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The Impact of Fintech and Artificial Intelligence on COVID 19 and Sustainable Development Goals

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ABSTRACT

Purpose: The main goal of this article is reviewing the importance of Fintech and AI in achieving sustainable development goals such as education, health, equality and etc. and reducing the negative effects of COVID19. Generally, it is necessary to pay special attention to the environment, poverty, education and welfare, and artificial intelligence and finance can complement each other in this regard.

Methodology: In this article, we have addressed issues such as digitalization, green finance, climate change, big data, sustainable development parameters, and issues related to artificial intelligence and its potential impact on sustainable development. Finally, we have studied the effects of COVID-19 on Fintech and AI and vice versa.

Findings: The results show that Fintech and AI can be effective in achieving the sustainable development goals and they can play an important role in mitigating the harmful effects of COVID-19 in different dimensions such as economic, social health, environment and etc.

Originality/Value: The main contribution of the article is that we have focus on the impact of Fintech and AI on SDGs and COVID19 simultaneously which are often examined separately. On the other hand, the author has tried to look at the issue of sustainable development and its challenges from a financial perspective and have a special and comprehensive look.

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1. Introduction

Humans have always tried to improve their standard of living, but this has been done by harming the environment. For example, increasing greenhouse emissions and consumption of fossil fuels will affect the environment and human life in the future. As a result, in order to improve the economy and economic growth, it is necessary to pay more attention to the issue of sustainable development and its implications such as clean water, climate action, good health and etc [1]. Finance can be very effective in achieving sustainable development goals and it can drive financial flows to improve natural resources and the environment and totally human life. The concept that results from the combination of finance and sustainable development is green finance, which focus on goals such as clean energy, improved water and air quality and etc [2]. Green finance means that the public sector and the private sector work together for sustainable development and share their resources. But it seems that, green finance is not sufficient for achieving sustainable development goals and it contains too much costs. A concept and tool that can complement and help green finance is Fintech. Fintech not only addressing the scaling of green finance and encouraging behavioral change, but also increasing efficiency, transparency and security [3]. Fintech tries to expand financing resources to mitigate environment and climate related risk such as reducing carbon emission. Fintech can improve monitoring and control of the achievement and progress of sustainable development goals because data plays an important role in it.

There are different methods to optimize such as statistical and numerical methods and methods based on soft computing. Today, researches have proven that artificial intelligence can play an important role in various fields, including sustainable development. AI working with data and if you can set the parameters and tuning correctly, the results and output will be interesting. It could be possible to use AI as a prediction method. For example, artificial intelligence can be used to predict volcanic eruptions, earthquakes, droughts, and so on [4]. So, a combination of Fintech, AI and green finance can be interesting in achieving sustainable development goals.

The main contribution of the article is that we have tried to examine the issue of sustainable development by combining Fintech and artificial intelligence which have always been examined separately and we have mentioned the effects of COVID-19 on sustainable development too.

The article contains two section. The first part belongs to Fintech and topics like green finance, climate finance, carbon credits, digital financing such as Bitcoin and etc. we have talked about economic, environment and social impact of Fintech on SDGs and Fintech challenges on SDGs and Fintech applications. The second part dedicated to AI and SDGs such as big data, AI applications in SDGs, challenging means barrier and opportunities, pros and cons of AI on SDGs and statistical information.

2. Fintech and SDGs

At first, it is necessary to mention sustainable development goals for better understanding. Sustainable development goals (SDGs) are some programs and actions to improve disabilities in different fields such as education, growth and employment, inequality and etc. these goals were adopted by all united nations member states in 2015 in order to end poverty, protect the planet and happiness and peace for human beings until 2030. In the following Table (1) you can see the sustainable development goals (source: United Nations, Department of Economic and social Affairs Disability).

Table1. SDGs

No	goals
1	No Poverty
2	Zero Hunger
3	Good Health and Well-being
4	Quality Education
5	Gender Equality
6	Clean Water and Sanitation
7	Affordable and Clean Energy
8	Decent Work and Economic Growth
9	Industry, Innovation and Infrastructure
10	Reduced Inequality
11	Sustainable Cities and Communities
12	Responsible Consumption and Production
13	Climate Action
14	Life Below Water
15	Life on Land
16	Peace and Justice Strong Institutions
17	Partnerships to achieve the Goal

As it is clear, SDGs contains many goals in different dimensions such as economic, management, society, environment and addressing considered problems and issues by innovative instruments which Fintech and its productions can be effective.

2.1. A brief history of fintech

Fintech consists of two parts: Fin (Financial) plus tech (Technology) means financial technology and refers to technology enable financial solutions [5]. According to definition, we use Fintech for companies that use new technology in the financial world. This concept has developed to include wider area such as Bitcoin, various e-wallet apps and capital marketplaces like Kickstarter. Fintech tries to help companies, managers and consumers better manage their financial operations, processes by applying technology such as software and algorithms [6]. There are a lot of content bout Fintech but we tried to mention the essentials. A brief history of Fintech and its evolution is as follows [7]:

From Table (2), we can find out that Fintech tries to make works and tasks easy with innovative and efficient instruments simultaneously. So it is necessary to become more familiar with the tools of Fintech in order to understand its capabilities. In the following, we have tried to introduce and present some productions of Fintech which are associated with sustainable development goals.

