1992); Mankiw et al. (1992). Recent theories on this subject have developed several variables to explain growth. These variables can be grouped into three categories, according to Tarno cited by Silue et al. (2023):

- Conventional variables;
- Economic policy variables;
- Variables related to the environment.

To these three categories of variables and in order to respect the purpose of our study, we will add a fourth category of variables composed of variables related to the knowledge economy.

The theoretical basis of these variables are presenting as follows:

Innovation: Technological progress, organizational change, new ways of working or production, new products creating or responding to new needs, are the characteristics of our society and future societies and are a prerequisite for growth and development. Indeed, Boyer et al. (1998, p. 8) explain that innovation was always the main source of growth in the case of the United States and that "*one of the characteristic features of the 'American miracle' is the diffusion of innovation to the entire economy, including services*". On the other hand, the emphasis on innovation in economic analysis and studies of development and growth has grown significantly since the work of Schumpeter (1911), in particular, his analyses of economic development. This work has enabled innovation to take a central place in economic analysis, a place that has been further developed following the advances brought about the theory of endogenous growth. In this analysis, technological progress and innovation are considered to be the main drivers of economic development, according to Schumpeter (1911) cited in Universal Encyclopedia (2017, p. 1). Innovation creates the necessary conditions for an "*endogenous break with the economy.*" It thus opens up new perspectives on economic growth, which, according to Schumpeter cited by Paulré (2016, p. 43), is generated through "*new combinations of production*" and a new set of supply factors, these factors make economic growth possible. New production methods, new sales markets and the use of new raw materials may be available. For reasons of information availability, the measurement of innovation in our conceptual model will be based on the number of patents. Therefore, the variable (IUU) is a measure of the number of patents representing an innovation. **Governance:** Ancient theories held that the development, economic growth and prosperity of a country were purely the result of economic determinants. However, several recent studies have shown a strong relationship between growth and certain non-economic determinants. Indeed, the presence of these non-economic determinants of a business-friendly environment may lead to significant differences in development and economic growth across countries. Such is the case with governance, which since the 1980s has become an important element of any development strategy and a requirement for donors. This has attracted the interest of several authors (Barro (1991); Mauro (1995); Knack et al. (1995)) and institutions (World Bank (1989)). Rasoud et al. (2019) citing Staplen-hurst F. and Kpundc, S.J. define governance as "*the exercise of economic, political and administrative power to manage the affairs of a country at all levels*". These include mechanisms, procedures and institutions through which citizens and groups express their interests and disagreements, exercise their rights and fulfill their obligations. Governance includes the state but transcends the state and involves the private sector and civil society organizations. " Our model will therefore integrate governance variables (denoted GOV) by applying the World Governance Indicators Database, which is based on a weighted average based on six indicators (* Voice and Accountability; * Political Stability and Non-

Violence; * Government efficiency; *Regulatory quality; *Rule of law; *Anti-corruption). The implementation of this weighting will be based on principal component analysis (PCA) at our model level, applied to 6 governance indicators identified from the World Bank's WGI database.

Human Capital: The importance of the individual as a factor in economic progress is no longer obvious, as this conclusion has long been unanimously accepted by economists. In fact, the idea of individuals as capital goes back to very old economists like Smith A., who viewed individuals as assets just like physical capital factors. According to Keeley (2007), this vision took a long time to become a theoretical concept until the 1960s, especially through the work of the 1992 Nobel Prize winners Shultz (1961) and Becker (1993). The development of a concept is considered an important component of economic analysis aimed at assessing the impact of investments in education and training on individuals. Some authors consider this concept as a major driver of growth (Blankenau et al. (2007); Leeuwen et al. (2008); Stengos et al. (2008)). Thus, several authors have incorporated the human capital variable into their conceptual models, even if this incorporation has been done gradually, and is now becoming one of the main components of any development strategy. On the other hand, other authors, based on the empirical studies they have conducted, estimate that the effect of human capital is either minimal or negative (Sequeira et al. (2008)) on economic growth or requires the fulfilment of a number of conditions, such as the generalization of education (Permani, R. (2009); Horii et al. (2008)). Inspired by the MRW model, we will use as a proxy for human capital "the growth rate of the gross secondary enrolment ratio (denoted KH)" which is a measure of the effort undertaken by any country to improve its stock of human capital.

