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Economic Complexity and Sustainable Economic Growth in Arab Countries

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Abstract

The nature and size of the productive structure of economies represent fundamental determinants of sustainable economic growth and their ability to adapt to the economic shocks faced by these economies. Therefore, the study aims to measure the impact of the nature of the productive structure, represented by the economic complexity index and its determinants (knowledge and innovation), on sustainable economic growth (represented by the GDP per capita by PPP) in Arab countries. Also, it aims to measure the extent to which these countries can absorb those shocks through their ability to sustain their export revenues from highly complex goods. The results show an insignificant impact of economic complexity on GDP per capita by

PPP. This is because developing countries (including Arab countries) face fluctuations in their export revenues of low-complexity exported products (low added value). This requires economic policymakers to formulate effective strategies aimed to enhance innovation and cognitive ability and creating a diversified economy with competitiveness and sustainable economic growth.

Keywords: Economic complexity, Economic growth, knowledge index, Innovation index, Economic complexity index, Economic complexity trade, Product complexity index.

Abbreviations:

ECI: Economic Complexity Index.

ECT: Economic Complexity Trade.

GDP: Gross Domestic Product.

GII: Global Innovation Index.

GKI: Global Knowledge Index.

PCI: Product Complexity Index.

PPP: Purchasing Power Parity.

1. Introduction

The global economy has faced a series of successive political, economic, financial, and environmental challenges and crises. It was negatively reflected in the state of uncertainty witnessed by global markets. This has led to numerous economic and social consequences, including economic stagnation, reduced investment and employment, and slower economic growth. This requires decision-makers and business leaders to manage these challenges and improve their ability to adapt to economic crises. Especially since more competitive economies are more resilient to

risks and have a greater ability to adapt to changing environments in the long term and achieve sustainable economic growth and prosperity.

Foreign trade literature has indicated the importance of exports in improving economic performance by increasing economic growth rates and improving living standards. However, the nature of the goods produced and exported to developing countries (Arab countries) tends to produce and export goods of low complexity with low added value to face low competitiveness, low terms of trade, and unstable trade returns, which directly affect the low level of economic growth and individual income in these countries.

Accordingly, many recent studies have emphasized the importance of making changes in the productive structure represented by the nature of the goods produced and exported (accompanied by structural transformations at the macroeconomic level) and the transition of developing countries (Arab countries) from the production of "goods of poor countries" to the production of "goods of rich countries", that is, the shift to a more complex economy characterized by diversification in production and export (especially the rarer goods with wide demand), the produced and exported goods are characterized by competitiveness and high added value, with high rates of trade, and thus have the ability to achieve sustainable economic growth.

The research aims to measure and analyze the impact of the production structure (represented by the index of economic complexity) and its main determinants (represented by the index of knowledge and the index of innovation) with their direct and indirect effects on economic growth. Our vision is also consistent with visions and theoretical frameworks that assume that countries with higher economic complexity witness higher rates of sustainable economic growth in the long term. This is what the Arab countries lack in this context. To achieve the aim of the study and test its hypothesis, the research relied on descriptive and statistical approaches

to describe and analyze the nature of these effects in Arab countries for the period (2017-2021).

The research covers several sections. The next section discusses the theoretical literature on the relationship between economic complexity and economic growth. The third shows the distribution map of Arab countries according to the economic complexity index, economic complexity of trade and the relative share of most complex exported products in total exports. The fourth is represented by the model used to estimate the relationship between the evidence of economic complexity and its determinants and their impact on economic growth. The fifth section presents the study's results and discussions related to the nature of the direct and indirect relationship between economic complexity, its determinants, and economic growth in Arab countries. Finally, the sixth section presents the conclusions and suggestions of the study.

