Section A-Research paper

Worldwide Sustainable Development Research on Social, Economic and Environmental Aspects of Civilization

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Abstract: Numerous positive changes have occurred since the Sustainable Development (SD) policies were followed. The policies have begun to be incorporated into national plans and schemes, and many have established coordination configurations to ensure that they are carried out in a consistent manner. Global research on sustainability and SD is reviewed in this paper. The philosophies of sustainability and SD are first defined. Following that, the literature-based aspects of SD and sustainability are emphasized in the paper. Additionally, the paper demonstrates the connection among sustainable development and sustainability. According to the findings of the paper, every part of the globe has developed few headway toward attaining great levels of SD. Nevertheless, the achievement of the region's SD policies is impacted by the unique challenges faced by each region. There are economic, institutional, structural, political and social aspects to these difficulties. In addition, despite the fact that SD is a broadly accepted idea in academia, its applicability in policymaking has been contested. Prevailing pragmatic research

demonstrate that environmental or business management gains from incorporating sustainability or sustainable development issues. Finally, a few suggestions for forthcoming research are made.

Keywords: Sustainable development, Sustainability, world, economic, biodiversity, Research & Development (R&D), society, climate change

I. Introduction

The effects of SD can be broken down into three categories: impacts on the environment, society, and economy. Improved health as a result of less air pollution, more jobs, less poverty, easier access to energy, and gender equality are just a few examples of the effects. This study discusses some of the policy implications of harnessing such approaches, highlights how they may contribute to the success of the SD policies, and presents several new and emerging innovation approaches [1-2]. In order to maximize the contribution of new innovation approaches to SD, it provides an overview of specific problems and considerations that must be taken into account in the coming years. There have also been efforts to protect the environment, particularly in relation to oceans, land use, and climate change. In addition, significant segments of the private division have initiated to depart from corporate typical frameworks, such as by following sustainability standards as well as reporting on them. In the meantime, nongovernmental organizations and civil society are becoming increasingly active in support of sustainable development.

According to the fact, current trends with several dimensions that have cross-cutting effects on the entire 2030 Agenda are not even transiting in the correct direction adds to the cause for concern. That group includes four in particular: increasing disparities, climate alteration, the biodiversity loss, and the ever-growing quantities of waste produced by human action are straining the resources available to deal with them. Analytically, current research proposes that few of these negative trends point to the overpass of negative tipping points, which would cause irreversible changes to the world system's settings on time scales important to society [3]. According to recent assessments, the natural/social biophysical systems of the world cannot support the Sustainable Development Goals' aspirations for worldwide social welfare under current trends.

There are just over ten years left to complete the 2030 Agenda [4], however no nation is still persuasively capable of fulfilling a set of fundamental human requirements at a level of resource utilization that is sustainable globally. The overarching objective of striking a healthy balance between human well-being and the environment is absent from all to varying degrees. Breaking away from existing practices of developing primarily and cleaning up later is necessary for each nation to respond to its own circumstances and priorities. In the upcoming decade, the concurrent success of innovative nation-specific pathways is necessary for the universal shift toward sustainable development. As a result, sustainable development's theory and practice point the way forward. To assure society welfare, human health, as well as a restricted influence on the environment, advancing the 2030 Agenda must include a critical and deliberate alteration of socioeconomic and ecological systems that are distinct around nations but also contribute to the anticipated global/regional consequences. The connections among targets as well as goals must be carefully considered in order to achieve that transformation, which is a significant and deliberate departure from business as usual. Because an action toward one policy can vary the potentials to fulfill the other policies, policymakers will discover resemblances as well as conflicts among them [5]. They will also discover systemic interactions and cascading effects. There is already a lot of information about those crucial interactions, and more research is being done.

The factors of sustainable development and sustainability, encouraging sustainable development via the implementation of new innovations and infrastructure, the various methods to sustainable development, nation-specific SD guidelines, sustainable development via economic development/environmental responsibility as well as financial inclusion for sustainable development, and have all been the subject of previous studies [6-9]. There are very few research that provide an outline of the development made and problems influencing the SD as well as sustainability in various parts globally, despite the fact that such themes address quite significant problems in the prior studies.

In addition to few proposed domains for upcoming studies into SD practices, it is necessary to identify the advancements that have been developed in the study on sustainability and SD as well as the concerns that have not yet been resolved. This paper becomes one of the few papers in the sustainability and SD studies that reviews the existing research. A review of the existing research

on SD as well as sustainability in various parts globally is presented in this paper. Additionally, it identifies areas for future research in sustainable development and sustainability.