Table 2. Fintech History and evolution

Fintech evolution	
1838	Samueal Morse demonstrated the electric telegraph system for the first time
1866	Translantic cable was laid which provided a global connection
1918	Fedwire Fund Services which connected the reserve banks means the board and the treasury department
1920	A book published by John Meynard Keynes "The Economic Consequences of Power" which was about the Fintech
1950	The first credit card issued by Diners Club
1966	Telex networks established and were communications infrastructure between some european countries such as USA, UK, Germany and France.
1967	First cash machine in Barclays (England)
1970	Establishing the Clearing House Interbank Payments System (CHIPS) in New York City
1971	Electronic trading of securities and the IPO by NASDAQ
1973	Formed SWIFT to solve the problems in association with payments across borders
1981	Innovative Market Solutions (IMS) was created by Michael Bllomberg to provide some financial services in association with stock market to Wall Street firms
1982	Online brokerage investment was created by William Porter (TradePlus) which diminished the online trading costs
1993	A project handled by Citicorp which was an effort to improve the technological collaboration with outsiders.
1995	The first online checking account was offered by Wells Forgo Bank
1997	The first virtual banks emerged
2008	It could be possible look at the financial crisis of 2008 as the turning point for Fintech
2009	Bitcoin generation
2013 to current	Google Wallet

2.2. Green finance

Any kind of financial activity that is done with the aim of paying attention to the environment and in the direction of sustainable development is called green finance [8]. Because of incorporating new technologies and financial products in the area of green finance, we mention it here. Fintech can facilitate the SDGs and achieving green finance goals too. It has somehow a complementary role. At first, for better understanding the role of green finance in sustainable development, let's take a look at the following Figure (1).

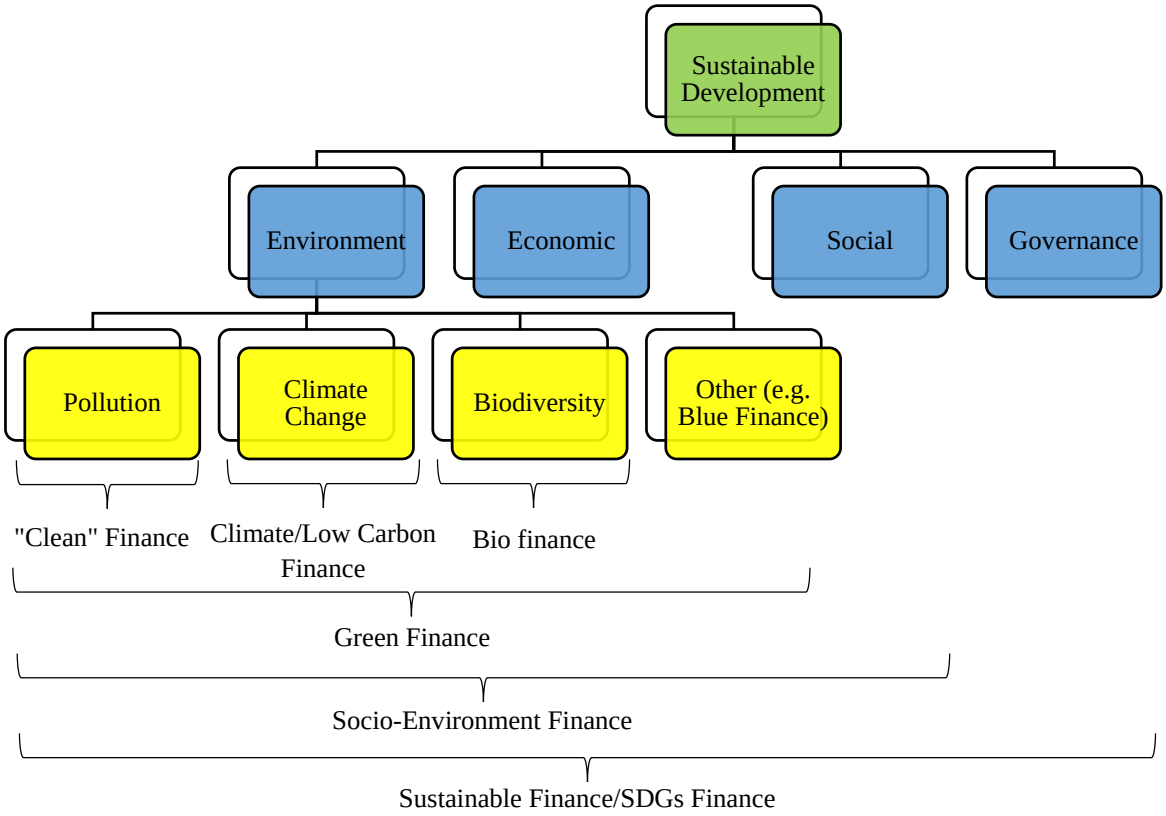

Fig. 1. Understanding Green Finance (Source: IIGF)

Green finance contains different categories such as private and public finance. But because the focus of article is on sustainable development, we mention categories which are related to SDGs. So, the scope of green finance is as follows; (Figure 2), [9,10,11].

