

Digitalization Meets Sustainability: Opportunities and Challenges

Dr. Kamal Preet Kaur

Assistant Professor, Department of Commerce
Gurugram University
Gurugram, Haryana
kamal.commerce@gurugramuniversity.ac.in

Abstract

Global flow of information takes place as today no one uses traditional media. It's a great opportunity for the economy, but it has some challenges, too. A recent example flaunting in the economy is that Facebook, the biggest company, has leaked confidential information, so it's a big problem whether we can easily move towards sustainable digitalization at present times. As the issue of sustainable development is the biggest and most important issue today, it plays a pivotal role in society. According to a United Nations report, around 2050, our Earth will be home to millions of people as everyone resides in the lap of nature. In the current scenario, almost all the oceans and a major part of our Earth are in a worse condition as compared to earlier decades. The Government set Sustainable Development Goals to meet environmental standards. The temperature will continuously increase and lead to an increase in global warming. In this article, it is showed that how digitalization will contribute towards sustainability. Digitalization needs a huge amount of energy, as the power sector alone contributes almost 2% of total energy. The emerging concept today is Green Computing which can reduce the negative impact of environment by decreasing the consumption of energy, by emit the radiations of carbon. It can increase the capacity utilization factor and provide an efficient system of cooling. The IT devices include so many elements which can ruin the soil completely, affect the groundwater, and be dangerous for wildlife also.

Keywords: Digitalization, Sustainable Development, Opportunities and challenges, SDG (Sustainable Development Goals), Environmental Management.

1. Introduction

The principle behind sustainable thinking is to share knowledge of the environment through digital media. We have to opt for the best designs so can easily meet the established standards and result in less dependency on raw materials. The goal of society is to do optimum utilization of resources or to have a completely closed resource cycle. There are so many challenges faced by the company, such as companies having to adopt transparent or sustainable supply chain mgmt. And the economy has to give favourable rewards to the companies who adapt these kinds of practices. Procurement of materials will lead towards the sustainable standard goals. Every individual has the right to acquire the new and latest kind of knowledge by properly accessing the Internet and finding valuable information. This can change the pattern of education and take a step towards sustainable development goals. The UNESCO Global Action Programme on sustainable development focuses on that point. Digitalization has a positive effect on education by availing the E-Learning platforms. These aspects can provide education at all levels, which can help future generations to meet their needs. The ultimate goal is to do Sustainable Digitalization. Digitalization has been adopted globally also due to globalization, and various new services are available in all sectors, whether private or public. It provides a single platform where all their problems are solved, and everyone will be connected to that global village and share ideas and facts. This can change the way business is conducted today as compared to earlier times and also assist individuals to get access to different services, like in the health care sector, education, etc. Today, concern towards environmental management proves to be the topmost factor that has to be taken care of. So, in this, digitalization plays a very important role is played and it makes the 'Shared Economy' possible. It can invite landlords, owners, and tenants to a single platform, i.e., online mode, and in that companies also come forward and start services like sharing cars, providing accommodations, and so many more. The best solution against overconsumption is to share, that have so many benefits by efficiently utilizing resources. Rather than buying an asset permanently, if we buy a thing whenever it is needed by us, then it also serves a lot of benefits towards sustainable development. And by that sharing nature, we can easily shift from the product to services part in almost all sectors. This switch can prove to be a challenge for traditional business concepts. Now firms have also adopted a huge network where all the work will be done through online mode, and it distorts the physical boundaries in order to save the necessary resources. In the future times the Government suggested a four-day office, which is only possible with the help of technology, as it saves fuel and necessary resources, so the environment will be cleaner than in earlier times. But these type of things brings challenges also for businesses that don't adopt the latest technologies and aren't able to rethink or reshape their thinking pattern. The need of the hour today is to save the earth and be more sustainable by creating value in society. This article aims to build a logic called Service Dominant (S-D) and focus on the interorganisational governance models so as to prepare a conceptual viewpoint towards making a digitalized ecosystem where there are so many stakeholders present, and they create value. Here, we can identify the emerging models towards sustainable governance in order to take care of the ecosystem. We can study here mainly how technology can