2. Literature Review

- The theoretical visions centered on the underlying causes of income inequality and economic growth between countries along two paths: The first is represented by technology, human capital, international trade, and the quality of institutions, while the second path is represented by the structural nature of economies, which varies between the production of complex goods and simple goods. Countries exporting primary and simple goods face a slowdown in the growth of income generated by their exports. Due to the low prices of these commodities compared to complex commodities in the long run and the low rate of trade and economic growth of these economies. Therefore, those economies need to modify their production structure towards more complex products with added value and high returns (Güneri, 2019: 2;8) via spending on research, technology investments and human capital development to enhance competitiveness as the main driver of long-term economic growth (Erkan & Yildirimci, 2015)

- The conclusions of Yalta & Yalta's (2021) study indicate that increasing economic complexity positively effects economic growth. Economic complexity is subject to many determinants, such as macroeconomic variables, human capital, investment in infrastructure (such as education, energy, airports, and highways), foreign direct investment, GDP per capita, institutional quality, improving production knowledge, production capabilities, and adopting new production methods that can produce more diverse and sophisticated goods (Yalta & Yalta, 2021).
- Pugliese and Tacchella's (2021) study concludes that economic efficiency achieved by the complexity of the production structure of economies with diverse and rare industrial products is an effective indicator of global competitiveness (Pugliese & Tacchella, 2021).
- Koch's (2021) study concludes that economic complexity represents a measure of the knowledge produced in the economy and it also, explains income differences between countries and predicts future growth rates (Koch,2021).
- Güneri's (2019) study shows that economic complexity (i.e. the production of diverse and complex goods) can be achieved through improvement and accumulation of capabilities and structural transformation to obtain new, more productive activities and a diversified and complex production structure as major factors for long-term economic growth. This means creating advanced, highly productive industries and moving workers from sectors with low productivity to sectors with higher productivity. This is because sustainable economic growth and development cannot be achieved through a fixed set of goods, but it must include creating new, more complex products with high productivity, as is the case in industrialized countries (Güneri, 2019).

- Jinn and Shuhaimen (2018) finds that technical and cognitive progress, innovation and the skilled level of workers are a prerequisite for expanding the production boundaries of more complex and diversified goods and raising the potential for long-term growth. While less complex economies do not have these characteristics (Jinn & Shuhaimen, 2018).
- Ferrarini & Scaramozzino's (2013) study shows that a complex production structure requires the development of appropriate skills and the ability to adapt to changing technical needs. Also, economic development requires continuing to develop capabilities to move to sectors with higher productivity and diversifying products specialized in producing goods with broad capabilities, which only a relatively limited number of countries can to produce (Ferrarini & Scaramozzino, 2013).
- In their study, Hausmann and Hidalgo (2010) explains that the ability of an economy to grow and confront external shocks is linked to its ability to diversify its production structure, which can be represented by two paths; the first is the comparative advantage of the economy in producing basic goods and moving to the production of other goods close to them. The second is the accumulation and development of capabilities that enable economies to produce more complex and diverse goods. At the same time economies with limited capabilities face the so-called static trap (economic stagnation trap) due to their inability to diversify the production structure and exports of their economies (Hausmann & Hidalgo, 2010).
- Hausmann and Hidalgo's (2009) study entitled "analyzing the productive structure of economies" shows that levels of knowledge and productive capabilities are responsible for determining the level of economic complexity and diversifying the export package and sources of income[1]. Hence, those levels are also responsible for the ability of economic complexity to absorb shocks that the economy may be exposed to if compared to economies with undiversified production and low

productive capacities, which should rely on the capabilities available to it to produce goods close to the goods it produces (Hausmann & Hidalgo, 2009).

- Hesse (2009) explains that economic development constitutes a structural change represented by the shift from producing goods for poor countries to goods for rich countries, which is reflected in the diversification of the productive structure of exports and the shift in terms of trade in their favor, contrary to countries with a narrow export basket (such as primary products), which will be vulnerable to instability resulting from fluctuations in global demand. Therefore, diversifying commodity exports is the only way to alleviate these restrictions (Hesse, 2009).
- Another study by Hausmann and Hidalgo (2009) has shown that countries with low capabilities to produce various goods must resort to adopting the available capabilities to produce other goods "nearby" the goods produced (Hausmann & Hidalgo, 2009).
- However, Hausmann and Rodrik's (2003) concludes that the role of government in industrial growth and structural change by encouraging entrepreneurship and supporting incentives for investors to produce new, highly complex goods (Hausmann & Rodrik, 2003).
- Acemoglu and Zilibotti's (1997) study finds out the relationship between economic complexity and economic performance is mutual and that the accumulation of productive knowledge and diversification of production structures will lead to improved income levels and improved living standards (Acemoglu & Zilibotti, 1997).
- The conclusions of Hesse's (2009) study supports the views presented by Chenery (1979) and Syrquin (1989) within the framework of structural models of economic development, as well as Prebisch-Singer's views on foreign trade, on the importance of countries diversifying their exports and the complexity of their