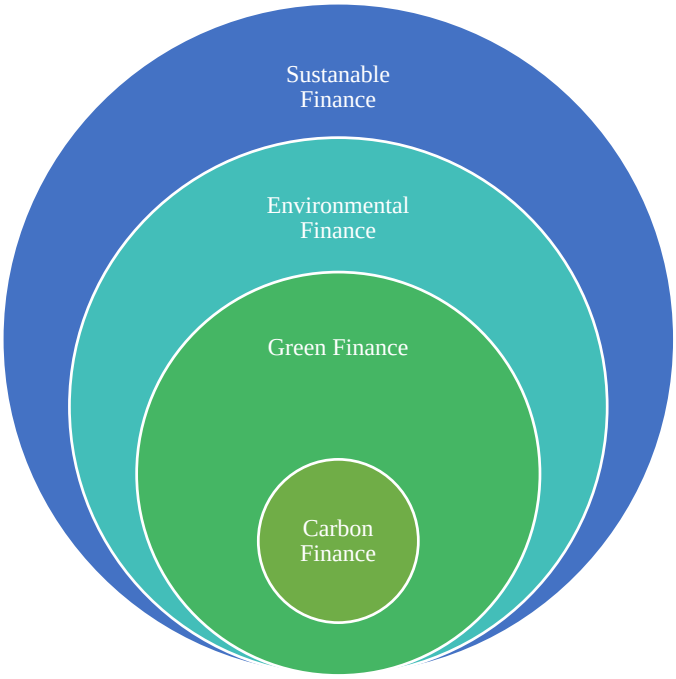

Fig. 2. Green Finance Category due to Sustainable development

2.2.1. Climate finance

Climate finance is a kind of finance that follows different goals such as reducing emissions, and enhancing sinks of greenhouse gases and addressing climate changes like global warming, drought and etc [12]. Climate changes can be effective in achieving SDGs and be accompanied by many risks. The following Figure (3) shows different risks of climate changes to sustainable development.

Fig. 3. Climate changes risks
(***Source:*** *World Meteorological Organization WMO)*

2.2.2. Carbon finance

Carbon finance refers to some applied resources for the aims of greenhouse gas (GHG) and carbon emission reduction which there is a carbon market and tradable tools to purchase and a determined price. Carbon credit is a generic term for any tradable certificate and the holder has the right to emission a certain amount of CO2 gas. If a project could be successful in less carbon emission than previous, it will be eligible to earn carbon credits. The mechanism of carbon credit is as follows;

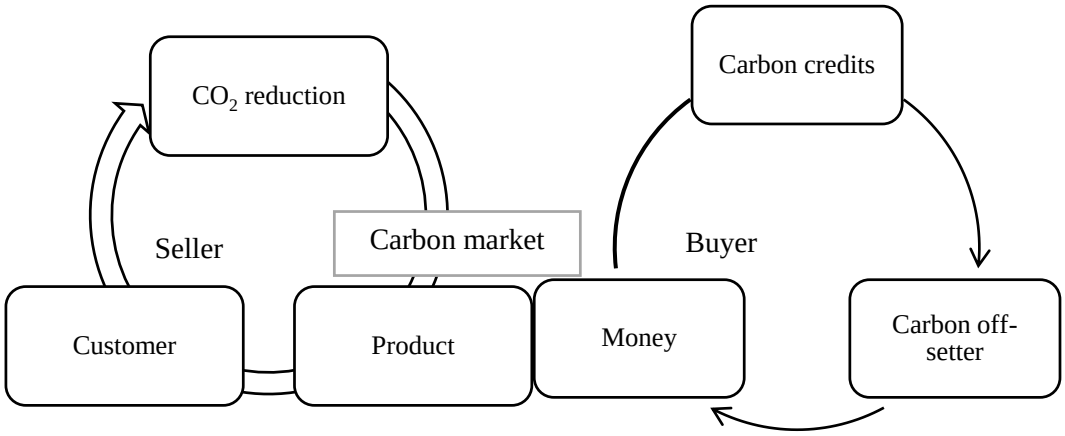

Fig. 4. Carbon Finance Mechanism
*(**Source:** https://buddhajeans.com)*

If we want to explain it as a picture and better understanding, see the following Figure (5).

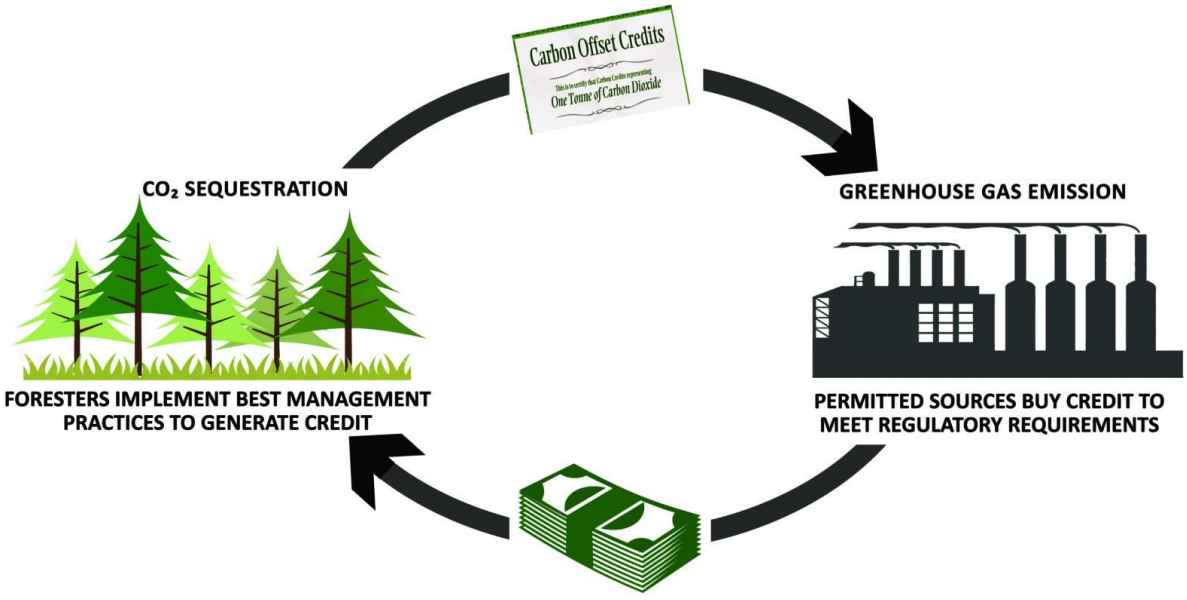

Fig. 5. Carbon credit mechanism
*(**Source:** https://robertgreenfieldiv.medium.com/blockchain-enabled-carbon-credit-markets)*