take advantage of digitalisation, as today everything will go digital. It can change the way of doing business in the economy. With the help of digitalization, the middle-class person can also buy luxurious goods, as there are so many discounts available with the help of plastic cards; that's also a good initiative towards sustainable development. As there is a continuous rise in the trend of the Shared Economy to take the benefits from society. It can create value by analyzing the relationship between costs and benefits. The adopted model, called service-dominant logic, suits the digitalized world and creates value. Today, it is the emerging concept towards an eco-friendly environment. Early people will not easily adapt to the technological changes, but now they are used to this type of change. This brings a lot of changes to realize the need for it.

Literature Review

Black and Lynch (2004) stated that the current type of payment system or doing transactions has totally changed, and they also built the trust of the consumers towards this type of online service by using an intelligent E-commerce system and invoice system; in that order, a place called the hyper-efficient markets was created. E-commerce has completely changed the way we do shopping or other things, as today everyone knows that just by one click they avail so many benefits of the latest technological events.

Nov, Constantin Ides and Fountain et al. (2010) recognized the usage of internet facilities by aggregating both the concept of supply and demand, where all the demands of the consumers are not met, and they are also not able to do proper utilization of supply. Social networking sites can bring demand and supply together. Earlier the products which don't use the digital technology like the bikes, watches, and other home appliances or kitchenware appliances they started adapting the latest advancement like today there is smart watch present by which we don't only see the time but also there are so many activities done with the help of it, other example is bike or car today we can charge our phone by that, facility of GPS is also there to navigate any location, it can save our lives as there is air bag facility installed in it so there are so many changes taken place today they all lead towards the process called IOT (Internet of Things).

Kristen et al. (2012) analysed the importance of moving from the analog world to the digital world in the twenty-first-century world, which can increase the speed of communication and also its processing, which can give the facility of sharing the data. The stakeholders grab the huge amount of information, as it can help a lot with the features of products and services which can be easily available in the market, and also share that valuable information with friends and family members, as it can prove profitable for the business as well as for society. It can lead to the optimum utilization of resources, their flexibility can be increased, and go towards the goal of sustainable development.

Oostburg (2013) stated the importance of sustainable development goals, which depend on Digitalization, as today everything is delivered online or there are robots to perform any kind of task. Today, the economy focuses on adapting the latest innovations and technological upgradations and reducing carbon footprints. The machines talk with each other and perform the task in a very short period. They can

do it at very minimal cost and take a step towards the natural environment by making it cleaner.

McFee (2014) realized that the pattern of changing the workplace is not new; in fact, it has changed from time to time. The automated systems and robotic applications will add the more level of intelligence according to the passage of time. There are so many trends changing everywhere, as every industry has to adopt the latest changes takes place in the economy; otherwise, it lacks in all aspects.

Virgo and Lush (2015) defined that there is a distinction between products and services, as services are not treated as a residual or add-on to the products; in fact, they also play a very significant role along with the products, as they also serve as a great application in achieving the competencies of the market. Services are the fundamentals of economic exchange as they contribute almost half of the portion of the economy. Today, customers purchase the product after properly analyzing the service assortment needs.

Muller von Bluemencron (2016) recognized the importance of Digitalization that, which has positive consequences in the economy and can provide transparent and consistent results, be accountable, and create new measures to shape and govern sustainability. Both the emerging concepts of Digitalization and sustainable development will have a major impact on the world economy, and it will also change the whole structure of society.

Schultz (2016) analysed that the changing pattern of work from handmade things to machine work was a completely new scenario. All the physical factors are replaced with virtual boundaries, and the tasks become complex or complicated, which also leads to the growth of a safer environment. The pattern of jobs also changes, which proves appropriate in adverse conditions like in Pandemic.