goods and moving from exports of primary goods to exports of manufactured goods, to overcome the problem of potential fluctuations in their prices, the instability of their export revenues, and the low terms of trade of these economies (producing and exporting primary commodities), the resulting reduction in necessary investments in the economy by companies avoids the risks of macroeconomic uncertainty, and thus economic growth in the long term (Hesse,2009:2-3).

- Martin and Sunley (1998) point out that the theory of endogenous growth (New Economic Growth), one of the basic pillars of structural change and the formation of economic growth and development has shown that macroeconomic policies are not sufficient to achieve sustainable economic growth, without being accompanied by technical knowledge and innovations. This is defined outside the neoclassical Solow growth equation (Solow Residual)[2]. Therefore, technology has been included as an internal variable within the internal growth theory model, taking into account that this variable is determined within the system that governs the production process and not by forces outside the system; this vision represents the basis of endogenous growth theory (modern growth theory), (Martin & Sunley, 1998:201-227).
- Modern (endogenous) growth theory is based on two basic points: First, it adopts technical progress as an internal variable in the production function model of economic activity (which previous theories considered an external variable). The second represents knowledge and modern technology used in companies, which is the reason behind the increasing returns that drive economic growth. This theory explains the mechanism of transformation from a resource-based economy to a knowledge-based economy. In contrast, neoclassical theory focused on capital accumulation and labour force improvement as a source of growth without

emphasizing the importance of increasing returns generated by knowledge and technology.

- Endogenous growth theory considers investment in human capital (training, education, research and development) as one of the main variables of economic growth because they represent critical factors towards knowledge, innovation, raising the level of skill and productivity of workers in the economy (Martin, 2003:14). It also contributes to achieving increasing returns to scale and increasing gains that compensate for the decreasing marginal returns on invested capital, as a result of the external economies of scale and productivity improvements achieved from these investments (Todaro, 2006:155).
- Achieving sustainable economic growth accompanies economies that are characterized by competitiveness in international trade and stable export earnings. It is also associated with macroeconomic stability, institutional quality, infrastructure and productive knowledge within the physical and human capital framework. Those determinants are the basis of the difference in the structure of production and income among countries (Al-Shammari et al., 2024:12).

3. Distribution Map of Arab Countries According to ECI and ECT

The Economic Complexity represents a standard for measuring the degree of complexity and diversity of the production structure, and it also reflects the relative advantage of the economy in the uniqueness of a particular product (Hausmann and Hidalgo, 2009). The value of the index ranges from (3) to (-3), and Japan ranked first in the world with an estimated value of the ECI (2.26) and ECT (2.06), while Liberia came in last place (133) with an estimated value of the ECI (-2.44) and in the place (139) with value of ECT (-1.49) in the year (2021). In contrast the (ECI) and (ECT) in Arab countries for the same year showed that the value of the indices ranged (0.62)

and (0.9) respectively in the Kingdom of Saudi Arabia, (-1.46) and (-1.32) respectively in Mauritania, as in Figure (1).

The low values of the economic complexity index in the Arab countries are due to the nature of the production structure and exports, which are characterized by a low of high complexity products in these countries.

Therefore, we will try to review the Arab countries on the basis of the levels of complexity of their production structure and its reflection in the nature of the exported goods and their degree of complexity. In other words, we examine the level of complexity of the structure of Arab exports and measure the proportion of exports of the most complex products compared to total exports.