3. Digital financing

The form of economy and financing has changed i.e. it has turned from traditional to electronic or digital. Digital finance includes big data, artificial intelligence, Block-chain, internet of things and etc [13]. Its role is not only financial services but also, it leads us toward sustainable development. Technology has positive and negative impacts simultaneously and it needs to gain knowledge about it and mitigate the potential risks. Digital finance increases accuracy and efficiency and reduces costs and it makes data access faster, easier and more cheaply [14]. It could be possible to use digital finance for mobilization and integrating environmental, social and governance (ESG) criteria into the business or investment decisions for the lasting benefit of both clients and society at large and tracking to achievement of sustainable development. One of the major impact of digital finance is financial inclusion [15]. Financial inclusion means equally, appropriate, affordable and timely access to financial products and services. The main question is that "how Fintech is helping to achieve the Sustainable Development Goals (SDGs)" or the important role of sustainable finance in achieving SDGs?

As we mentioned earlier, Fintech causes financial inclusion. It causes poor people improve their lives and decreases poverty rate. There are some financial technology channels as a result of financial inclusion such as Block-chain, mobile money accounts, and transaction accounts.

The functions of sustainable finance are in the Table (3):

Table 3. Sustainable finance functions

(***Source*:** https://www2.deloitte.com/ch/en/pages/risk/articles/sustainable-finance).

1. A common means to compare ESG products
2. Increase transparency and reduces market fragmentation
3. Reduces the risk of greenwashing
4. Provides a common language about SDGs
5. Accesses investors to monitor environmental investors and objectives
6. Increases the investor's confidence
7. Broader access and impact of the individual investments

There are some obligations in disclosure of SDGs reports. This compulsory disclosure comes with consequences such as new transparency standard for financial products marketed as green or sustainable. They increase market discipline, stimulate competition and product innovation, and finally fight "greenwashing" in which products are misleadingly portrayed as environmentally friendly.

In the following Table (4), we have defined each channel separately [16].

Table 4. Financial technologies

No	Technology	Explanations	Advantages
1	Block-chain technology	Building blocks (BB) is an example which helping to achieve SDG no 1 and 2. It is a World Bank Food Program (WFP) and used to distribute humanitarian assistance. It could be possible to use Block-chain in renewable energy, decentralized electricity market, carbon credits, and climate finance, land administration, supply chain management, health, education, cross-border payments, and carbon market trading.	- Protects beneficiary's data - eliminates fraud - lowers administration fees
2	Mobile money technology	It is a kind of e-money which uses mobile phone. Some use cases include utility and bills payment, money transfer, merchant payments, insurance, international remittances, peer-to-peer transfer, salary disbursement, and payment of government levies. It is used to humanitarian aids too. It helps to achieve SGD Goal No 1 and 2.	- Low bank penetration - high mobile adoption - Facilitate access to some services such as health, agriculture, and education.
3	Digital applications/platforms	People can open an account, access loans and insurance products, store and transfer value enabling financial inclusion. It helps to achieve SDG Goal No 9 (industry, innovation and infrastructure) in the financial industry.	- low bank penetration - public procurement and social benefit transfers - promotes integrity

4. The impact of Fintech on sustainable development

Banks and most of the businesses tries to invest in projects with high return or they are often motivated by profitability. Hence, they pay less attention to issues related to sustainable development because environmental projects have some qualifications such as high cost and time-consuming. So, the green bond just raised less than 1% means almost 130 billion in 2017. Green finance has some challenges such as high trade costs, limited coverage, and insufficient product. So, it needs a kind of innovation and Fintech can be effective and helpful.

In the following Figure (6) the potential advantages of Fintech over Green Finance are stated;

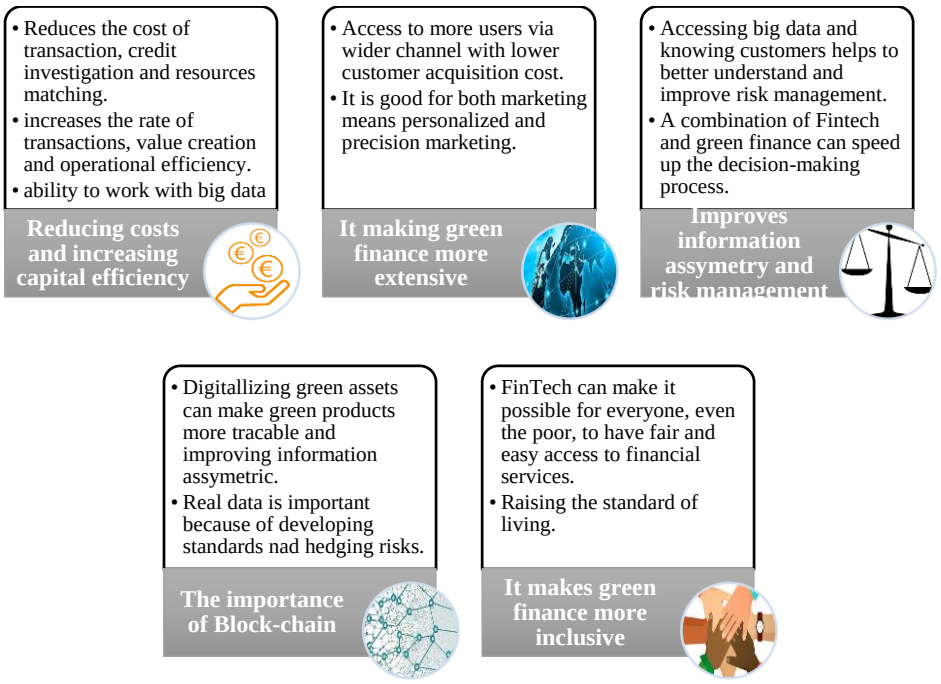

Fig. 6. The impacts of Fintech on green finance and sustainable development

There are some consequences as a result of using Fintech: green financial services, low carbon and saving time and money. For paying bills, it is not need to drive and there is no need to use gasoline and pollution. Everything can be done with just a smartphone. New green products can be efficient and benefit the people such as clean energy, low carbon emission and the results are time saving, cost reducing and efficiency.

