



منتدى الاستراتيجيات الأردني
JORDAN STRATEGY FORUM

Jordan's Economic Complexity and Product Space: Key Drivers to Increase Productivity and Growth

April 2023

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The Jordan Strategy Forum (JSF) is a not-for-profit organization, which represents a group of Jordanian private sector companies that are active in corporate and social responsibility (CSR) and in promoting Jordan's economic growth. JSF's members are active private sector institutions, who demonstrate a genuine will to be part of a dialogue on economic and social issues that concern Jordanian citizens. The Jordan Strategy Forum promotes a strong Jordanian private sector that is profitable, employs Jordanians, pays taxes and supports comprehensive economic growth in Jordan.

The JSF also offers a rare opportunity and space for the private sector to have evidence-based debate with the public sector and decision-makers with the aim to increase awareness, strengthening the future of the Jordanian economy and applying best practices.

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 Jordan Strategy Forum

Amman, Jordan

 T: +962 6 566 6476

 F: +962 6 566 6376

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1. Introduction

The question of why some economies witness strong economic growth and enjoy high per-capita income, while others are not that lucky, has always caught the imagination of economists.

One strand of the economics literature argues that the income gaps between countries is due to their “productive capabilities”. In other words, capable economies produce sophisticated goods such as airplanes and less capable can only produce simple goods such as tomatoes.

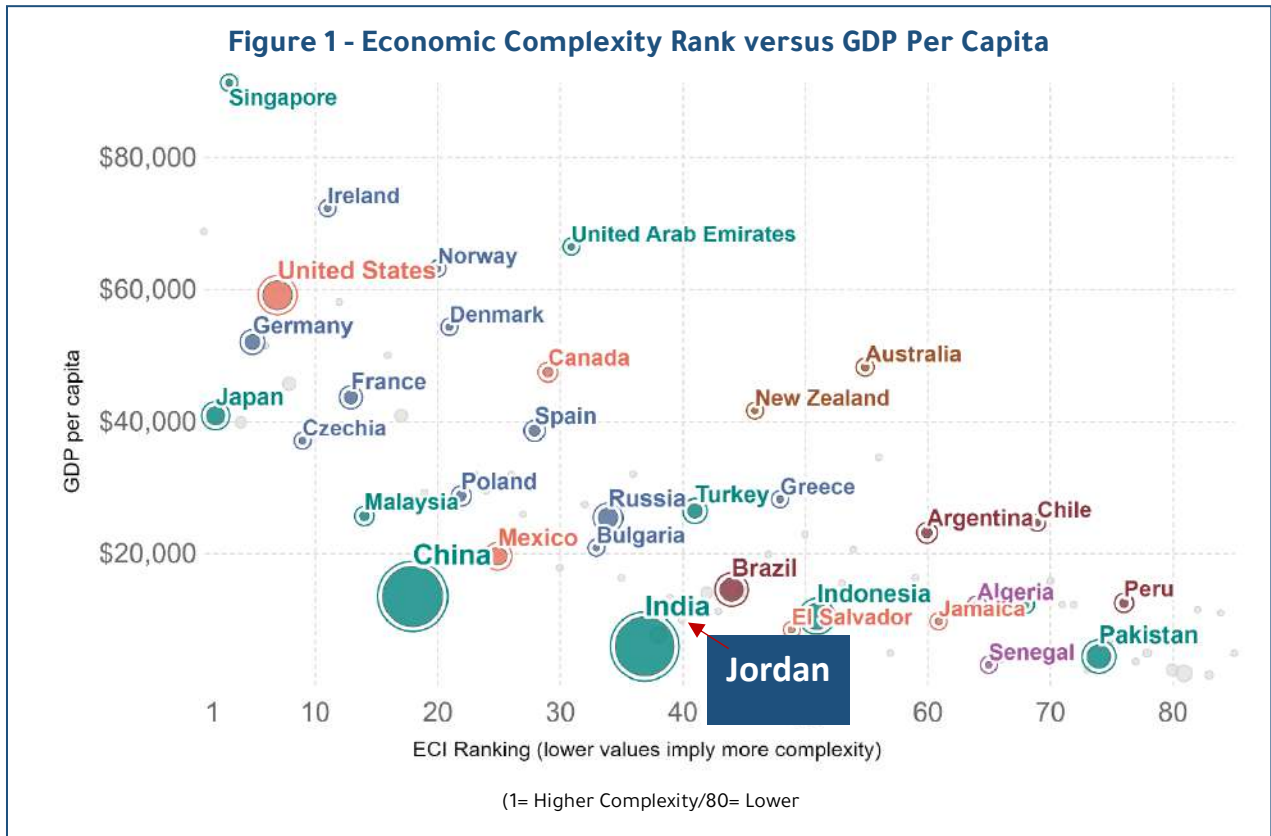
The fact that it is difficult to measure the productive capabilities of economies, the Harvard Team, led by Hausmann and Hidalgo, coined the term Economic Complexity Index (ECI).

The ECI uses the exports of countries and reduces every country’s economic system into two dimensions: The “diversity” and “ubiquity” of the exported products. Diversity is the number of products that a country can export competitively. Ubiquity is the number of countries that export the product competitively.

To simplify, less complex countries, such as Pakistan and Peru, lie at the bottom of the ECI rank. Such economies export very few different types of products (not diversified) and those products are produced in many other countries. Complex economies, such as Japan and Germany, on the other hand, export many different kinds of sophisticated products, and those products are produced by few other countries that have similarly diversified productive capacities.

On average, the literature reports that complexity increases economic growth and helps countries climb from being middle-income to high-income (middle-income trap). For example, Malaysia’s rank on the ECI is higher than other countries, such as Poland, Russia, Turkey, and Greece. However, the fact that these countries have similar GDP per capita, statistically speaking, it is likely that Malaysia will grow faster.

The fact that economic complexity has significant growth implications, policymakers should focus on encouraging specific productivity constraints in “key sectors” or “products” that are likely to unlock their economies’ growth potential.



In this Policy Paper, the objectives of the Jordan Strategy Forum (JSF) are four-fold.

- A.** To briefly outline the basic logic of the ECI and its' other related concepts.
- B.** To highlight the relevance of economic complexity to Jordan.
- C.** To examine where Jordan stands on the ECI.
- D.** To outline some recommendations to enhance the complexity and exporting capacity of Jordan.

2. The Basic Logic of the ECI and its Other Related Concepts

The notion that the prosperity of nations depends on their ability to develop complex and innovative products and have competitive advantage is not new. No two economists would disagree with such a statement. In other words, no nation would become rich in a sustainable manner by simply making and exporting more of the same product.

To succeed, any nation must change what it produces and move to activities that are new and more productive. Over time, the diversification process results in more sophistication. No nation cannot suddenly move from producing, for example, tomatoes to making satellites. A gradual build-up of capabilities and knowledge, and expansion into a new set of more sophisticated products make sense.

The sophistication of the products that any nation makes is an indication of its **“accumulated amount of productive knowledge and capabilities”**.

To measure complexity, one can look at the composition of Gross Domestic Product (GDP). For example, one can argue that countries with high agriculture to GDP ratios in their economies are less complex than countries with lower ratios. However, this measure is too aggregated.

One can also look at **“product complexity”** and **“country complexity”**.

1. The complexity of product A is lower than the complexity of product B. For example, a computer is more complex than a package of chewing gum (a priori classification).
2. The complexity of country A is lower than the complexity of country B because it spends less on, for example, research and development (R&D), and has a lower number of patents (a priori classification).

These two measures of the productive structure of countries do not really capture their levels of sophistication. They are too general or simply a priori definitions. These measures are also unidirectional. By definition, they run from products to countries or from countries to products.

To better measure complexity per se, one needs to consider the bidirectional relationship between the product-based and country-based definitions. To account for this, the Harvard team came up with the **“Economic Complexity Index”**. The methodology of this index reduces each country’s economic system into two dimensions:

- 1) **Diversity** of products in the export basket. Diversity is the number of products that a country exports competitively or with revealed comparative advantage (a country's exports of the product, as a share of total exports, is higher than global exports of the product as a share of total global trade).
- 2) **Ubiquity** of products in the export basket. Ubiquity is the number of countries in the world that are able to export a product competitively.

To ensure that the index captures economic complexity well, the ECI considers diversity and ubiquity iteratively and uses them to correct one another. For clarification, we can state:

- a) It is not necessarily the case that all ubiquitous products are complex. Natural export products (i.e. diamonds) might be rare. However, if other countries that export such a rare good are not diverse, then its scarcity does not reflect complexity. Here, we have a case of non-ubiquity but without complexity.
- b) It is not necessarily the case that a diverse economy is complex. Such an economy might export a wide range of products (fruits, vegetables, etc....) and these products are exported by many other economies too. Here, we have a case of ubiquity but without complexity.

These two examples show that diversity and ubiquity should be used simultaneously to correct the information that they carry. For the mathematically sophisticated, the used method is Moments of Reflections.

Based on the concepts of diversity and ubiquity, the Harvard team arrives at a summarized measure of knowledge required by a product (Product Complexity Index / PCI) and a summarized measure of knowledge present in a country (Economic Complexity Index / ECI).

“The PCI is a number unique to each product that captures how complex it is. A product is complex if it is made by highly diversified countries that make predominantly rare products”.