Sachsische Hans Carl Von (2017) analysed the importance of the environment and increased global warming, which leads to an increase in temperature, so as not to cut the trees; in fact, plant more and more trees so that they can grow and the consequences are clear. He talked about the management of forests that would be done logically. This concept of sustainability is integrated with digitalization, which is called the digital Revolution or Digital transformation.

De Croo (2019) stated that with the innovation of Digitalization in the field of mobile internet or IOT (Internet of Things), the opportunities are rising. This can bring a lot of growth factors in all sectors. As it gives individuals the right to have the freedom of speech and expression, which contributes towards the success of innovations. But how these innovations can cause a change in either positively or negatively as it will be a great step towards sustainable development as the technology at somewhere not proves effective especially in student's life as they do misuse of it and they lack from the education or reading habits.

Domscheit-Berg (2019) recognized the importance of digital payment systems, which sometimes lack privacy and security measures, as it causes adverse effects on society. They analyse the dramatic shift in all transactions in recent times, which can give some benefits as well as some disadvantages, as it is beneficial to pay money by just one click, but on the other hand, it proves to be disadvantageous as it includes fraudulent things also.

Objective

To analyse the opportunities and challenges

Opportunities

There are a lot of opportunities or benefits provided which are included in any plan of action for people, planet and prosperity. The opportunities mainly revolve around 5P's we mainly consider three of them, which are as follows: -

People

It can be included to improve the working conditions and the kind of environment provided to them and the quality of job offered to the employees. There is a need for the emergence of labour-saving technologies and of digitalization, i.e., intelligent robots, autonomous vehicles and cloud solutions that eliminate lower-skilled jobs and also create job opportunities in various fields such as automation, engineering, designing of control systems, machine learning, and software engineering. It gives less importance to monotonous work structures in which employees will learn how to do work from the homes like pandemic scenario, improve flexibility, and reduce pollution. Automation in the process can result in safer working conditions in the environment. Technologies are better accepted when employees are properly trained, and employees can be aware of the benefits of the solutions to the problem. It will improve the capability of the workforce by providing practical education to the workers and giving them various training courses. Development of employees can increase the knowledge level and improve the capability of workers, which supports green-colored products. It can gain a competitive advantage, which leads to an increase in social sustainability by defending the level of employment, producing new job opportunities for employment, create employee opportunities for the disabled employees also and to the elder employees. Open-source-based applications of 3D printing will contribute towards sustainable development in rural areas with low profits in the economy as it overcomes the gap in the market of spare parts, consumer products or tools.

Planet

The smart production systems can reduce the energy consumption of companies. The use of real-time data from any production systems and from supply chain partners will require less and more intelligent consumption of data. From wind power plants, the unused electricity can be distributed and used every time. The pattern of energy consumption can be reduced with the help of process simulations by sharing the renewable energy surplus with the plants, improving time and capacity utilization. Adoption can lead to lower resource consumption. Virtualization and use of intelligent devices can lead to smart system of production, which can reduce wastage and of overproduction. The production process will improve the efficiency of production, and diminish the materials which are used. It can increase the reuse of resources, remanufactured and recycling of the materials. Block chain gives the facility of recycling behaviour by providing incentives to individuals to participate in

recycling process. Additive manufacturing (AM) makes use of wastage to generate new value added products. These initiatives have the ability to unlock the supply chain sustainability process by developing the green products through sustainable designing. Digital technologies provide lot of efficient solutions for the green products, their designing, production facilities and process of service. These new processes can be favorable for the easy recycling of resources. It is possible to design to design products with extended duration by using 5R's strategy that are Reduce, Recycle, Repair, Re-use, Remanufacture.

