

The Fourth Industrial Revolution and its effect on the Pattern of International Trade: The Case of Oman

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Abstract: This study aims to shed light on the impact of the Fourth Industrial Revolution on the pattern of international trade, with a main focus on the Sultanate of Oman. In this paper, we examined how the digital transformation and ICT development impact on trade. The study concludes that the new technologies created more opportunities which help to sustain economic growth and reduce the danger of unemployment, causing the increase in productivity and the improvement of quality of life. In order to maintain stability, governments should have policies that countries could follow to deal with the challenges and take advantages arising from the fourth industrial revolution.

Keywords: 4IR, International Trade and Ports, Digitalization, ICT, Oman

1. INTRODUCTION

Klaus Schwab has described the 4IR in his book as “The Fourth Industrial Revolution creates a world in which virtual and physical systems of manufacturing cooperate with each other in a flexible way at the global level” [1]. It's the start of a new era in human progress, made possible by incredible technological advancements comparable to those of the first, second, and third industrial revolutions, moreover, the word revolution come from a Latin word “revolution” and entered English language from old French “revolution” which mean a substantial shift that frequently happens in a short amount of time. The Fourth Industrial Revolution is a term used to describe how the physical, digital, and biological worlds are becoming increasingly intertwined.

2. STAGES OF THE REVOLUTION

Throughout history, revolutions have happened when new technology and new ways of understanding the world have triggered significant changes in economic systems and social structures. Given the use of history as a reference point, the abruptness of these shifts may take years to manifest. Before talking about the fourth industrial revolution, it is important to look back at the three previous revolutions and how its occurrence affected the whole world.

2.1. The 1st Industrial Revolution

It happened in 1784, near the close of the eighteenth century (1760 -1840), the time of the building of railroads and due to discovering the steam and harnessing it for the mechanical industry. The invention of the first mechanized loom, for example, was a turning point in history.

2.2. The 2nd Industrial Revolution

It began in the late nineteenth century and continued into the early twentieth (1870), which because of the huge invention of the electricity and the assembly line that enabled mass production possible. That leads to the industrial sector speeded up exponentially.

2.3. The 3rd Industrial Revolution

The 1960s marked the start of the third industrial revolution which is usually known as a computer or digital revolution. It was the time of the invention of semiconductors, mainframe computers in the

1960s, personal computing in the 1970s and 1980s, and the internet (1990s). As a result, progressive automation became possible.

After that, by 2014, the world started a new revolution that was built on the digital revolution. The Fourth Industrial Revolution is ushering in profound changes in the way we live, and it's all happening at an unprecedented, breakneck speed. [3] it is characterized by a fusion of technologies that combine the physical, digital, and biological spheres by its Artificial Intelligence: Internet of things, Robots, Augmented reality and virtual reality, Big data and 3D and 4D printing.

3. 4IR AND TRADE: IMPACT AND CHALLENGES

The qualities of the fourth Industrial Revolution (4IR) are bound to achieve various effects on work, which are not generally restricted to one industry, yet all ventures. At the same time, a lot of jobs will disappear, but the introduction of machines and new technologies will create new jobs demanding new skills. However, the 4th Industrial Revolution will create a demand for new jobs while eliminating some of the jobs. For the time being, humankind will confront an extraordinary test and the jobless will take off. However, in the long run, the 4th Industrial Revolution will create more wealth and additional jobs elsewhere in the economy and the number of new jobs will grow dramatically. Because of the hardships for certain individuals to adjust to the new position prerequisites and expert new job skills.

On one hand, the jobs that are most at risk are those which as Martin Ford explains: “are on some level routine, repetitive and predictable”, because they are possible to replicate through Machine Learning algorithms. Richard Johnston from Ulster University's Economic Policy Centre said: "Sectors like manufacturing, logistics and retail and wholesale and some of the lower-skilled occupations within are the most vulnerable to being replaced by some technology or machinery or robots.”, which mean that lower-skilled employees were often affected: either losing their jobs or having to take wage cuts.