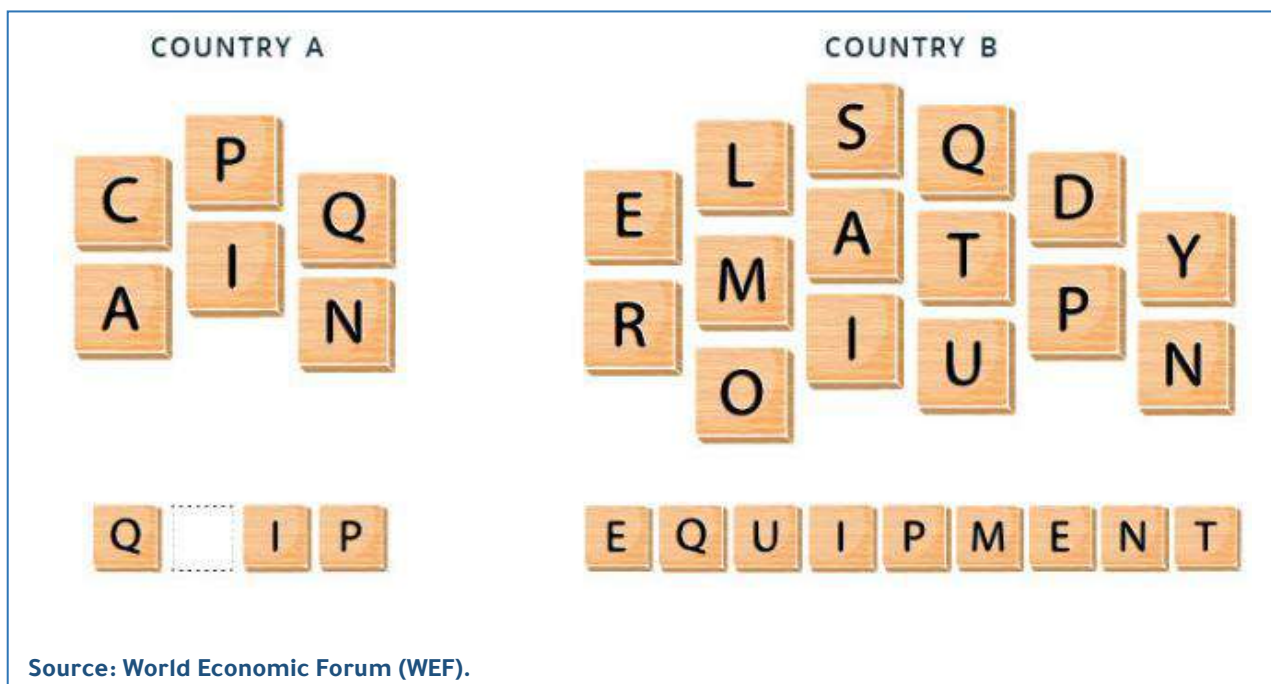
“The ECI is a number unique to each country that measures the average complexity of its products. Countries with a high ECI are well- diversified countries exporting, on average, high-PCI products”.

The fact that the productive knowledge and capabilities of any country are **abstract** and **immeasurable**, its' economic complexity can be revealed by the products it makes. To

illustrate this, one Harvard team-member (M. Yildirim, 2014) provides us with a useful analogy.

Think of each type of productive knowledge as a letter and each product as a word composed of these letters. Every economy holds a set of letters and tries to make words out of them. For example, with letters H, M, O, W, and Y, we can construct six words, and these are my, oh, how, who, why, and whom. Extending this analogy to countries and products, we can understand that a country that has a large diversity of letters can make more products, and more unique products. Words that require more letters cannot be produced by countries that have few pieces (letters). A graph, presented by the World Economic Forum (WEF), illustrates this analogy.

Countries that have diversified letters are able to produce more unique products. On the other hand, words that require more letters can be composed by economies that have all the requisite pieces (letters).



In addition to the ECI and PCI concepts, the Harvard team also argues that the assets and capabilities needed to produce one good can be used to produce other, somewhat similar, goods.

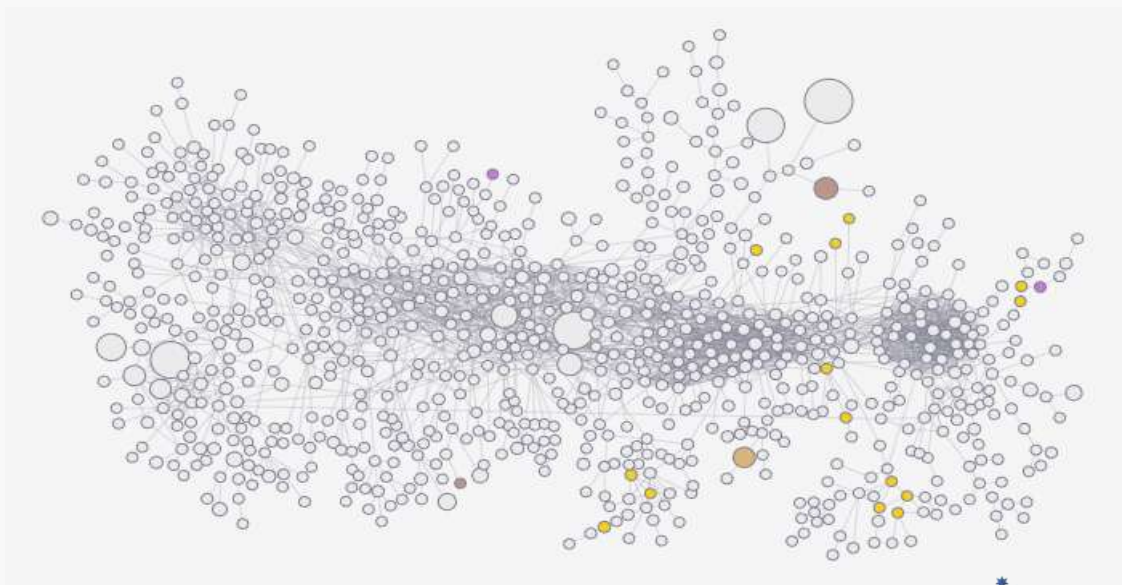
The **proximity** between the two agricultural products is high. The inputs used for producing apples and oranges are close or similar. The closeness or proximity between auto parts and electronic goods also makes sense. This is why the Harvard team developed **“The Product Space”** using trade data on 133 countries.

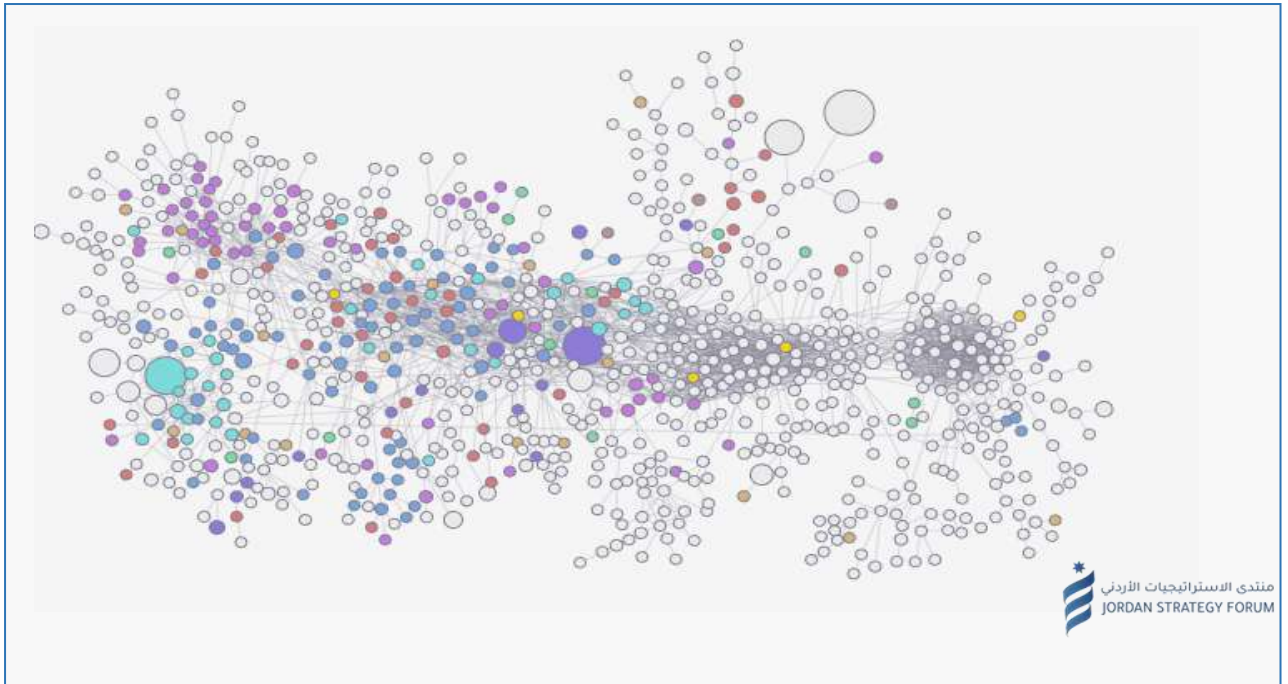
The product space is a “visualization that depicts the connectedness between products based on the similarities of the know-how required to produce them. The product space visualizes the paths that countries can take to diversify. Products are linked by their proximity to each other, based on the probability of co-export of both of the two products” ... “By using real export data over time, the shape of the product space teaches us how diversification works in practice: countries move from things they know how to do, to things that are nearby or related, or what they call the adjacent possible”.

To illustrate this, let us consider the product spaces of simple and complex economies.

1. The circles represent the product space of all global trade. Each circle is a different exported product. The size of each circle denotes the product’s share of world trade.
2. The different colors represent the broader industries of these products. The colored circles are the products that the country exports. The grey circles are products that the country does not export.

Figure 2 - Product Space of a Simple Economy





Two features of the product space illustrate these two countries' level of economic complexity.

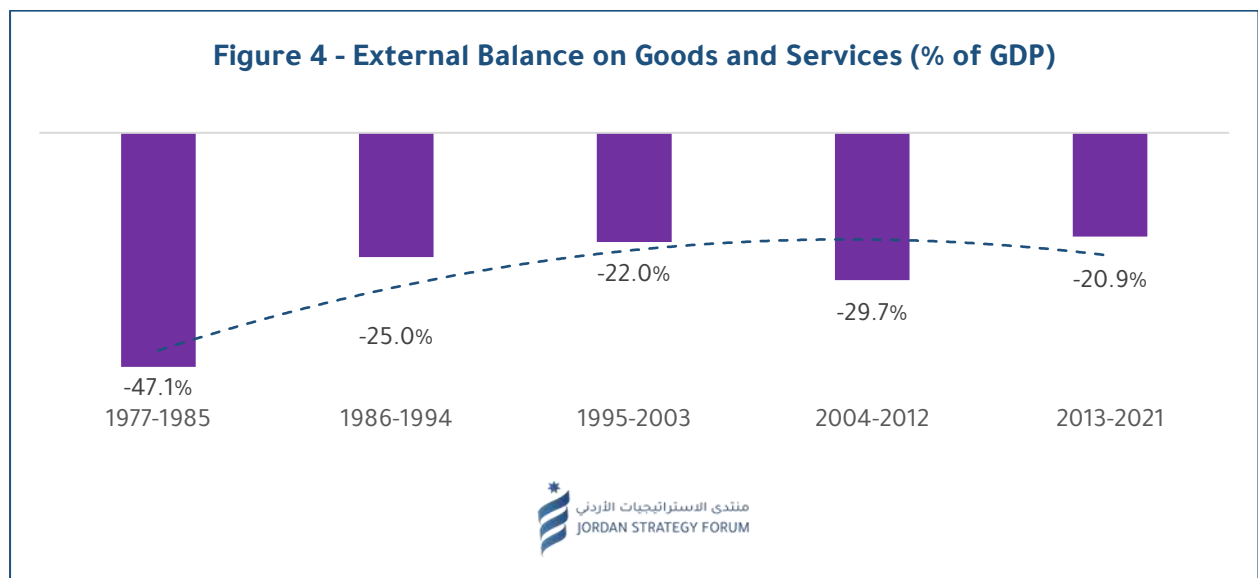
1. The simple economy has a limited number of colored dots across the product space. The complex economy, on the other hand, has a large number of colored dots (diverse set of export products).
2. The simple economy has a limited number, if any, of product circles located at the center of the product space. This reflects poor connectivity to other goods. In addition, the product space of the simple economy reflects how difficult it is to increase complexity. Products that are not tightly connected do not share similar capabilities to produce.

