Potential of Alternative Energies

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The economic development model of the Angolan economy in order to analyze the adoption of an alternative strategy capable of leveraging the economy, based essentially on alternative energies, and therefore, to demonstrate and prove the need to diversify Angola's economic model, highlighting the benefits of a diversified versus a non-diversified economy with respect to sustainability.

Keywords: Angolan economy ; diversification

1. Introduction

The primary source of revenue for Angola's GDP is oil, thus, defining Angola's economic model as practically monolithic. Since oil is a commodity, a change in market value is predictable and can be positive or negative for Angolan interests. If the change in market value is negative, the Angolan government would be forced, as it has been in the past, to adjust its general budget to reflect updated oil prices. Oil is the country's largest generator of revenue, which could mean that many of the actions planned for a given year would not be carried out. This situation could force expenditure restraint or restriction situations and could even generate serious social and political pressures.

The World Bank's Report No. AUS6794, clearly stated that "an effective economic diversification strategy could increase Angola's long-term GDP growth trajectory". In the report, there is an obvious association between economic growth and the need to diversify domestic production, and therefore, create a more balanced fiscal balance. Based on the above, researchers justify the need to address this topic, since it is clear that strategic alternatives for Angola are necessary and mandatory to concretely change their economic model, generating greater sustainability and economic growth in the long term.

According to the Central Intelligence Agency, the Angolan economy is driven by the oil sector, representing around 50% of the GDP, accounting for more than 70% of the government's revenues, and corresponding to more than 90% of the country's exports, which confirm Angola's flagrant dependency on the oil sector. Oil prices are defined on the international markets with daily price oscillations, which become an economic instability factor and a problem for managing an economy that depends essentially on the oil industry. On the one hand, the problem of the Angolan economy lies precisely in the fact that oil is a non-renewable natural resource that could compromise the country's economic position in the long term. On the other hand, as researchers have seen, oil is a commodity and the Angolan government has no control over its price since it depends on the international markets. This reality already occurred in 2008, 2009, 2015, 2016, and 2017, when the Angolan government's general budget had to be revised due to a drop in the price of oil on the international markets. Between July and December of 2008, oil prices fell by about 70%, and since then, have fluctuated constantly. According to the International Monetary Fund Report No. 18/157, Angola, although it is the second largest oil producer in Africa, suffers severely when the price of oil is between USD 50 and 55, which involves reducing oil production because it is unprofitable, thus, creating severe budgetary problems because of the gigantic investment needs in infrastructure and social spending. The ideas presented in the abovementioned report justify the need for this research on energy alternatives.

2. Models of Endogenous Development of an Economy

Endogenous development is a paradigm based on the basic idea that the productive system of a country grows and is transformed using the development potential existing in the territories, that is, regions and cities, through investments made by companies and public entities, under the control of local communities, with the ultimate goal of improving the standard of living of the populations in these territories [1][2]. In this sense, it is clear that the concept of endogenous development integrates the social and economic dimensions. The protagonism claimed for the territorial dimension, in turn, is suggested not only as an expression of the spatial anchorage of organizational and technological processes but,

equally, of the circumstance that any locality or region offers itself as the result of a history that has been shaping its economic, cultural, and institutional environment.

Endogenous development is linked to the dynamics of a country, its cities and regions and the network of agents and interests that give them substance. This is to underline, in line with what [3][4][5] have stated, among others, that the processes of growth and structural transformation that take place arise as a consequence of the transfer of resources from traditional to modern activities, the exploitation of external economies, and the introduction of innovations, which are aimed at increasing the well-being of the population of the city, locality, or region that generated a change. In other words, growth is organized around the expansion and transformation of pre-existing activities, using the resources and innovation potential available in a territory, conditioned by the social and cultural structure and codes of conduct of human communities based in particular spaces, which favour or limit it and, in any case, give it its unique shape.

From a policy point of view, starting from the framework described above, the actions to be developed should take into consideration the availability of the country's resources and promote their economic enhancement, whether natural resources or others. The solidity of the economic affirmation processes and the capacity to internalize the wealth generated is due to political initiatives that should take advantage of the network of local solidarities and the existing or developed concertation capacity, involving all the economic operators' social agents and political decision-makers. The emphasis on a country's potential, which is the starting point for this approach to development, takes the form of a policy to enhance the resources and capacities of a region or country, which, as researchers shall see below, must be at the root of regional or even national policymaking.

3. Models of Exogenous Development of an Economy

An exogenous model studies the growth of a country's economy over a long period of time. The model presents the source of economic growth: capital accumulation, labor force growth, and technological change [6]. was concerned with demonstrating that product per capita was an increasing function of the relationship between capital and labor. Labor force grows at a natural rate (exogenous to a model). In this sense, an amount of savings per capita is necessary, which must be used to equip new workers with capital per capita equal to that of other workers. The other part of the savings should be used to guarantee non-depreciation of the capital. The first part of the savings quoted above to equip new workers is called "capital enlargement" (expansion of the labor force), and the savings used to increase the capital/labor ratio is called "capital deepening". To reach a steady-state situation, the savings per capita must equal capital enlargement. The capital per worker has a decreasing income, therefore, when this equilibrium point is reached, there is no point in investing more in a worker who has per capita savings equal to the capital expansion because this worker's productivity will not be maximized. Thus, the conditioning factor of economic growth is the growth rate of the labor force.