Information and communication technology: ICT is an effective means of spreading the knowledge economy and has accelerated the pace of innovation through the development of cooperation in knowledge production and significant externalities of its outcomes. The definition of ICT has been accompanied by many difficulties and disagreements, related to each author's position and perspective, time or technological developments. Therefore, Basque (2006, p. 34) describes these activities as "*a set of technologies based on computers, microelectronics, telecommunications (especially networks), multimedia and audiovisual media that, when combined and interconnected, enables the search, storage, processing and transmission of information in the form of various types of data (text, sound, still images, etc., video images, etc.) and enables interaction between people and between people and machines.*" Regarding the relationship between ICT and growth, several studies attribute positive effects on economic growth to ICTs, a large part of these studies, Gordon (2000), Oliner et al. (2000), Schreyer (2000) for example, have based themselves on national accounts data. On the other hand, the work of Röller et al. (2001) and Sridhar et al. (2004) focuses specifically on the contribution of telephone line types (fixed and mobile) and finds that there is a positive link, in developing countries, between cellular services and the increase in national productivity. This is also confirmed in developing countries by Waverman et al. (2005) and sub-Saharan African countries by Lee et al. (2009). In order to measure, in our model, the contribution of the ICT variable (denoted ICT) to economic growth, we opted for the indicator of the number of Internet users in relation to the total population.

Table 1 summarizes the variables used to explain economic growth in the Moroccan case.

Table 1.
The variables of the model

Variable Group	Variable Name	Measurement indicator
Variables related to Knowledge-Based Economies	Innovation	* Number of patents (INN) * Venture capital investment (Caprisk)
	Governance	The weighted average of six rated indicators (GOV) (* Voice and Accountability; * Political Stability and Absence of Violence; * Government Effectiveness; * Regulatory Quality; * Rule of Law; * Control of Corruption)
	Human Capital	The growth rate of the gross secondary school enrollment rate (KH)
	Information and Communication Technologies (TIC)	Number of Internet users compared to the overall population (TIC)
Conventional variables	Natural resources	Dummy variable (denoted RESNAT), this variable takes a value of 1 if the country is an exporter of petroleum products and 0 otherwise
	Population growth	Population size (TPOP)
	Physical capital	Gross fixed capital formation (CAPH)
	Labor force	Number of workers in the economy (TRA)
	Infrastructure	The density of the road network (INFST)
Variables related to economic policy	Inflation	Consumer price index (INFLA)
	Budget policy	Budget deficit (DEBU): expressed as a budget deficit rate
Variables related to the environment	The political system	Dummy variable (denoted SYSPO) which will take a value of 0 for republican countries and a value of 1 for monarchical countries
	The quality of institutions (QINS)	The perception index Corruption (CORUP)
Variables related to openness to the outside	Imports and exports	* The volume in constant Dollar $ (noted IMPOR) * Volume in constant Dollar $ (denoted EXPOR)
	Foreign direct investment	Foreign Direct Investment (FDI) flows (denoted IDE-F)

Note: Authors' own conception

In addition, the integration of the variables identified in Table 1 into our conceptual model will be linked to the availability and regularity of usable statistical data during the period chosen for the latter.

3.2. Econometric Study of the Impact of KBE on Economic Growth

The objective of this third point is to estimate a medium-term economic growth model using panel data techniques. The model estimate will be based on an endogenous growth model and will make it possible to analyze the impact of the variables related to the KBE, identified above, on economic growth by integrating in turn the effect of each variable that makes up these economies.

3.2.1. Econometric Approach

We will try in this part reserved for the econometric approach, to present the data sources used and the specifications of our conceptual model.