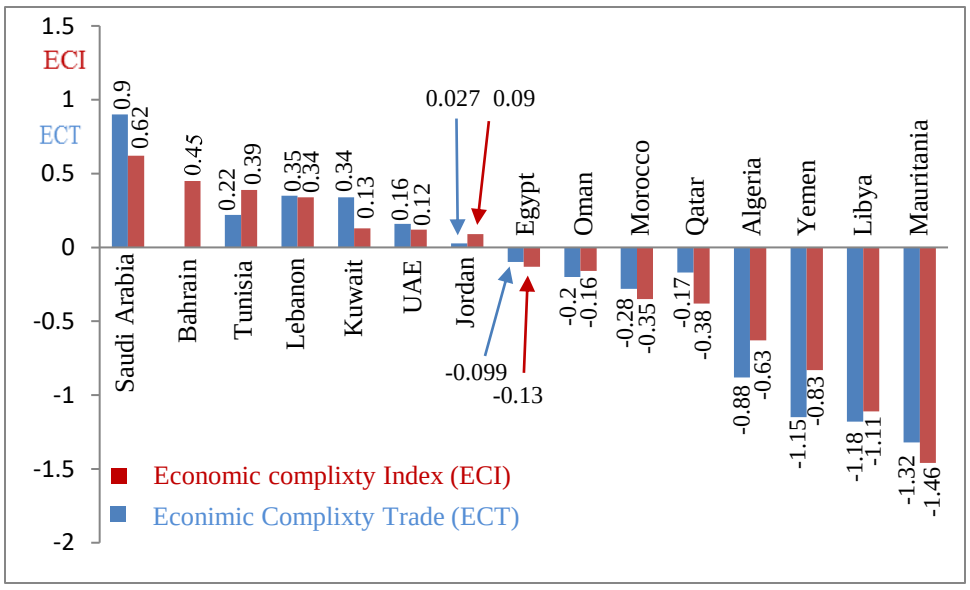

Figure 1: Distribution Map of Arab Countries According to the ECI and ECT for the Year (2021). Sources: (1): Hausmann, Ricardo, and et.al (2021), Atlas of Economic Complexity: Mapping Path to Prosperity, Center for International Development at Harvard University, (https://atlas.cid.harvard.edu). (2): The Observatory of Economic Complexity (2021), (https://oec.world/en/profile/country).

- The Kingdom of Saudi Arabia's economy is ranked first in the Arab world according to the ECI, estimated at (0.62). This is reflected in the economic complexity of trade (ECT), which was estimated to be (0.9); see Figure (1). The PCI value of these most complex exported products ranged from (1.62) to (1.10) (https://oec.world/en/profile/country/sau). The proportion of these exported products reached (1.595) per cent of total exports. Most of the complex exports were distributed among chemical, plastic, and rubber products (see Appendix A).
- Then Bahrain took second place in the Arab world with an ECI value of (0.45). But the value of ECT (unavailable). The share of more complex exported products is (2.26) per cent of total exports. The PCI value of these complex exports ranged from (1.15) to (0.48) (https://oec.world/en/profile/country/bhr). Most of these exports are distributed among stone and glass products in addition to other items (see Appendix A),
- As for Tunisia, it was in third place in the Arab world with an ECI value of (0.39), while the value of ECT was (0.22). The structural transformation achieved by the economy was reflected in its exports of more complex products, which amounted to (2.88) per cent of total exports. The PCI value of these complex exports ranged from (1.53) to (1.01) (https://oec.world/en/profile/country/tun). They were distributed among machines and instruments products (see Appendix A).
- As for Lebanon, it came in fourth place in the Arab world with an ECI value of (0.34), while the value of ECT reached (0.35). The proportion of more complex exported goods reached (0.64) per cent of total exports. The PCI value of these complex exports ranged from (2.38) to (1.11) (https://oec.world/en/profile/country/lbn). Most of these exported products distributed between machines, plastic, and rubbers (see appendix A).
- Kuwait ranked fifth in the Arab world with an ECI value of (0.13), while the value of ECT reached (0.34). The proportion of more complex exports amounted to

(0.46) per cent of the total exports. The PCI value of these complex exports ranged from (0.67) to (0.037) (https://oec.world/en/profile/country/kwt). Most of these exports are chemical products (see Appendix A).