II. Transformations for sustainable development

Six entry points are detected in the current Global Sustainable Development Report as promising the most for bringing about the anticipated alterations at the essential speed/scale. It does this by taking into account the perseverance, anticipatory prospects of a progressive worldwide populace looking greater levels of welfare, as well as normative deliberations like "leaving no one behind," which are not entry points into specific Goals or even groups of Goals nevertheless instead into the outlining systems. Simultaneously, development across several components of the 2030 Agenda would be jeopardized if we did not pay attention to the interlinkages that are inherent to such entry points and cross them, for instance by concentrating on definite targets/goals [10]. The chosen points of entry are:

- Sustainable and economics
- Human well-being and capabilities
- Energy decarbonization with global authorization
- Food systems as well as nutrition patterns
- Worldwide ecological commons
- Development of urban as well as peri-urban regions

Table 1 Empirical research based on global regions [11]

Author(s)	Method	Objective	Discovery
Voica, Panait, and Haralambie (2015)	This research utilized cross data panel regression to assess the EU nation info.	Examine whether sustainable development is in relation with the stock/flow of foreign direct investment (FDI) in 28 EU member states from 2000 to 2012.	The ecological impact of FDI has the Biggest influence on the sustainability indicators, subsequent by the social impact and then the economic FDI impact.
Bokpin (2017)	The researcher utilized panel estimation approach	Examines how institutions/governance may regulate the	A growth in FDI inflows substantially Enhances the

	to assess the 24-year panel info from 1990 to 2013.	influence of foreign direct investment (FDI) on ecological sustainability.	ecological destruction, thus causing an adverse effect on ecological sustainability.
Ibănescu et al. (2018)	Investigators utilized three composite indexes: socioeconomic sustainability, public utilities, and demographic stability, The Mann-Whitney U test was utilized to estimate the differences in every sustainability indexes.	Examine how tourism influences the sustainable development of rural regions in Romania from 2001 to 2016.	There is a substantial positive impact of tourism on entire composite indexes assessed, indicating that tourism enhanced rural SD in Romania.
Fotis and Polemis (2018)	They used a dynamic GMM method over a panel of 34 European Union nations from 2005 to 2013.	Examine the correlation among renewable energy, sustainable development, and ecological policy utilization.	There is a positive correlation among the pollution and development. Energy saving positively impacts on the ecological destruction, while energy intensity enhances air pollution.
Odugbesan and Rjoub (2019)	Researchers assessed info from 26 sub-Saharan African nations from 1990 to 2016. They utilized the pooled mean group (PMG) estimator depending on Pesaran, Shin, and Smith's (1999) approach.	Analyzed the correlation among SD and HIV/AIDS prevalence and handling the human capital and good governance.	There is a significant Correlation among HIV/AIDS prevalence and SD, and among human capital and SD.
Asongu and Odhiambo (2019)	Examiners utilized the generalized method of moments (GMM) estimation approach. Three inequality	Examine whether growing information and communication technology (ICT) decreases inequality in 48 nations in Africa	Increasing internet penetration and fixed broadband subscriptions have a net impact on decreasing the Gini

	indicators were utilized, known as, the Palma ratio, Atkinson index and Gini coefficient. The ICT indicators consist mobile phone/internet penetration and fixed broadband subscriptions.	from 2004-14.	coefficient and the Atkinson index, while enhancing the internet penetration and mobile phone penetration decreases the Palma ratio.
Cioacă et al. (2020)	Investigators utilized panel regression data models depending on gathered info from the Eurostat database.	Analyzed the correlation among the ICT sector progress indicators and few SD measures for EU nations from 2008-18.	There is a constructive correlation among ICT growth with the variation in GDP per capita.
Sarpong and Bein (2021)	The info was estimated utilizing various panel estimation approaches, such as GMM dynamic panel estimation and fixed effect panel estimation.	Examine the impact of sustainability on the life quality in certain sub-Saharan African nations from 2000-17.	Sustainability recovers society welfare in sub-Saharan Africa.
Mendez-Picazo, Galindo-Martin, And Castano-Martinez (2021)	Examiners utilized structural equation models.	Assess the effect of social/general entrepreneurship on sustainable development in 15 OECD nations among 2015 and 2016.	Both social/general entrepreneurial events stimulate SD, while the effect of usual entrepreneurship is higher than that of social entrepreneurship.
Chai et al. (2021)	Investigators utilized the spatial Durbin model.	Investigate the restrictions developed by economic development targets' influences on air pollution.	The constraints developed by economic progress targets were illustrated to grow air pollution.