For [1], exogenous economic growth is long-term growth determined by forces that are external to the economic system. Exogenous development restricts the use of endogenous resources. It seeks opportunities for economic development abroad, considering the supply of raw materials, as well as knowledge, financing, skilled labor, and markets [7][8]. In the case of the Angolan economy, it is necessary to analyze the conditions and potentialities that the country possesses and to evaluate which economic development model best adapts to its reality. However, determining the optimal size of the public sector is difficult. The state's concern with maximizing long-term growth must weigh the effects of public intervention policy and the growth-retarding effects of higher taxes and regulations.

Regarding higher taxes and regulations, economic growth theory that takes consideraiton public sector functions such as correcting market failures, investments in infrastructure, and taxes, may neglect the state's role in redistributing income and how policy behavior is determined by sometimes conflicting interests. This is a situation that occurs in many countries, and researchers believe that sometimes political decision-makers are not in a position to make strategic decisions for the development of their countries.

4. Oil

Brazil's National Electrical Energy Agency [9] defines oil as a flammable oil formed, over millions of years, from the decomposition of organic matter such as plants, marine animals, and vegetation typical of flooded regions and found only in sedimentary terrain. Oil is composed of hydrocarbons, made up of carbon and hydrogen, to which atoms of oxygen, nitrogen, and sulphur can be added, as well as metallic ions, mainly nickel and vanadium. According to BP, world oil production in 2014 was around 4226.60 million tons per day, while daily consumption was around 4211.10 million tons. From the figures presented at the time, one can see that oil is a resource in high demand on the international markets [10]. Oil is a primary source resource on the stock exchange and its price is determined by supply and demand. Therefore, this

explains the importance of oil when analyzing some of its derivatives, such as petrol, paraffin, diesel, asphalt, synthetic rubber, lubricants, and plastics, among others. The BP report published in June 2015 illustrated the importance of oil in the Angolan economy, as the second largest oil producer on the African continent, with the ranking led by Nigeria [11].

The Economic Report of Angola 2016, prepared by the Catholic University of Angola, outlined the importance and impact of oil, evidencing the clear dependency on oil in relation to the economy. Oil is undoubtedly of paramount importance to the Angolan economy because it leverages a good part of other sectors of national activity such as agriculture, fisheries, manufacturing, and transport. Thus, economic sustainability involves a greater balance in the sources that generate the gross domestic product to generate new opportunities and reduce costs by reducing the need to import and leverage new possibilities and opportunities for internal capacity building and investments in new forms of energy production. When nearly 30% of the state budget is dependent on oil and gas revenues, the country is in a weak position to make reforms and strategic investments for the integral and ongoing development of the Angolan economy and society [12].

5. Biofuels

According to [13], biofuels are obtained from renewable organic matter, also called biomass, which can be products of animal or vegetable origin, as is the case of sugar cane, corn, soya, sunflower seeds, wood, and cellulose. Therefore, it is possible to produce fuels such as alcohol, ethanol, or biodiesel from these products. Biofuels are popular because they are a valid alternative to fossil fuels such as oil in specific sectors. In addition, they have lower production costs because they cause less impact on nature since they are biodegradable, they are marketed at a lower cost, and they are the result of renewable sources.

Brazil is an example of one country that have been looking at biofuels since very early on. According to the Ministry of Mines and Energy (MME), the pioneer tests were carried out between 1905 and 1925. In 1931, the Brazilian government established a decree that made mixing 5% alcohol in imported gasoline compulsory. However, with the discovery of extensive oil reserves in the Middle East, interest in biofuels declined globally. However, with the first world oil crisis in 1973, the search for new energy sources re-emerged.

In 2015, Paris, France hosted the 21st United Nations Conference on Climate Change (COP 21), whose objective was to bring countries to an agreement on global warming by reducing the emission of greenhouse gases [14]. Unfortunately, that same year, there was a drastic fall in oil prices, generating considerable constraints in the economies of the producing countries, which had to review their budgets and were forced to reflect on alternatives. However, even before the great discussions on climate, greenhouse effect, and oil crisis, several countries were already producing biofuels in considerable quantities, such as the United States of America, Brazil, Germany, and Indonesia.

6. Ethanol

Ethanol is obtained from sugar cane as a biofuel, since the term biofuel is generic and may encompass several types and several origins. Nevertheless, researchers identified different energy alternatives in the questionnaire, such as biodiesel, algae biodiesel, H-BIO, geothermal, hydraulic, solar, wind, and tidal energy alternatives. According to Petrobras, ethanol is alcohol with an oxygenated organic compound, also called ethyl alcohol, and its chemical formula is C_2H_5OH. Ethanol is obtained from various raw materials such as sugarcane, corn, manioc, and sugar beet [13].