- As for the United Arab Emirates, it ranked sixth in the Arab world with an ECI value of (0.12), while the value of ECT reached (0.16). The most complex export products constituted about (6.5) per cent of total exports. The PCI of these complex exports from (0.9) to (0.47) (https://oec.world/en/profile/country/are). The majority of these exports are represented by machinery exports (see Appendix A).
- Then Jordan came in seventh place in the Arab world according to the ECI which is estimated at (0.09), and the value of ECT is (0.027). The most complex exported products were estimated at (0.85) per cent of total exports. The PCI of these complex exports is from (1.97) to (0.56) (https://oec.world/en/profile/country/jor). Most of these exports were chemical products (see Appendix A).
- Egypt's economy ranked eighth in the Arab world. The ECI value was (-0.13), while the ECT value was (-0.099). The proportion of the most complex exported products reached (0.605) per cent of the total exports. The PCI value of these complex exports ranged from (1.92) to (0.78) (https://oec.world/en/profile/country/egy). The products are distributed between textiles and chemical products (see Appendix A).
- As for Oman, it came in the ninth place in the Arab world with an ECI value of (-0.16). This is reflected in an ECT value estimated at (-0.2). The proportion of most complex products reached (3.24) per cent of total exports. The PCI value of these complex exports is from (0.91) to (0.34) (https://oec.world/en/profile/country/omn). These most complex exports are distributed among chemicals, plastics, rubbers and metal products (see Appendix A).
- Then Morocco ranked tenth in the Arab world according to the ECI value (-0.35). While the value of ECT (-0.28). The proportion of its most complex exported

products was estimated at (5.95) per cent of total exports. The PCI of these complex exports is from (1.15) to (0.7) (https://oec.world/en/profile/country/mar). Most of the exported products include machines and transportation (see Appendix A).

- As for Qatar, it ranked eleventh in the Arab world with an ECI value of (-0.38), and the value of ECT is estimated at (-0.17). The proportion of the most complex exported reached (5.09) per cent of the total exports. The PCI value of these exported products is from (0.94) to (-0.97) (https://oec.world/en/profile/country/qat). Most of these complex exports are distributed among plastic, rubber, and chemical products (see Appendix A).
- Algeria came in the twelfth position in the Arab world with an ECI value of (-0.63) and an ECT value of (-0.88). The proportion of most complex exported products is (2.17) per cent of total exports. The PCI value of these exported products is between (0.91) and (0.34) (https://oec.world/en/profile/country/dza). Most of these most complex exports are centred around metals and chemicals (see the Appendix).
- Yemen ranked thirteenth in the Arab world with an ECI value of (-0.83) and an ECT value of (-1.15). Most complex exports amounted to (8.58) per cent of the total exports. The PCI value of these most exported products ranged from (0.48) to (-0.72) (https://oec.world/en/profile/country/yem). Most of these complex exports are distributed among metals and chemical products (see Appendix A).
- As for Libya, it ranked fourteenth in the Arab world with an ECI value of (-1.11) and an ECT value of (-1.18). Most complex exports amounted to (2.79) per cent of the total exports. The PCI value of these exported products ranged between (-1.18) and (-1.77) (https://oec.world/en/profile/country/lby). They were distributed between metal and chemical products (see Appendix A).

- As for Mauritania, it was in last place in the Arab world with an ECI value of (-1.46). This was reflected in the value of the ECT (-1.32). The most complex exported products reached a proportion of (2.15) per cent of the total exports. The PCI value reached between (1.28) and (-0.14) (https://oec.world/en/profile/country/mrt). These most complex exported are distributed between animal and foodstuff products (see appendix A).
- The above values indicate the weak complexity of the productive structure in the Arab countries. The depreciation of the product complexity index (PCI) and then the economic complexity index (ECI), was directly reflected in the decline in the percentage of most complex exports to total exports. This was reflected in the decline of ECT and the value of exported goods for these countries.
- The low degree of economic complexity of the production structure will decrease the competitiveness in the global market and thus affecting sustainable economic growth in the Arab countries.

4. The Model

To achieve the goal of the study in determining the influences exerted by the degree of economic complexity and some of its main determinants represented by the knowledge index and the innovation index, as well as the nature of the direct and indirect relationships between these variables in influencing the economic growth of Arab economies, the study adopts a model which is based on previous studies to measure these relationships.

GDP Per Capita by PPP = $\alpha + \beta_1$ ECI + β_2 GKI + β_3 GII + μ ……. (1)

- GDP Per Capita by PPP: This measures the per capita share of gross domestic product, adjusted according to the parity between countries.
- ECI: it measures the capabilities and know-how embedded in the production of goods and services. It also measures a country's commodity diversity (the

number of products that a country exports with revealed comparative advantage) and a product's ubiquity (the number of countries with revealed comparative advantages in that particular product)[3], The value of the economic complexity index (ECI) depends on the product complexity index (PCI) matrix[4], as each commodity has a specific value determined according to its quality, scarcity, its added value, and the extent of its spread.