3.2.2. Data Source

To do this, the data used come from the World Bank's World Development Indicators database (2021) and the University de Sherbrook's Perspective Monde website and they have an annual dimension and cover the period from 1996 to 2019. This choice of period is dictated by the

availability of consistent and actionable data throughout the analysis period. To calculate the composite governance indicator, we applied a principal component analysis (PCA) to the six governance indicators in the World Bank's WDI database between 1996 and 2019, which will allow us to calculate the governance indicator by identifying the weights for each indicator in the composition of this variable.

3.2.3. Model Specification

The models adopted in this study are simple linear models that take the form: $Y_i = \alpha_i + \beta_i X_i + \varepsilon_i$

With:

Y_i: GDP

β_i : The coefficients associated with the explanatory variables

X_i: One of the explanatory variables

ε_i: Error terms or innovations

The initial specification of the model conforms to the standard neoclassical growth model. It takes into account only one factor of convergence and the fundamental determinants of steady state, namely physical capital accumulation and population growth. By necessity and based on a set of indicators developed by the endogenous growth stream, it is necessary to introduce other factors that influence growth, namely human capital, innovation, factors related to economic policy, the environment, openness to the outside world and governance.

4. Results and Discussion

Before estimating our model, we will start with a description of the data identified by the different databases used in this research work. Thus, after a descriptive analysis of the data, we will try to study the correlation between the variables used in the formation of our conceptual model.

4.1. Descriptive Data Analysis

In order to present a descriptive analysis of the data collected at the level of the different databases used in this study, we decided to divide the analysis period into two equal groups: the first is spread over a period of 12 years between 1996 and 2007 and the second over the same period (12 years) between 2008 and 2019. This sharing of the analysis period would allow us to better estimate the change in data and their evolution over time. The average GDP recorded during the first period was estimated at $ 64.26 billion and $ 106.61 billion during the second period recording a significant evolution of 65.90%. For the KBE-related variables, the descriptive analysis will focus on the four variables used to analyze the impact of these economies on economic growth.

Table 2 summarizes the results obtained.

Table 2.
The average of the variables related to the knowledge economy

Ln INN		GOV		KH		Ln TIC	
1999-2007	**2008-2019**	**1999-2007**	**2008-2019**	**1999-2007**	**2008-2019**	**1999-2007**	**2008-2019**
6,02	7,19	0,22	0,07	3,33	3,74	0,05	3,91

Note: World Development Indicators (WDI) 2021, author's calculation

The study of the evolution of the indicators for measuring the variables related to KBE shows an evolution of all these indicators between the two periods of analysis, with the exception of governance, which recorded a significant decline.

Table 3 above gives us a summary of the averages obtained by the other variables.

Table 3.
The average of the other variables used to study economic growth in Morocco

Conventional variables					
Ln POP		**Ln CAPH**		**Ln TRA**	
1999-2007	**2008-2019**	**1999-2007**	**2008-2019**	**1999-2007**	**2008-2019**
17,19	17,34	23,28	24,17	16,11	16,28
Economic policy variables					
INFLA		**DEBU**			
1999-2007	**2008-2019**	**1999-2007**	**2008-2019**		
0,0181	0,0135	-0,0158	-0,0412		
Variables related to openness to the outside					
Ln EXPORT		**Ln EXPORT**		**IDE-FN**	
23,66	24,29	23,83	24,59	1 254 374 119,50	2 019 770 554,31

Note: World Development Indicators (WDI) 2021, author's calculation

All the variables used to study economic growth show a positive evolution between the two periods of analysis, with the exception of the budget deficit, which recorded an increase between these two periods.

4.2. Contribution of KBE to Economic Growth in Morocco

In this step we present our approach to estimate the specific effects of each KBE variable.

