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Research Article

Approaching The Impact Of The Technological Knowledge Sector Gap In The Efficiency Of Technological Balance Of Payments Performance: Selected Countries Case Studies

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ABSTRACT

The basic elements of efficient technological balance of payments performance are traditionally embedded in the capabilities of institutions, to educate the scientific and technological workforce. The research problem is reflected in the increasing size of the gap between innovative and adapting environments of technological knowledge, poses a fundamental challenge to the stability of the technological balance of payments. The research hypothesis stems from the dialectic between investment in the technological knowledge sector, enhancing the efficiency of the performance of technological balance of payments indicators. The research gap confirms the study of the impact of the dynamism of the technological balance of payments on the development of the knowledge economy environment. The research adopts the Meso-approach, which makes the research analyzes flow successively from theoretical inference (Deduction) concerned with extracting preliminary results from known premises to analyze theoretical aspects to experimental induction (Induction), studies molecules in order to reach comprehensive results from interpreting statistical data by adopting both descriptive and quantitative methods. The research addressed the conceptual framework and the technological export gap in the sample of selected Arab countries, then the gap in spending on research and development, education and patents between the selected countries, as well as the ICT sector gap between the selected countries, while the technological balance of payments indicators reflected the fact that the sample of selected countries are net importers of advanced technologies, in addition to the weak enabling environment procedures with regard to intellectual property arrangements, especially joining the World Intellectual Property Rights Organization, agreement on Trade-Related Aspects of Intellectual Property Rights within the framework of the World Trade Organization.

Keywords: technological balance of payments, technological exports, research and development, education patents, information and communications technology.

Introduction:

The basic elements of efficient technological balance of payments performance are traditionally embedded in the capabilities of institutions to educate the scientific and technological workforce, technical knowledge and skills, and to adopt research and development outcomes in order to develop new products and production processes, as well as innovations as the bases on which competitive capabilities are based. There is a growing contribution Information and communications technology creates added value, especially in economic environments based on technological information and knowledge. The importance of the research confirms that technological knowledge has become a qualitative element of production that affects the dynamism of the technological balance of payments, in addition to its impact on the development of the knowledge economy environment. The research problem is reflected in the increasing size of the gap between innovative

and adaptable environments of technological knowledge, which constitutes a fundamental challenge to the stability of the technological balance of payments. The research hypothesis is based on the dialectic between investing in the technological knowledge sector and enhancing the efficiency of the performance of technological balance of payments indicators. The research aims to analyze the implications of the technological knowledge economy environment and its impact on technological balance of payments indicators. The research gap is confirmed by studying the impact of the dynamism of the technological balance of payments on the development of the knowledge economy environment. The research adopts the Meso-approach, which makes the research analyzes flow successively from theoretical inference (Deduction), which is concerned with extracting preliminary results from known premises to analyze theoretical aspects, to experimental induction (Induction), which examines molecules in order to arrive at comprehensive results from interpreting statistical data by adopting both descriptive and quantitative methods. The research involves studying the effects of technological knowledge on the dynamics of the technological balance of payments in selected countries during the period (2010-2020). The research addressed the conceptual framework, the technology export gap in the sample of selected Arab countries, then the spending gap on research and development, education and patents between the selected countries, as well as the information and communications technology sector gap between the selected countries.

First: The conceptual framework

The path of intellectual production is no longer limited to a material production path linked to practical applications only, or a theoretical abstraction, so there is an organic interaction between these two paths in one compound represented by technological knowledge. Which gives importance to clarifying the concepts of technological knowledge and its dimensions as well, especially when this matter relates to this new branch of economic theory (1).

The term technology is a term whose origins go back to the Greeks. It is composed of two syllables: the first is Technikons, which means the sum of technical methods, and the second is Logos, which means science, dialogue, or logic. By combining the two syllables, it becomes clear that every technical knowledge contains logic and raises controversy around it (2). In this context, it is necessary to design a comprehensive concept of technological knowledge that represents a point of contact with its scientific and technical dimensions. However, due to the flexibility of the concept, it has become difficult to formulate a specific concept that will gain acceptance, whether by academics or technocrats, due to the multiplicity of opinions of specialists within this field and other fields to which technology contributes, such as space technology, materials technology, biotechnology, and information technology (3).

Both Antony and Hodage presented a definition of technology as “the science and art used in the production and distribution of goods and services. Technology means science because it focuses on scientific methods and research on the one hand, and art because expertise and skills are used to ensure that technology serves the needs of the production and service institution on the one hand, and society on the other hand.” (4).

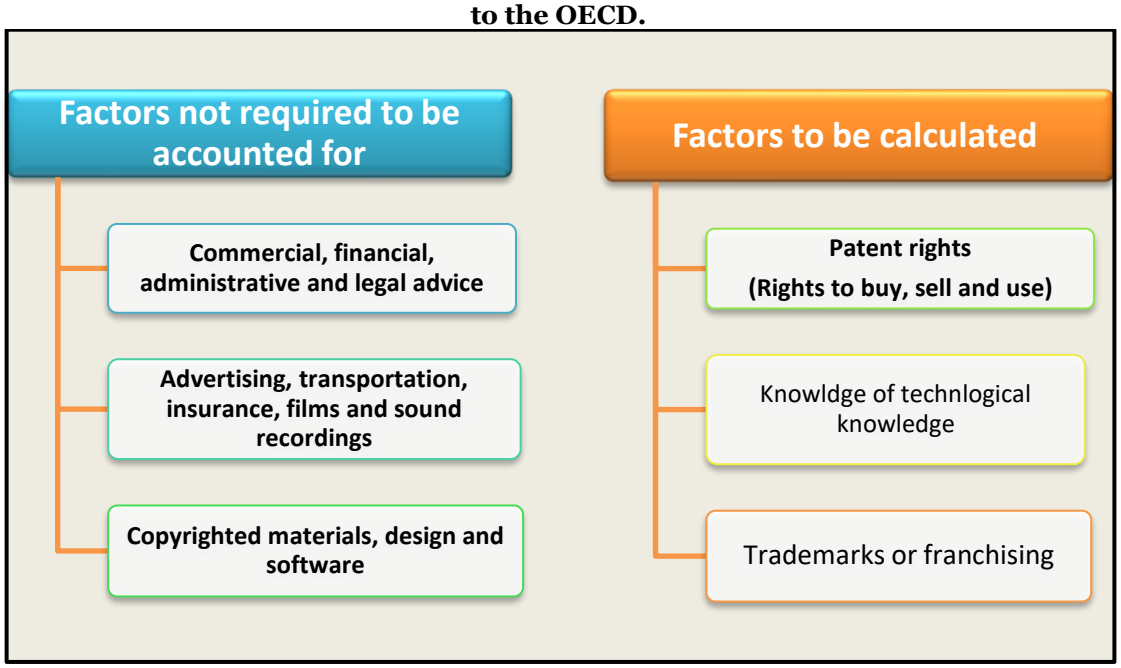
The Organization for Economic Co-operation and Development (OECD) has defined the concept of the Technological Balance of Payments (TBP) as a record of commercial information related to the transfer of technological knowledge between different economic environments. The Technological Balance of Payments reflects the cash amounts paid or received for the acquisition and use of trademarks, industrial designs, technological licenses, and patents (5).

The activity of transferring technological knowledge within economic environments is evaluated through what is known as the Balance of Payments Technology Handbook, through which funds related to intellectual property can be recorded, and the technology balance of payments can provide information about the dissemination of technological knowledge and competitiveness in the international market when it is adopted. To compare countries that use similar data collection methods (6).

In a related context, the technological balance of payments includes the buying and selling of non-embodied technology, including licenses, property rights, and technical assistance. It also includes payments that are not related to technology, such as administrative services, and it does not interfere with technological exchanges in which there are no payments, and this is the case of agreements related to the transfer of technological knowledge or the exchange of licenses. The technological balance of payments indicates the dynamism of exports and imports of goods that are technologically knowledge-intensive between two economic environments in which there is a difference in their technological capabilities (7).

The OECD has proposed different methods for collecting and using data for the technological balance of payments, and also made recommendations on how to apply the technological balance of payments for the purpose of measuring the transfer activity of technological knowledge (8). In this context, Figure (1) illustrates the nature of technological balance of payments data.

Figure (1) Data collection methods for the technological balance of payments (TBP) according to the OECD.



Source: Figure prepared by the researcher based on ideas quoted from:

- Saleh Mahdi Al-Burhan, The Technology Gap Perspective in the Knowledge Economy Environment, Al-Kut Journal of Economic and Administrative Sciences, Wasit University, College of Administration and Economics, Volume One, Issue Three, 2010, p. 20.

Figure (1) shows that the technological balance of payments (TBP), which is classified according to the Organization for Economic Co-operation and Development (OECD), consists of two groups of factors: the factors that are required to be calculated, and the second are the factors that are not required to be calculated. The first group included invention rights and know-how that are not covered by patents, franchising, or trademarks. While the second group consists of commercial, financial, administrative and legal advice provided by specialized cadres, this group also includes audio recordings and films, as well as materials subject to copyright, design and software.