- Global Knowledge Index (GKI): it is evaluated through seven sub-indicators (MBRF,2022:12), Pre-University Education, Technical and Vocational Education and Training (TVET), Higher Education, Research Development and Innovation (RDI), Information and Communication Technology (ICT), Economy and Enabling Environment.
- Global Innovation Index (GII): it relies on two sub-indices, (Dutta et al., 2021:39) **1st .**the Innovation Input Sub-Index [has five enabler pillars: 1. Institutions (Including Political environment, Regulatory environment, and Business environment), 2. Human capital and research (Including Education, Tertiary education, Research and development R&D), 3. Infrastructure (Information and communication technologies (ICTs), General infrastructure, and Ecological sustainability), 4. Market sophistication (Credit, Investment, Trade, competition, and market scale), and 5. Business sophistication (Including Knowledge workers, Innovation linkages, and Knowledge absorption)] and **2nd.** The Innovation Output Sub-Index [has two enabler pillars: 1. Knowledge and technology outputs (Including Knowledge creation, Knowledge impact, and Knowledge diffusion), 2. Creative outputs (Including Intangible assets, Creative goods and services, and Online creativity)].
- μ: The Stochastic Variable.

To calculate the estimates for the above model, balanced cross-sectional data was adopted for the period (2017-2021) for a group of Arab countries represented by

Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the Emirates. The rest of the Arab countries were excluded due to the lack of data during the study period.

5. Results and Discussions

The analysis of the estimated results of equation (1) contained in the previously specified model and based on the literature that dealt with the study problem, the estimation results are presented in Table (1). The impact of the Knowledge and Innovation Index and the Economic Complexity Index (as independent variables) on the GDP per capita by purchasing power parity (PPP) (as a dependent variable) for Arab countries during the period (2017-2021).

Table 1: Results of the Regression Function for the Effect of Economic Complexity on Economic Growth in Arab Countries.

GCI	Intercept	ECI	knowledge Index	Innovation Index	Adj.R^2
B. Coefficient	-123706.079	-7636.261	2558.062	1136.677	0.608
T-Test	-7.372	-1.502	5.490	1.935	
T-Tabulate	1.9	ECI: Economic Complexity Index.			
F-Test (3,56)	31.464				

- Calculated by the researchers using the SPSS program.

The total effects (direct and indirect) of the knowledge index and the innovation index (as major determinants of the level of development and the diversity of the productive structure of economies) are associated with a positive significant relationship with the GDP per capita by PPP as a dependent variable. The total effects of these two variables were estimated at (2988.49) and (1105.043) respectively, see Table (2). Most of the effects of the knowledge and innovation index were distributed within the path of direct effects, whose parameters reached (2558.062) and (1136.677), respectively, on the GDP per capita by PPP. See Tables (1) and (2); this is explained by the fact that knowledge and then innovation in Arab countries support the productive structure and economic growth through the expansion of the production and export of low-complexity goods with low added value. We find this

clearly through the low value of the direct effect of the knowledge index and the innovation index on the economic complexity index, which was estimated at (0.023) and (0.004), respectively. See Table (2) and Figure (2); this means that knowledge and innovation in Arab countries are ineffective in the production and export of highly complex goods with high added value.

Table 2: Direct and indirect effects of knowledge, Innovation and ECI on GDP per capita by PPP.

	ECI	Knowlgment Index			Innovation Index		
	D.E.=T.E.	D.E.	I.E.	T. E	D.E.	I.E.	T. E
ECI		0.023	0.002	0.025	0.004		0.004
Innovation Index		0.547		0.547			
GDP per capita by PPP	-7636.26	2558.062	430.428	2988.490	1136.677	-31.634	1105.043

- Calculated by the researchers using the Amos statistical program.
- Direct Effect (D.E.), Indirect Effect (I.E.) and Total Effect (T.E.).