4.2.1. The Specific Effects of Human Capital (HK)

Our objective is to estimate the effects of human capital on economic growth in the Moroccan case. We will use secondary school enrolment (KH) as a proxy for human capital in line with most empirical studies on the subject Lucas (1988), Barro (1991), Mankiw et al. (1992). Our (fixed-effect) model in this case takes the form of the following equation 1:

$$\ln Y_{it} = \mu + \alpha_i + \beta_1 TPOP_{it} + \beta_2 CAPH_{it} + \beta_3 \text{INFLA}_{it} + \beta_4 \text{DEBU}_{it} + \beta_5 \ln IMPORT_{it} + \beta_6 \ln EXPORT_{it}$$
$$+ \beta_7 SYS_{it} + \beta_8 \ln RESNAT_{it} + \beta_9 IDE - FN_{it} + \beta_{10} KH_{it} + \varepsilon_{it}$$

With HK_{it} : The gross secondary enrolment rate in logarithm was approximated by the number of students enrolled in secondary education.

The fixed-effect model estimate shows that human capital (HK) effects are not significant (see Table 4).

This result is consistent with the conclusion of several empirical studies (such as those of Benhabib, J. and Spiegel, M. (1994), Islam, N. (1995); Pritchett, L. (1996), Marc Gurgand; 2000) which confirm the lack of effect.

Table 4.
Specific effects of human capital (HK) (Fixed-effect model) in the Moroccan context

Source	SS	DF	MS		
Model	.000016198	7	2.3140e-06	Number of obs =	24
				F(7,16) =	3.55
				Prob > F =	0.0169
Residual	.000010416	16	6.5098e-07	R-squared =	0.6086
				Adj R-squared =	0.4374
Total	.000026614	23	1.1571e-06	Root MSE =	.00081

Population growth ~ n	Coef.	Std. Err.	t	P > |t|	[95% conf.	Interval]
FBCFPIB	.00002	.0000595	0.34	0.742	-.0001062	.0001461
INFLA	-.0001446	.0002081	-0.69	0.497	-.0005858	.0002966
LnEXPORT	-.008322	.0027129	-3.07	0.007	-.0140731	-.0025709
LnIMPORT	.0083211	.002505	3.32	0.004	.0030107	.0136316
Fluxnets	2.91e-13	2.22e-13	1.31	0.209	-1.80e-13	7.63e-13
Perception index of 1~u	.0000518	.0000556	0.93	0.366	-.0000661	.0001697
The growth rate KH	.000831	.0003004	2.77	0.014	.0001942	.0014678
SYS	0	(omitted)				
RESNAT	0	(omitted)				
- Cons	.0079117	.0163835	0.48	0.636	-.0268197	.0426432

Note: World Development Indicators (WDI) 2021, author's calculation

This result remains in line with the conclusions of the World Bank, which estimates that "*41% of the country's per capita wealth was based on human capital, a figure well below that of countries with a comparable level of development*". According to the same source, the study of the evolution of the Human Capital Index (ICH) between 2010 and 2020 shows an increase of 5% on average at the international level. This increase was estimated at 6% in the Moroccan case, an advance mainly attributed to developments in the field of education. This progress is considered by the World Bank encouraging and remains insufficient given the significant challenges that persist in this country in terms of quality, equity, competitiveness, adaptation to market requirements and strategies to solve the problems and shortcomings that characterize the management of this sector. Indeed, this analysis by the World Bank revealed that Morocco is not yet able to achieve the fourth Sustainable Development Goal focused on access for the entire population and on an equal footing to quality education while guaranteeing lifelong learning opportunities. The World Bank estimates that "*in 2019, 66% of Moroccan children aged 10 were unable to read and understand plain text, 2.5 points below the regional average for the Middle East and North Africa and 10.7 points below the average for lower-middle-income countries*".

The unfavorable situation that Morocco is experiencing in terms of this indicator, despite the efforts made, is also expressed by the actual duration of schooling (number of effective years of schooling in relation to the volume of achievements), which was estimated at only 6.2 years, 4.4 years below the actual level. This reflects a situation of real learning crisis that requires urgent mobilization by the authorities in order to equip each student with the necessary skills to integrate, in adulthood, more easily into society and the national economy. In addition to this crisis, there is an exceptional constraint created by the Covid-19 pandemic crisis, which has brought Morocco into a new dynamic leading to the transfer of learning places from school to other unconventional spaces. Morocco, like the majority of countries, is not prepared to face this situation. Indeed, Naji (2020) explains that Morocco "did not have a prior strategy to deal with this unexpected situation, as the concept of resilience of education systems is not yet included in public policies".