Second: The technological export gap in the sample of selected Arab countries

Table (1) shows the revenues of the communications technology sector in the selected countries. Kuwait topped when it achieved a value of exports amounting to 4 billion and 293 million dollars in 2020. Saudi Arabia came in first place with the lowest value of the gap when the gap in the value of technology exports between it and Kuwait reached 2 billion and 923 million dollars in 2020, and Egypt came in second place with a gap Exports amounted to 3 billion and 220 million dollars in 2020, then Tunisia ranked next to last, as its export gap amounted to about 4 billion and 70 million dollars in the approaching year 2020. While Jordan came in last place with the highest value, an export gap of 4 billion and 278 million dollars in the year. 2020.

Kuwait topped the list when it achieved the value of exports amounting to 3 billion and 558 million dollars in 2010, then it reached 4 billion and 293 million dollars in 2020. Saudi Arabia ranked second when it achieved the value of its exports about 293 million dollars in 2010. Then it increased and reached about 1 billion and 370 million dollars in 2020. Egypt came in third place with technology sector exports, which amounted to $996 million and then increased in 2020 to $1.73 billion. Then Tunisia came in penultimate place in 2010 with $345 million, and after that the value of exports declined to $223 million in In 2020, while Jordan, without data from 2010 to 2014, achieved a value of $30 million, which fluctuated up and down to an amount of $15 million in 2020 (Figure 2).

Table (1) ICT services export gap between selected Arab countries and Kuwait for the year 2020 (million dollars).

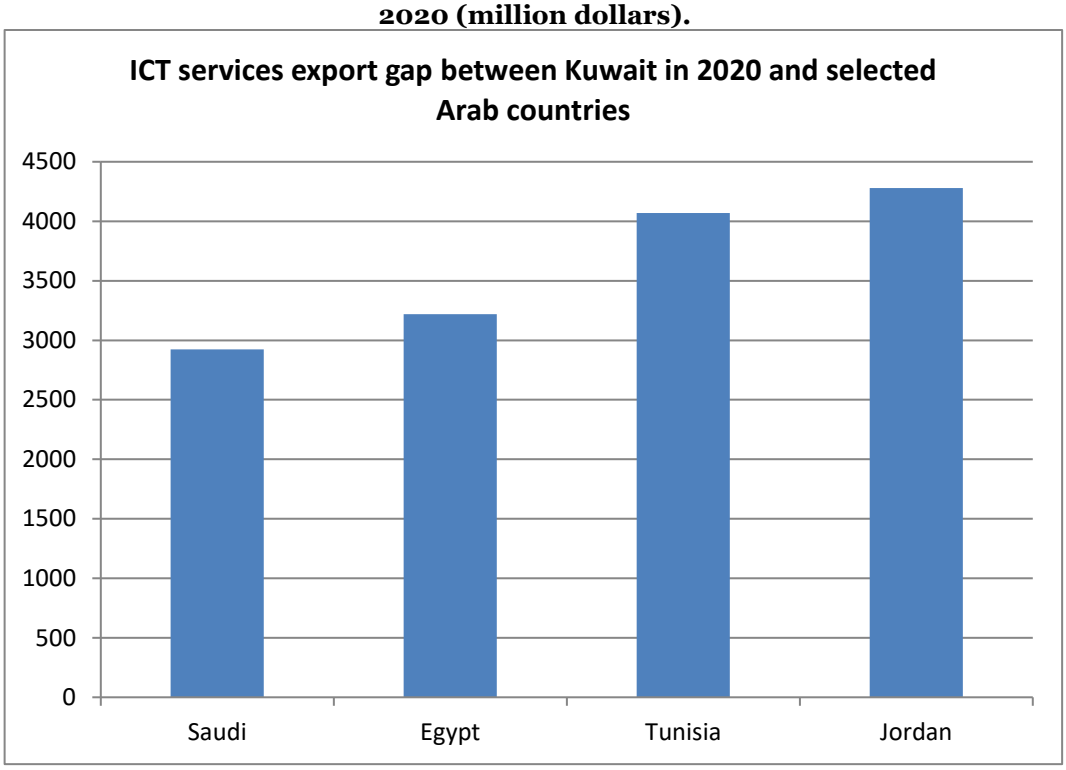
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	3558	3601	3446	3351	3064	2708	2554	2285	3264	4373	4293	-
Saudi	293	264	307	298	359	252	273	338	1159	1577	1370	2923
Egypt	996	894	1084	949	1013	810	890	682	752	836	1073	3220
Tunisia	345	380	374	410	377	310	323	301	266	268	223	4070
Jordan	16.5	17	17	16	30	44	41	24	16	14	15	4278

Source: Table prepared by the researcher based on data extracted from:

-The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:

https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

Figure (2) ICT services export gap between Kuwait and selected Arab countries for the year 2020 (million dollars).



Source: Figure prepared by the researcher based on data extracted from:

-The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:

https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

In addition to the above, the data in Table (2) shows the gap in ICT services exports as a percentage of service exports in the balance of payments, as the value of the information technology services exports gap in the selected countries ranges between 44.63% in Saudi Arabia in 2020 and about 59.28% in Jordan in 2020. 2020. Jordan topped the size of the gap with a rate of 59.28% in 2020, then Egypt followed with a rate of 52.75% in 2020, then Tunisia came with a rate of 49.67% in 2020, and Saudi Arabia came with a gap rate of about 44.63% in 2020. The data confirms the high gap between countries Kuwait and selected Arab countries. (Figure 3).

Table (2) ICT services export gap (% of total services exports) between selected Arab countries and Kuwait for the year 2020.

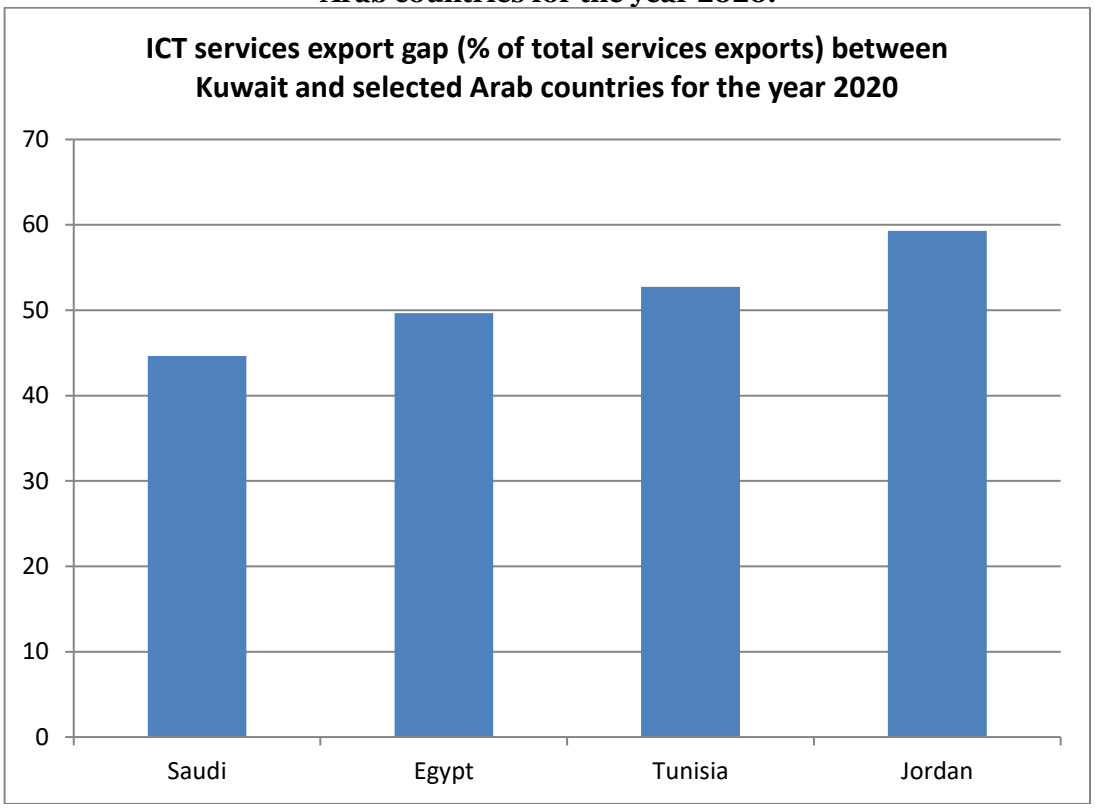
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	39.49	35.67	39.00	54.23	48.88	44.71	46.19	43.28	40.21	54.42	59.88	-
Saudi	2.74	2.30	2.78	2.51	2.86	1.74	1.58	1.87	5.65	6.51	15.25	44.63
Egypt	6.12	8.24	7.37	8.48	7.95	9.42	9.93	9.18	6.91	6.42	10.21	49.67
Tunisia	4.18	4.67	4.98	5.20	4.62	4.37	6.54	3.49	3.19	3.34	7.13	52.75
Jordan	0.61	0.58	0.54	0.47	0.41	0.70	0.68	0.36	0.21	0.17	0.60	59.28

Source: Table prepared by the researcher based on data extracted from:

-The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:

https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

Figure (3) ICT services export gap (% of total services exports) between Kuwait and selected Arab countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from:

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In a related context, Table 3 on advanced technology exports (% of total exports of manufactured goods) shows that the percentage of the gap in advanced technology exports in the selected countries ranges between 4.3% in Egypt in 2020 and about 6.37% in Saudi Arabia in 2020. The table also shows What is concerned is the extent of the advanced technology export gap rate, as Egypt topped the selected countries in 2020 with an export gap rate of 4.3%, and Saudi Arabia came in last place with a gap rate of 6.37% in 2020, then Jordan reached the position of the closest gap rate after Egypt, amounting to 5.44% in 2020, then Kuwait ranked penultimate in the advanced technology export gap by about 5.63% in 2020 (Figure 4).