5. Artificial intelligence and sustainable development

One of the subjects and topics discussed at Fintech is artificial intelligence (AI). For AI, there are a lot of definitions. But there is a common concept and is that "AI refers to simulation of human thinking by using machines which they don't have any emotion and conscious". AI has different applications in different fields such as economic, finance, banking sector and etc. one of the abilities of AI is that it works based on experience and improves itself continuously without any bias. In this section, we decided to examine the capabilities of artificial intelligence in achieving SDGs.

5.1. Big data

There is too much data around us which needs process and analysis. A number of reports state that about 90% of the data was generated in the last two years and it will increase about 40% annually. We need to act quickly with efficient decision-making. One of the important issues is big data. Big data means all of the data and information that comes from smartphone, computers and etc [17, 18]. They have high speed and generate quickly. These raw data have no value. So, it needs to extract the valuable information and make them ready for decision-making. In Fintech companies, there are a lot of clients, projects with a huge data and products. These data have several characters such as volatility, variety, volume, velocity and veracity. So, data science can be effective and efficient. In making decision about

sustainable subjects such as environment, big data can help to understand the demand for energy and food as the world population increases and climate change reduces these resources by every passing year.

For achieving SDGs, it needs to integrate data in different fields and dimensions such as environment, social and economic. There is still a lack of access to critical global data. For example, people who work at home. Below table shows how big data could be used to help achieve the SDGs: (Source: United Nations, big data for sustainable development)

Table 5. Big data and sustainable development goals

No	SDGs	Explanations
1	No poverty	Spending on mobile phone services can be an indicator of income levels.
2	Zero hunger	Tracking online prices of food can help monitor food security.
3	Good health and well-being	Prediction of infectious diseases by tracking the movement of mobile phone users.
4	Quality education	Virtual training and use of artificial intelligence and digital tools.
5	Gender quality	Financial analysis of spending pattern and different impacts of shocks on both genders.
6	Clean water and sanitation	Tracking and tracing the amount of storage and water available by using sensors connected to water pumps.
7	Affordable and clean energy	Reduce water and electricity waste and ensure adequate storage.
8	Decent work and economic growth	Using patterns as indicators of economic growth, trade, GDP and etc.
9	Industry, innovation and infrastructure	Controlling traffic and Shipping status by using data from GPS.
10	Reduced inequality	Information analysis in different fields such as workforce, food access, natural resources and etc. which can be controlled.
11	Sustainable cities and communities	Using smart automobiles and new technologies such as Nano instead of old fashioned with high carbon emission and GHG.
12	Responsible consumption and production	Tracking and tracing online search pattern can lead the sources to considered one.
13	Climate action	Using satellites and high-tech machines can prevent the risks of natural disasters and phenomenon such as drought and deforestation.
14	Life below water	Controlling unreported and unregulated fishing activities by tracking data.
15	Life on land	The role of social media and supporting disaster management with real-time information on social events and phenomenon.
16	Peace, justice, and strong institutions	The social media with sentiment analysis can be effective in the degree of citizens' satisfaction with the government.
17	Partnerships for the goal	A broader and inclusive connection around the world can make a kind of coordination between them and is helpful and effective for policy making.

5.2. AI and its impact on different dimensions of SDGs

As it is clear, SDGs are dynamic and AI can help better understand of them and the rate of progress. In this part, we have tried to do a sentiment analysis means examine the impacts of AI from different point of view such as economic, technical, environmental, individual and social dimensions.