Additionally, the Report detects four levers that can be effectively utilized at every entry point to effect the essential alterations [12]:

- Science and Technology
- Individual and collective action
- Finance and Economy
- Governance.

At all levels, decision-makers must act on the basis of contemporary understanding as well as comprehension of the connected human social-environmental systems. This understanding also requires to be made accessible to the entire nations and actors in a larger number of ways, which will encourage creative alliances and coalitions that will succeed.

III. Society welfare and capabilities

Transformations toward SD are centered on progressing social welfare, which involves education, health, material welfare, resilience, voice, access to a safe/clean atmosphere. Individual's abilities, in turn, drive worldwide ecological, social and economic transformation in accordance with sets of physical/psychological potentials, proficiencies, skills as well as knowledge. Human well-being is important in and of itself. Education and health are more than just progressive outcomes. Additionally, they are the means by which crucial facets of the global development agenda can be accomplished. In recent decades, there have been significant advancements in human well-being, but extreme poverty persists and development is uneven. In 2018, 8.6% of the global populace survived in extreme poverty, which is defined as living below $1.90 per person per day. This poverty is focused, with more than 50% of the global populace survived in excessive poor living in five nations in South Asia and sub-Saharan Africa. 85% of the remaining 342 million individuals alive in excessive poverty in 2030 will reside in fragile states affected by conflict and crisis [13].

According to current estimates, the world will not be able to eliminate extreme poverty by 2030 without additional efforts. Women, indigenous people, members of ethnic minorities, individuals with disabilities, and other marginalized groups currently make up the majority of those living in extreme poverty. Women's poverty is exacerbated by gender inequality that restricts the prospects as well as potentials of 50% global populace. Because people with disabilities frequently have greater rates of economic inactivity and unemployment, lower education levels,

and insufficient social protection with respect to their peers, there are socioeconomic gaps among them and people without disabilities in many locations.

Lack of access for sanitation, clean water, poor health, low levels of education, and other deprivations frequently coexist. People and households frequently experience several poverty types. People in extreme poverty had decreased to 736 million in 2015 [13]. However, a more sobering picture was provided by the multidimensional poverty index that was measured in 2018 for 105 nations and revealed that 1.3 billion people live with families along with overlying deprivations [13]. In addition, there is abundant proof to suggest that multidimensional poverty has been lessening more slowly with respect to income poverty. Communities as well as authorities on all levels—local, regional and national—should concentrate on closing the gaps in basic rights and opportunities for the social groups most at risk of being left behind in their own zones.

Furthermore, around one billion individuals survive on $2 to $3 per day, just above the $1.90 threshold for extreme poverty [14]. The 4 billion individuals who do not have any societal protection type and those who just shift out of extreme poverty are still extremely susceptible to shocks like environmental/economic disasters, armed conflicts, climate change and other shocks that could push them back into excessive poverty. If billions of people are not taken care of, they run the risk of being left behind and deprivations must be eradicated and resilience built, particularly via targeted intrusions in areas where vulnerability as well as poverty are concentrated.

Addressing the multifaceted and overlying nature of poverty, intensifying intrusions and events far beyond the financial thresholds of excessive deficiencies is necessary to eradicate poverty, advance gender equality, as well as reduce other types of inequality, all of which are thoroughly related goals. That cannot be accomplished by economic expansion alone. Healthcare, education, access to clean energy and water, sanitation, contact to transmittable ailments, and many other important aspects of welfare are all subject to inequality and deprivation. Everyone ought to have access to high-quality social services such as education/health care, as well as protection from natural disasters, including disaster risk reduction. Social/legal discernment against marginalized groups should end, as should restrictions on women's and girls' access. Respecting human dignity and realizing human rights for all require this.

Extending human potentials far beyond extreme poverty, whether depending on financial aspects or other fundamental requirements, is necessary for advancing social welfare and guarding the World's resources. This is necessary so that individuals are equipped/empowered to effect variation. The extension of healthy years of life, consideration to psychological well-being as well as non-communicable ailments, access to great quality teaching, investment in primary childhood growth, and greater enrollment in science, technology, engineering, and mathematics (STEM) programs—particularly for female—can all improve individuals' lifelong chances as well as are economical means of escalating SD.

The close relations among human health with climate change, for example, or the techniques in which destruction of ecosystem services as well as biodiversity loss worsen inequalities necessitate addressing the interconnectedness of these issues in order to take efficient action in any of those parts. In the end, the use of numerous levers of change and dialogue, collaboration and cooperation, between several actors are necessary for advancing human well-being. There is no one path, and different arrangements of efforts are needed for nations in unique conditions as well as across regions.