The indirect effects of the knowledge and innovation index, whose parameters reached (430.428) and (-31.634), respectively, Influence the GDP per capita by PPP. See Table (2). The knowledge index exerts its indirect effects (with its positive value above) through the path of the economic complexity index and the innovation index, see figure (2). Meanwhile the innovation index exerts its indirect effects (with its negative value above) through the path of economic complexity. To reflect these values, knowledge and innovation influence the development of the production structure and increase its productivity for low-complexity goods or nearby products to them (Low PCI value results in low values of ECI and ECT). Without bringing about any noticeable improvement in the level of economic complexity of the production structure and exports. Resulting in instability of export revenues and economic growth in the long term. For this reason, it seemed clear that there was a negative and insignificant relationship between the economic complexity index and the value of the GDP per capita by PPP.

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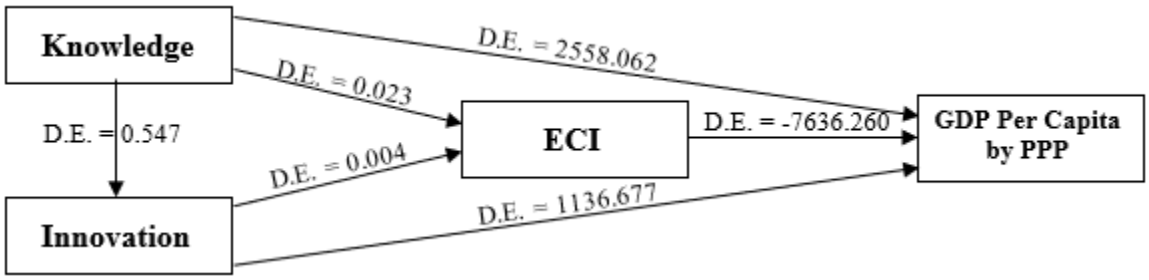

Figure 2: Direct and indirect effects of knowledge, Innovation and ECI on GDP per capita by PPP

Knowledge and innovation, with their direct and indirect effects, are ineffective in enhancing both the GDP per capita by PPP and the level of economic complexity because Arab countries face many restrictions, namely the level of education, technical and vocational training, and institutional quality, employee skills and the level of stimulation of innovation, research and development, and human capital development, the ability to benefit from technology and ICT infrastructure, the level of infrastructure (railways, energy networks, roads), as well as the ability to attract foreign direct investment and transfer technology. Most Arab countries are still below the required level for these indicators as it is the case with many variables that have an impact on the degree of economic complexity, especially since the Arab countries have not made the structural changes required to make knowledge and innovation sufficient to produce highly complex goods.

Consequently, the results show that the economic complexity index reflects the nature of the productive structure of economies. It is subject to the influences of knowledge and innovation with its determinants (as we indicated in the analysis above). It is noted from Table (1) that the economic complexity index is linked to a direct, negative (-7636.260) non-significant relationship in its impact on the GDP per capita by PPP in the Arab countries during the period (2017-2021). The reason for this is that the structure of production activity in Arab countries is characterized by the production and export of less complex goods (the index of product complexity

and trade is low or negative) compared to highly complex goods. Low-complexity goods are characterized by low-added value and volatile export earnings. Especially during global financial, economic and environmental shocks, such as the fluctuations faced by oil economies, including Arab countries (during the Covid-19 period), the effects of which were negatively reflected in the slowdown in economic growth in these countries.

6. Conclusion and Suggestions of the Study

The study concludes that Arab countries have not made the structural changes necessary to shift from producing Low complexity goods (commodities with low or negative PCI value) To goods of high complexity (intermediate or final goods with a high positive PCI value). This is based on the results that showed the insignificant effect of the economic complexity index on the GDP per capita by PPP. In contrast, the Knowledge Guide and Innovation Guide shows that Arab economies tend to expand the production and export of less complex goods due to the weak effect of these two variables on the economic complexity index despite its statistical significance.

Therefore, improving the competitiveness and economic growth of low-complexity countries (such as Arab countries) can follow two approaches: the first is to adopt existing capabilities and similar knowledge in diversifying goods by moving into nearby or related products. The second is to increase knowledge and capabilities to produce more diverse and complex goods.