4.2.2. Specific Effects Related to Governance (GOV)

In our understanding of the knowledge economy, governance is the second pillar. In the following, we will test the impact of the quality of governance on economic growth in the specific Moroccan case. To measure the quality of governance, we developed the indicator (GOV) which is by definition the weighted average of the six governance dimensions presented in the World Governance Indicators database (2021). The following equation 2 presents our model after the introduction of the indicator (GOV).

$$\ln Y_{it} = \mu + \alpha_i + \beta_1 TPOP_{it} + \beta_2 CAPH_{it} + \beta_3 INFLA_{it} + \beta_4 DEBU_{it} + \beta_5 \ln IMPORT_{it} + \beta_6 \ln EXPORT_{it}$$
$$+ \beta_7 SYS_{it} + \beta_8 \ln RESNAT_{it} + \beta_9 IDE - FN_{it} + \beta_{10} KH_{it} + \beta_{11} GOV_{it} + \varepsilon_{it}$$

According to the result, summarized in Table 5, the quality of governance has a positive effect on economic growth. This result is consistent with the literature that suggests a positive relationship between the level of governance and economic growth.

These analyses again confirm the results we have reached in our descriptive analyses carried out in the previous section. It is clear that governance as the second pillar of the KBE has a positive and statistically significant impact on economic growth in the Moroccan case. This result is consistent with empirical assessments and consistent with theory, it is an accurate reflection of the situation in this country. Despite this positive result, Morocco is called upon to double its efforts in order to overcome certain shortcomings that persist, in particular, as explained by the ICPC (2011), in terms of:

- Accountability and control of public affairs managers;
- Lack of participation of all components of society in the national economic and political effort;
- Operationalization of all governance structures;
- Solve the problem of corruption once and for all;
- Resolving failures in the justice system.

Table 5.
Specific effects of governance (fixed-effects model) in the Moroccan context

Source	SS	DF	MS			
Model	.000018328	8	2.2910e-06	Number of obs =	24	
				F(8,15) =	4.15	
				Prob > F =	0.0086	
Residual	8.2857e-06	15	5.5238e-07	R-squared =	0.6887	
				Adj R-squared =	0.5226	
Total	.000026614	23	1.1571e-06	Root MSE =	.00074	

Population growth ~n	Coef.	Std. Err.	t	P > |t|	[95% conf.	Interval]
FBCFPIB	-.000048	.0000648	-0.74	0.471	-.0001862	.0000902
INFLA	-.0001313	.0001918	-0.68	0.504	-.0005402	.0002775
LnEXPORT	-.006189	.0027249	-2.27	0.038	-.0119969	-.000381
LnIMPORT	.0069177	.0024157	2.86	0.012	.0017688	.0120666
Fluxnets	4.28e-13	2.16e-13	1.98	0.067	-3.33e-14	8.89e-13
Perception index of 1~u	7.84e-06	.0000559	0.14	0.890	-.0001114	.000127
The growth rate KH	.0010106	.0002914	3.47	0.003	.0003894	.0016317
Gov	.0045074	.0022954	1.96	0.068	-.0003852	.0094
SYS	0	(omitted)				
RESNAT	0	(omitted)				
- Cons	-.0068556	.0168618	-0.41	0.690	-.0427956	.0290844

Note: World Development Indicators (WDI) 2021, author's calculation

4.2.3. Specific Effects Related to Innovation (IUU)

In this model, we use the indicator (INN) as a measure of innovation. This variable represents the number of patents granted per year. Introducing this indicator into our (fixed-effect) model yields the following equation 3:

$$\ln Y_{it} = \mu + \alpha_i + \beta_1 TPOP_{it} + \beta_2 CAPH_{it} + \beta_3 \text{INFLA}_{it} + \beta_4 \text{DEBU}_{it} + \beta_5 \ln IMPORT_{it} + \beta_6 \ln EXPORT_{it}$$

$$+ \beta_7 SYS_{it} + \beta_8 \ln RESNAT_{it} + \beta_9 IDE - FN_{it} + \beta_{10} KH_{it} + \beta_{11} GOV_{it} + \beta_{12} \ln INN_{it} + \varepsilon_{it}$$