Table (3): Advanced technology export gap (% of total exports of manufactured goods) between Tunisia and selected Arab countries for the year.

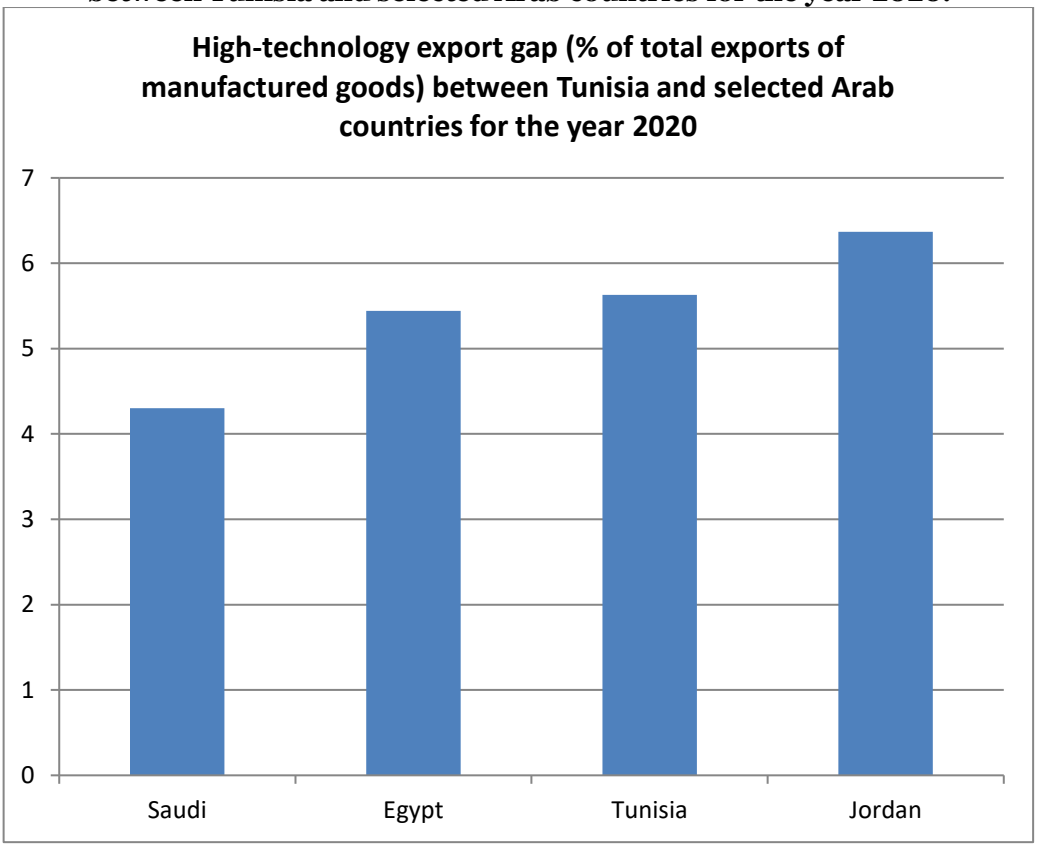
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	8.00	8.30	7.04	6.42	6.77	7.79	7.86	7.39	6.76	6.89	6.98	-
Saudi	0.95	0.99	0.62	0.53	1.25	0.79	0.50	0.57	0.87	2.33	2.68	4.3
Egypt	2.86	2.55	2.37	1.68	1.81	2.58	3.38	1.81	1.51	1.37	1.54	5.44
Tunisia	3.11	2.77	**	1.66	0.13	0.13	0.15	0.20	4.12	0.90	1.35	5.63
Jordan	0.75	0.59	0.66	0.71	0.59	0.79	1.30	0.73	0.54	0.65	0.61	6.37

:(**)Data not available

Source: Table prepared by the researcher based on data extracted from:

-The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:
https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

Figure (4) Advanced technology export gap (% of total exports of manufactured goods) between Tunisia and selected Arab countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from:

- The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:

https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

In this context, Table (4) of advanced technology exports (at current prices in million dollars) shows that Egypt leads the selected countries in 2020 with a total gap in advanced technology exports between it and Tunisia amounting to about 475 million dollars, and Kuwait came in last place in the total technology exports gap. The advanced technology amounted to about $788 million in 2020. As for the rest of the countries, Saudi Arabia came with a total advanced technology export gap of $602 million in 2020, then Jordan came in penultimate place with a total advanced technology export gap of $740 million in 2020 (Figure 5).

Table (4) Advanced technology export gap (at current prices) between Tunisia and selected Arab countries for the year 2020 (million dollars).

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	999	1085	854	801	871	838	871	851	829	841	819	-
Saudi	105	133	79	73	168	90	56	74	125	324	344	475
Egypt	202	214	258	290	255	278	421	262	253	271	217	602
Tunisia	122	117	108	82	93	121	149	83	74	71	79	740
Jordan	128	131	**	98	4	4	6	5	231	26	31	788

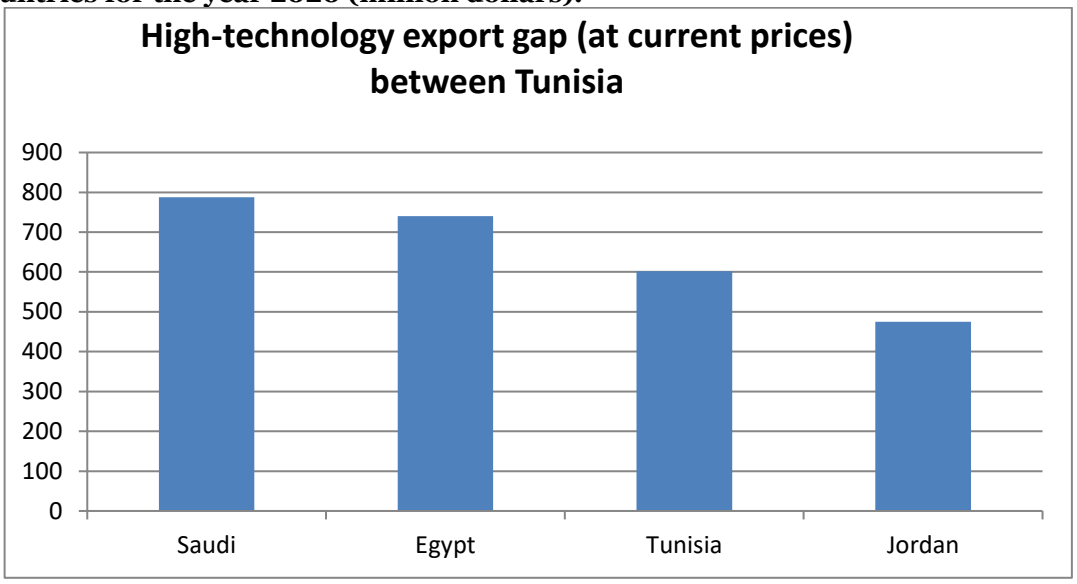
:(**)Data not available

Source: Table prepared by the researcher based on data extracted from:

-The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:

https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

Figure (5) Advanced technology export gap (at current prices) between Tunisia and selected Arab countries for the year 2020 (million dollars).