3. The Relevance of Economic Complexity to Jordan

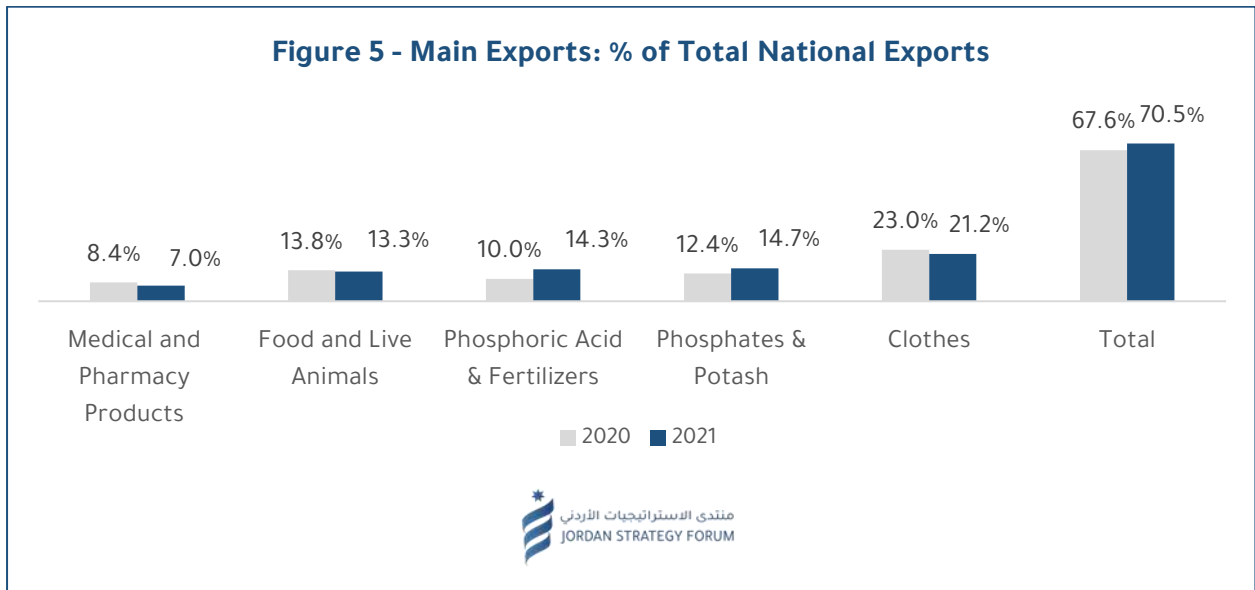
Long before the onslaught of COVID-19, Jordan has been wrestling with a myriad of socio-economic challenges. Some of these challenges are consistently high unemployment rates, low labor force participation rates, increasing poverty levels, consistent trade and budget deficits, and rising public debt levels.

To rise up to these challenges, Jordan must achieve strong and sustainable real economic growth. One way to realize this is to increase national exports. Within this context, it is unfortunate to note that Jordan's trading performance has always been weak. Below, we outline a number of observations.

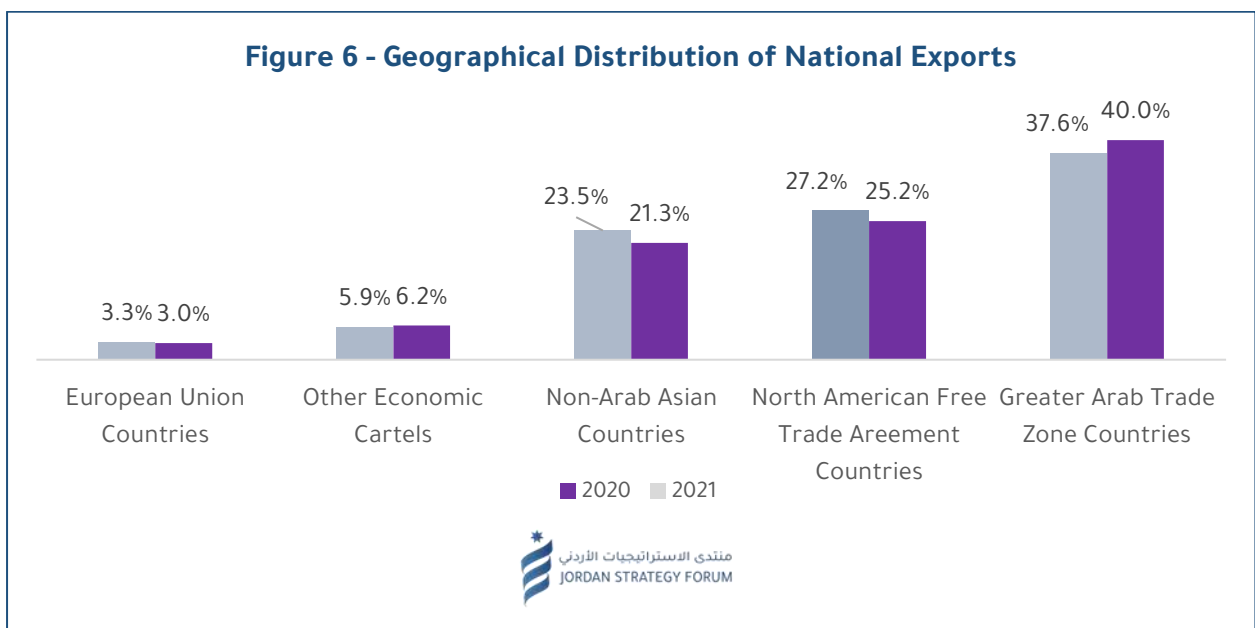
1. Since decades, the Jordanian economy has never realized a surplus in its trading performance.



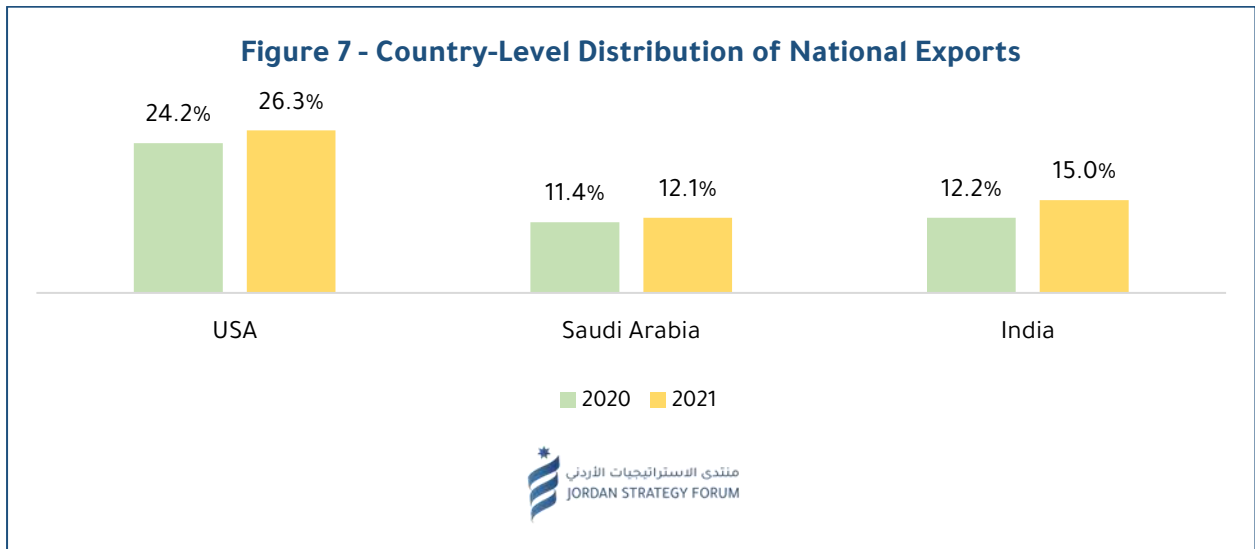
2. National exports are concentrated. Clothes, Phosphates and Potash make up 35.9% of national exports.



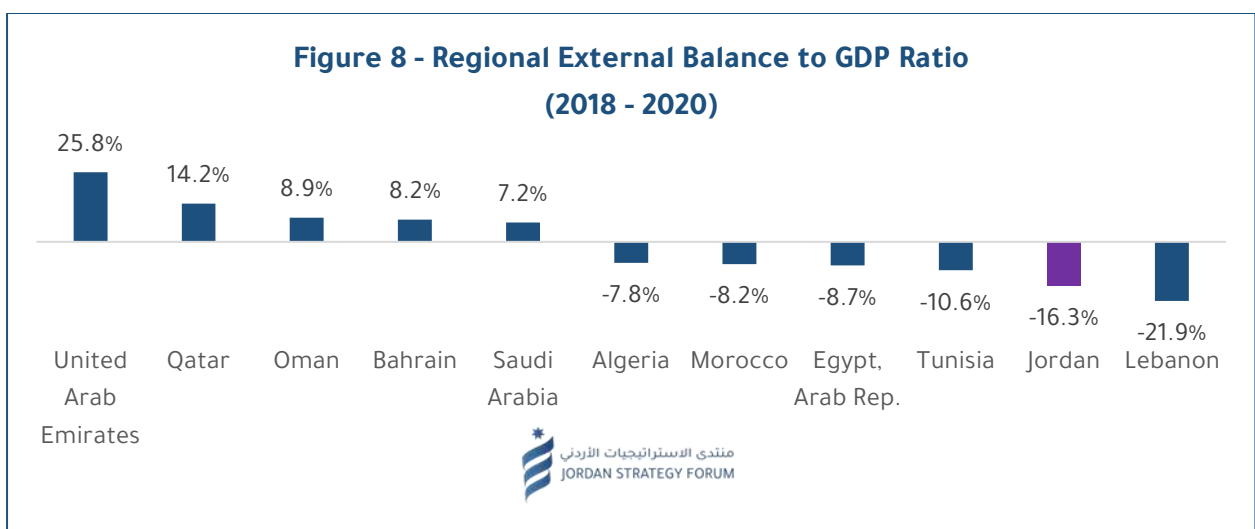
3. National exports are “concentrated” in terms of geographical distribution. The greater Arab Trade Zone Countries and North America make-up about 65% of total national exports.