IV. Sustainable and just economies

National incomes have increased significantly as a result of economic expansion, though not uniformly across nations. Despite the fact that that has contributed to improvements in human, economical as well as social welfare, the current impacts on the ecology as well as human societies cannot be sustained. Financial action should be viewed as a means of sustainable human capability advancement rather than an end in and of itself. It is essential to decouple economic activity's benefits from its expenses at all levels, and doing so can also help support the systemic conversions envisioned by the other five entry points recommended in this Report. Such a result would assist in putting individuals, societies, and nature on the route to SD and greatly accelerate the necessary reconfiguration.

There are a lot of reasons why that isn't happening right now. The sole utilization of the gross domestic product (GDP), which is the market value of services/products generated per annum, is one of the frequently cited reasons or the most widely used metric for directing human

development-related economic policy. Even though it is crucial to reform policymaking at this level, it may not occur quickly enough worldwide to warranty efficient paths to SD. However, there are a number of other significant obstacles that could be overcome, even in the very near future. It is unsustainable to continuously increase global consumption of services/goods that generate waste. By 2060, based on existing trends, global resource consumption is expected to exceed 18 tons per person annually, with unsustainable effects from industrial water withdrawals, rising greenhouse gas emissions, and agricultural land zone [15]. Similar conclusions are reached when examining specific items' life cycles, such as electronics and plastics. In fact, increasing consumption is the only way to alleviate economic/social hardship in several regions of the globe. However, this must be balanced by moving global consumption toward services/goods that have a much lesser effect on the environment.

There is significantly insufficient investment in the SD policies from all sources. Additionally, construction across national jurisdictions presents its own set of difficulties. The circulation of construction across various national jurisdictions can also consequence in a race to the bottom in terms of ecological as well as labor criterions, despite the fact that globalization has contributed to the lessening of poverty, the creation of jobs, higher access to a broader product range, and the stoking of novelty. It's possible that national instruments like taxes or regulations won't be enough to control those effects. Economic expansion has also been extremely uneven in recent times. In many nations, wealth and income disparities have increased at an unprecedented rate, primarily due to the concentration of wealth at the top, with the richest 1% of the populace holding approximately 33% of global wealth in 2017. The share was only about 10% for the distribution's lowest quarter [15].

The duration was characterized by, at paramount, lethargic income growth for those caught among those two extremes, mainly the central classes in the US as well as Western Europe. There are still concerns that growing automation—involving the operations done by skilled workers—could worsen outcomes for a lot of people, increase inequality, and further concentrate wealth and power. Additionally, women's empowerment as well as gender equality are hampered by gender pay disparities in the workplace. Inequalities in income, wealth, and gender frequently limit intergenerational mobility and lead to inequalities in prospects via unequal access to high-

quality education, childhood nutrition, and health care or societal discrimination. Indeed, special access to great quality teaching or inherited wealth and proficiencies can perpetuate inequality.

Based on solid empirical evidence, there is now agreement that great levels of inequality not only cause problems for social justice, but they also slow and weaken economic development over the long term. The efforts of those at the uppermost to safe and sustain their positions via a variety of channels, like having a greater say in the political procedure or weakening anti-trust and other supervisory efforts targeted at reducing controlling power as well as refining market effectiveness, also tend to engender inequality. The 2030 Agenda's entirety is in jeopardy if current consumption and production practices, as well as inequality levels, continue. It is necessary to make an immediate shift away from arrangements of economic development, manufacture, and consumption that preserve poverty, create inequality, reduce the worldwide ecological commons, and threaten to cause impairment that cannot be undone. It is essential to move toward long-term, decarbonized, and SD that optimizes optimistic human impacts, matches prospects between social groups, women as well as men, and reduces ecological destruction. The shifting patterns and volumes of public and private investment will play a substantial role in the change. The amount of money required for the investment varies, but it is typically in the trillions of dollars per annum range.

V. Food systems with nutrition

Over one billion people are employed in the provision of food, which is necessary for human survival. Numerous local and regional food systems make up the global food system. It encompasses not only the production of food, but also all activities related to food and their interactions with the Earth's natural processes and resources. The current global food system cannot be sustained due to its impacts on the climate and the environment as well as its shortcomings in providing everyone with safe, healthy food. In addition, it does not guarantee that the world's population will consume healthy food sources. More than 820 million people are still considered to be hungry. Simultaneously, almost every region of the world is experiencing an increase in overweight and obesity. 40 million children under the age of 5 and 2 billion adults worldwide are overweight [16].