In addition, jobs requiring a level of human interaction or guiding robot behavior will be very common in the future. For instance, first-line supervisors of mechanics, installers, and repairers and first-line supervisors of transportation and material-moving machine and vehicle operators. The skilled labor has the skills required on how to process and manage new technologies like for example robotics, advanced energy supplies, and autonomous transport, etc. However, with the advanced technology, there might be machine trainers that will provide knowledge to other new machines in order to function better. For instance, in medicine, they could teach robots how to detect diseases which will make the coming process much easier.

Moreover, a lot of jobs will not be replaced easily by robots and machines, such as emergency management directors. They are very difficult to replace because machines are good at repetitive tasks. As a result, the implementation of the 4IR devices in international trade encounters multiple barriers that will certainly fail to impede the revolution's progress. As has been demonstrated by previous industrial revolutions.¹

²These barriers include the following:

- Technical hurdles that must be overcome in order to develop and implement the most viable inventions.
- High R&D and production expenditures for digital devices.
- Insufficient resources of adequately skilled workers who could cooperate with one another and operate modern devices.
- Top management's anxiety about risk is based on traditionalism, conservative beliefs, and apprehension about danger.

¹ Lou, Karine, Stephan Kreutzer, Francie Sadeski, Matthieu Lecave, and Fiona Merki. 2019.

² “Country Case Study: Nigeria.” Unlocking the Potential of the Fourth Industrial Revolution in Africa. Côte d’Ivoire: African Development Bank Group. Study Report.

- The absence of standards, norms, and certification options for digital devices.
- The risk of cyber-attacks and piracy in business due to a lack of effective data network security.
- The possibility of redundancy in commercial Information Technology and Information Communication Technology departments.
- Uncertainty about the anticipated economic impact of new technology.
- Concerns and demonstrations by workers and trade unions about prospective job losses as a result of machines' replacing the labor..³

The loss of employment to automation, and the subsequent relegation of medium-skilled, waged workers into unemployment and/or informal employment would push a large cohort of Asia's population back into poverty. Loss of predictable waged employment, in turn, impacts household budget decisions and would cause some families to under-invest in their children's education.⁴ In addition, the division of labor between individuals in countries that produce raw materials and those that produce manufactured goods increased the total volume of world trade. In return the increased amount of this led to better technology which caused the reinforcement of trade.

One of the most frequently cited impacts of the 4IR is the automation of the manufacturing industry, of relevance to developing Indo-Pacific Nations given the reliance on this industry across the region for a significant proportion of economic output. In addition, in developing contexts the phenomenon of automation is particularly worrying given the boost it provides to top-end workers in any economic system. As the means of production are increasingly delegated to machines, this implies a significant shift in the creation of value in the economic system and indeed humans will become increasingly valued for the contribution they can bring in terms of knowledge.⁵

The 4IR will have an impact on how businesses generate goods and services, as well as what they produce. Trade will be affected in three ways as a result of the technologies:

- Lower transaction costs and Improve trade logistics.
- Change the actual content of what firm's trade – moving from goods to services and data.
- Change the way things are made and where they are made. Automation and, as a result, the prospect of scattered, self-orchestrated production might be facilitated by technological advancements. The impact on trade is expected to be substantial.

However, moving production closer to customers to serve local markets will lead to less measured trade. Second, the global value chain (GVC) setup will change when companies no longer produce their goods in one place. Beyond being close to customers, companies want to be close to “hubs”, i.e., centers of competition, innovation, and collaboration. Again, this will affect the GVC setup. Third, trade flows will change since reorganized GVCs lead to changing movements of the inputs and regional sourcing. Fourth, trade participation will change, for both countries and firms. Nations' trade participation will shift as new GVC structures turn receiving countries into importers of inputs and exporters of the same product that is now produced in that same country.