4. At the country-level, national exports are also concentrated. Three countries only (USA, Saudi Arabia, and India) make-up more than half of total national exports.



5. Within the same context of the above, it is unfortunate to note that Jordan witnesses a very high external balance deficit relative to the countries in the region. (World Bank Database).



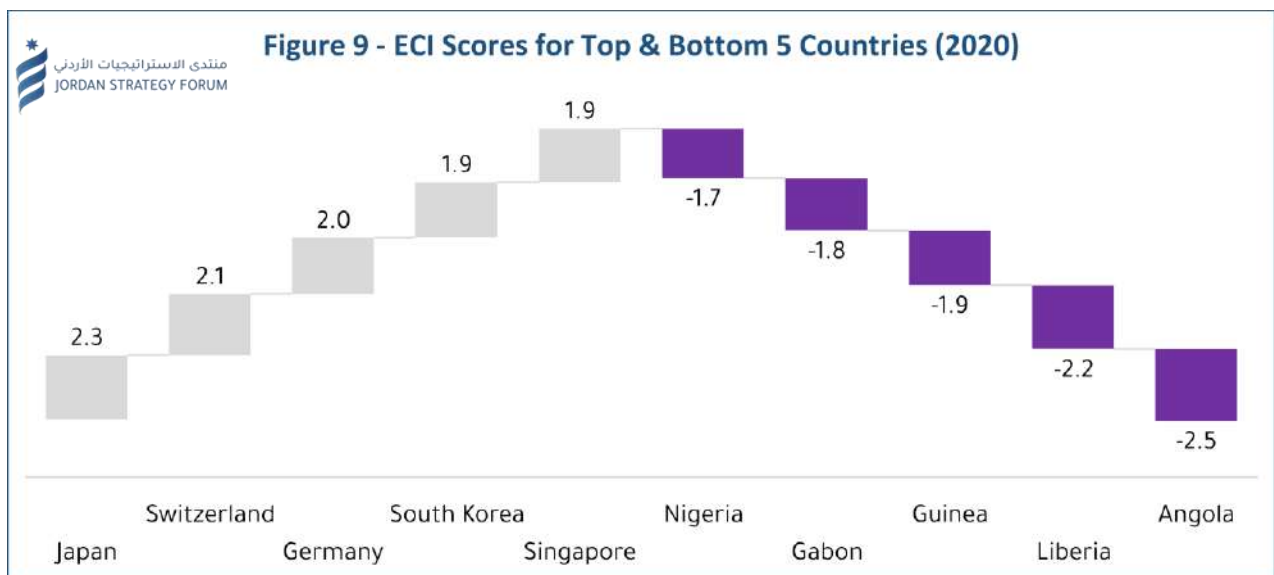
Nations have always traded with each other. International trade brings in a myriad of benefits. Trade encourages countries to specialize in the production of goods and services that they can produce more effectively and efficiently, and at a lower cost. Trade promotes competition and encourages innovation.

Given Jordan's underlying socio-economic challenges, and the economy's poor trading performance, the subject matter of economic complexity is important to look at. Indeed, this is one commonsensical way to not only increase national exports and enjoy stronger economic rates, but also to diversify exports into more sophisticated goods.

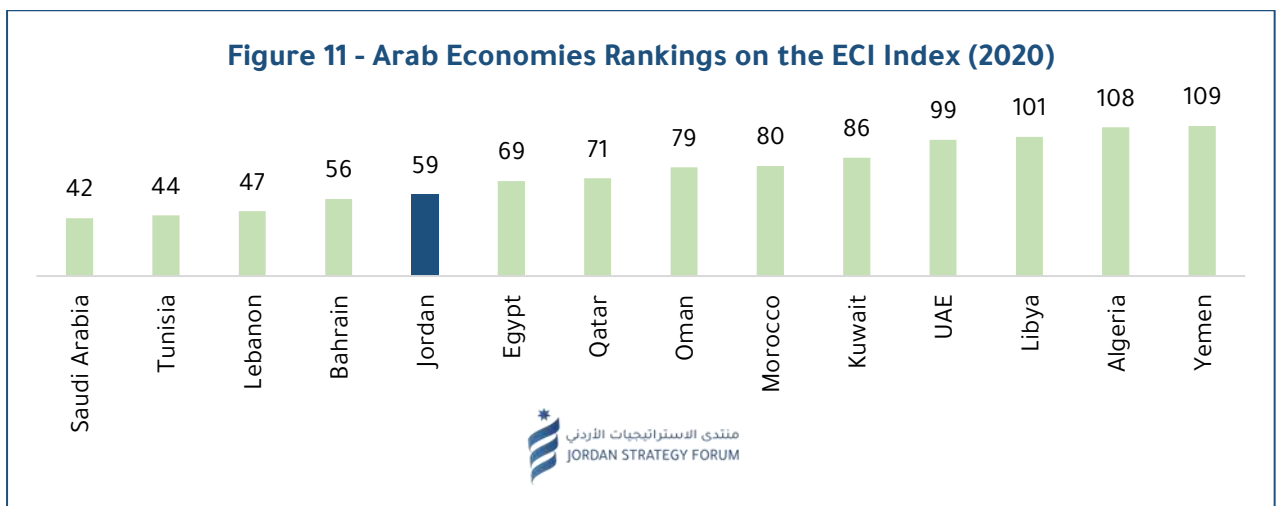
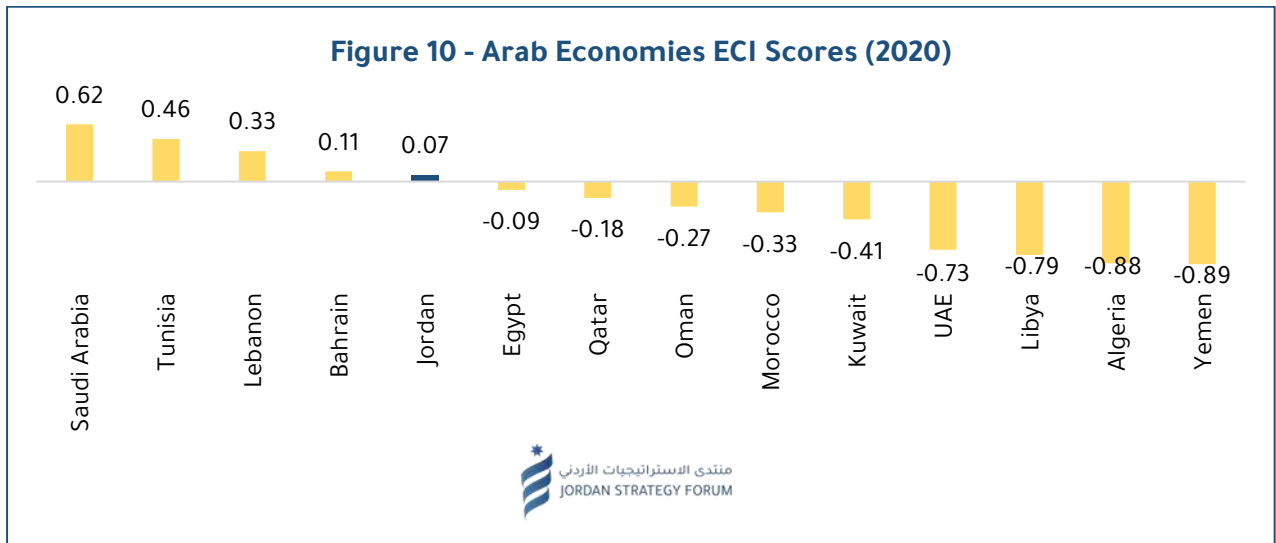
4. Economic Complexity: Some Observations on the Global, Regional, and Domestic Levels

Following our discussion of economic complexity in general, and the ECI, PCI, and product space in particular, we outline below a number of observations from the Harvard Team's webpage. Based on the latest available data (2020), the Harvard team's webpage contains the rankings and scores of the ECI for 133 countries. Below, we report some observations.

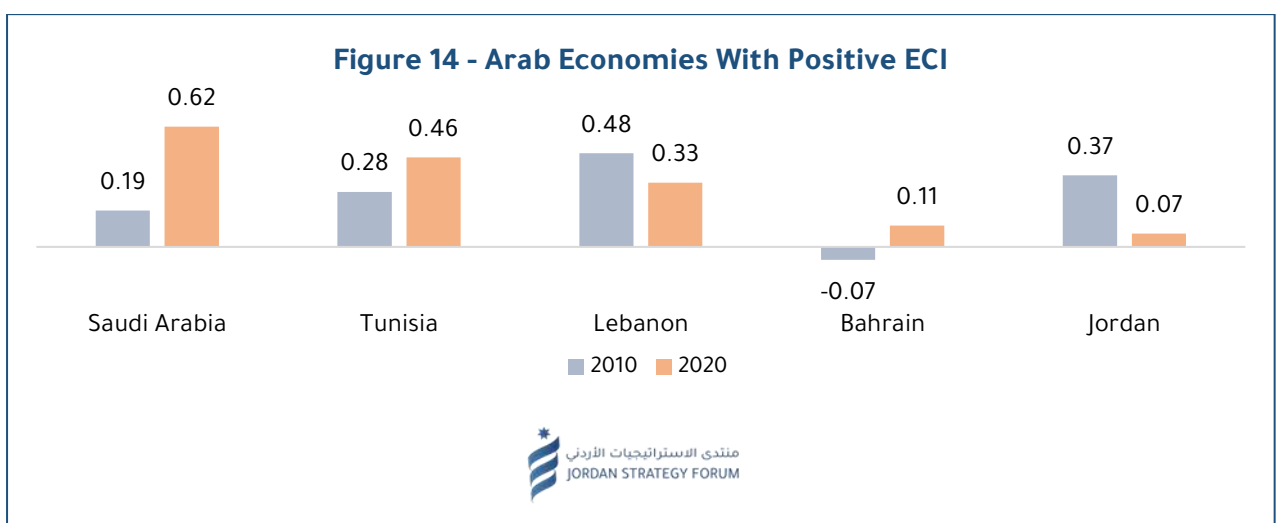
- a) Japan, Switzerland, Germany, South Korea, and Singapore are the top five economies by economic complexity. With a score of -2.5, Angola ranks last (133rd). As explained above, the relatively high ECI scores is the result of economies being well diversified and on average, exporting complex products. A product is more complex if it is made by highly diversified countries that make predominantly rare products.