Already degraded by billions of hectares, 12 million hectares of farming zone are probably to become impracticable for food generation annually. In addition, agricultural practices may result in aquatic eutrophication, contamination of groundwater, soil acidification, and pollution of the atmosphere. In 2011, these practices also contributed 60% of the world's productions of the greenhouse gas nitrous oxide (N_2O) [17]. Nevertheless, agriculture appears to be producing less N_2O. When all emissions from the global food system are taken into account, they account for more than 19 to 29% of all emissions of greenhouse gases. If manufacturing is merely improved to fulfill the requirements of the worldwide populace in 2050, greenhouse gas emissions from worldwide farming could increase by as much as 87% without technical advancements or other mitigation types, particularly the repair of soil strength in order to upsurge its carbon value [17]. The SD Agenda and the Paris Agreement are incompatible with that scenario.

The Earth's 750 million smallholder agriculturalists in developing nations are harmed by changing food rates as well as uneven trade/contractual agreements, affecting poorer households that spend a large portion of their pay on food [17]. In addition, the global food market is dominated by a small number of actors, despite the presence of numerous economic players. By uniformizing industrial agricultural practices, concentration has the potential to weaken the global food system's resilience.

An overarching concern is how to expand the current food system to feed an expanding worldwide populace by 2050 as well as beyond although accommodating non-food farming merchandises. Nevertheless, under corporate settings, a projected 637 million people will be malnourished, as well as any chance of achieving the 2030 Agenda's goals would be lost due to the environmental effects of increased production [17]. Crop diseases and pests also threaten worldwide food supplies; however, handling them with a great utilization of chemical inputs may threaten numerous Goals related to the environment.

If the worldwide food system is to fulfill the requirements of the universal populace in a sustainable and equitable manner in the future, then commercial normally routes and expanding existing practices are out of the question. Providentially, though, the task of reorienting food systems in a way that is sustainable is not impossible. Contemporary research explain food systems that can provide nutrient-rich food to a worldwide populace of 9 to 10 billion people while significantly reducing their impact on the environment. New forms of governance, value

and behavior shifts, technological innovation, and the strategic use of economic incentives are all necessary for the conversion to sustainable food systems.

Technological advancements in food production approaches are necessary for the transition to production systems that are healthier and better for the environment due to the quality, quantity, and cost of farming things generated by universal plant production schemes continue to be heavily reliant on chemical fertilization as well as pest and weed control. However, the transition cannot be accomplished solely by technologies. A more reasonable universal access to nutritious foods as well as the promotion of agro ecological policies that are profoundly rooted in native knowledge/cultures, depending on small- and medium-scale agricultures with spatial/temporal diversification and locally adapted breeds/diversities that can be powerfully unaffected to ecological stress require changes in policy, institutional and cultural norms. In many developing nations, agroecology has validated effective in assisting agriculturalists overcome the impacts of poor weather and degraded soil.

VI. Energy decarbonization with universal access

Everyone agrees that having access to energy is essential to human and social well-being as well as economic growth. The World Health Organization (WHO) estimates that energy poverty continues to be widespread, with near to 1 billion people lacking access to electricity, most of whom live in sub-Saharan Africa, as well as more than 3 billion people cooking with polluting solid fuel that results in an assessed 3.8 million premature deaths annually. Women and children in many areas are required to spend many hours a week gathering as well as transporting conventional biomass, which is burned in greatly polluting/inefficient stoves, as a result of the present utilization of biomass fuels. However, transport, the production of heat, and the generation of electricity all depend severely on fossil fuels as well as together account for approximately 70% of global greenhouse gas emissions, involving 40% from electricity. Due to the rapid growth of solar photovoltaics (PV) and wind power, electricity generation continues to see the most rapid progress in renewables. In 2016, close to 25% of electricity came from renewables [18]. With shares of 9% and 3.3%, respectively, modern renewables are still used sparingly for transport and heating. Given that transport and heat consume 80% of all final

energy, particular efforts are required to accelerate the adoption of renewables in these sectors [18].

