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Big Data: A Preferred Tool For Sustainable Development

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Abstract:
The last part of the 20th century stood witness to the irreversible process of interlinking of countries due to the opening up of economies and further procedural liberalization. The advent of 21st century has seen the convergence of global efforts to speed up the developmental process across countries with programs like MDGs and the ongoing SDGs, which have become more people centric, integrated, universal and indivisible in nature. The programs on a global scale, require herculean effort for policy detailing, efficiency of execution, monitoring capability, placing an adequate feedback mechanism, and timely corrective action. The capability of the system to deal with such humongous data subsequent to the generation, manipulation, correction, restoration, and storage of the data, requires much more than the traditionally used system by the governments. It is a very interesting coincidence that the 21st century has also paved the way for the most revolutionary technology till date, the 'Big Data Analytics' or Big Data. Technology has always been known to provide the administration with the requisite tools and techniques. It is a genuine contemplation that the evolution of the dynamic, revolutionary and unprecedented technology can reap huge benefits in the attainment of the Agenda 2030. It is a promising combination since the Sustainable Development Goals, as envisaged in the Agenda 2030, requires a highly transparent, dynamic, flexible, real time, fast, and pro-active mechanism to cater to the multitude of global problems. The present descriptive study, using the secondary data sources, aims at understanding the role of Big Data in adequate response to the Sustainable Development Goals as envisioned by the global apex organization – the United Nations.

Backdrop to Sustainable Development

The world started on its journey of becoming a 'global village' in the true sense with the genesis of the United Nations (UN) towards the mid of the 20th century (later part of 1940s).

The process was a disintegrated and jumbled effort till the 1990s as the specialized functional arms of the UN came up with progressive mandate at different World forums to support the developmental agenda, signaling a dearth of strong focus and concerted efforts for justifying the dimensions of development. The new millennium embarked upon many landmark and inclusive policy initiatives and efforts on the Global level, spearheaded by the global apex body and its allied agencies. The first in the series signifying the confluence of multiple agencies for international development were the iconic 'Millennium Declaration' and the 'Millennium Development Goals'. These global programs nested the policies and program objectives, primarily of the agencies like UNESCO, WHO, UNICEF, UNEP, UNDP and others. **(Kumar S. Health in international development Agenda: Present, past and future. Indian J Community Med. 2013;38:129–31. [PMC free article] [PubMed] [Google Scholar])**

The Millennium Development Goals kick started the progress in many critical areas like poverty
reduction, provision of basic living amenities, providing the basic education and safeguarding the future human capital, fighting against diseases like malaria, tuberculosis, HIV/AIDS, and mother and child health improvement (https://www.undp.org/content/undp/en/home/sustainable-development-goals/background.html) from 2000 - 2015, targeting the developing countries. Therefore, the program was not encompassing the entire world fraternity and functional systems. Another milestone came in the year 2015, when a series of international commitments were documented spurring the global movement for a broad based, inclusive and sustainable development for all the countries. Both developed, developing and least developed economies would partake in the program initiative.

Many landmark initiatives for development earmark a shared vision of all member nations for peace, prosperity, inclusiveness, and partnership, with a futuristic and sustainability orientation.

The Sustainable Development Goals draw their strength from rigorous analysis and integration of information by member nations, apex body – the UN and the allied agencies.

Elements of Sustainable Development

Sustainability can be principally understood as a set of programs, policies, initiatives and rules of governance for preserving a distinct capability or resource. This, in turn, is associated with the following four dimensions (https://www.futurelearn.com/courses/sustainable-business/0/steps/78337):

Human Sustainability

The human angle of sustainability includes the provision, maintenance, and augmentation of systems pertaining to the health, nutrition, education, skill and capacity development, employment, and gender rights. It also involves the direct or indirect impact of the

organizational working in the form of products or services (Dunphy, Dexter C., Suzanne Benn, and Andrew Griffiths. Organizational change for Corporate Sustainability: A Guide for Leaders and Change Agents of the Future. 2nd ed. Milton Park, Abingdon, Oxon: Routledge, 2007.)

Social Sustainability

This refers to the provision, maintenance and enhancement of activities and services which constitute the basic framework of the societal functioning and well being. It revolves around the principles of social cohesiveness, social equality, honest behavior, reliable relationship among the social constituents. The stimulus for building a proper social fabric can be given through legal framework, equal and rightful deployment of resources by the regulators.

Economic Sustainability

It refers to safeguarding and augmenting the economic capital, whereby efforts are made through implementation of appropriate measures for betterment of living standard of general public and providing them with more opportunities of job and entrepreneurial ventures. It is equally important to match the quantity of the economic opportunities along with the quality so that future discomforts and problems can be avoided.

Environmental Sustainability

The dimension of environmental sustainability is related with the preservation and enhancement of the natural which includes the natural resources like land, water, air, animals and vegetation, minerals etc. The sustainability of environment mandates that the necessities of the current inhabitants of the planet do not disturb the resource requirements of future generation. The main emphasis of the concept is to provide for the welfare of human race through the preservation and care of the inhabiting environment. It is impossible to have the other three sustainable objectives without consideration of the natural habitat. It is the foremost necessity to achieve the economic, social and human sustainability.

The UN Sustainable Development Goals place an equal emphasis on all the four dimensions of the sustainability and therefore these may also be termed as the 'four pillars of sustainability'.