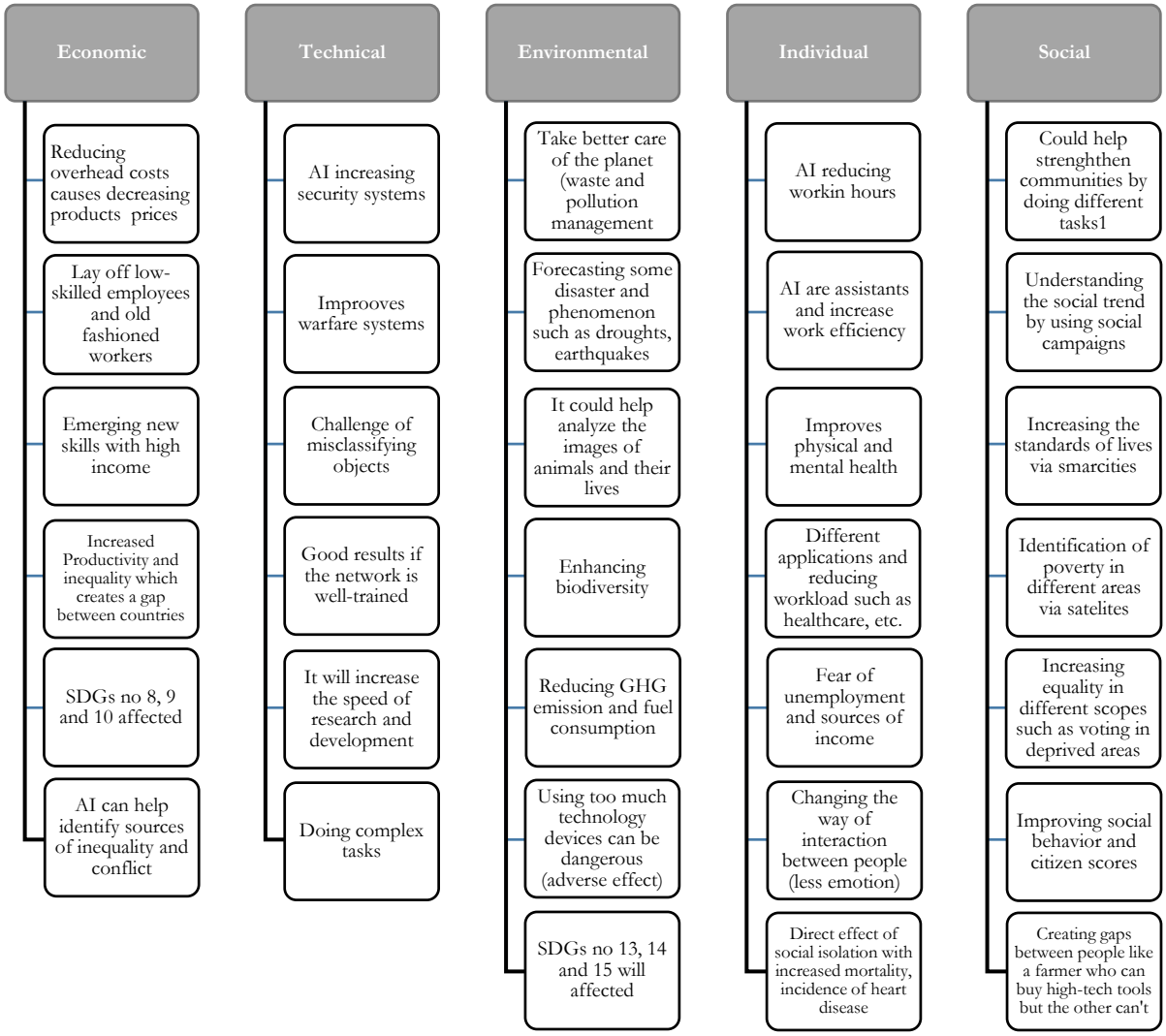

Fig. 7. Sentiment analysis of AI impacts on SDGs [19, 20].

We have mentioned the impact of artificial intelligence on some of the SDGs in terms of sensitivity and comprehensibility (Source: UN Global Compact).

SDG 2. Zero hunger

- Genetic changes of seeds to adapt to climate change and some special conditions such as drought.
- Food supply chain improvement to avoid wasting resources

SDG 3. Good health and well-being

- Tracking and tracing healthcare data to improve the quality of services i.e. better and faster services
- Restructure medical products to further improve effectiveness
- Assistant physician and perform repetitive tasks
- Online appointments to avoid wasting time
- It could be possible modelling and predicting epidemic or chronic disease

SDG 4. Quality education

- Interpret data and pay attention to learner interests and teach more attractive and higher efficiency
- Virtual education and its many capabilities, including distance education

SDG 9. Industry, innovation and infrastructure

- Using machine learning and analysis to improve time to market.

Like other issues and technologies around the world, AI have positive and negative impacts on our lives. But the studies show that the positive effect of using AI is more than negative one. For example; Ricardo Vinuesa et al, [20] presented that AI can have a positive and negative effect on SDGs targets about 79% and 35% respectively. We have mentioned potential negative impacts of AI in the following:

1. Workforce considerations: AI may lead to unemployment and policy makers should consider some insurance schemes to protect against technological redundancy

2. Equality of access: AI can increase innovation and creation but there is a gap between developed and emerging countries and they don't have equal access to AI and its products.

3. Misuse: There is a possibility of using artificial intelligence in making more deadly weapons that threaten the life of humanity. There is a note that we should update ourselves by technology to better life.

4. Learning to learn: AI hasn't independence and does everything you learn and still, it needs the human's intervention and involvement to handle exceptions.

6. COVID-19 and sustainable development

From the conceptual viewpoint, startups originated from human birth and when they felt the need, even before the formation of civilization and society. Over time, this concept found universal meaning and strengthened the first collective ideas. However, the use of the term startup began with the launch of Silicon Valley technology companies and it still remains strong and years later, people like Bill Gates (Microsoft), Elon Musk (New Tesla technologies), and Steve Jobs (Apple) pioneered the field with the products they offered.

Today, it is impossible to write an article without mentioning the important issue of Corona. One of the most important issues in 21st century is Corona-Virus Disease (COVID-19) which has affected all aspects of life. Because it has different impacts on different dimensions of SDGs, especially economic dimension and health, so, it needs to pay attention to this issue. With the advent of the Corona, the form of human life changed. For example, distance education was provided and teleworking was given priority because it was a threat to human health. Due to the reduction of the disease, the authorities had to quarantine some cities and sometimes the whole country, which had economic effects on countries, including widespread unemployment. With the widespread closure, tourism activity was severely

damaged and people's entertainment such as going to clubs, going to the cinema, etc. was reduced, which caused social, psychological, economic and other harms. In this section we have tried to examine the effect of Corona on each of the SDGs separately.