Source: Figure prepared by the researcher based on data extracted from:

- The International Monetary Fund, the Yearbook of Balance of Payments Statistics, and data files, are available on the website:
https://data.albankaldawli.org/indicator/BN.GSR.MRCH.CD

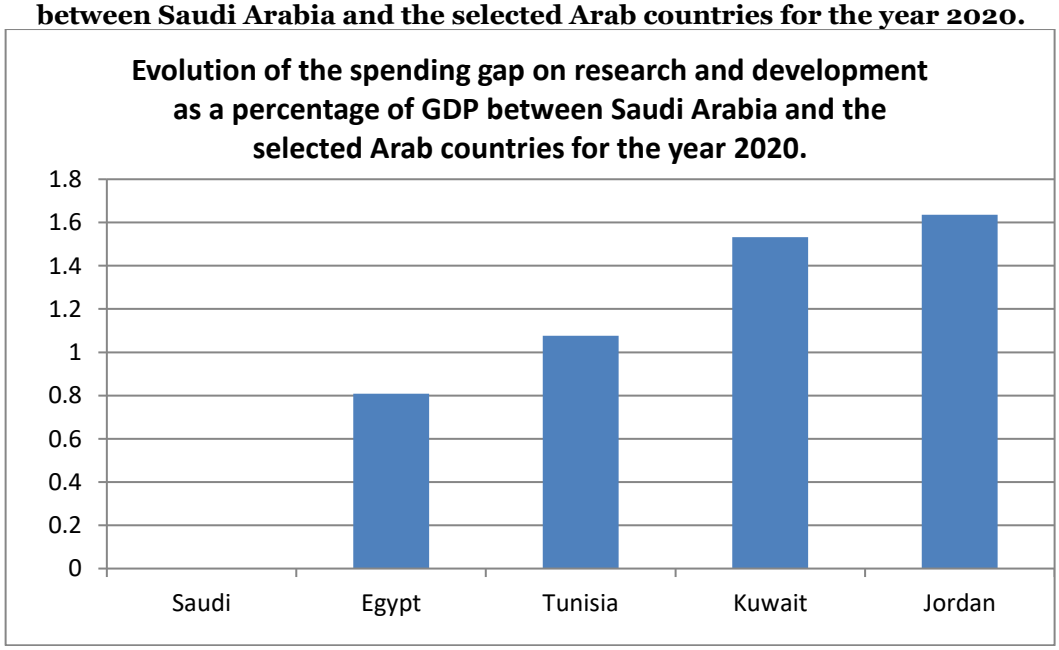
Table (5) Evolution of the spending gap on research and development as a percentage of GDP between Saudi Arabia and the selected Arab countries for the year 2020.

Country	2020	Gap
Saudi	1.636	-
Egypt	0.828	0.808
Tunisia	0.56	1.076
Kuwait	0.104	1.532
Jordan	0	1.636

Source: Table prepared by the researcher based on data extracted from:

-World Bank, UNESCO Institute for Statistics 2020, available on the website:
https://data.albankaldawli.org/indicator/GB.XPD.RSDV.GD.ZS

Figure (6) Evolution of the spending gap on research and development as a percentage of GDP between Saudi Arabia and the selected Arab countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from:

- World Bank, UNESCO Institute for Statistics 2020, available on the website:
https://data.albankaldawli.org/indicator/GB.XPD.RSDV.GD.ZS

The volume of spending on education is constantly evolving, as it reached about (6608) million dollars in Egypt in 2010, then it rose to (9820) million dollars in 2015, and continued to rise until it reached (14103) million dollars in 2020 as the highest spending on education. Education among the study countries. Therefore, the gap between the study countries and Egypt in 2020 was calculated.

The size of the spending gap on the education sector in Saudi Arabia reached about $1,069 million in 2020, with the smallest gap between it and Egypt. Then comes Tunisia, with the size of the spending gap on the education sector in Tunisia amounting to about (7,587) million dollars in 2020. As for Jordan, it came in the penultimate place when the size of the spending gap reached about (11,758) million dollars in 2020. As for Kuwait, it was It ranked last among the study countries when the size of the education spending gap reached about $13,137 million in 2020.

From analyzing these numbers, it is clear that the increase and development of the education spending gap among the study countries reached its highest levels in 2020, as Figure (7) shows.

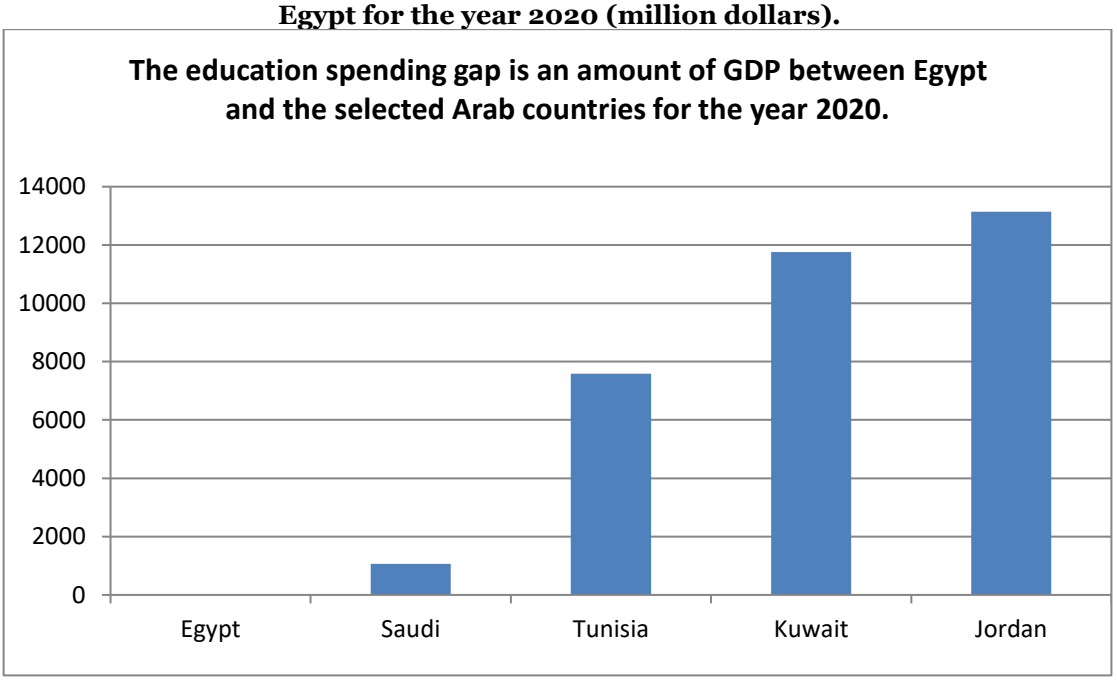
Table (6): Evolution of the education spending gap in the sample of selected countries and Egypt for the year 2020 (million dollars).

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Egypt	6608	7332	8345	8615	9171	9820	11109	11393	13326	13340	14103	-
Saudi	3642	4878	5884	7257	8286	8949	9458	10041	10897	12145	13034	1069
Kuwait	3509	3748	3913	4323	4615	5072	5445	5877	5564	6209	6516	7587
Tunisia	1448	1439	1411	1437	1411	1454	1710	1962	2627	2230	2345	11758
Jordan	744	804	834	881	799	875	825	861	1003	946	966	13137

Source: Table prepared by the researcher based on data extracted from:

- World Bank, World Development Indicators, Washington, 2020.

Table (6): Evolution of the education spending gap in the sample of selected countries and Egypt for the year 2020 (million dollars).



Source: Figure prepared by the researcher based on data extracted from:

- World Bank, World Development Indicators, Washington, 2020.

In addition to the above, Table (7) shows the schedule of spending on education as a percentage of the GDP of the study countries for the year 2020, as Tunisia comes at the forefront in terms of spending on education at a rate of approximately 10.32% of the GDP. Therefore, the gap between it and the rest of the selected Arab countries was measured. For the year 2020.

Saudi Arabia comes in first place with a spending gap on education amounting to approximately 2.51% of GDP. Kuwait followed in second place, with a spending gap on education amounting to approximately 3.77% of GDP.

Jordan ranked penultimate with a spending gap on education amounting to approximately 6.65% of GDP.

As for Egypt, it ranked last among the study countries with the largest gap amounting to approximately 7.84% of the gross domestic product (Figure 8).

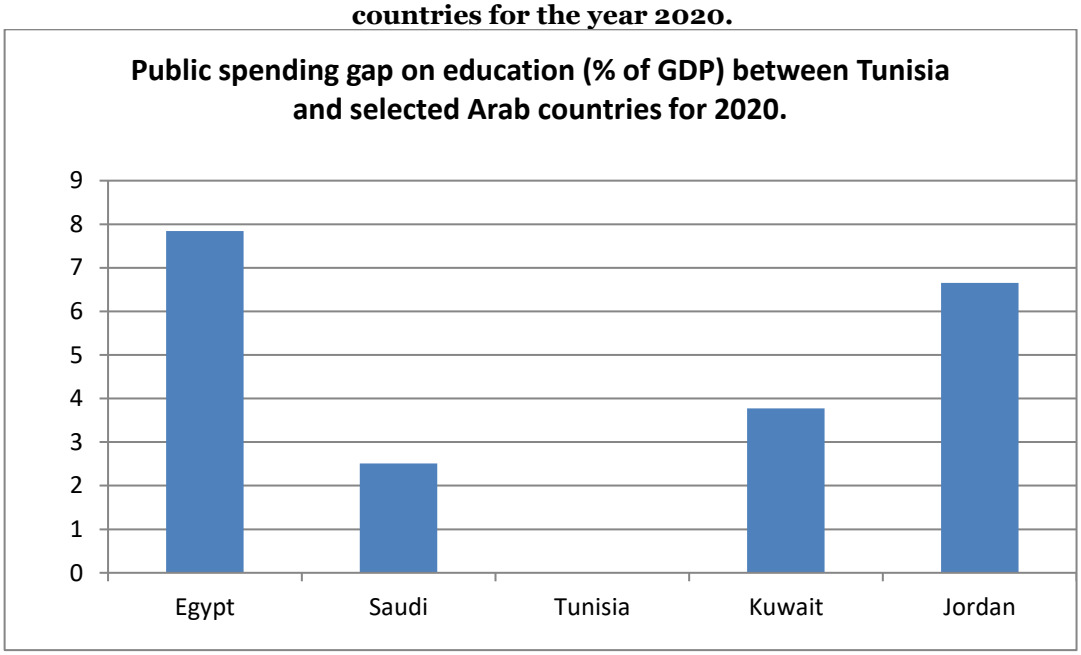
Table (7) Public spending gap on education (% of GDP) between Tunisia and selected Arab countries for the year 2020.