4. ADVANTAGES AND DISADVANTAGES OF THE 4IR

As the case of all past industrial revolutions there are advantages and disadvantages for each one of them. Therefore, our focus will be on the 4th industrial revolution. The 4th industrial revolution was described as a “current and developing environment in which disruptive technologies and trends such as the Internet of Things, robotics, virtual reality and Artificial Intelligence are changing the way

³ Rymarczyk, J. (2021). The impact of industrial revolution 4.0 on international trade. <https://doi.org/10.15678/EBER.2021.090107>

⁴ This channel — waged employment converting into higher investment in children's education — was crucial to East Asia achieving its generational transformation.

⁵ Schwab, Klaus. The Fourth Industrial Revolution. 25 May 2018, www.britannica.com/topic/The-Fourth-Industrial-Revolution-2119734.

people live and work”. Said by professor Klaus Schwab the founder and executive chairman of the world economic forum.⁶

What does 4IR mean for business and trade? Answering this question is easy, with technological development it will take less time to do most of the stuff, which is for sure more efficient and that means an increase in productivity. It will also cost less to move products from one place to another. Another point is that 4IR will have a great impact on logistics and the global supply chain. When the cost of international trade drops this will open doors for new markets to participate causing rise in economic growth.⁷

The advantages caused by the fourth industrial revolution might change the aspect of international trade. Productivity as the first advantage of the 4th industrial revolution will cause international trade to increase. However, the increase in productivity will lead to the increase in production and consumption of more goods and services with the same amount of work, plus it would bring quality to work which will cause an increase in revenue. According to statistics the productivity of each industrial era increases to be 50 times more. Moreover, the digitalization process of international trade has accelerated with Industry 4.0. The digitalization process has reshaped the way countries and companies make production and trade. Especially, the volume of international trade and the level of development of countries is gradually increasing with the increasing e-commerce activities as a result of digitalization.

The second advantage is the “New Markets”. A new term came out called technological fusion that caused connection between physical, digital, and biological spheres. This would create new markets and a lot of opportunities. For instance, it will cause improvements in different fields that were previously separated, in order to create new products or services that will benefit international trade. The third advantage is there will be no barrier to entrepreneurship. It's amazing how new technology like 3D printing reduces the barriers between inventors and markets. Entrepreneurs in the 4IR can create their companies and have the opportunity of testing different products with less costs. Disconnecting from the old traditional way that took a lot of time and cost.⁸

Another advantage of 4IR on international trade is that it will cost less. Replacing labor with robots and artificial intelligence is preferred by international industries. Using robots as a replacement will reduce labor cost and of course human error, thus industries may prefer to reduce their costs, increase their output and productivity, and enhance their efficiency by removing human errors. This will reduce trade barriers between countries because it causes less to produce the product or service.⁹

The disadvantages of 4IR on international trade can be a big challenge. The main issue that we believe we should focus on is finding a balance between human and technological resources. The huge reliance on technology and the innovative ways which satisfy our needs may turn us into automatons. For instance, we would not be able to control technology and we might fully depend on technology to control international trade and cause unbalance in the world. The 4IR is characterized by disruption on multiple levels, because it requires organizations to adjust their business practices into becoming more competitive. Kinetic Consulting Services company released a paper called business 4.x that mentioned ten principles that are essential for organizations so they could develop a new operating mode that is capable of tackling the constant change brought due to high technological change.

Business 4.x was created to focus on how important the X - factor is in a high performing organization operating in the world styled by the 4IR. Technology has reached an evolutionary stage

⁶ *The pros and cons of the 4th industrial revolution.* (2019, December 31). Lights On Data. <https://www.lightsondata.com/pros-cons-4th-industrial-revolution/>

⁷ (2016, December 2). *The Fourth Industrial Revolution: Benefits and Challenges.* Global Trade Magazine. <https://www.globaltrademag.com/fourth-industrial-revolution-benefits-challenges/>

⁸ 360. “The Fourth Industrial Revolution: Benefits and Challenges.” *Global Trade Magazine*, The Authority For US Companies Doing Business Globally., 2 Dec. 2016, <https://www.globaltrademag.com/fourth-industrial-revolution-benefits-challenges/>.

