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# Environmental Sustainability, Research, IOT, and Future Development

**Umesh Kandekar, Viswajeet Bharti**

ASM IMCOST, University of Mumbai, Maharashtra, India

## ABSTRACT

The importance of sustainability is increasing, and so is the group of investigators researching it. This phenomenon motivates the authors to conduct a survey study that yields environmental sustainability results. The purpose of this paper is to describe the research and future, define literature categorization, and research focuses on environmental sustainability engineering research from the point of view of historical analysis using the highest impact factor journals in the Institute of Scientific Information's Journal Citation Study. The process for classifying research publications is based on the time horizon. Water research and pollution control and prevention rank first and second, respectively, in terms of research focus on sustainability. Furthermore, over the years, the Journal of Environmental Science and Technology has emerged as the journal with the most published sustainability research. The implications of our study's findings aid in the direction of future research in the field of sustainability.

***KEYWORDS:*** *Sustainability, Environmental Engineering, Environmental Sustainability, Research and Future, Research Focus*

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## 1. INTRODUCTION

Since the 1970s, the term "sustainability" has been more often associated with human survival on the planet, resulting in the most widely stated definition of sustainability and sustainable development. The United Nations' World Commission on Environment and Development defined sustainable development as "development that meets current demands without compromising future generations' ability to meet their own needs". It is a process caused by digital technology that causes disruptions in businesses, with huge implications for corporate value generation, strategy, and structure mechanisms. Academics from all disciplines are contributing empirical study to better understand challenges such as material and technology use, green engineering/manufacture, pollution control and prevention, energy management, and water research. Despite the fact that digital technology is the key enabler, other factors have also contributed to the digital transformation in sustainability. Consumer expectations and habits are changing, as are digital competitions and data availability. The implications of digital transformation in environmental sustainability have been recognized to be wide, extending beyond consumer behaviour and enterprises to other domains such as healthcare and social dynamics. Furthermore, the sustainability triangle, i.e., environmental sustainability, is predicted to suffer as a result of digital transformation. Digital technology advancements benefit the environment, human health, and the food supply system as a whole. As a result, more thorough studies are needed to better understand the effects of digital transformation on different factors that are currently disregarded in the literature, such as corporate social responsibility, society, performance, and the environment. The constant influx of new digital technology into the market has compelled firms to digitally change their operations. The importance of digital transformation has grown to the point where it has become a strategic priority for top management.

## 2. THEORETICAL BACKGROUND

### 2.1. Digital Transformation

Various definitions of digital transformation can be found in the literature. The existing literature gives us

a good understanding of digital change and how it affects our daily life. "The use of new digital technologies to enable large business changes in operations and markets, such as boosting customer experience, optimising processes, or developing new business models," according to the definition of digital transformation. Others defined digital transformation as an evolutionary process in which digital technologies and capabilities add value to business models, customer experiences, and operational processes. small and medium-sized organizations defined digital transformation in terms of the impact of information technology (IT) on the company and its alignment with small and medium-sized businesses (SMEs). From these numerous definitions, it is obvious that digital transformation is more of a process that brings fundamental changes to businesses and results in the creation of further prospects for development than a single step made for improving certain operations of organizations. Furthermore, digital transformation is a phenomenon that causes changes in the industry and society, not a procedure centred on a company. It's crucial to distinguish between digital transformation and digitization and digitalization. Digitization refers to processes and operations that are performed automatically, such as the conversion of analogue to digital data.

### 2.2. Environmental Sustainability

Environmental sustainability has been emphasized by the confluence of the circular economy and Industry 4.0, which strives to improve resource usage efficiency. Stakeholder connections are being redefined as the sustainability-based sharing economy in an increasingly linked global environment. Environmental sustainability is one of the fundamental principles of sustainability, which states that meeting our needs should not come at the expense of the environment's quality and that the ecosystem should be preserved for future generations. Incorporating environmental sustainability concepts into business operations may increase the value of a firm and make digitalization more valuable. The steady rise in pollution and depletion of resources has elevated environmental preservation to a new level of urgency, requiring the full attention of corporations and governments. As a result, market and stakeholder pressures are increasing to embrace ecologically sustainable practices. As a result, sustainable practices can be positioned as a way to provide greater value to customers while also improving the company's image. Environmental sustainability practices must be considered as firms adopt digital transformation strategies in order to evolve business models and create compelling outcomes.