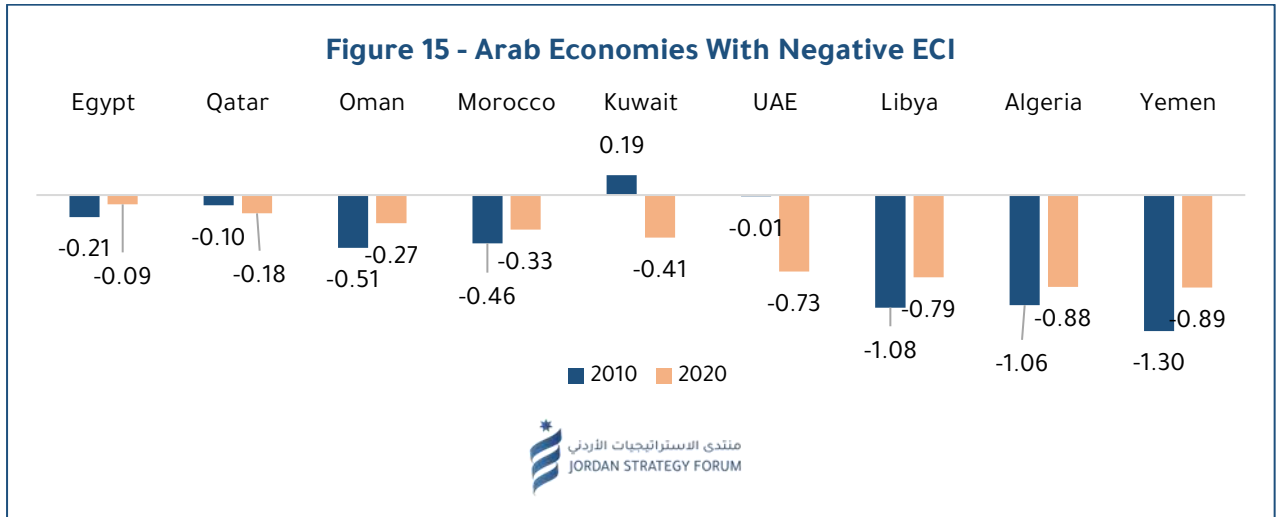
- b) At the Arab economies level, Saudi Arabia is the most sophisticated. With a score of 0.62, Saudi Arabia ranks 42nd out of 133 economies. Jordan ranks 59th.



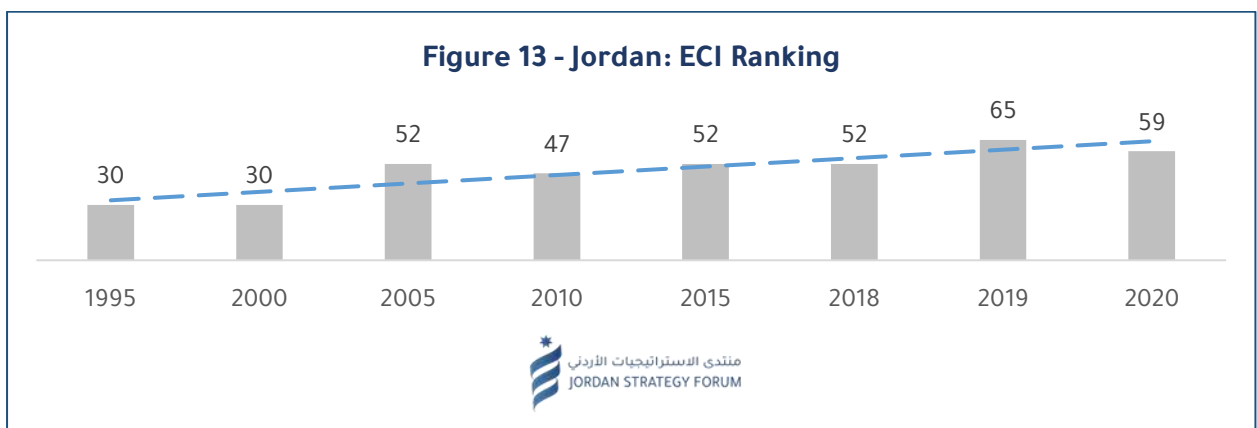
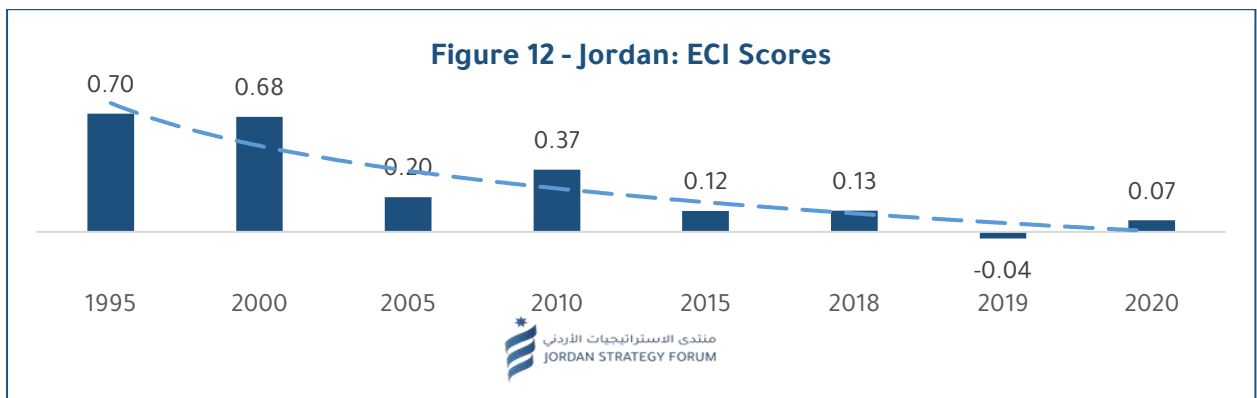
c) The Saudi Arabian and Bahraini economies reflect positive improvements in their ECI scores during the period 2010-2020.



- d) Despite their negative ECI scores, it is encouraging to note that the Arab economies that have witnessed some improvement in their economic complexity were Egypt (-0.09), Oman (-0.27), Morocco (-0.33), Libya (-0.79), Algeria (-0.88), and Yemen (-0.89).



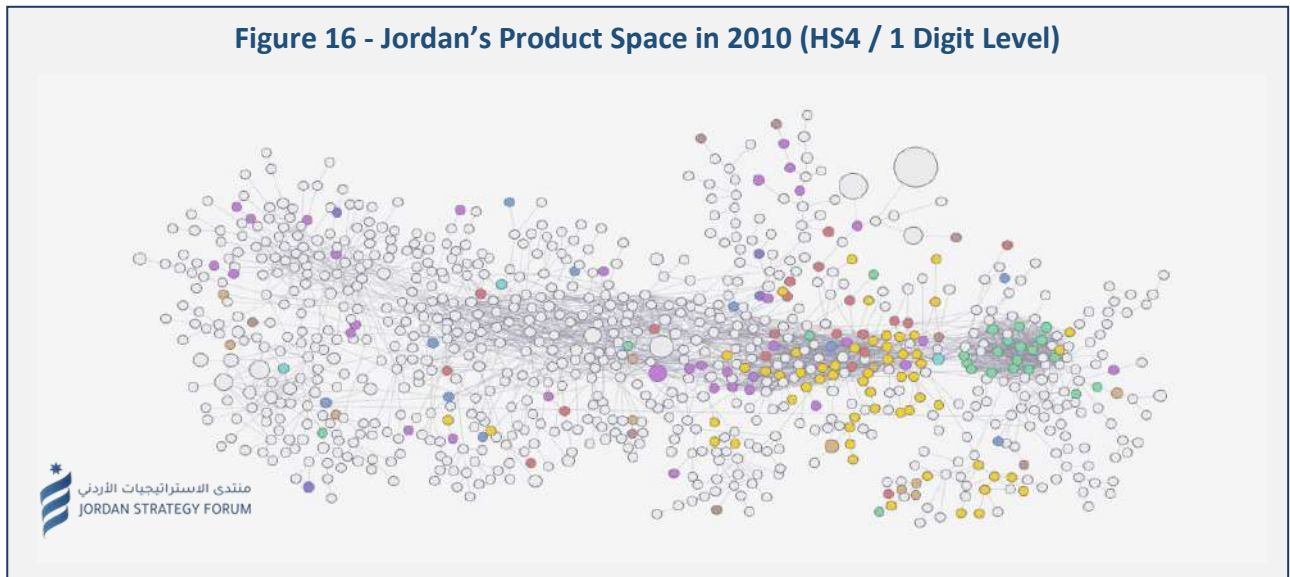
- e) It is unfortunate to note that Jordan's ECI has come down from +0.37 in 2010 to +0.07 in 2020. This deterioration is reflected in the ranking of the economy (59th in 2020). As for the year 2019, and with a score of -0.04, Jordan's ECI took an unprecedented turn due to the emergence of the COVID-19 pandemic.