⁹ Sok, Haylle. “Companies Face Major Challenges in the Fourth Industrial Revolution.” *Global Trade Magazine*, The Authority For US Companies Doing Business Globally., 6 June 2018, <https://www.globaltrademag.com/companies-face-major-challenges-in-the-fourth-industrial-revolution/>.

where everything is possible, which makes the 4IR very dangerous for market incumbents. Technologies like robotics, artificial intelligence, augmented reality, and 3D printing, are some examples of technologies that enabled organizations to create products and services, with new business models that brought greater value than the one offered in the 3IR.¹⁰

The technological achievement in the 4IR might cause a major issue. Some governments will not be able to set long term policies which will put the economy at risk, when all other economies are running with great speed. The country who has not set a long-term plan will drive itself to deterioration of their competitiveness, the reduction of their revenue, which will cause more spending to occur with the possibility of bankruptcy. This will decrease international trade because some countries will not have the ability or the right conditions to have mutually beneficial trade, increasing the risk of poverty between its people.

Another negative side of 4IR is the nature of national and international security. For instance, when a conflict occurs between nations with the new age it will probably turn into a threat of a chemical or nuclear war. The use of this new technology in a conflict will cause mass destruction of humans and condemn the next generation. This affects the idea of international trade directly, because there will be no humans in countries to trade for sure if this means the end of the human race.¹¹

5. HOW HAS THE 4IR AFFECTED INTERNATIONAL TRADE IN OMAN?

5.1. The Move to Digitalization

The fourth industrial revolution has begun to affect the entire world, and Oman is no exception. Oman is undergoing a major transformation as it transitions from a hydrocarbon-based economy to a knowledge-based economy. As part of its economic diversification program, Tanfeedh¹², the government emphasized 121 projects in manufacturing, tourism, logistics, finance, and employment to create a large socio-economic effect. Many Omani enterprises and factories employ 3D modeling software or computer-aided design to combine design and production, such as Oman, which specializes in the design, fabrication, and installation of pre-engineered buildings and structural steel works. Many of Oman's ministries have begun to implement Artificial Intelligence (AI) and Internet of Things (IoT)¹³ technologies. For example, SQU's Communication & Information Research Centre (CIRC)¹⁴, is currently working on several projects related to the Fourth Industrial Revolution, including a smart streets, a remote healthcare system and a vision-based navigation system that uses robot application of deep learning algorithms. In terms of international trade, Oman's geographic location will help it in terms of ports, transforming the country into a major exporting hub, particularly with the growth of port cities such as Dugm, Salalah, and Sohar. Figure No. 1 and Table No. 1 sequentially show the size of the Sultanate's exports of information technology and the development of Omani ports and their global competitiveness

¹⁰ Sok, Haylle. "Companies Face Major Challenges in the Fourth Industrial Revolution." *Global Trade Magazine*, The Authority For US Companies Doing Business Globally., 6 June 2018, <https://www.globaltrademag.com/companies-face-major-challenges-in-the-fourth-industrial-revolution/>.

¹¹ Zervoudi, Evanthia K. "Fourth Industrial Revolution: Opportunities, Challenges, and Proposed Policies." *Intech Open*, Intech Open, 21 Jan. 2020, <https://www.intechopen.com/chapters/70877>.

¹² Tanfeedh (Implementation Support and Follow-up Unit) - <http://www.tanfeedh.gov.om/> - is a government initiative that aims mainly at linking the strategies of the main vital sectors of Manufacturing, Tourism, Transport & Logistics, Mining and Fisheries to each other in order to diversify the national income resources and fulfill the objectives of the Ninth Five Year Development Plan 2016 – 2020. It also works towards a sustainable participation between the public and private sectors. Tanfeedh will be identifying the challenges and opportunities of the government projects and community by outlining an inclusive roadmap with the participation of the public to ensure better solutions and fulfillment of KPIs of the government

¹³ The Internet of Things (IoT) Laboratory, which was recently opened at SQU, is indicative of the University's keenness to attain technological status and join global players in the Fourth Industrial Revolution. For example, The IoT Lab has been set up at the Communication & Information Research Centre (CIRC), with the support of the Omantel and Momkin companies in order to promote IoT in the Sultanate and the region, through training, research and collaboration with academic institutions and companies

¹⁴ The CIRC was established in 2002 with a mission to promote research and education through government, SQU, and industry partnerships in focused and shared competitive ICT research programs.