Prosperity

It can favor the introduction and use of new business model their innovations, like Crowd Sourced innovation (CSI), manufacturing as a service (MaaS) and Paas. The data is exchanged and process is efficient between the robots that increases the innovation. There are employee development programs that can improve the knowledge and improve the capabilities and then support the employees to develop the green projects that shortens the process of innovation and its implementation can reduce the time of its set up, shorten the lead time, reduce the cost of labor and material, increased the flexibility of the process of production. Digitalization can have used the data analytics process, machine learning, artificial intelligence and can be connected with the industrial process suggested by industry. The production based on AI, IOT can increase the efficiency and also improves the flexibility level. They used the cloud manufacturing process that use small and flexible systems with local production networks that are integrated on demand. It proves to be a driver for meeting the needs of sustainability. They have spent the short span of time on the markets as well as on the products with more complexity in the shapes. It can lead to increase in efficiency as well as improve the level of production and provide high quality products and services. The infrastructure should be digitally enabled and there are so many sources which can give the competitive advantage by giving the customized products and services and increase their value of perceived benefits. The cost will be decreased but the profits will be more that is the most common benefit of adopting digital technology. Smarter machines may provide several advantages such as reduction of cost, increased productivity, increase the efficiency, decrease the cost of inventory and cost of logistics, reduce manpower and can save the energy consumption. It can be provided at right time, in right quantity, by right people that increase the efficiency of fuel and decrease the real time of the spare parts available for the machines.

Challenges

The transformation brings lot of challenges in various forms which can be described as follows: -

Challenges of Designing and Developing the Models of the Business in the Digital Environment

There are lot of difficulties like technical as well as operational that arises from Digitalization. The designing and development of business model will not be so easy process as there is huge level of immaturity in the products and services and in the

level of complexity. Customers want flexible and high quality products at very minimal cost and have huge experience which require the firms to collaborate with the networks. The business models are very complex by the help of only the customers it can be made simple. Across the different regions companies adapt and deal with different types of culture and languages. There are some models which are not able to fit with the expectations of customer so to meet with these interactions companies closely focus on the problems or complexities with the local actors present in the different regions. There is a necessity today to acquire the resources globally. Today firms use the specialized suppliers and there is no need of vertical integration. The utmost factor is speed for the companies to serve the customers easily by using the resources well from the world under some competitive pressures. As the effective supply chain can be a best contributor to achieve the competitive advantage. It requires to work in a collaborative manner from conceptual design to recycling of products by realigning the partners and suppliers from the supply chain.

Societal and Environmental Issues

Digitalization has play a very important role in sustainability. Due to digitalization only we use today all the electronic devices. But there is so much e-waste is there of all that items which can harm the environment and can be discarded properly. If it cannot be discarded in a proper manner, then it can cause health issues and pollute the whole environment. E-scrap material contains some harmful materials like cadmium, brominated flame retardants, lead etc. E-waste can be processed not under the ideal conditions and can be exported to the developing countries. A proper care will be taken to be safe from any exposure while doing recycling of that materials or from leakages from the landfills and also from the incinerator ashes. In the digital scenario exchange of goods and services is also an alarm that cause threat to the security and privacy issues. The digital data can be a threat as it can be leaked also so there are strict laws made for them to avoid misuse of any personal information. Digitalization can violate the needs of humans and the minerals are also not pure used in any electronic devices. It affects the revenue also if any confidential information will have leaked. As the cost of the extraction is very much it cause negative impact on economy. Employability is a biggest challenge for the society nowadays. But now it can be slowly and slowly resolved by proper use of digitalization. The factories can cause hindrance in the opportunity for the labour intensive workforce which can lead to some type of social problems in the society. There are so many risk involved which can be like loss of job, shifting of the competencies present in the employees, automation and reduction of steps of the process. To manage the human resources is a biggest challenge for the top management. As the physical and psychological wellbeing of the employees, ageing issues, diversity which can be taken care off. The adoption of the innovation process and resistance to change can be a biggest challenge for the society. It requires proper policy making, better infrastructural facilities and deal with the social and environmental challenges. These changes can lack the problem of management commitment, support, resistances to change in culture, include the midlevel and executives. It also considers cultural differences with the partners of supply chain. There is a risk associated with Digitalization and inequality