5. Some Observations of Jordan's Product Space:

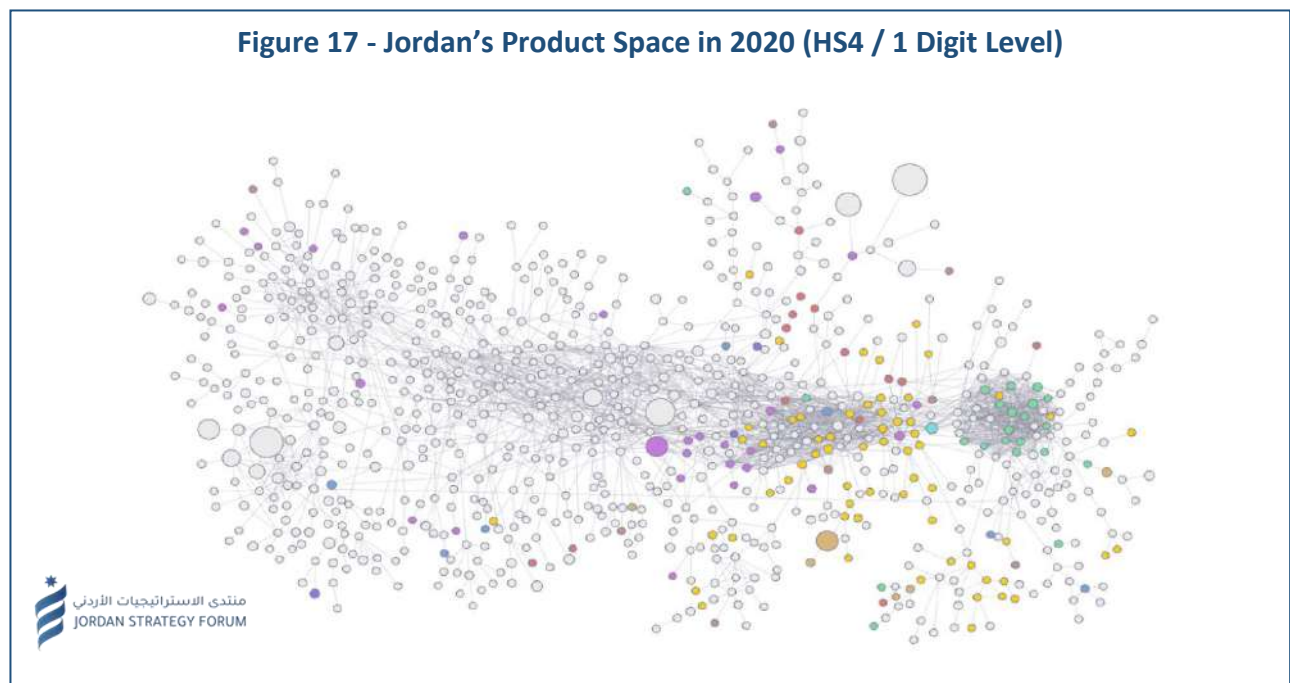
The deterioration of Jordan's ECI becomes easy to explain if one looks at the 2010 and 2020 products spaces, and at the HS4¹ (1 digit sector level) and HS4 (4-digit sector level) compositions of exports.

Figure 16 - Jordan's Product Space in 2010 (HS4 / 1 Digit Level)



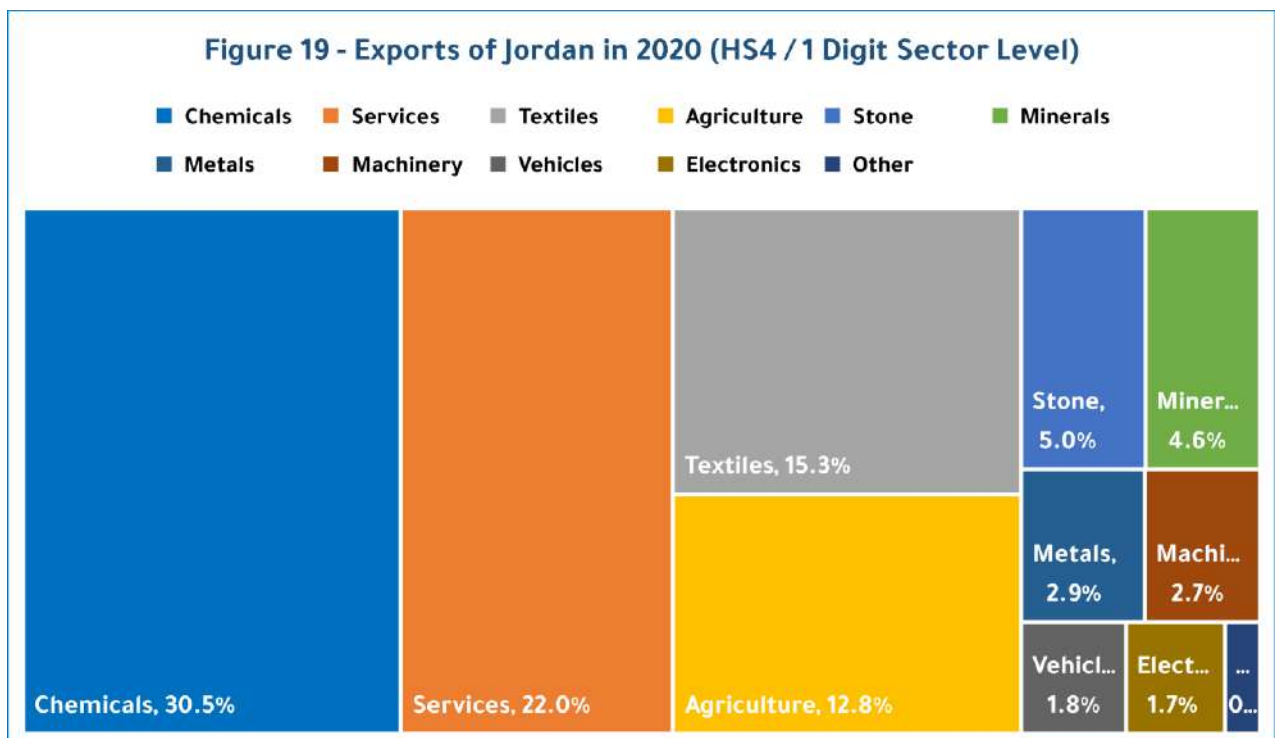
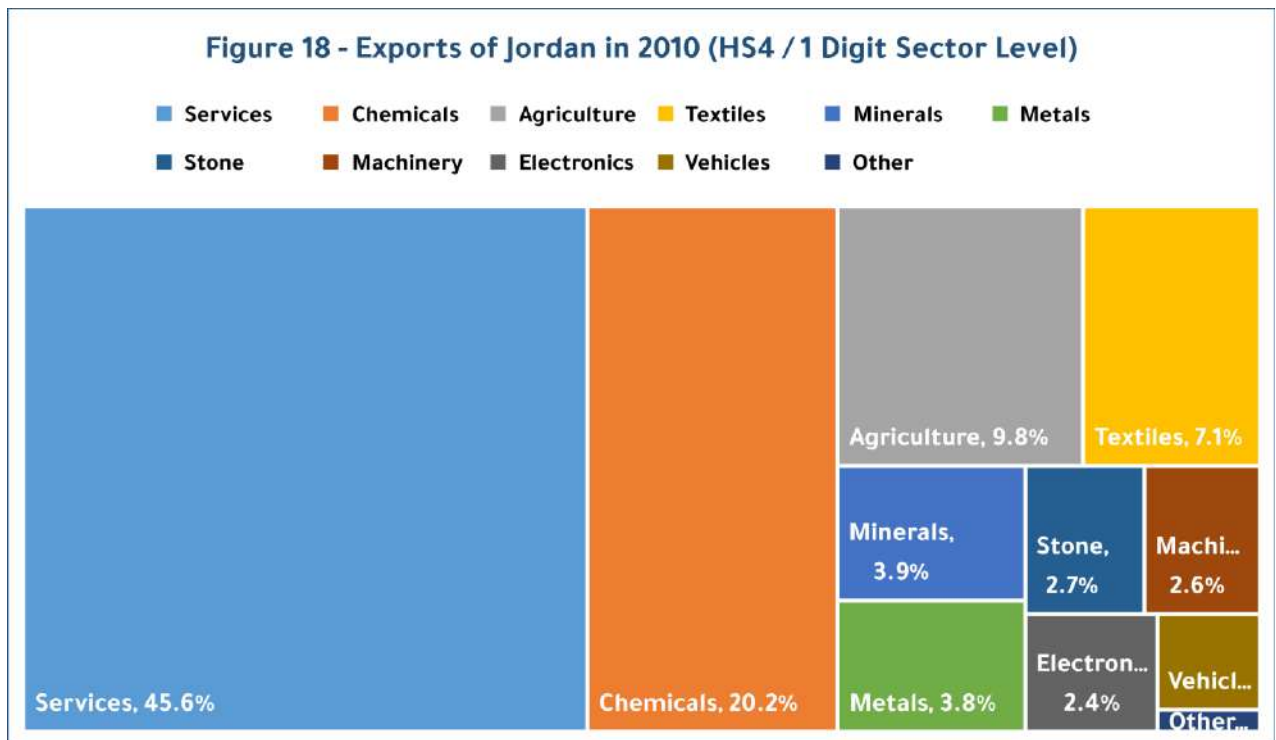
First, on average, the 2010 product space contains more circles than the 2020 space.

Figure 17 - Jordan's Product Space in 2020 (HS4 / 1 Digit Level)



¹ The Harmonized System (HS) of tariff nomenclature is an internationally standardized system of names and numbers to classify traded products.

Second, based on the product classification HS4 (1 digit sector level), the main change in Jordan's trading performance is the relative increase in the exports of services and chemicals.