Estimating this equation by a fixed-effect model gives the results reported in Table 6 below. The coefficient associated with innovation reveals a positive and insignificant effect of innovation on economic growth. This is consistent with the theory that predicts a positive impact of innovation on economic growth.

Table 6.

Specific effects of innovation (Fixed-effect model) in the Moroccan context

Source	SS	DF	MS		Number of obs =	24
Model	.00002338	9	2.5978e-06		$F(9,14) =$	11.25
					Prob > F =	0.0001
Residual	3.2341e-06	14	2.3100e-07		R-squared =	0.8785
					Adj R-squared =	0.8004
Total	.000026614	23	1.1571e-06		Root MSE =	.00048

Population growth ~n	Coef.	Std. Err.	t	P > |t|	[95% conf.	Interval]
FBCFPIB	.0000143	.000044	0.32	0.751	-.0000801	.0001086
INFLA	.0001533	.0001382	1.11	0.286	-.0001431	.0004497
LnEXPORT	-.0035859	.001848	-1.94	0.073	-.0075494	.0003776
LnIMPORT	-.0026115	.0025676	-1.02	0.326	-.0081186	.0028955
Fluxnets	4.23e-13	1.40e-13	3.02	0.009	1.23e-13	7.23e-13
Perception index of 1~u	.0000175	.0000362	0.48	0.637	-.0000602	.0000952
The growth rate KH	.0002341	.0002512	0.93	0.367	-.0003046	.0007728
Gov	.0001453	.0017532	0.08	0.935	-.0036148	.0039055
LnINN	.0001105	.0000236	4.68	0.000	.0000598	.0001612
SYS	0	(omitted)				
RESNAT	0	(omitted)				
- Cons	.1564506	.0365845	4.28	0.001	.00779846	.2349166

Note: World Development Indicators (WDI) 2021, author's calculation

The results obtained by this indicator perfectly reflect the situation in Morocco. Indeed, a reading of Morocco's 2020 ranking in terms of the global innovation index (75th place out of 147 countries) shows that Morocco's situation remains fragile and requires unconditional support from public authorities for its development. Based on the conclusions of the CESE (2020), we can present a number of recommendations summarized in the following points:

- Strengthen financial support for innovative companies and start-ups, create, and strengthen venture capital initiatives;
- Development of a legislative and regulatory framework specific to this type of investment promoting greater ease in the procedures for the creation and dissolution of this type of business;
- Provide a specific tax framework and simplify encouraging initiatives in this area;
- Support or relax the costs related to the registration of patents at the national and international level;
- Strengthen the link between companies and universities in the context of public-private partnerships;

- Development of the role of the region through the creation of incubators and spaces for innovative companies;
- Strengthening intellectual property protection policies.

4.2.4. The Specific Effects of Information and Communication Technologies

In our model, we try to show the impact of the use of information and communication technologies (ICT) on economic growth in the Moroccan context. It should be noted that ICTs are represented in this model as a pillar of the knowledge economy, and therefore their effects are tested in conjunction with the effects of the other pillars.

The variable (ICT) that represents the ratio of Internet users to population is used here as an indicator of ICT use. Our (fixed-effect) model takes the form of the following equation:

$$\ln Y_{it} = \mu + \alpha_i + \beta_1 TPOP_{it} + \beta_2 CAPH_{it} + \beta_3 INFLA_{it} + \beta_4 DEBU_{it} + \beta_5 \ln IMPORT_{it} + \beta_6 \ln EXPORT_{it}$$

$$+ \beta_7 SYS_{it} + \beta_8 \ln RESNAT_{it} + \beta_9 IDE - FN_{it} + \beta_{10} KH_{it} + \beta_{11} GOV_{it} + \beta_{12} \ln INN_{it} + \beta_{13} \ln TIC_{it} + \varepsilon_{it}$$

The estimation of this equation by the fixed-effect model gives the results reported in Table 7 which confirms that the variable (ICT) is not significant although it shows a positive sign, which means that the ratio of Internet users to population cannot play a role in explaining the economic growth of this country.