Transformation of electricity transport and distribution, involving choices like hydrogen and storage techniques, and electrification of energy end utilization can become the drivers of decarbonization in the energy division as renewable energy production increasingly dominates. There are already technologies in place to switch to decarbonized routes. Solar photovoltaic (PV) and wind power accounted for closely one fourth of electricity production in 2016. Slow development in long-term electricity storage and smart grid management, on the other hand, has slowed progress. Over the course of the past ten years, the proportion of contemporary renewable energy in the total supply of universal energy has risen by an average of 5.4% yearly. Additionally, worldwide investments in clean energy have surpassed $300 billion yearly for five years in a row (from 2014 to 2018). That was made easier by the fact that the cost of electricity from renewable sources has fell by 77% for solar PV as well as 38% for onshore wind since 2009, while the electricity expenses from traditional sources has slightly decreased [18].

Parts of the 2030 Agenda are in jeopardy due to difficulties in scaling up the use of renewable, nuclear, hydroelectric, and other fossil fuel-free energy sources. Subsidies for fossil fuels, both direct and indirect, still outnumber those for renewable energy globally, and this price distortion is slowing the spread of renewable energy sources. Transport continues to depend heavily on fossil fuels. While the need for aircraft, ships and trucks continues to propel the complete oil demand for transportation on a quick upward trajectory, moves in customer behavior may decrease global oil utilization for cars, i.e. anticipated to attain its peak in the 2020s. Between 2015 and 2050, universal passenger request in passenger kilometers is anticipated to more than double, with the majority of the growth happening in emerging economies [16].

Based on the electric vehicle type, driving conditions, the energy generation source, the accessibility of charging infrastructure, charging patterns, the native climate in the region of utilization and government policies, the welfares of electric vehicles for lessening human exposure to pollutants and greenhouse gas emissions may change significantly. Indeed, key strategies for decarbonizing the transportation and energy sectors continue to be the promotion of slow mobility (such as biking/walking) as well as public transportation. Concerning biomass: Due to the fact that its harvesting can result in the loss of biodiversity as well as tradeoffs

regarding access to water, food security and land rights, it is a restricted resource as well as should be selected for utilization in conditions where there is no clear substitute. Because burning biomass also pollutes the air in a big way, it should be strictly regulated, and people should be encouraged to use alternatives, especially for cooking.

Energy consumption per person worldwide increased from 1.3-1.9 tons of oil corresponding among 1965 and 2015. However, individual average consumption is 3-4 times greater in developed nations, where development in energy efficacy has only been capable to slow demand growth. At the global level, demand for energy is anticipated to upsurge by 25% in 2040 due to increasing revenues as well as a rising population, primarily in urban zones in developing nations. If energy efficiency improvements do not continue, this demand could double.

The International Energy Agency says that fossil fuels will still provide up to 78% of total energy in 2030, as well as an equivalent percentage even in 2050, if yearly investment in renewables does not at least twice as well as remains at the present rate [9]. The Paris Agreement's objective of restrictive worldwide average temperature rise 2 degrees Celsius above pre-industrial levels will be impossible to achieve if the present negative trend of rising greenhouse gas emissions continues. People without electricity fell below one billion for the first time in 2017, but energy access trends fell short of global goals in 2017 [9]. Despite this, it is anticipated that 650 million people in sub-Saharan Africa will continue to live without electricity in 2040, with the majority of them residing in rural areas.

Electricity currently accounts for close to 20% of global final energy consumption and is expected to continue growing [15]. Cleaner, globally accessible as well as affordable electricity must be at the center of policies for decreasing greenhouse gas emissions and economic SD due to the doubling of electricity demand in developing economies. If electrification is to fulfill its complete capability as a means of meeting climate objectives, it will necessitate additional measures to decarbonize the power supply. Among its benefits is the reduction of local pollution. It is evident that advancement is possible. A key driver of change is the digital applications, convergence of low-cost renewable energy techniques, and the growing importance of electricity.

VII. Global environmental common

The large-scale biomass, Polar Regions, global oceans, hydrosphere, atmosphere and natural resources systems like water, land, forests and biodiversity create the world's mutual resources, which are the universal ecological commons. The commons are necessary to human survival and well-being because they support the biosphere, the universal environmental system. The interaction between the climate system and all living organisms (the biosphere) influences the conditions on Earth. As a result, the complete ecological circumstances on Globe eventually reflect human-caused changes in the functioning of the biosphere. Therefore, it is essential to guarantee the global environmental commons' long-term health. The commons are rapidly being depleted and degraded by human activity.

There are risks associated with severe social, economic, and political repercussions when these systems are breached. Nature across most of the world has been significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline. 75% of the planet's land surface has been considerably altered, 66% of the sea's surface is facing growing accumulative effects and more than 85% of wetlands have disappeared [12].