Table 6. Impact of COVID-19 on SDGs [21]

No	SDGs	Impacts
1	No poverty	Due to closures and quarantines, people's income levels have fallen, leading to falling below the poverty line.
2	Zero hunger	Disrupting the production and distribution of food
3	Good health and well-being	Mental and physical injuries due to the disease and its complications.
4	Quality education	Remote learning doesn't have enough efficiency and all of the people don't have equal access to internet. Just 54% of the global population use the internet and in the least developed countries only 19% have online access.
5	Gender quality	Women are more vulnerable to the impact of outbreak and most of the nurses are women.
6	Clean water and sanitation	You need to wash your hands and accessing to clean water is important. Supply disruption and inadequate access to clean water is a problem
7	Affordable and clean energy	curbing investments and threatening to slow the expansion of key clean energy technologies is the result of COVID-19
8	Decent work and economic growth	Business closures, unemployment, declining incomes, rising medical costs and declining economic growth
9	Industry, innovation and infrastructure	Some industries, such as the film and tourism industries, suffered more. Some industries, such as the pharmaceutical industry, benefited the most. Corona strengthened medical infrastructure and cyberspace.
10	Reduced inequality	Inequality and discrimination in the treatment of elderly and young patients, and discrimination in the distribution of vaccines among countries
11	Sustainable cities and communities	Cities with high population densities and poor sanitation are at greater risk
12	Responsible consumption and production	The COVID-19 pandemic offers countries an opportunity to build recovery plans that will reverse current trends and change our consumption and production patterns towards a more sustainable future.
13	Climate action	Due to the importance of the issue of Corona and its harmful effects, more attention is drawn to itself and less attention is paid to the issue of climate change than before.
14	Life below water	The temporary shutdown of activities and human mobility due to COVID-19 may have provided marine environments time and space to start to recover. Still, long-term commitments to ocean preservation must remain a priority! Recovery after the pandemic offers the opportunity to invest in action plans to conserve our oceans and ensure progress toward the health and recovery of the planet.
15	Life on land	Increasing production and use of medical products such as masks, oxygen capsules, etc. is a threat to the planet Earth. On the other hand, closures and pollution reduction are in the interest of planet Earth
16	Peace, justice, and strong institutions	UNDP country offices are supporting national partners to address situations of emergency and mitigate negative effects of COVID-19 through tailor-made interventions. Evidence shows that there is no justice in the distribution of the vaccine, Medical devices to reduce the corona.
17	Partnerships for the goal	The novel coronavirus (COVID-19) pandemic has underscored the importance of enhancing global collaboration and effective partnerships among all sectors and stakeholders, while building back better, together.

6.1. How Fintech and AI can mitigate the negative impacts of COVID-19

There are short –term and long-term impacts of COVID-19 on Fintech companies and services. Some Fintechs benefited from the corona and others lost. When funding decreases, some sectors are damaged such as restaurant, gyms and etc. For example; companies that support serving the restaurant industry

they suffered more damage than outdoor and e-restaurants. Let's take a brief look at short and long term impact of Corona on Fintechs:

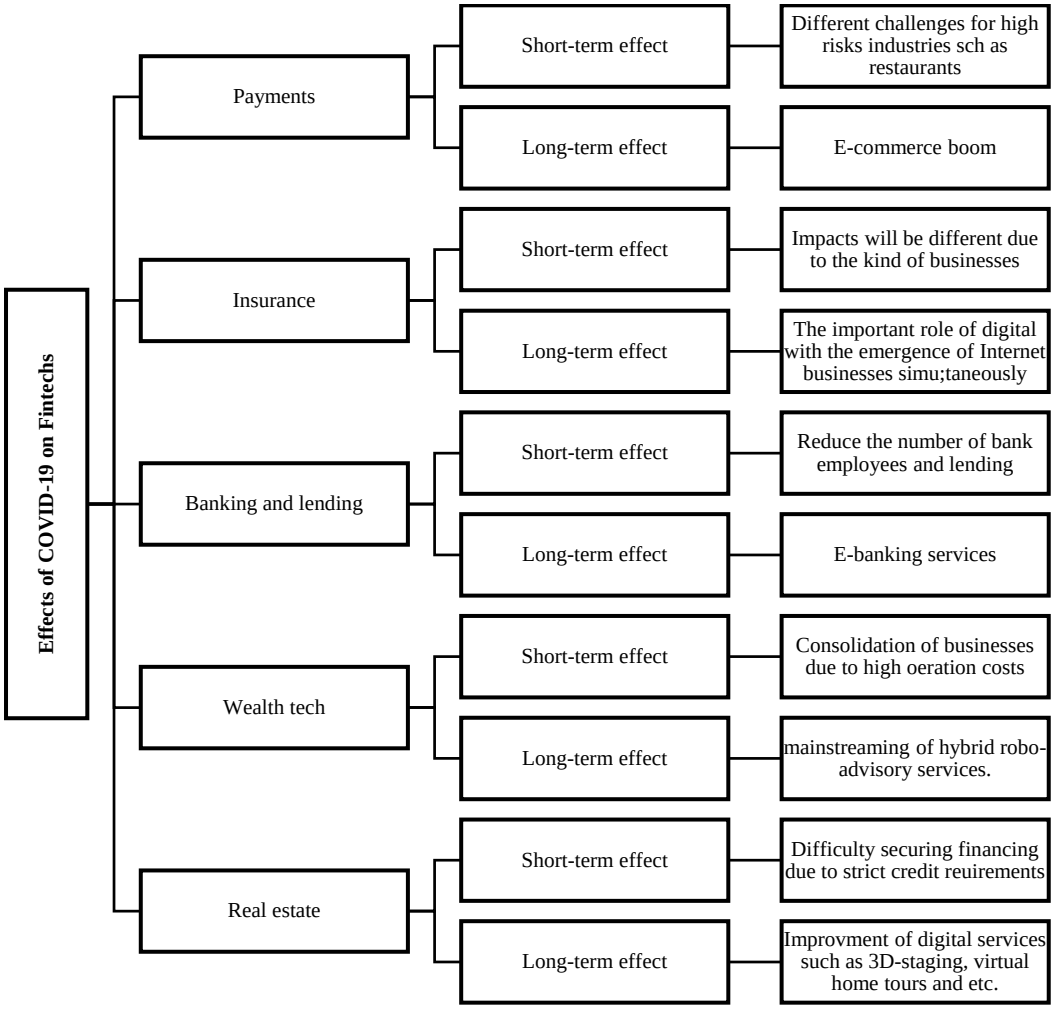

Fig. 8. Short-term and long-term effects of COVID-19 on Fintechs

(Source: CB Insights)

As it is clear from figure (8), Fintech has been able to reduce the harmful effects of corona to some extent. Examples include virtual medical services, virtual financial services such as loans and authentication. It should be noted that with the growth of Fintech services, the rate of innovation and attention to the environment and economic growth will also improve.