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Tunisia	5.96	7.55	5.95	6.97	6.88	6.22	7.32	8.94	8.03	9.82	10.32	-
Saudi	0.69	0.72	0.79	0.96	1.08	1.34	8.51	8.02	7.09	6.79	7.81	2.51
Kuwait	3.57	3.42	3.75	3.88	4.40	4.77	5.85	6.37	6.39	6.49	6.55	3.77
Jordan	3.10	3.40	3.50	3.50	3.80	3.45	3.45	3.23	2.98	2.99	3.67	6.65
Egypt	3.54	3.34	3.37	4.12	4.25	3.93	4.05	4.58	5.07	2.61	2.48	7.84

Source: Table prepared by the researcher based on data extracted from:

-World Bank, World Development Indicators, available on the website:
https://data.albankaldawli.org/indicator/NY.GDP.MKTP.CD

Figure (8) Public spending gap on education (% of GDP) between Tunisia and selected Arab countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from: The World Bank, World Development Indicators, available on the website:

https://data.albankaldawli.org/indicator/NY.GDP.MKTP.CD
https://data.albankaldawli.org/indicator/NY.GDP.MKTP.CD
The size of the patent index for residents of the selected Arab countries is constantly developing and increasing, as it reached (1078) in Saudi Arabia in 2018, as the highest number of patents among the study countries. Therefore, the gap between the study countries and Saudi Arabia was calculated for the year 2018.
The size of the patent index gap for residents of Egypt reached about (81) patents in 2018, with the smallest gap between it and Saudi Arabia.
Then comes Tunisia. The size of the patent index gap for residents of Tunisia was about (898) patents in 2018.
As for Jordan, it came in penultimate place among the study countries when the size of the patent index gap for residents reached about (1,054) patents in 2018.
Kuwait ranked last when the size of the patent index gap for its residents reached (1,077) patents in 2018.
From the analysis of the relevant data, it is clear that the patent index gap for residents in the study countries increased when it reached its highest levels in 2018 (see Figure 9).

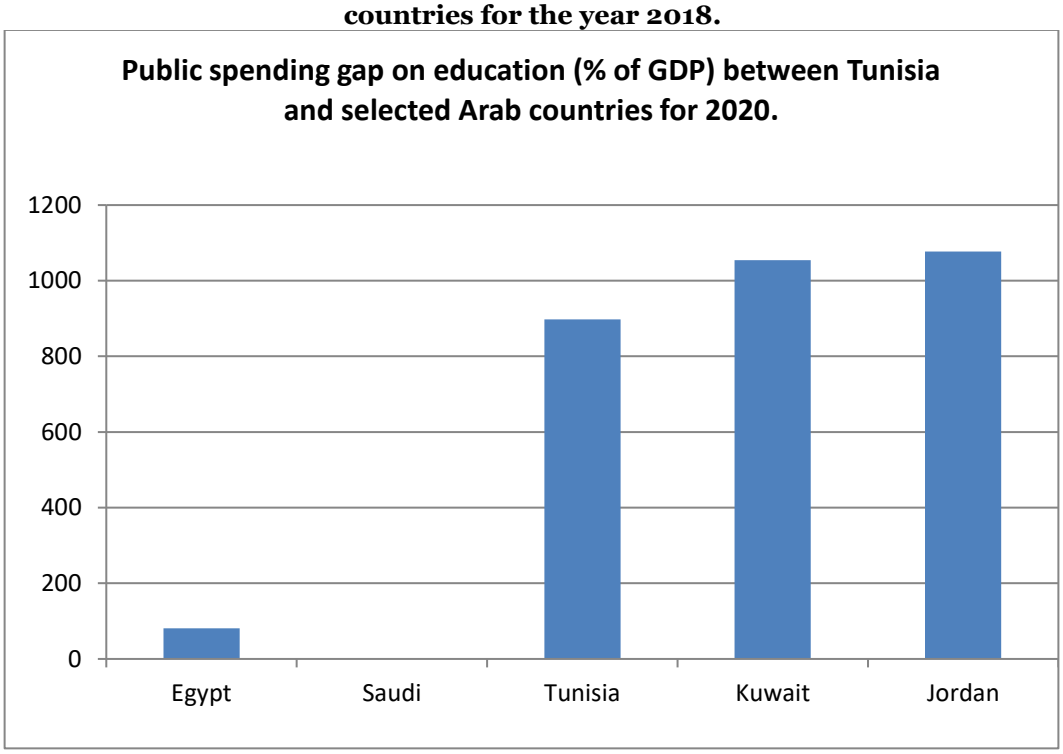
Table (8) Patent index gap (for residents) between Saudi Arabia and the selected study countries for the year 2018.

Country	2018	Gap
Saudi	1078	-
Egypt	997	81
Tunisia	180	898
Kuwait	24	1054
Jordan	1	1077

Source: Table prepared by the researcher based on data extracted from:

- World Bank, World Development Indicators, available on the website:
https://data.albankaldawli.org/indicator/IP.PAT.RESD

Figure (9) The patent index gap (for residents) between Saudi Arabia and the selected study countries for the year 2018.



Source: Figure prepared by the researcher based on data extracted from:

- World Bank, World Development Indicators, available on the website:
https://data.albankaldawli.org/indicator/IP.PAT.RESD

The size of the gap in the patent index for non-residents in Egypt reached about (1,063) patents in 2018, with the smallest gap between it and Saudi Arabia.

Tunisia was followed by the size of the patent index gap for non-residents in Tunisia, which amounted to about (2050) patents in 2018.

As for Kuwait, it came in penultimate place among the study countries when the size of the gap in the patent index for non-residents reached about (2065) patents in 2018.

As for Jordan, it ranked last among the study countries when the size of the gap in the patent index for non-residents reached about (2,212) patents in 2018.

From the analysis of this data, it is clear that there is a growing increase in the gap in the non-resident patent index between the study countries, when it reached its highest levels in 2018 (see Figure 10).

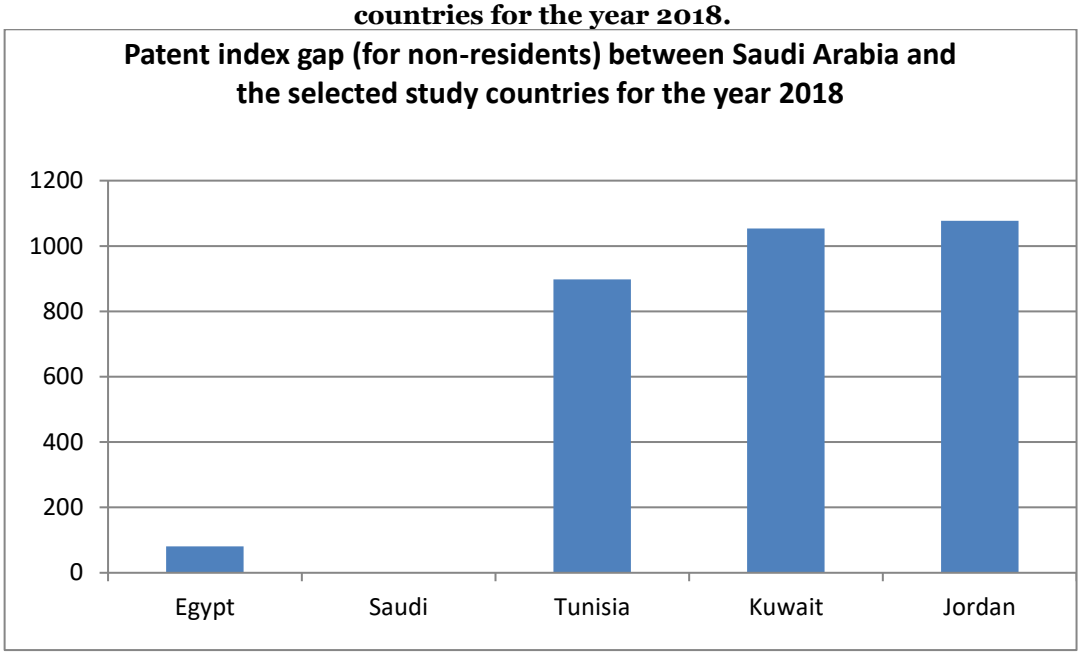
Table (9) Patent index gap (for non-residents) between Saudi Arabia and the selected study countries for the year 2018.