The depletion of natural capital stocks, which are essential for the majority of economic activities, is one immediate consequence. Human-made infrastructure cannot fully replace much natural capital. Natural man-made dikes or coastal mangroves and sea walls, for instance, can help reduce coastal flooding caused by storm surges. Built infrastructure, on the other hand, is very expensive, usually needs a lot of maintenance in the future, and does not deliver extra welfares like nursery environments for eatable fish or prospects for recreation. Other ecosystem services or environmental operations cannot be replaced. The loss of biodiversity poses a threat to resilience because lost species may have been resistant to climate change, pests and diseases. The universal rate of species extinction is already 10-100 of times greater than it has been in the average over the past ten million years, indicating that closely one million species are already in danger of extinction. This makes biodiversity loss specifically dreadful. The generation of 75% of food crops is in jeopardy as a result of the decline in the abundance of numerous pollinating species and the potential for further loss. Domesticated species and breeds of local origin are also disappearing. Overexploitation of resources, chemical pollution, land fragmentation, climate

change, the plastic disposal, poaching and the introduction of invasive species are just a few of the human-caused negative externalities that are contributing to this unprecedented loss of biodiversity.

Threats exist to additional components of the universal ecological commons: Emissions of greenhouse gases, air pollution, the loss of stratospheric ozone, and persistent organic pollutants are deteriorating the atmospheric system. These agents have extreme negative impacts on terrestrial and oceanic ecosystems due to the commons' interconnections. As a result of climate change, for instance, ecosystems' supporting, regulating, and providing services are disrupted, as are the severity of hazards like extreme heat, heavy rainfall, flooding, landslides, rising sea levels, and drought. With 91% of the biosphere's populace breathing air containing pollutants that surpass the World Health Organization's pollution strategies, air pollution poses one of the greatest risks to health worldwide, particularly in rapidly expanding cities in developing nations. The World Health Organization evaluates that outdoor/indoor air pollution result in the deaths of 8 million people annually.

The majority of the SD Goals are synergistically supported by the essential regulating and provisioning services provided by the ocean. As a carbon sink, the ocean can feed people as well as deliver them with a means of subsistence while also preserving habitats, preserving biodiversity, and regulating climate change. It is anticipated that ocean-related changes will result in feedback that will accelerate global warming. Coral reefs are being harmed, along with biodiversity, local livelihoods, and coastal protection, by warming itself and ocean acidification brought on by carbon uptake. 40 million fishermen depend on the ocean for their livelihoods. However, ocean acidification and overfishing pose a threat to those livelihoods. Additionally, an increasing amount of garbage, hazardous chemicals, fertilizers, anthropogenic nanoparticles, plastic debris, sewage and oil enter the ocean, all of which pose risks to the human immune system and upsurge cancer risk and decrease fertility. They also contaminate human food chains, endanger marine species and biodiversity.

VIII. Science for sustainable development

Depending on how they are steered, science and technology can be powerful change agents for good or ill. Increased cooperation among society, policy and science, guided by the 2030 Agenda, can lead to advances in our comprehension of coupled human-ecological systems and

the development of novel strategies for achieving the SD Goals. It's encouraging to see a growing number of nations including innovation, science, and technology in their national development plans.

Between 2007 and 2013, worldwide spending on R&D augmented by 30.5%—more than the global GDP (up 20%)—despite the 2008–2009 financial crisis. Both the number of scientific publications and the number of investigators worldwide increased by 21% [11]. In addition, governments and businesses are increasingly investing in environmentally friendly technologies. According to recent reports, at least 101 economies in the developing/developed worlds (which account for more than 90% of worldwide GDP) have implemented formal manufacturing growth policies in the past ten years [11]. This has increased opportunities for the development of novel strategies to encourage inventions toward SD. Nevertheless, knowledge development alone is insufficient: In order to encourage widespread adoption, technology must be made accessible, available, and sufficiently appealing. As a result, sustainable technology adoption and scaling up are crucially needed in addition to research and development.

Numerous challenges experiencing the SD Goals, involving those that consist problematic trade-offs, hold the promise of being addressed by rapid technological advancements in biotechnologies, artificial intelligence, computer science, and biotechnology. For instance, technology has the potential to make constructed surroundings, transportation, and communication/information services more accessible to people with disabilities, as well as to encourage inclusion and aid in realizing their full and equal participation in society. At the same time, advancements in technology run the risk of worsening existing inequality, creating new ones, and, as a result of unintended consequences, delaying progress toward the 2030 Agenda. People with disabilities, for instance, run a greater risk of being left out of surveys and statistics utilized to create forthcoming programs and strategies if they don't have access to digital infrastructure as well as IT. In addition, global technical valuations that have already contributed to the tracking of progress and the identification of obstacles to SD can create current information as well as establish a consensus on essential understandings. Additionally, they offer critical policymaking advice. To maximize synergies between various assessments and integrate regional perspectives in the future, more work is required. There are still significant gaps between developed and developing nations in terms of scientific and technological advancement.