Table 7.

Specific effects of information and communication technologies (ICTs) (fixed-effects model) in the Moroccan context

Source	SS	DF	MS		
Model	.000023579	9	2.6199e-06	Number of obs =	24
				F(9,14) =	12.09
				Prob > F =	0.0000
Residual	3.0348e-06	14	2.1677e-07	R-squared =	0.8860
				Adj R-squared =	0.8127
Total	.000026614	23	1.1571e-06	Root MSE =	.00047

Population growth ~n	Coef.	Std. Err.	t	P > |t|	[95% conf.	Interval]
FBCFPIB	-.0000736	.0000409	-1.80	0.094	-.0001614	.0000143
INFLA	.0000445	.0001254	0.35	0.728	-.0002244	.0003134
LnEXPORT	-.0070655	.0017162	-4.12	0.001	-.0107464	-.0033845
LnIMPORT	.0004226	.0020079	0.21	0.836	-.0038838	.0047291
Fluxnets	3.83e-13	1.36e-13	2.82	0.014	9.17e-14	6.75e-13
Perception index of 1~u	3.92e-06	.000035	0.11	0.913	-.0000712	.0000791
The growth rate KH	.0003281	.0002293	1.43	0.174	-.0001636	.0008198
Gov	.0013104	.0015779	0.83	0.420	-.0020738	.0046946
LnINN	0	(omitted)				
TIC	.0001104	.0000224	4.92	0.000	.0000623	.0001585
SYS	0	(omitted)				
RESNAT	0	(omitted)				
- Cons	.1694874	.0373539	4.54	0.000	.0893714	.2496035

Note: World Development Indicators (WDI) 2021, author's calculation

The results obtained by this indicator show that the use of ICTs has no significant effect on economic growth in the Moroccan context. This is obviously not in line with the conclusions of the various theoretical currents regarding the existence of a positive impact of the use and diffusion of ICTs on growth and development. In our opinion, this result can be explained by the fact that the use of ICT is often known for final consumption. Therefore, this technology is not widely distributed in sectors other than sectors related to final consumption, especially in sectors related to production. This deprives productive activities of the advantage generated by ICTs, including the productivity gains achieved in ICT-producing sectors and transmitted

through the use and diffusion of ICTs. To be more precise, it can be said it is true that the diffusion and use of ICTs can have positive effects on growth, but we believe that these effects are conditioned by the nature of this diffusion and the character of the sectors targeted.

5. Conclusion

This research work focused on two main objectives, first, the identification of the main factors influencing economic growth in Morocco, and second, the presentation of HGFs, their main components and their impacts on growth. The study conducted previously allows us to conclude on the contribution of the economy to knowledge to economic growth in the Moroccan context; the results obtained through our models confirm on several occasions the absence of significant specific effects of the four components of the EFC (HK, GOV, INN, and ICT) on economic growth in Morocco.

Therefore, the KBE does not fully participate in stimulating economic growth in this country that does not benefit from all dimensions of this economy. This observation of Morocco's weak performance in terms of KBE, allows us to conclude that the identification of certain variables forming these economies in the CSDM report as a source of growth can constitute a sustainable bet for the development and diversification of the Moroccan economy. Add to that, for the achievement of the ambitious objective of achieving an annual growth rate above 6%, doubling GDP per capita by 2035, in line with the ambitions of the CSDM.

Abbreviations

CSDM: Special Commission on the Development Model.
KBE: Knowledge-based economy.
NDM: New development model.
OECD: Organization for Economic Co-operation and Development.
CAPC: Central Authority for the Prevention of Corruption.
MENA: The Middle East and North Africa

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