This calls on economic policymakers to formulate strategies that promote sustainable economic growth by investing in policies that enhance economic diversity and complexity, implementing policies that promote innovation, entrepreneurship and technical progress, Investing in strategic industries, improving institutional quality and infrastructure, stimulating foreign direct investment and technology transfer,

investing in human capital, research and development and ensuring a favorable business environment for the purpose of enhancing its global competitiveness and achieving long-term economic growth and prosperity.

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Appendix A

Percentage of the most complex exported products to total exports to Arab countries in the year (2021)
Source: The Observatory of Economic Complexity (2021), (https://oec.world/en)

Countries	Value of Exports (B$)	Exported Products														
		Animal Product	Chemical	Foodstuff	Foot headwear	Instrument	Machines	Metals	Mineral	Miscellaneous	Paper Goods	Plastic& rubbers	Precious Metal	Stone & Glass	Textiles	Transportation	Wood
Algeria	35.4	1.17	22.31				3.9	63.59			4.30			4.32			0.41
Bahrain	15		13.03		2.92		21.82	5.36				8.76		43.61		4.5	
Egypt	44.5		39.96				0.89	1.13				9.0		8.63	40.39		
Jordan	12		78.34			2.03	7.82	5.76		6.05							
Kuwait	58.2		90.6			1.72	0.60	0.17			0.45			2.66		3.8	
Lebanon	4.79		1.35				52.74	8.29				34.32		3.3			
Libya	30.8	2.37	17.26					78.65	1.72								
Mauritania	4.14	60.84	9.07	15.47				8.28				0.97			0.47	4.9	
Morocco	41.9						54.56					1.04				44.4	
Oman	56.9		34.1			3.07		24.77			9.72	28.34					
Qatar	94.7		47.14						0.48			48.73				3.65	
Saudi	256		55.09				16.72			4.55		19.85		3.79			
Tunisia	18.8					36.74	63.02	0.24									
UAE	296					0.11	90.69	7.68			1.19	0.26			0.07		
Yemen	1.97	3.05	29.22				2.79	60.72					4.22				

[1] Some diverse local productive capacities in the economy are non-tradable, such as infrastructure, gifts of natural resources, some types of technology, and physical and human capital (including some specific labor skills) institutional quality, property rights, regulation, etc. They cannot be imported and are considered among the main determinants of the diversity of the production structure and economic complexity. See:

- Hidalgo, César A., and Hausmann, Ricardo (2009)," The Building Blocks of Economic Complexity", Working Paper No. 186, Center for International Development (CID), September, P.3.

[2] Solow points out that the diminishing returns to capital and labor exceeded, enhancing productivity and economic growth involves adding the technical knowledge factor to the economic model because most of the economic growth achieved is due to the increase in workers and capital. However, the remaining factors of growth are attributed to technical improvements and were identified outside the economic model (considering that the Solow model is an exogenous model of growth). This model forms the basis for economic theory and economic policy. Moreover, the poor performance of the neoclassical (traditional) theory in explaining the sources of long-term growth led to its non-acceptance and criticism. The absence of technical changes and external shocks leads economies to zero growth. The growth in average per capita income represents a temporary phenomenon that occurs as a result of these technical changes. While modern growth theory seeks the determinants of long-term growth, which confirm that increasing investment in physical and human capital will lead to increased productivity in the absence of diminishing returns on capital (physical and human) because of the existence of the external economies of scale that are generated by the investment itself, and which offset diminishing returns, to drive companies and the economy towards sustainable growth, see:

- Todaro, Michel (2006). Economic Development. *Translated by Mahmoud Hassan Hosni and Mahmoud Hamid Mahmoud Abdel Razzaq, Riyadh, Kingdom of Saudi Arabia*.
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[3]for more on the concept and measurement of the economic complexity index, see: Hausman, R., & Hidalgo, C. (2011). The atlas of economic complexity. Mapping path to prosperity/R. Hausmann, CA Hidalgo, S. Bustos, M. Coscia, S. Chung, J. Jimenez, A. Simoes, MA Yildirim//Puritan Press. PP.14,19-25.

[4] The Product Complexity Index (PCI): a measure the level of production knowledge contained in the commodity, its rarity, prevalence and added value, where the high value of this index represents that the product is more complex and can only be produced in a few countries (example: electronics, chemicals).