The 2030 Agenda may be derailed by the highly unequal distribution of technical capacity and information access across the globe. The majority of technical literature and R&D are conducted in wealthy nations. Through South-South collaborations, multidirectional science and technology handovers from the North to the South, from the South to the North, and from the North to the South will help align growth as well as innovation trajectories to fulfill the requirements of the 2030 Agenda. In the end, in order for the Agenda to be universal, each nation needs to have access to the science and technology it needs to come up with transformative solutions to its particular characteristics, requirements, and priorities.

On the issue of gender equality, men still outnumber women, chiefly at the maximum levels of science and engineering, despite the fact that the number of women working in these fields is increasing worldwide. Less women than men actually pursue careers in science and engineering, even in nations where girls and boys take roughly equal numbers of math and science classes and about the same number of girls as boys graduate from secondary school ready. Gender parity in science could result in significant advancements in knowledge, society, and the economy.

Consolidation the directionality of science in favor of a jointly valuable "moon landing" for humankind and the world is essential to fulfil the urgent need for sustainable alterations. The 2030 Agenda can serve as a common guide for scientists, policymakers, and funding agencies to upsurge the significance and welfares of science and technology to the universal community.

With interdisciplinary investigation focusing on coupled human ecological systems or socio-ecological systems, experts have commenced to address the web of problems experiencing humanity in recent decades. As a result, a new, more involved academic field known as sustainability science has emerged. This field uses a problem-solving method to draw on all technical fields, containing the humanities/social sciences. It aims to shed light on nature-society interactions that are complex, frequently contentious, and laden with value while also producing useful technical knowledge for SD. The implementation of the 2030 Agenda's trade-offs and contested issues, like handling with uncertainty, risks, the suitable application of the protective principle and ethical dimensions, can all benefit from the assistance of sustainability science. It involves collaborating with affected groups and communities to identify key trade-offs, identify problems and objectives, and Tens of thousands of investigators, experts, knowledge users, students and teachers, from a variety of organizations and fields have joined sustainability

science. However, substantial funding from funding agencies and the scientific and engineering communities is still required.

IX. Conclusion

Over the past ten years, there have been issues with sustainability. The economic disaster is not over yet, and we are about to enter a time of lesser development, making it more difficult than ever to finance investments in sustainability. In the meantime, ecological disasters all over the world have made it clear that these investments are necessary. In light of this, we suggested two years ago, in addition to the actions derived from our Corporate Sustainability Program, to closely link sustainability and economy when promoting economic sustainability, which is becoming more and more affordable as a result of the third digital revolution, which is a byproduct of the digitalization of business and society. Both sustainability and digitalization are crucial to our future. We are able to achieve sustainability thanks to digitization. Any program of political action or social change is affected by the dilemma that advocates of SD face: the conflict between the need to win widespread political support and acceptance and the desire to take firm stances on fundamental issues. SD is being presented as the inevitable result of objective scientific analysis, almost a historical necessity that does not contradict the deeply ingrained normative notion of development as economic growth. This is based on the experience of eco-development, which tended toward the former. In the academic, governance, planning, and development intervention fields, SD has received a lot of attention. It appears that numerous governmental and non-governmental organizations have adopted it as a suitable growth paradigm. This is due to the fact that most, if not all, paradigm proponents and advocates appear to agree that adhering to the tenets and principles of SD can address the issues facing humanity today, including climate change, ozone layer depletion, water scarcity, vegetation loss, poverty, deprivation, hunger, insecurity and inequality.

The eventual objective of SD is to strike a balance between social, economic, and environmental sustainability, making these the foundations upon which SD is built. The availability of effective health systems, peace and respect for human rights, decent work, gender equality, high-quality education, and the rule of law all play a role in ensuring the long-term viability of society. While appropriate physical development and land utilization, and the preservation of biodiversity/ecology, are the driving forces behind environmental sustainability, the

sustainability of the economy hinges on the implementation of appropriate production, consumption and distribution practices. Intergenerational equity, which recognizes the long and short-term inferences of sustainability in order to address the requirements of both present as well as forthcoming generations, is implied in the universal viewpoints about the concept of sustainability, despite the abundance of definitions and interpretations of the term in the literature.

X. References

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