Country	2018	Gap
Saudi	2321	-
Egypt	1258	1063
Tunisia	271	2050
Kuwait	256	2065
Jordan	109	2212

Source: Table prepared by the researcher based on data extracted from:

- The World Intellectual Property Organization (WIPO), and the World Intellectual Property Indicators, available on the website:
https://www.wipo.int.
- World Bank, World Development Indicators, available on the website:
https://data.albankaldawli.org/indicator/IP.PAT.NRES

Figure (10) Patent index gap (for non-residents) between Saudi Arabia and the selected study countries for the year 2018.



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https://www.wipo.int.
- World Bank, World Development Indicators, available on the website:
https://data.albankaldawli.org/indicator/IP.PAT.NRES

Fourth: The information and communications technology sector gap in the sample of selected Arab countries

Table (10) shows that Kuwait ranked first in the number of Internet users in the period from 2010 to 2020, and therefore the gap in the number of Internet users between Kuwait and the rest of the study countries was calculated in 2020. Tunisia comes after Kuwait with the smallest gap in the number of Internet users with a number of 86.7 In 2020, then Saudi Arabia came with a gap of 184.3 in 2020, then Jordan came in penultimate place with a gap in the number of Internet users of about 279.2 in 2020, and Egypt ranked last with a gap in the number of Internet users of 364 in 2020. (Figure 11).

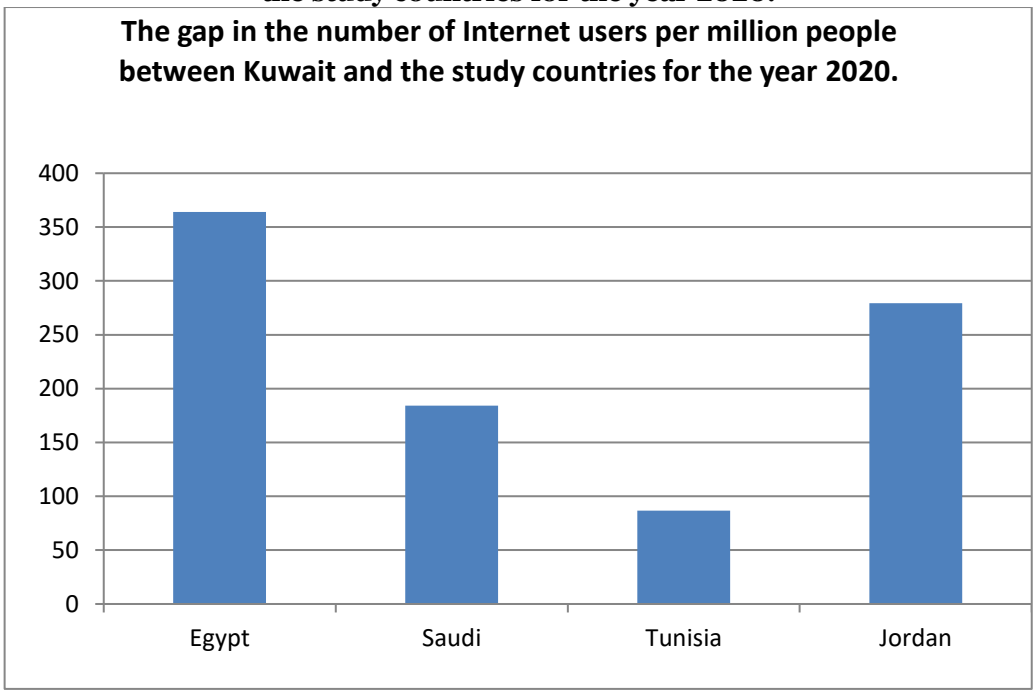
Table (10) The gap in the number of Internet users per million people between Kuwait and the study countries for the year 2020.

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	80.2	117.7	185.3	216.6	254.1	326.4	389.1	476.1	394.9	415.2	405.9	-
Tunisia	6.1	7.4	10.5	15.0	19.7	18.5	89.4	207.4	306.5	263.0	319.2	86.7
Saudi	12.2	19.1	38.2	49.4	68.1	86.6	103.0	161.5	155.5	174.6	221.6	184.3
Jordan	12.4	18.4	34.7	38.2	40.0	44.9	67.1	103.5	98.0	102.1	126.7	279.2
Egypt	2.3	2.8	4.8	6.0	7.6	10.0	13.9	34.3	33.3	33.6	41.9	364

Source: Table prepared by the researcher based on data extracted from:

- The World Bank, available on the website:
https://data.albankaldawli.org/indicator/IT.NET.SECR.P6

Figure (11) The gap in the number of Internet users per million people between Kuwait and the study countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from:

- The World Bank, available on the website:
https://data.albankaldawli.org/indicator/IT.NET.SECR.P6

In addition to the above, Table (11) shows that there is a noticeable development in all the study countries except Jordan, which witnessed a decline in the spread of fixed telephone lines, and that Egypt leads the study countries in the number of fixed-line subscribers, when the number of fixed-line subscribers in it reached about (9,618,123).) in 2010 and then reached about (9,858,331) in 2020, so the gap between Egypt and the selected Arab countries in 2020 was calculated. Saudi Arabia came in first place with a gap in the number of fixed-line subscribers estimated at about (4,109,273) in 2020, and Tunisia comes in ranked. Second, with a gap in the number of fixed-line subscribers amounting to (8,325,058) in 2020, then Kuwait came in penultimate place when the gap in the number of fixed-line subscribers reached (9,274,868) in 2020, and Jordan ranked last among the selected study countries with a gap in the number of fixed-line subscribers. The fixed rate is approximately (9,466,845) in 2020.

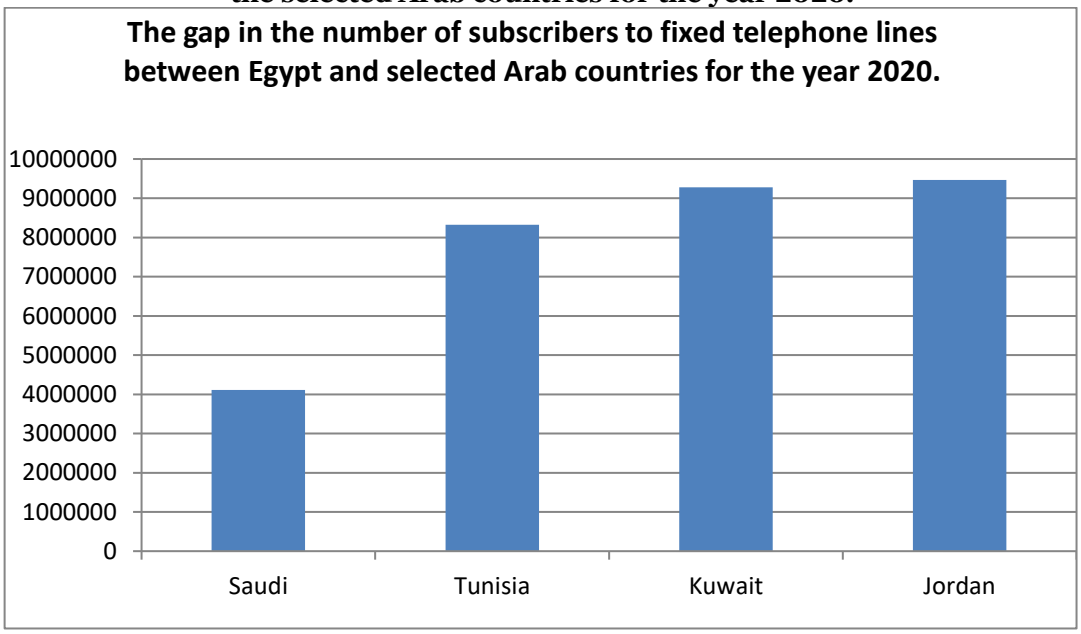
The reasons for this gap are that there is a noticeable development in all the countries of the study except Jordan, which witnessed a decline in the spread of fixed telephone lines. It is clear from the relevant table that Egypt leads those countries in the number of fixed-line subscribers when the number of fixed-line subscribers reached about (9,618,123). In 2010, then it increased to (9,858,331) in 2020. Then Saudi Arabia came in second place with the number of fixed-line subscribers (4,165,750) in 2010 until it reached the number of fixed-line subscribers at about (5,749,058) in 2020, and Tunisia ranked third in In 2010, it reached about (1,289,585) and then it reached about (1,533,273) in 2020. Kuwait ranked next to last when the number of fixed-line subscribers reached about (519,418) in 2010, then the number of fixed-line subscribers reached about (583,463) in 2020. Jordan ranked last among the selected study countries with the number of fixed-line subscribers (485,529) in 2010, which decreased to (391,486) in 2020 (see Figure 12).
Table (11) The gap in the number of subscribers to fixed telephone lines between Egypt and the selected Arab countries for the year 2020.