### 2.3. Digital Transformation in Environmental Sustainability

Digital Transformation in Environmental Sustainability is also increasing day by day. Artificial intelligence (AI), big data analytics, mobile technology, the Internet of Things (IoT), and social platforms are examples of digital technologies that benefit society and industry. Environmental sustainability is becoming increasingly dependent on digital technologies. Companies are currently launching new goods and platforms that are based on digital technologies that help to improve environmental sustainability. Smart Water Management Systems, PlantVillage, and Peter Ma's pioneering application of AI for diagnosing waterborne diseases that have contaminated waters were among the AI-based technologies mentioned by Goralski and Tan. Firms are now depending on AI, IoT, and big data analytics to carry out sustainable business strategies such as reducing carbon emissions and minimizing other environmental waste. Big data analytics tools are revolutionizing how environmental effect is evaluated and mapped. Big data analytics can be utilized to develop a way for improving food chain traceability and certification of items in terms of their direct sustainability impact (i.e., carbon emissions) or manufacturing standards.

## 3. RESEARCH METHOD

As stated previously, the goal of this study is to highlight research trends and outline future research goals in the field of environmental sustainability through digital transformation and technologies. The main aim of this research is to find a better solution for the sustainability in terms of technology. Nowadays, being technologically advanced is a good thing, but being efficient at the same time is a bit of a challenging task in itself. There are a lot of ways to harvest natural renewable resources such as solar, wind, and hydro energy for the generation of electricity. So, by combining all of the three renewable energies together we can harvest the energy in the current time like, from solar (in this case – solar panels) we can harvest the sun-light, from the windmill we can harvest the wind energy, and from the continuously flowing water, we can harvest the hydro-electricity/energy. But we haven't seen anything like the modern machine or technology which can harvest all of these energies at once, i.e., a machine or technology which can harvest all of these (solar, wind, hydro) energies all at the same time. No machine or technology has been created so far which can harvest all of these renewable energies together all at the same time. So, in this research paper, our aim is to take a look at a concept that can help humans to capture solar energy, wind energy, and

hydro energy, all at the same time. Now let us have a look (in figure 3.1) of how a typical solar panel looks like which help us (humans) to harvest the sunlight/sun/solar energy and converts it into electricity.

**Figure 3.1 Solar Panel(s)**

And now let us also have a look (in figure 3.2) of how a typical windmill looks like when it comes to harvesting the wind energy.

**Figure 3.2 Windmill**

And last but not the least, let us have a look (in figure 3.3) of how a typical hydropower plant looks like when it comes to harvesting the energy/electricity from the flowing water.

**Figure 3.3 Hydro Power Plant**

Now, as we saw in the figures 3.1, 3.2, and 3.3 respectively. We can say that these are the types of different techniques by that human can harvest the energies. So, now the question is – If we have the methods to harvest these energies separately then what is the need for a new revolutionary method/technology which does the same job? The answer is in the question itself; these methods/techniques are used as separately instead of a combined one. And a combined one means the method/technology which can be able to harvest all of these above-mentioned energies together with just a single device that has multiple capabilities.

Below is the concept of the method/technology which can be used to harvest solar energy, wind energy, and hydro-energy.