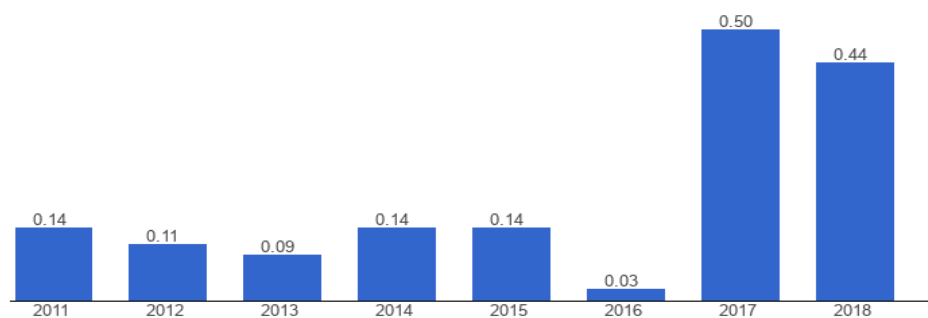


Figure1. Oman: Information technology exports, percent of total goods exports, 2000 - 2018

Source: https://www.theglobaleconomy.com/Oman/Internet_users

Table1. Oman’s Ports Growth and Global Ranking

Rank	Item
1 st in the world	In the fast handling of containers ships in Oman ports, spending an average of 12.5 Hours at port, including entering, exiting, loading and unloading.
6 th in the world	In operational efficiency of Port of Salalah.
Growth rates and Development indicators of Omani Ports	
Growth rates until September 2021 compared with the same period in 2020	7% increase in general cargo handling
	8% increase in liquid cargo handling
	62% increase in livestock handling

Source: Oman Vision 2040, Implementation follow-up unit, based on UNCTAD annual review of maritime transport 2020.

5.2. The Growth of ICT Sector: Key Challenge

The ICT is a vital sector that plays a key role in socio-economic development. ICTs, which falls under the umbrella of the Fourth Industrial Revolution, such as Artificial Intelligence, the Internet of Things, Mega Data and Block chain, have begun to progress in Oman. According to a recent report by market research firm Global Data. Oman’s ICT market will nearly double to OMR2.2 billion (\$5.6 billion) by 2024, up from OMR 1.2 billion (\$3.2 billion) in 2019.¹⁵

The government of Oman has taken various measures to diversify the economy for sustainable development of the country and one of the major steps is to transform Oman into a digital society¹⁶. Oman’s government has placed a great emphasis upon creating a digital economy as key drivers for the sustainable growth of the country. In September 2003 Oman established Knowledge Oasis Muscat (KOM 2008), a technology park as one of the initiatives taken to help develop a knowledge-driven economy, attract investment, and to serve as an incubator for local start-up companies in the ICT sector. Also, in 2006 the government of Oman created an Information Technology Authority (ITA 2008)¹⁷ for developing a national IT strategy, help facilitating and implementing an ICT infrastructure and overseeing the implementation of Oman’s digital strategy.

The key challenges facing Omani government in adopting and developing the ICT sector are summarized in Table 2 below. As the Table show the lack of national focus and funding for ICT sector and the restrictive licensing requirements and regulations beside others represent a major

¹⁵ <https://www.omanobserver.om/article/1102338/business/vision-2040-to-boost-omans-ict-market-to-ro-22-bn-by-2024>

¹⁶ Transforming Oman into a sustainable knowledge-based economy began with setting the economic vision for the sultanate toward the year 2020 to which the Oman e-Government strategy, endorsed in March 2003, contributes in terms of developing the Omani Digital Society and e-Government. E-Government strategies were revised and there is more focus on the Omanization process, digital literacy and increasing competency of the Omani citizens (Ministry of National Economy).