But what about artificial intelligence?

Application of digital technologies and its products can be value creation for both social health and economic condition. One of the major applications of AI during pandemics is screening of the population and infection risks. For example, in China, it is possible to monitor the population and identify sick and healthy people. So, they can act quickly and in a timely manner. In the following figure (Fig.9) you can see the Role of AI in Mitigating COVID-19 and Its Impacts.

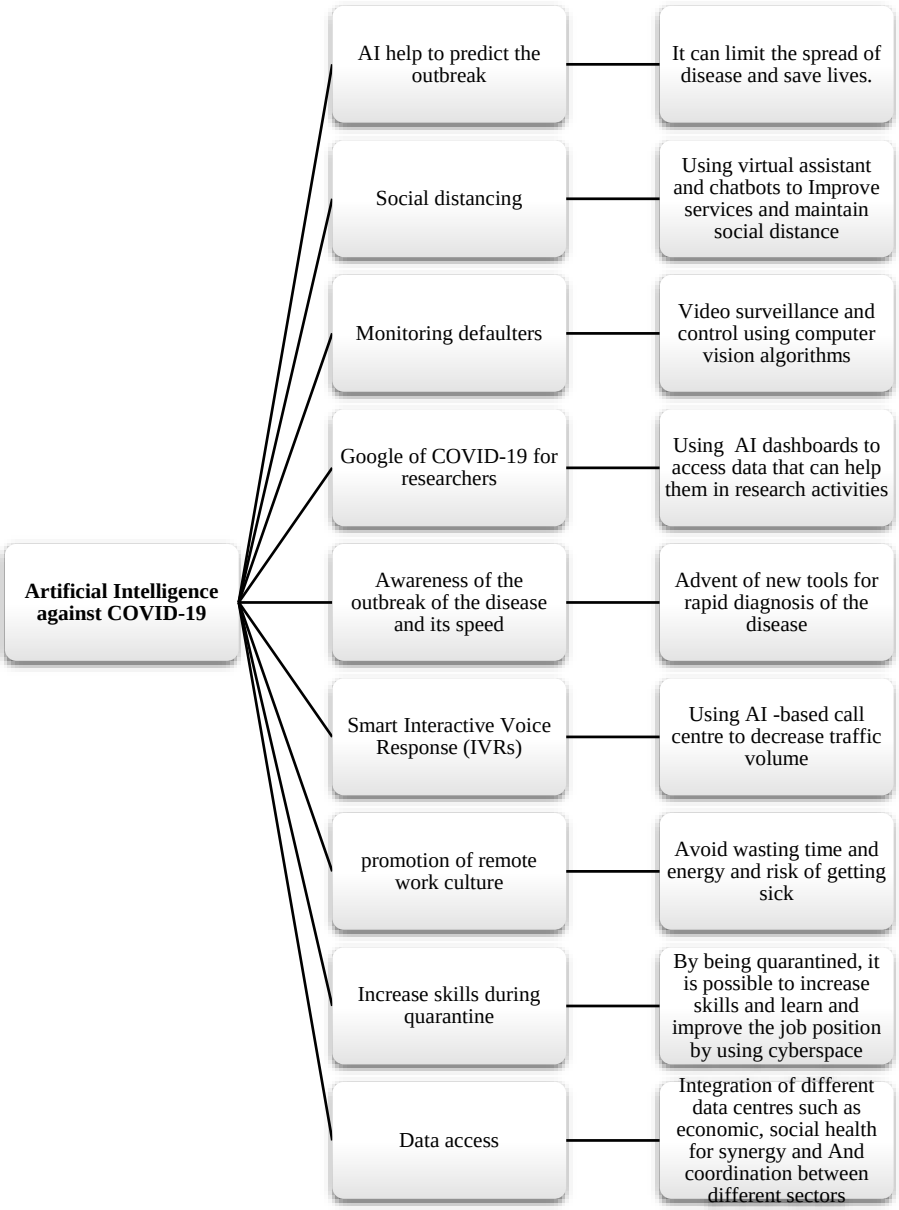

Fig. 9. The role of AI in the fight against COVID-19

(Source: https://zinnov.com/the-role-of-ai-in-mitigating-covid-19-and-its-impact)

7. Conclusions

Sustainable development is a very important issue and it should always be considered and pay attention. Fintech can help a lot in improving the quality of financial products, especially in the field of sustainable development, and be value creation. Artificial intelligence (AI) can optimize the functions and improve the quality of life. But it is necessary to mention that both of them means Fintech and AI can have positive and negative effects. Using artificial intelligence makes functions easier but it needs education and learning. So, it can lead to unemployment and some economic effects. On the other hand, there is the possibility of large forecasts such as flood, earthquake, drought, etc. that can be useful.

In this article, we have studied the effects of Fintech and AI on SDGs from different points of view and dimensions such as economic, social, environment and etc. We have examined the impacts of COVID-19 on SDGs too. The results showed that Fintech and AI can be effective and mitigates the harmful effects of the Corona virus on the economy, the environment and society. The use of technology and artificial intelligence requires skills and is a good opportunity to increase our skills.

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