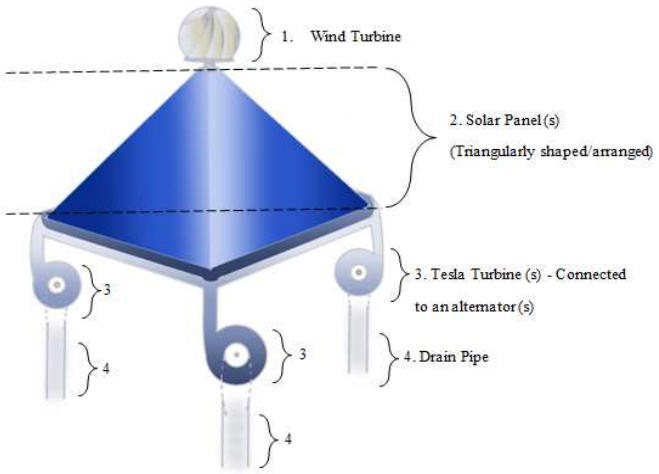


**Figure 3.4 Wi-So-Tu Device/Technology**

Now, in figure 3.4 as we can see, that **Wi-So-Tu** device/technology means '**Wi**' for Wind, '**So**' for Solar, and '**Tu**' for Turbine. It is a device/technology which can harvest all the energies (Wind, Solar, Hydro) all at the same time. The No. **1.** Is for 'Wind Turbine', **2.** Is for Solar Panel (s), **3.** Is for the Tesla

Turbine (s), and **4.** Is for the Drain Pipe through which all the flowing water will be released outside. So, the Wind Turbine (1.) on the top will help humans to capture the wind energy, and the Solar Panel (s) (2.) arranged/shaped in a triangular form to harvest the sunlight/solar energy from all the possible directions for the maximum coverage, the Tesla Turbine (s) can be connected single or multiple for one or all the corners which will capture the kinetic energy of the flowing water if in-case there is raining. The distance between the solar panel (s) and both the turbines can vary to achieve the maximum result and efficiency. Wi-So-Tu can be a great device/method/technology to harvest the energies in the most efficient ways. This device/method/technology can be installed and used to produce better outcomes in terms of energy generation. Wi-So-Tu can also help reduce the dependency on fossil fuels for better sustainability. Thus, helping in the reduction of air pollution without burning fossil fuels. Wi-So-Tu device/method/technology is the combination of the wind turbine, solar panel (s), and tesla turbine (s).

The wind turbine on the top is used to capture wind energy. The solar panel (s) below the wind turbine is/are used to capture or harvest the solar energy (in this case – from the sun). The water gutter (s) is/are situated at the bottom of the solar panel (s) to collect the rainwater and then feed them into the tesla turbine (s) which will be connected to a dynamo or an alternator or generator to generate the electricity. And the water will be then drained once it has passed the tesla turbine (s).

Multiple Wi-So-Tu can be installed in various places such as, on rooftops of the buildings, in gardens, etc. And the best part is – the Wi-So-Tu can be connected to the IOT device to track the data on its performance. The IOT device can help to track the day-to-day data points like, how much energy has been harvested today and from which part. Also, it can help to create a monthly as well as seasonal graph to let the users know that from at which time the energy was harvested more. So, users of Wi-So-Tu will get a brief understanding on how the Wi-So-Tu is performing through an app which can be downloaded in the user's devices for the convenience. Now, let's take a look at the conclusion of the Wi-So-Tu.

## 4. CONCLUSION

So, the conclusion is that the Wi-So-Tu device/method/technology can be used to harvest all the three types of energy which are, the solar, wind, and hydro energies respectively. Which can also be able to track its own performance data and send it's reports to the user's device (s). And with this device/method/technology, humans can achieve more efficiency in terms of energy/electricity generation and sustainability. This device/method/technology can help humans to reduce their dependency on fossil fuels and thus reduce the carbon emissions for a better future. This device/method/technology can also help to reduce global warming which is a big concern nowadays. Hence, we (Umesh Kandekar and Viswajeet Bharti) conclude that, because of constant growth in global warming, humans can't simply rely on just one or two methods to achieve the efficiency when it comes to energy harvesting and sustainability.

## 5. REFERENCES

[1] Images in the figures 3.1, 3.2, and 3.3 are sourced from unsplash.com

[2] Current technological advancements from Wikipedia

[3] Current technology used for the sustainability from Wikipedia