According to the Ethanol Industry Association (IEA), and in terms of applications and uses of ethanol, it can be used as a raw material in three areas, i.e., beverages, fuels, and industry, the latter being the final use in: the manufacture of pharmaceuticals, cosmetics, toiletries, detergents and cleaning products, printer ink cartridges, paints, and coatings. The ethanol industry will always depend, in a first analysis, on the existence of the minimum conditions for the generation of raw material, and the potential that this raw material has in terms of quantities and respective renewal conditions [15]. According to [16], implementing biofuel projects in Angola require about two years of research related to product tests and choices of best species. In addition to expenses and direct costs required to implement an ethanol industry, there are other important areas to take into consideration, such as legislation, equipment, and human capital that always vary, and therefore, require a feasibility study involving experts in the most distinct areas, who can determine with proven evidence the probability of success or otherwise in implementing an ethanol industry.

Concerning the ethanol industry, the approach taken in this entry is not focused on the details of the feasibility or otherwise of implementing an industry. Rather, the focus is on an analysis that seeks to understand the capacity these industries can offer to Angola’s GDP in terms of economic and social impact, based on existing successful experiences with already implemented industries. An economic development model of the Angolan economy is highly dependent on its

endogenous characteristics, namely its oil production capacity, but it is also totally dependent on exogenous characteristics, namely the international fixing of oil barrel prices. This circumstance leaves the country's real economic growth dependent on finite natural resources and the impossibility of intervening in the fixation of the price of a barrel of oil. In this sense, there is a possibility that alternative energies may be a solution to the abovementioned dependency on oil, namely through ethanol production.

References

1. Stöhr, W. Development from Below: The Bottom-Up and Periphery-Inward Development Paradigm, Development from Above or from Below? Stöhr, W., Tailor, D., Eds.; John Wiley: Chichester, UK, 1981.
2. Vázquez Barquero, A. Desarrollo local y dinámica regional. In Economía y Política Regional en España ante la Europa del s, XXI ed.; Mella, J. (Coord.), Ed.; Akal: Madrid, Spain, 1998.
3. Garofoli, G. Le aree sistema in Italia. Política E Econ. 1983, 11, 17–34.
4. Maillat, D. Territorial dynamic, innovative milieus and regional policy. Entrep. Reg. Dev. 1995, 7, 157–165.
5. D'arcy, E.; Giussani, B. Local economic development: Changing the parameters? Entrep. Reg. Dev. 1996, 8, 159–178.
6. Solow, R.M. A contribution to the theory of economic growth. Q. J. Econ. 1956, 70, 65–94.
7. Francisco, A. Desenvolvimento Económico Endógeno: Construção de um Modelo Conceptual para os Pequenos Estados Insulares em Desenvolvimento. Ph.D. Thesis, Universidade Fernando Pessoa, Porto, Protugal, 2015.
8. Ahmed, S. An Examination of the Development Path Taken by Small Island Developing States: Jamaica a Case Study. Master's Thesis, Faculty of Arts, The University of Prince Edward Island, Charlottetown, PE, Canada, 2008.
9. ANEEL. Derivados de Petróleo. Atlas de Energia Elétrica. 2008. Available online: http://www.aneel.gov.br/arquivos/pdf/atlas_par3_cap7.pdf (accessed on 14 March 2020).
10. Abdelrehim, N.; Maltby, J.; Toms, S. Narrative reporting and crises: British Petroleum and Shell, 1950–1958. Account. Hist. 2015, 20, 138–157.
11. BP. Statistical Reviews of World Energy. 2015. Available online: http://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf (accessed on 14 September 2020).
12. CEIC. Relatório Económico de Angola 2016-Universidade Católica de Angola. 2016. Available online: http://www.ceic-ucan.org/wp-content/uploads/2017/06/Apresenta%C3%A7%C3%A3o-do-Relat%C3%B3rio-Econ%C3%B3mico-de-Angola-2016.pdf (accessed on 15 March 2020).
13. Petrobras, B. 50 Perguntas e Respostas Sobre Este Novo Mercado 2007. 2007. Available online: https://www.agencia.cnptia.embrapa.br/Repositorio/matprima1_000g7pcetcc02wx5ok0wtedt32e6jis7.pdf (accessed on 14 October 2020).
14. United Nations Climate Changes. What Is the Paris Agreement? 2015. Available online: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/ (accessed on 15 July 2020).
15. IEA (Industrial Ethanol Association). Market and Applications. 2015. Available online: http://www.industrial-ethanol.org/index.php?page=industrial-ethanol (accessed on 28 January 2020).
16. Copercana. Odebrecht Acelera Plano de Produzir Álcool em Angola. 2015. Available online: http://www.copercana.com.br/index.php?xvar=ver-ultimas&id=3218 (accessed on 16 December 2020).