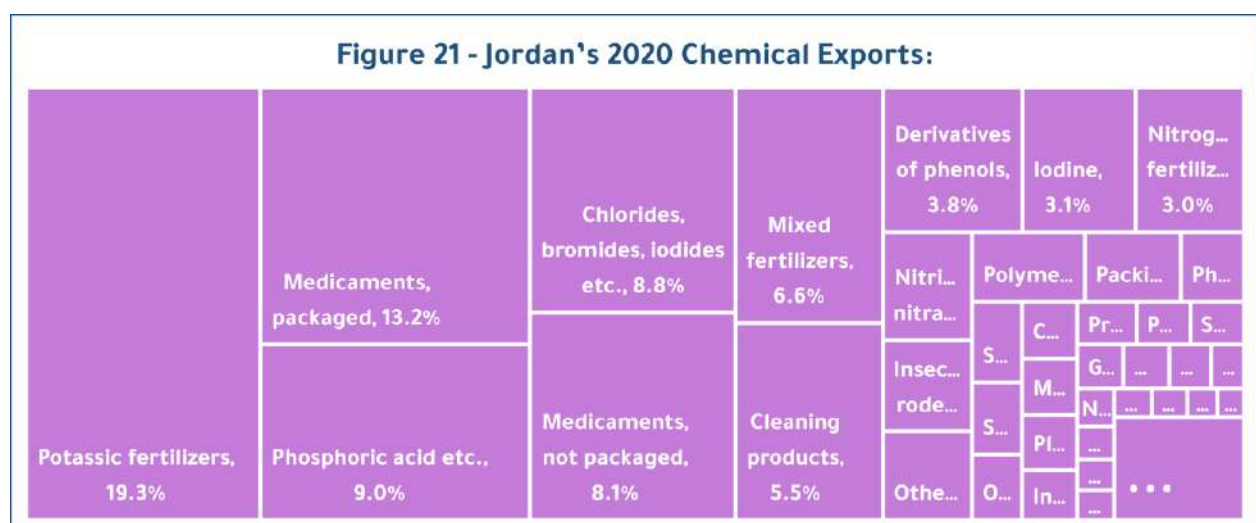
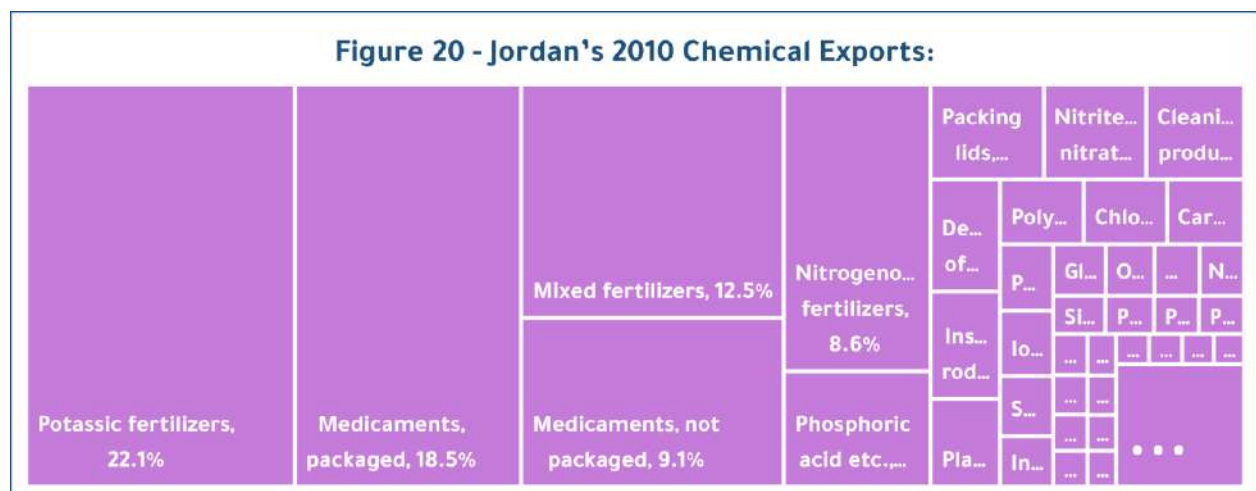


Third, based on the product classification HS4 (4-digit sector level), Jordan's 2010 and 2020 main exports of chemical exports include potassic fertilizers, medicaments (packaged), phosphoric acid etc., chlorides, bromides, iodides etc., medicaments (not packaged), and mixed fertilizers.

On average, the changes in the complexity of these products, and the change in each product's exported ratio to the total, have not been to the advantage of Jordan's ECI.

Chemicals:

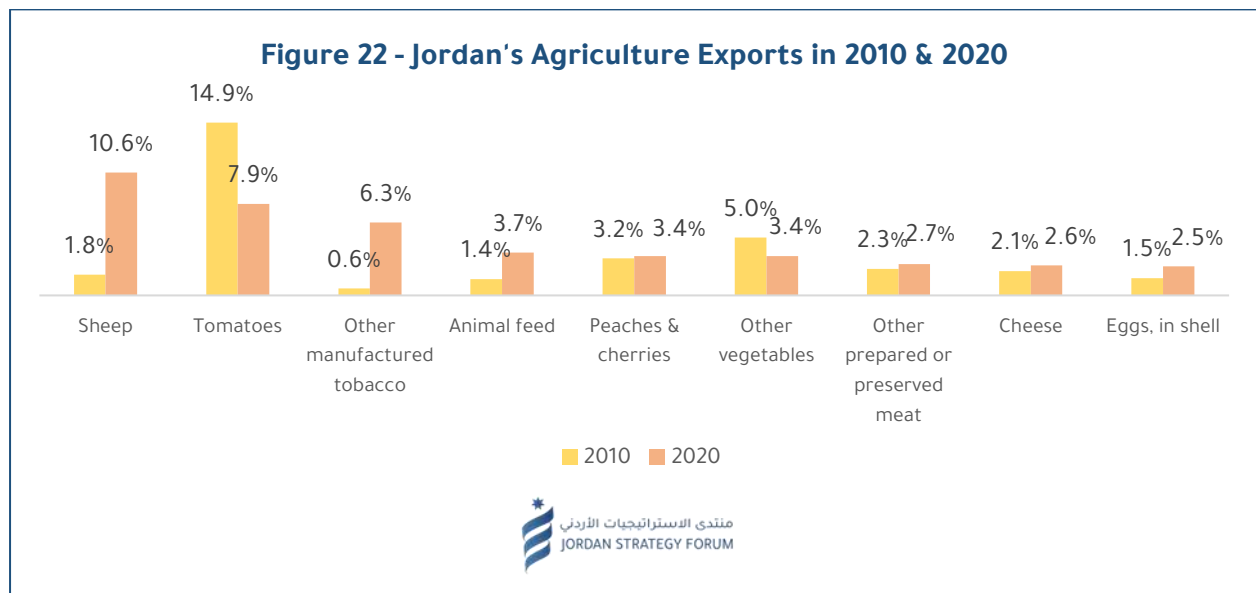
- The complexity of potassic fertilizers decreased from +0.221 in 2010 to -0.463 in 2020.
- The complexity of medicaments (packaged) decreased from +0.805 in 2010 to +0.682 in 2020.
- The complexity of medicaments (not packaged) increased from +0.0577 in 2010 to +0.421 in 2020.
- The complexity of phosphoric acid decreased from +0.347 in 2010 to -0.806 in 2020.
- The complexity of Chlorides, bromides, iodides etc. decreased from +0.618 in 2010 to 0.19 in 2020.
- The complexity of mixed fertilizers decreased from -0.634 in 2010 to -0.912 in 2020.



Fourth, Jordan's 2010 and 2020 main agriculture exports are sheep, tomatoes, other manufactured tobacco, animal feed, peaches & cherries, and others.

On average, the changes in the complexity of these products, and the change in each product's exported ratio to the total, have not been to the advantage of Jordan's ECI.

- The complexity of sheep decreased from -1.42 in 2010 to -1.45 in 2020.
- The complexity of tomatoes decreased from -0.998 in 2010 to -1.39 in 2020.
- The complexity of other manufactured tobacco decreased from -0.339 in 2010 to -0.935 in 2020.
- The complexity of animal feed increased marginally from -1.50 in 2010 to -0.337 in 2020.
- The complexity of peaches & cherries decreased from -0.664 in 2010 to -1.12 in 2020.



Fifth, Jordan's 2010 and 2020 main textile exports are other garments knit, sweaters, pullovers, sweatshirts, etc., knit, women's suits, knit, women's suits and pants, men's suits, knit, and men's suits and pants.

On average, the changes in the complexity of these products had witnessed slight improvement despite remaining negative.

- The complexity of other garments knit increased marginally from -1.32 in 2010 to -1.23 in 2020.
- The complexity of sweaters, pullovers, sweatshirts, etc. increased from -1.62 in 2010 to -1.26 in 2020.
- The complexity of women's suits, knit increased from -1.53 in 2010 -1.3 in 2020.
- The complexity of men's suits and knit increased from -1.7 in 2010 to -1.34 in 2020.

Figure 23 - Jordan's 2010 Textile Exports:

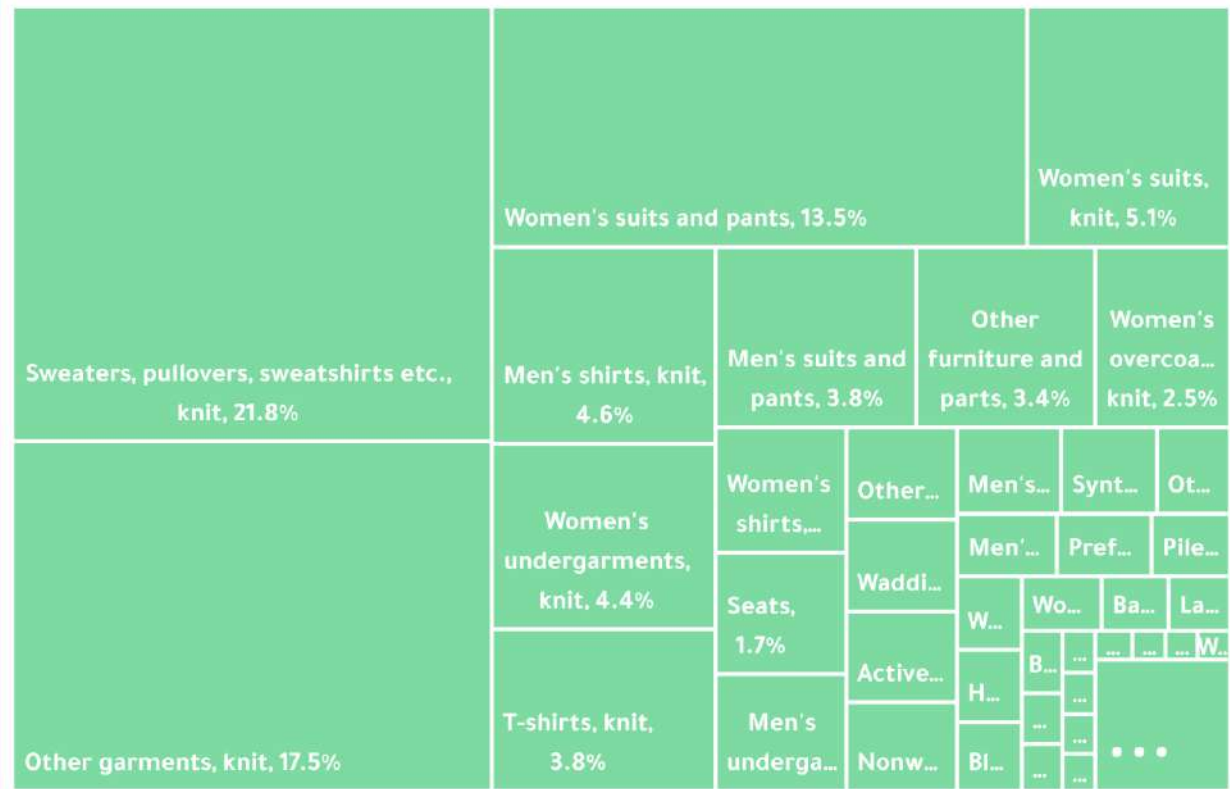
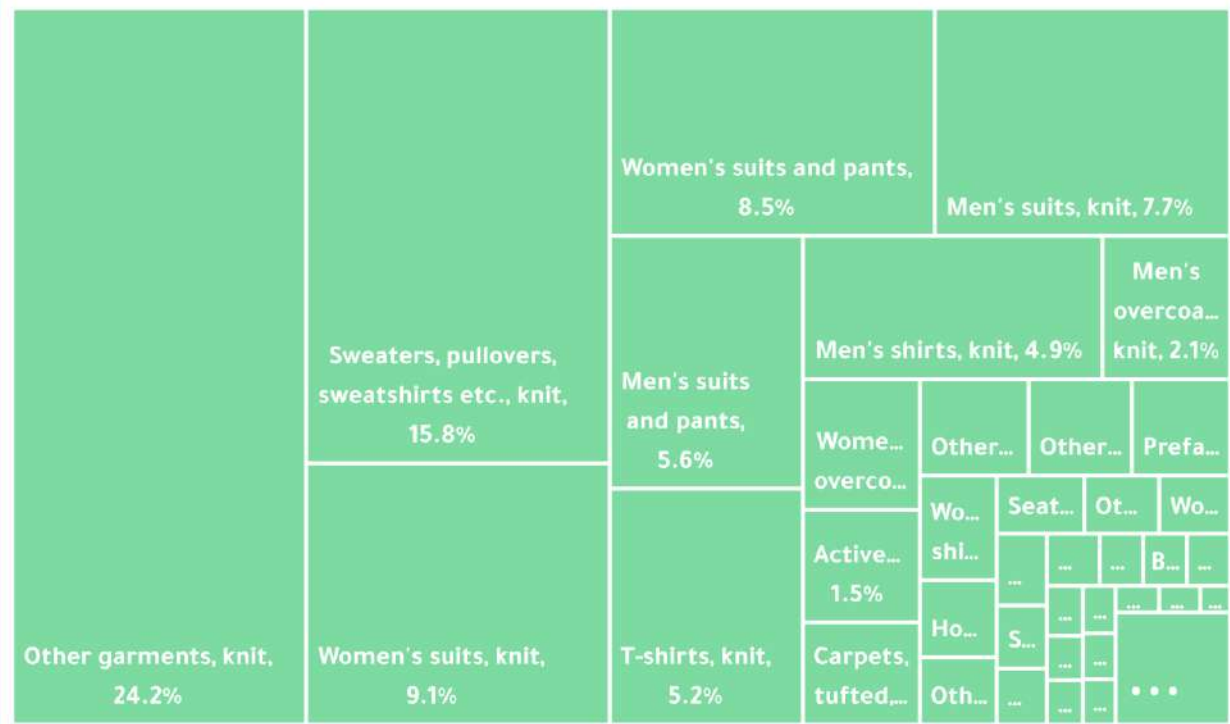


Figure 24 - Jordan's 2020 Textile Exports:



6. The Jordanian Economy & ECI: What Options are Available?

To grow in a sustainable fashion, Jordan cannot go on making more of the same. Compared to 2010, the Jordanian economy has become less complex. In 2010 and 2020, the economy's ECI was equal to +0.37 and +0.07 respectively. This worsening complexity is the result of a lack of diversification of exports, exporting much of the same goods that have, on average, negative complexity scores.

To move forward, Jordan must use its existing know how and take advantage of any available opportunities to diversify its production and exports. Jordan needs to move gradually into “ever-expanding set” of new and more sophisticated products. **WHAT TO DO?**

All relevant stakeholders should positively adopt the concept of economic complexity and work on increasing the ranking of the national economy on the ECI. **To do so, the JSF recommends the following:**

- 1. On the Production Scale:** Focus groups / meetings for the recommended product groups should be formed to explore ways and means to start making some of them.
- 2. On the Policy Scale:** Understanding what makes some economies more complex than others is critical. Indeed, this is important in the design and implementation of effective policies towards increasing complexity. The available literature reports point out a myriad of factors.

Jordan is a small country. To grow by diversifying into new products of increasing complexity, any policy should maintain a balance between distance and complexity.

Based on the database of the Harvard Team, we listed the new product opportunities for Jordan with a score of 0 - 1 on the distance dimension, whereby 0 is nearby and 1 is distant. Additionally, we also listed the product scores on the complexity dimension. Based on these guiding principles, the top 50 products relevant Jordanian stakeholders to consider moving into their production. Within this context and based on the list of products below, the Jordan Strategy Forum (JSF) in coordination with the Amman Chamber of Industry (ACI) have identified the most important promising products for Jordan in order to improve Jordan's score on the economic complexity index. These products include the following:

- 1. Float glass (HS 7005):** it is necessary to take advantage of the silica sand available in Jordan in large quantities and high levels of purity. The production of this commodity also helps to replace imports and supply the construction sector in the local market with glass sheets. This in turn facilitates benefiting from promising export opportunities for reconstruction in neighboring markets such as Syria and Iraq.

2. **Aluminum plates (HS 7606):** the industry producing this commodity is energy-intensive and includes great opportunities for using the natural gas present in the field of Risha and the Egyptian gas as well. In turn, it facilitates taking advantage of promising export opportunities to rebuild in neighboring markets such as Syria and Iraq.
3. **Parts for electrical apparatus (HS 8538):** it is necessary to point out the importance of establishing new industries in this field, which contributes to capacity building and the gradual transfer of technical knowledge to engineering cadres and graduates from various disciplines. The industries producing these commodities represent an important supply chain for several electrical industries at the level of the local and Arab markets, including the manufacture of electrical panels and electrical systems. electrical distribution and control.
4. **Wadding, gauze and bandages (HS 3005):** this industry contains large and promising opportunities in the local market to replace imports and exports at the regional level.
5. **Parts of motor vehicles (HS 8708):** the manufacture of these commodities constitutes a strategic direction in Jordan to attract investments. It also constitutes a great opportunity to build the capabilities and skills of engineering cadres and graduates from various specializations. In addition, it is necessary to point out the promising opportunities for these industries as a result of the increasing volume of electric car imports in Jordan and in various countries in the region. It is also worth noting the promising opportunities in the integration projects between Jordan, Egypt and the UAE in the electric car industry.

7. Table (1): listed the new product opportunities for Jordan

HS Codes	New Product Opportunities	Distance	Complexity	Global Size (\$Billion)
3305	1. Hair products	0.795	0.301	13.8
4822	2. Bobbins, spools, cops of paper	0.8	0.246	0.415
7314	3. Cloth of iron or steel wire	0.805	0.188	5.39
3925	4. Plastic builders' ware	0.805	0.274	12.3
3920	5. Other plates of plastics, noncellular and not reinforced	0.806	0.136	56.2
3921	6. Other plastic plates, sheets etc.	0.806	0.5	26.6
7308	7. Structures and their parts, of iron or steel	0.806	0.297	46.2
3210	8. Other paints and varnishes	0.811	0.125	0.67
7005	9. Float glass	0.818	1.81	4.73
4418	10. Wood carpentry for construction	0.818	0.103	13.2
7610	11. Aluminum structures (bridges, towers etc)	0.82	0.289	12.8
5811	12. Quilted textile products	0.821	0.181	0.195
2206	13. Other fermented beverages	0.825	0.0788	1.77
7608	14. Aluminum tubes and pipes	0.826	0.222	1.93
4823	15. Other paper cut to size	0.826	0.111	9.96
3303	16. Perfumes	0.826	0.157	15
4911	17. Other printed matter	0.827	0.683	9.29
9403	18. Other furniture and parts	0.827	0.655	88.4
4901	19. Books, brochures etc.	0.828	0.444	13.8
3902	20. Polymers of propylene	0.828	0.45	36.8
3809	21. Finishing agents	0.828	0.317	4.26
7019	22. Glass fibers	0.829	0.526	11.2
8431	23. Parts for use with hoists and excavation machinery	0.829	0.685	47.5
3306	24. Dental hygiene products	0.829	0.18	5.55
4805	25. Other uncoated paper and paperboard	0.83	0.395	13.4
4811	26. Cellulose wadding, coated	0.831	0.358	17.8
6810	27. Articles of cement, of concrete or of artificial stone	0.831	0.558	10
3304	28. Make-up preparations	0.831	0.504	52.8
7212	29. Flat-rolled iron, width < 600mm, clad	0.831	0.576	3.93

7325	30. Other cast articles of iron or steel	0.832	0.397	5.94
3922	31. Baths, sinks etc.	0.832	0.602	4.31
3606	32. Ferrocium and other pyrophoric alloys	0.832	0.742	0.289
4011	33. New pneumatic tires of rubber	0.832	0.508	67.6
7606	34. Aluminum plates > 0.2 mm	0.833	0.56	26.9
8438	35. Machinery for the industrial preparation of food or drink	0.834	0.404	12.5
8403	36. Central heating boilers	0.835	0.404	6.74
4016	37. Other articles of vulcanized rubber	0.836	0.751	24.4
8432	38. Machinery for soil preparation or cultivation	0.839	0.731	8.01
3006	39. Pharmaceutical goods	0.84	0.809	13.8
7008	40. Multiple-walled insulating glass	0.84	0.846	1.9
7326	41. Other articles of iron or steel	0.84	0.774	46.2
7616	42. Other articles of aluminum	0.841	0.708	15.7
8503	43. Parts for use with electric generators	0.842	0.866	16.9
8428	44. Other lifting machinery	0.842	0.917	28.6
8538	45. Parts for electrical apparatus	0.843	0.841	31.1
8434	46. Dairy machinery	0.843	0.761	2.14
9033	47. Other parts for machines and appliances	0.843	1.14	2.85
8608	48. Railway track fixtures	0.846	1.08	0.811
3005	49. Wadding, gauze and bandages	0.848	1	7.97
8708	50. Parts of motor vehicles	0.854	1.2	327



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