Country	2010	2015	2020	Gap
Kuwait	9618123	6235133	9858331	-
Tunisia	4165750	3746906	5749058	4109273
Saudi	1289585	943642	1533273	8325058
Jordan	519418	480000	583463	9274868
Egypt	485529	368938	391486	9466845

Source: Table prepared by the researcher based on data extracted from:

- International Telecommunication Union (ITU).

Figure (12) The gap in the number of subscribers to fixed telephone lines between Egypt and the selected Arab countries for the year 2020.



Source: Table prepared by the researcher based on data extracted from:

- International Telecommunication Union (ITU), available on the website: https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/

In addition to the above, Table (12) shows that there is a noticeable development in all the countries of the study, as Egypt topped those countries in the number of mobile phone subscribers when the number of mobile phone subscribers there reached (70,661,005) in 2010, then the number reached about (95,357,427) in the year 2020, so the gap in the number of mobile phone subscribers between Egypt and the rest of the study countries was calculated in 2020, then Saudi Arabia ranked first with the lowest gap in the number of mobile phone subscribers by about (52,141,988) in 2020, and Tunisia came in second place in terms of the gap in the number of mobile phone subscribers by about (80,504,570) in 2020, and Jordan ranked penultimate among the selected study countries in the gap in the number of mobile phone subscribers, with a number reaching (88,369,536) in 2020, then Kuwait ranked last when it achieved the largest gap in the number of mobile phone subscribers, amounting to (80,504,570) in 2020. 88587081) in 2020.

This gap between the study countries is due to a noticeable development in all study countries. It is clear from the table that Egypt leads these countries in the number of mobile phone subscribers when the number of mobile phone subscribers reached (70,661,005) in 2010 and then reached (95,357,427) in 2020. Saudi Arabia came in second place in the number of mobile phone subscribers by about (51,564,375).) in 2010, then it decreased until it reached the number of mobile phone subscribers by about (43,215,439) in 2020, and Tunisia came in third place in 2010 with a number of (11,114,206) then it developed to (14,852,857) in 2020, and Jordan ranked what It is penultimate among the selected study countries with the number of mobile phone subscribers (6,620,000) in 2010, and reached the number of mobile phone subscribers with (6,987,891) in 2020. Then Kuwait ranked last when the number of mobile phone subscribers reached (3,979,145) in the year 2010, then the number of mobile phone subscribers increased to (6,770,346) in 2020. (See Figure 13).

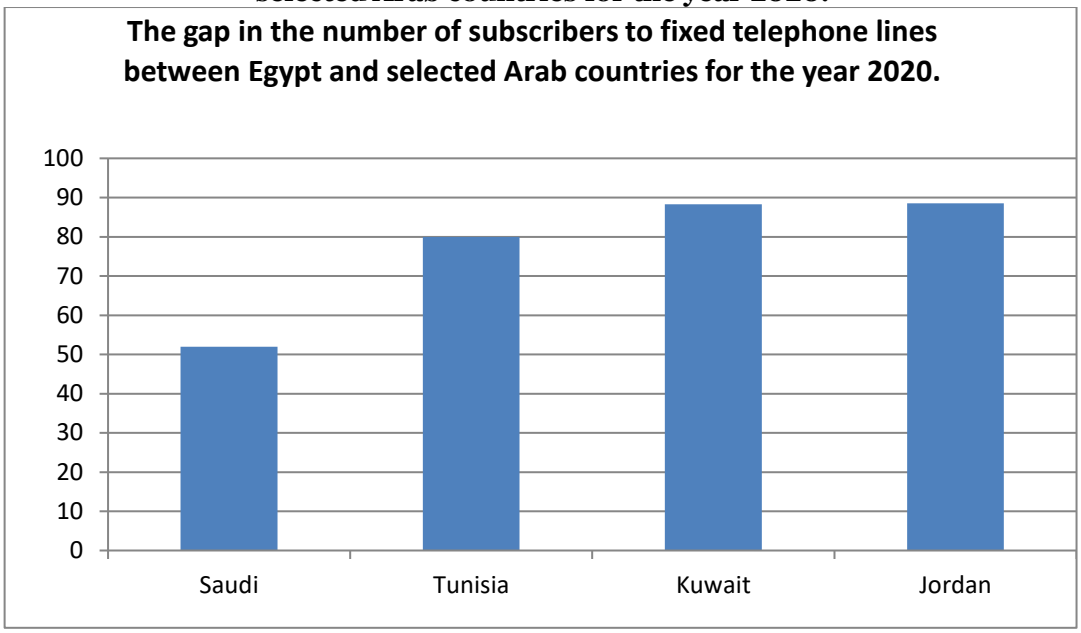
Table (12) The gap in the number of subscribers to mobile phone lines between Egypt and the selected Arab countries for the year 2020.

Country	2010	2015	2020	Gap
Egypt	70661005	94016152	95357427	-
Saudi	51564375	52796066	43215439	52141988
Tunisia	11114206	14595875	14852857	80504570
Jordan	6620000	13797968	6987891	88369536
Kuwait	3979145	7664743	6770346	88587081

Source: Table prepared by the researcher based on data extracted from:

- International Telecommunication Union (ITU), available on the website: https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/

Figure (13) The gap in the number of subscribers to mobile phone lines between Egypt and the selected Arab countries for the year 2020.



Source: Figure prepared by the researcher based on data extracted from:
- International Telecommunication Union (ITU), available on the website:
https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/

On a related level, Table (13) shows that there is a noticeable development in all the countries of the study and an increase in the percentages of Internet users. It appears from the table that Kuwait ranked first when the percentage of Internet users reached about (61.4%) in 2010. Then the percentage of Internet users developed to (99.1%) of the total population of Kuwait in 2020. Therefore, the gap in the percentage of Internet users between Kuwait and the rest of the selected Arab countries in 2020 was calculated, and Saudi Arabia came in first place with the lowest percentage of Internet users gap amounting to (1.2%) of the total population in 2020. After that, Jordan comes in second place in the percentage of internet users gap, reaching (23.7%) in 2020, and Tunisia ranked next to last in the percentage of internet users gap, at about (26.3%) of the total population in 2020, then Egypt ranked in It ranked last when it achieved the highest gap in internet users (27.2%) in 2020.

This gap is due to the fact that there is a noticeable development in all the countries of the study and an increase in the percentage of Internet users. It appears from the table that Kuwait ranked first when the percentage of Internet users reached (61.4%) in 2010, then it developed to (99.1%) of the total population of Kuwait in In 2020, Saudi Arabia came in second place in terms of the percentage of Internet users at about (41%) in 2010, then the percentage of Internet users developed to (97.9%) of the total population in 2020, then Jordan came in third place with a percentage of Internet users estimated at about (27.2% in 2010, then the percentage of Internet users developed to (75.4%) of the total population of Jordan in 2020, and Tunisia ranked penultimate in 2010 with a percentage of Internet users reaching (36.8%) in 2010 and then developed to (72.8% of the total population in 2020, and banking ranked last in the percentage of Internet users in 2010 at about (21.6%). Then the percentage of users of this service developed to (71.9%) of the total population in 2020 (see Figure 14).

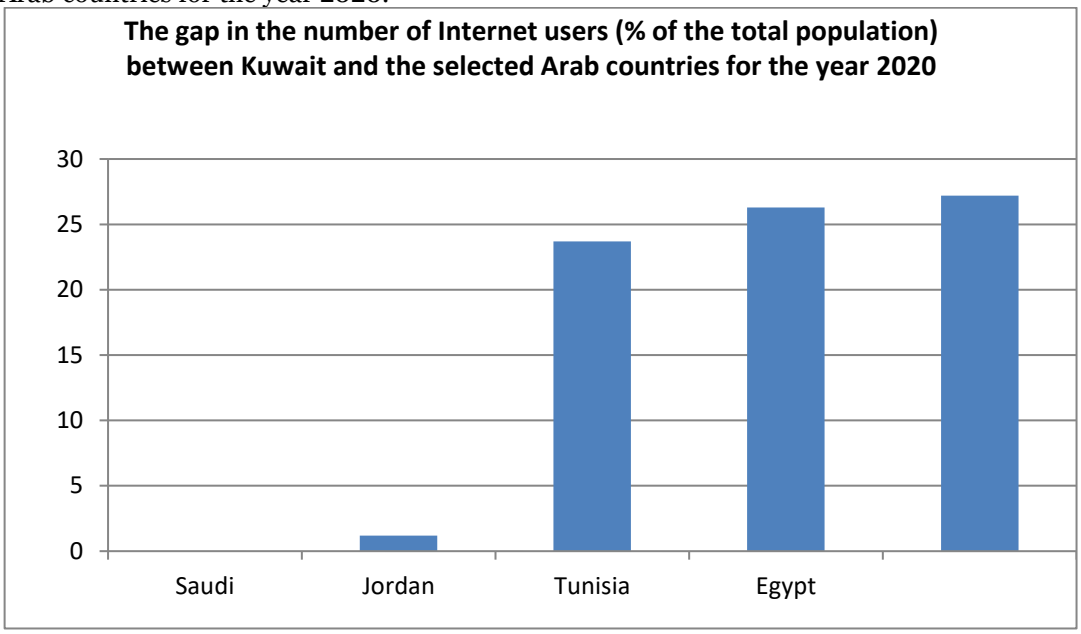
Table (13) The gap in the number of Internet users (% of the total population) between Kuwait and the selected Arab countries for the year 2020.