¹⁷ The Sultanate of Oman is responsible for the development and maintenance of e-government portals. The ITA provides efficient services, integrates processes and improves service efficiency. ITA is responsible for the implementation, supervision and maintenance of Digital Oman Strategy (Information and Communication Technology Surveys Results, 2012)

weakness to the ICT sector. In addition, the basic fear regarding the data security, personal information security and other resource security needs to be removed from the public mind.

On the other hand, the political stability compared to neighbors, government commitment to diversify from oil revenues, extensive submarine cable connectivity and geographical advantage, large number of ICT-educated graduates and mobile connectivity in most parts of Oman are considered to the major strength to ICT sector in Oman. Figure 2 below shows the size of the steady increase in the number of users of the Internet, which clearly reflects the size of the development in the use of technology and its impact on digital trade.

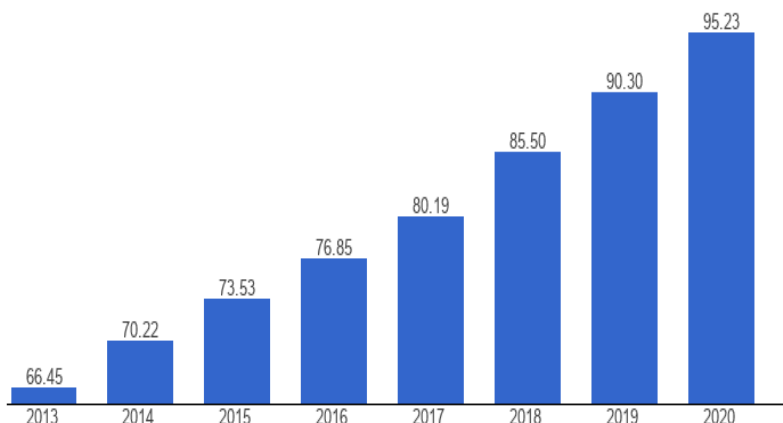


Figure2. Oman: Internet users, percent of population, 1990 - 2020

Source: https://www.theglobaleconomy.com/Oman/Internet_users/

Table2. Oman ICT: SWOT Analysis

<i>Strengths</i>	<i>Opportunities</i>
<ul style="list-style-type: none"> • Political stability compared to neighbors • Government commitment to diversify from oil revenues • Extensive submarine cable connectivity and geographical advantage • Mobile connectivity in most parts of Oman • Global positioning and institutional commitment for Cybersecurity • Large number of ICT-educated graduates 	<ul style="list-style-type: none"> • Growing demand for ICT services globally and regionally + untapped demand locally • Access to large markets such as Africa and Middle East • Growing interest of foreign investors in regional ICT sector • New technologies (considered to be part of 4th IR) in which Oman could become a leader
<i>Weaknesses</i>	<i>Threats</i>
<ul style="list-style-type: none"> • Small size of local market and Limited execution of strategy • Lack of national focus and funding for ICT sector & Restrictive licensing requirements and regulations • Open data & e-government not world-class • Low maturity of ICT market as a whole & Low skill levels despite high number of ICT graduates 	<ul style="list-style-type: none"> • Race towards new technologies among countries — Oman could be left behind • Misalignment across various stakeholders required to grow the sector

Source: Oman National Strategy Framework for ICT Sector Full Strategy Report

6. CONCLUSION

In conclusion, the 4IR affected the pattern of international trade in many ways as mentioned above. The 4IR has a mix of hope as well as doubt, but as we have seen with the new technologies more opportunities were created in order to sustain economic growth and reduce the danger of unemployment, causing the increase in productivity and the improvement of human life quality. The main important thing is to control the amount of technological development within the 4IR. In order to maintain stability, governments should have policies that countries could follow to deal with the challenges and take advantages arising from the fourth industrial revolution. As a new generation we believe International trade with 4IR would increase the welfare of the world.

CITATION

Stages of the Industrial revolution

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Advantage and disadvantage of the 4IR

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