in any kind of opportunity were proves to the biggest challenge for the society. There is a huge investment required in implementing in the developed countries which can live the benefit to pioneers, increase the disparity in wealth in the global consumer markets. Digitalization can create inequality in the developed countries which can include the knowledge and capabilities through education and training. There is a huge access to technological interfaces and knowledge requirements which can empower the countries and the local communities which can be integrated with the development of technology and with the community. There is a biggest challenge that is the concern with the environmental issues the need of alternative resources and consumption of energy. The best use of natural resources will not exceed from the rate of regeneration but industry on that suffer from so many limitations like it not able to focus on production and achievement of profits. Due to the increased use of rate of production which can result in more use of resources and consumption in the energy pattern concern of increasing the pollution, issue related to deforestation, health issues, contamination of ground water. The industries who used the resources, raw materials, information, energy more all these are unsustainable for the environment. As energy consumption is a biggest limitation for the block chain which can be integrated with the pattern of energy and material quantity of big data analytics that cause adverse impact on the sustainability of the organisation. The major challenge is of customized products that individualized products become harder for the other company or by any person to reuse all these products. The design factor is a very big hurdle for reuse and recovering of any material. The latest innovation can also be problematic for reuse. There is less support in the use of any technology in designing for reusing it. In that manner waste will not be properly managed, no proper recycling is there as it might be complex process. There is ineffective management of knowledge will be there during the historical designing of any product and their development is also very challenging. In this there is reverse logistics facilities available and also internal bureaucracy is there needed for the creation of circular logic in any kind of supply chain management process. There are also some technical limitations too like the 3D type of painting that might not provide any surface characteristics which is specified in the designing of the components or in the properties of the materials used which can be demanded in other processes which can also be performed.

Technical Disruptions to Existing Business

In the complex designing of business models cooperation factor will be very difficult to achieve as the old players will be there in the result of shift of technology to digitalization. The digital attackers or hackers will affect the existing models of business beyond the border of their country. There would be a new shift in the markets by introducing the goods and services about them customers are not aware fully which will be needed at their place of work. By this the value chain can reduce the fixed and variable cost and convert the products into services. They can gain lot of benefits and serve them to the customers as well. These platforms can create hindrance in entry while forcing them to integrate into that ecosystem. They can use of some multilayered business projects by that they provide good quality products and

services. The organisations who provide the content can coordinate according to the time to create value by providing them the huge offers. The companies misaligned their capabilities and make value through control of digital industry architecture. Cybersecurity problem is one of the biggest challenge today due to technology. The increment of critical digital data about the individuals that how the decision makers can misuse any kind of information or targeted by any cyberattacks. There is not proper usage of the tools of IT security standards sometimes there is lack of trust between IT systems and in supply chain partners, the reliability of the machines these problems may also arise. Cyberattack can be done through malicious software which need to be managed in a way so that their trustworthiness and acceptability can be improved in the digital systems. Security is biggest challenge there and also there are barriers like technology to block chain it that impedes the application for any purpose of business. The supply chain management system is also so complex that every action has to be taken in an integrated manner with both the business model and with the logistic parts in the whole supply chain management. There is a less reliability and connectivity between machines and integration of IT systems between supply chain partners. There is a lack of a dynamic infrastructure that links physical and virtual objects. There are other challenges also like poor internet connection, and storage capacity issues. To overcome with the issue of management of data and storage capacity we have to take care of the sustainability factor also. Sometimes there is poor quality of the current data available, lack of integration of the technological platforms, problem related to the coordination and with collaboration, no defined global standards, or the protocols related to data sharing. The ineffective management of data acquired for the designing and development of any product.