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Gap
Kuwait	61.4	65.8	70.5	75.5	78.7	82.0	85.6	98.0	99.6	99.5	99.1	-
Saudi	41.0	47.5	54.0	60.5	64.7	69.6	74.9	94.2	93.3	95.7	97.9	1.2
Jordan	27.2	34.9	37.0	41.4	46.2	54.2	56.2	64.5	65.2	70.1	75.4	23.7
Tunisia	36.8	39.1	41.4	43.8	46.2	46.5	49.6	55.5	64.2	66.7	72.8	26.3
Egypt	21.6	25.6	26.4	29.4	33.9	37.8	41.2	45.0	46.9	57.3	71.9	27.2

Source: Table prepared by the researcher based on data extracted from:

- World Development Indicators, World Bank Population Estimates, available on the website:
http://www.netcraft.com
- International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database, Available on:
https://www.itu.int.

Figure (14) The gap in the number of Internet users (% of the total population) between Kuwait and the selected Arab countries for the year 2020.



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- World Development Indicators, World Bank Population Estimates, available on the website: http://www.netcraft.com

-International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database, Available on:
https://www.itu.int.

Table (14) shows the percentage gap between computer users between Saudi Arabia and the selected Arab countries for the year 2018.

Table (14) Percentage of computer user gap between Saudi Arabia and the selected Arab countries for the year 2018.

Country	2010	2011	2015	2016	2018	Gap
Saudi	55.1	58.3	72.6	80	86.2	-
Kuwait	64	69	83.9	87	83.7	2.5
Egypt	26.3	36.4	43.1	45.1	61.2	25
Jordan	48.5	50.8	58.7	51.1	54.2	32
Tunisia	12	13.1	25.4	33.1	47.5	38.7

Source: Table prepared by the researcher based on data extracted (in various years) from:

- World Economic Forum, available on the website:
https://www.weforum.org/reports/global-information-technology-report.

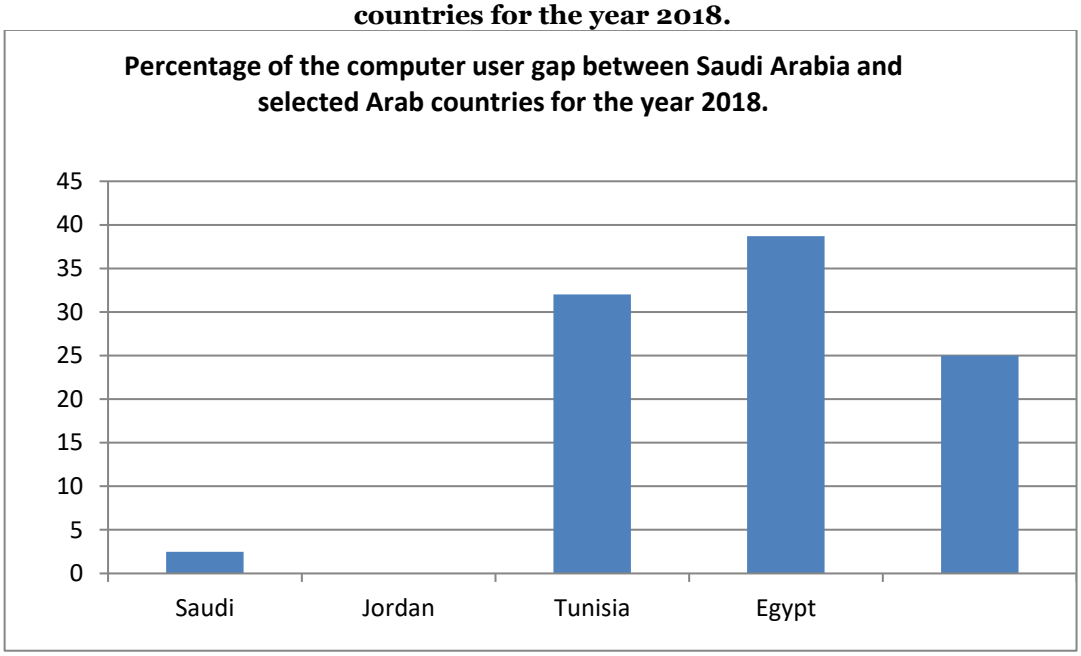
- International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database, Available on:
https://www.itu.int.

Table (14) translates the evolution of the percentage of computer users in the selected Arab countries. Saudi Arabia came in first place among the selected countries with a percentage of (55.1%) in 2010, then it developed to a percentage of (86.2%) in 2018, then Kuwait came in first place among the countries. selected countries with a rate of (2.5%) in 2018, and Egypt ranked second among the selected study countries with a rate of (25%) in 2018, then Jordan came in the penultimate place among the selected study countries with a rate of (32%) in 2018, and Tunisia came in It ranked last among the selected study countries with a rate of (38.7%) in 2018.

Analysis of the data confirms that the reasons for the gap between the study countries are due to an increase in the percentage of computers in the selected countries, as Saudi Arabia came in first place among the selected countries with a percentage of (55.1%) in 2010, then it reached (86.2%) in 2018, followed by Kuwait in the position. It ranked second among the selected countries with a rate of (64%) in 2010, then it developed to (83.7%) in 2018. Egypt ranked third among the selected study countries with a rate of (26.3%) in 2010, then it developed to (61.2%) in 2018, then came Jordan. In the penultimate place among the selected study countries with a rate of (48.5%) in 2010, then it developed to (54.2%) in 2018, and Tunisia came in last place

among the selected study countries with a rate of (12%) in 2010, then it developed to (47.5%). 2018. (Figure 15).

Figure (15) Percentage of computer user gap between Saudi Arabia and the selected Arab countries for the year 2018.



Source: Figure prepared by the researcher based on data extracted (in various years) from:

- World Economic Forum, available on the website:
https://www.weforum.org/reports/global-information-technology-report.
- International Telecommunication Union (ITU) World Telecommunication/
ICT Indicators Database, Available on:
https://www.itu.int.

Fifth: Conclusions

Empirical evidence in the sample of selected countries regarding the impact of technological knowledge on economic growth has shown that technological catch-up is possible, but it will only be possible for countries that have a specific technological policy that enables them to enhance the efficiency of the technological balance of payments. The outcome of the Mizan indicators test included Technological payments related to science, technology and innovation in the sample of selected countries compared to the global average, and even the rate of developing countries, on the small spending on research and development as a proportion of GDP, the public sector's acquisition of most research and development institutions, and the agricultural sector's absorption of the majority of researchers with full-time equivalent as an indicator that reflects Characteristics of the economic environment built on the natural resource base. In addition to what is affected by the distortion of labor markets in the form of a decrease in the return on higher education as a result of the dominance of the public sector, with the justification for ensuring the implementation of a free education policy that reflected the presence of quantity and the absence of quality.

The technological balance of payments indicators reflected the fact that the sample of selected countries are net importers of advanced technologies. In addition to the weakness of the enabling environment procedures with regard to intellectual property arrangements, especially joining the World Intellectual Property Rights Organization and the Agreement on Trade-Related Aspects of Intellectual Property Rights within the framework of the World Trade Organization.

Margins:

(1): Saleh Mahdi Al-Burhan, Analysis of the Effects of Technological Knowledge on Development in Economic Environments, Wasit Journal for the Human Sciences, No. 26, Wasit University, 2014, p. 314.

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(3): Ali Razzaq Jiyad Al-Abdi, Analysis of the relationship between information technology and intellectual capital, an analytical study of the opinions of a sample of decision makers in the General Company for Southern Region Cement, Iraqi Journal of Administrative Sciences, Volume 4, Issue 16, Karbala, 2007, pp. 6-7 .

(4): Same source, p. 6.

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(7): Saleh Mahdi Al-Burhan, Foreign Trade in Goods and Services of Technological Knowledge Industries, Environment of Economies of Selected Arab Countries, Comparative Case Study, Al-Kut Journal of Economic and Administrative Sciences, College of Administration and Economics, Wasit University, Volume 1, Issue 5, 2011 AD, p. 28.
(8): United Nation, New Indicators for Science, Technology and Innovation in the Knowledge, based Society, E/ESCWA/SDPD/2003/5, New York, 2003, p.23.

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