Knowledge and Support

There is less support provided from the regulatory authority and the absence of the IT legislation which can be a greatest challenge for the sustainability. There is less presence of IT security standards and policies which can affect both the customers as well as to the suppliers in the supply chain network. The barriers related to procedural and regulatory hinders the adoption of SCM also. The legal aspects related with working time regulations and with data protection include some type of political risks like the inefficient infrastructure. The existing rules and laws are also a barrier for the use of block chain so in that manner Government can formulate the new type of policies in encouraging or in raising any demand that manufactures use that block chain systems to improve the sustainability of the environment. There is a lack of commitment from the top management in integrating with the sustainable development. The management does not approve the investment done in any new technology. Some firms lack the understanding of industries and integration of it with the environmental management. There is a lack of commitment level from the middle as well as from the lower level manager sometimes to properly involve in promoting the ecofriendly products. There is a lack of technological expertise regarding the changes in the latest technological advancements. As it requires expert trainer and employees as at that point but society lack on that point. The new employees got hesitated from it to convert the process into new system, there is requirement of

training process, deal with mental stress, permanent availability of employees, missing social interaction between the employees so interdisciplinary thinking is needed.

Economic issues

The economic value is very high of the technology but it is maintained to take care of the sustainable development also. The investment and the capital expenditure are intense especially for the manufacturing industries which are located in the emergence of the new economies. There is lack of funding facility for upgradations of the technology and of the products in which the demand does not match with the high level of fixed cost and it also show a lack of interest in investing the money in sustainability. It can be aligned with the understanding the requirements of competitiveness with the long term sustainability pattern. There are constraints in the capital and organizational competencies. There is an ineffective linkage of sustainability with the current process structure, ineffective selection of supplier, ineffective performance management system may cause hindrance in integrating with the sustainability. It may lead to loss of the core competencies, customer demands, lack of understanding pattern of data driven business models and for the new competitors.

Conclusion

It is an emerging concept that include the elements of technical knowhow that can be linked with sustainable development. The new era is of collaborative behaviour, social networking sites and experienced and technical manpower. There are lot of technological developments takes place which have the ability to remove the obsolete things or materials from the economy. We will be integrated in a best possible manner with the sustainability issues with the help of technology. There are lot of value added activities which can create their unique value in the society with respect to the environment. There are lot of challenges takes place related to the designing and development of business models in that digital era. There are lot of technical disruptions present in the business related to the environmental issues. The issues can be resolved firstly then focus on sustainable governance models that will reduce the cost and process all kind of information and manage the whole process, conserve the pattern of energy and focus on manufacturing and logistics pattern. It will change the pattern of doing business for taking the benefits for the sake of society as well as for the digital improvements

References

- [1] Freeman LC (1978) Centrality in social networks conceptual clarification. Soc Netw 1(4): 220-229
- [2] Brass DJ (1984) Being in the right place: a structural analysis of individual influence in an organisation. Admin Sci Q 1:516-567
- [3] Carbzone P (2009) The emerging promise of business ecosystems. Open Source Business Resource, Feb 2010. <http://timereview.ca/article/225>

- [4] Atzori L, Iera A, Morabito G (2010) The internet of things: a survey, *Comput New* 64(16): 2626-2632
- [5] Evans D (2011) The internet of things- how the next evolution of the internet is changing every-thing. Cisco Internet Business Solutions Group (IBSG) White Paper.
- [6] Chui M, Manyika J, Bughin J, Dobbs R, Roxburgh C, Sarrazin H, Sands G, Westergren M (2012) The social economy: unlocking value and productivity through social technologies. McKinsey Global Institute
- [7] Leminen S, Westerlund M, Rajahonka M, Siuruaenen R (2012) Towards iot ecosystems and business models. In: Andreev S, Balandin S, Koucheryavy Y (eds) *Internet of things, smart spaces, and next generation networking*. Springer, Berlin, pp 18-30
- [8] Fischer, H., Rose, M., and Yigitbas, E. (2016). Towards a task-driven approach enabling continuous user requirements engineering. *CEUR Workshop Proceedings*, 1564.
- [9] Paton- Romero, J.D., and Piattini, M. (2017). Modelos de Madurez de Green IT: un Mapeo Sistemático. *Green IT Maturity Models: A Systematic Mapping Study*. 2nd Iberian Conference on Information Systems and Technologies (CISTI), pp. 1-6.
- [10] Vobugari, S., Srinivasan, M.K., and DVLN, S. (2017). Practitioner's Guide for Building Effective Complex Enterprise Architecture in Digital Transformation: An experience-based industry best practices summary. 3rd International Conference on Applied and Theoretical Computing and Communication Technology (ICATCCT), PP.338-348.
- [11] Seabacher, S., and Schuritz, R. (2017). Blockchain Technology as an Enabler of Service Systems: A Structured Literature Review. *International Conference on Exploring Services Science*. IESS 2017.
- [12] Yusaf, H. Balboni, B., Bortoluzzi, G., and Tracogna, A. (2017). SME export performance, capabilities and emerging markets: the impact of institutional voids. *European Journal of International Management*, Vol. 11 No. 2.
- [13] Hamidi, S.R. Aziz, A.A., Shuhidan, S.M., Aziz, A.A., and Mokhsin, M. (2018). SMEs Maturity Model Assessment of IR4.0 Digital Transformation. *Proceedings of the 7th International Conference on Kansei Engineering and Emotion Research 2018 KEER*, pp.721-740.
- [14] Arts, K., Thaisa, m., Rabelo, O., Figueiredo, D.M. De, Maffey, G., Ioris, A.A., and Girard, P. (2018). Online and Offline Representations of biocultural Diversity: A Political Ecology Perspective on Nature- Based Tourism and Indigenous Communities in the Brazilian Pantanal. *Sustainability*, Vol. 10 No. 10, pp. 3567.
- [15] Broadbent, S., and Cara, F. (2018). Seeking control in a precarious environment: Sustainable practices as an adaptive strategy to living under uncertainty. *Sustainability*, Vol. 10 no. 5.
- [16] Abreu, C. Goncalvez, H., Ferreira, J.C. and Rohlf, H. (2019). A Revised Concept of Quality Performance Measurement. *AIS Tech*, pp.42-46.

- [17] Ruspini, E. (2019). The future of tourism: innovation and sustainability. *Anatolia*, Vol.30 No.1, pp. 162-168.
- [18] Trivelli, L., Apicella, A., Chiarello, F., Rana, R., Fantoni, G., and Tarabella, A. (2019). From precision agriculture to Industry 4.0: Unveiling technological connections in the agrifood sector. *British Food Journal*, Vol. 121 No. 7, pp. 1780-1791.
- [19] Sivarajh, U., Irani, Z., Gupta, S., and Mahroof, K. (2019). Role of big data and social media analytics for business to business sustainability: A participatory web context. *Industrial Marketing Management*, Vol. 86, pp.164-178.
- [20] Beier, G., Ulrich, A., Niehoff, S., Reibig, M., and Habich, M. (2020). Industry 4.0: How it is defined from a sociotechnical perspective and how much sustainability it includes - A literature review. *Journal of Cleaner Production*, Vol. 259.
- [21] Gomez- Trujillo A.M., Velez- Ocampo J., and Gonzalez- Perez M.A. (2021) trust, Transparency, and Technology: Blockchain and its Relevance in the Context of the 2030 agenda. In: Park S.H., Gonzalez- Perez M.A., Floriani DE (eds) *The Palgrave Handbook of Corporate Sustainability in the Digital Era*. Palgrave Macmillan, Cham.
- [22] Websites
- [23] <https://www.globaldev.blog/blog/how-digitalization-supporting-sustainable-development>
- [24] <https://phys.org/news/2021-04-opprtunities-digitalization-sustainable.html>
- [25] <https://www.mdpi.com/2071-1050/14/2/830/htm><https://www.mdpi.com/2071-1050/14/2/830/htm>