The Data and Information Alchemy

The last part of the 20th century stood witness to the irreversible process of interlinking of the countries due to the opening up of the economies and further procedural liberalization. The advent of the 21st century has seen the convergence of the global efforts to speed up the developmental process in all the countries with programs like MDGs and the ongoing SDGs, which have become more people centric, integrated, universal and indivisible in nature. The programs on a global scale require herculean effort for policy detailing, efficiency of execution, monitoring capability, placing an adequate feedback mechanism, and timely

corrective action. The capability of the system to deal with such humongous data subsequent to the generation, manipulation, correction, restoration, and storage of the data, requires much more than the traditionally used system by the governments. Data is the life-blood of the contemporary decision-making structure. Coined in 2013, 'Data revolution' means an outburst in the volume, speed, the number of users and producers of data, its diffusion, and more and more device integration for data generation.

It is a very interesting coincidence that the 21st century has also paved the way for Big Data Analytics, also known as Big Data, as the most revolutionary technology till date. Technology helps to provide the administration with the requisite tools and techniques. It is a genuine contemplation that the evolution of the dynamic, revolutionary and unprecedented technology can reap huge benefits in the attainment of the Agenda 2030. It is a promising combination since the goals in the Agenda 2030, require a highly transparent, dynamic, flexible, real time, fast, and pro-active mechanism to cater to the multitude of global problems.

Experts have opined that the data driven economy is still in its nascent stage. The world is set to witness a bigger wave of data and information centric functional systems with more and more people and countries coming at par with the standards of data efficient developed countries.

Introduction to Big Data

The technical jargon 'Big Data' means a huge volume of data coming from the interconnected innumerable devices available with the people across the globe. As more and more devices get connected to the internet, the data keeps on increasing manifold with each passing day. The data is generated by using the networked devices connected to the internet in the normal daily life matters and is growing by leaps and bounds. This mammoth reservoir of data requires specialized methods, technology and analytical skills to correctly interpret the data and draw intelligent information from it. Such a data revolution and the resultant information can be of critical importance in fulfilling the development goals under the Agenda 2030. The experts define the "data revolution for sustainable development as the integration of data coming from new technologies with traditional data in order to produce relevant high-quality information with more details and at higher frequencies to foster and monitor sustainable development. This revolution also entails the increase in accessibility to data through much more openness and transparency, and ultimately more empowered people for better policies, better decisions and greater participation and accountability, leading to better outcomes for the people and the planet" [United Nations (2014), p.6. A world that Counts: Mobilizing a Data Revolution for Sustainable Development by the Independent Expert Advisory Group on a Data Revolution for Sustainable Development. New York].

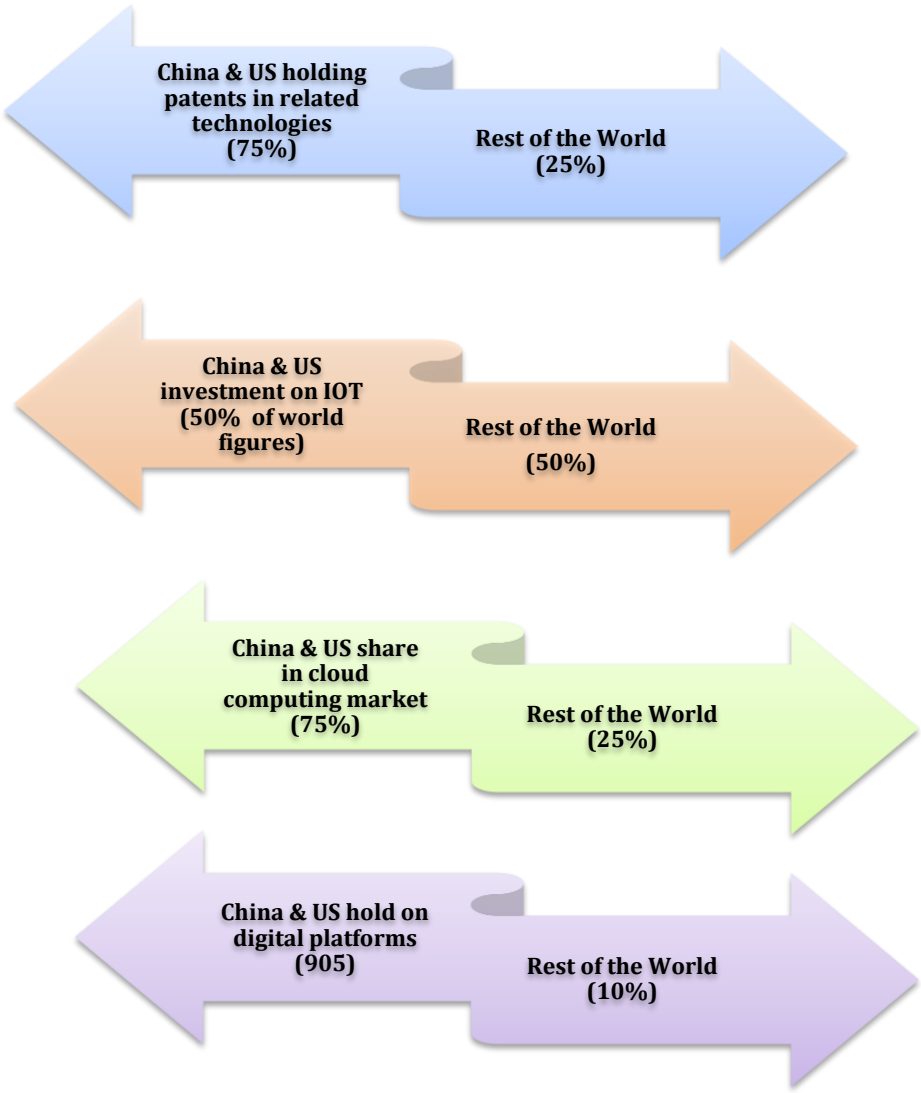
The developmental ecosystem has to function in the member nations for better and desirable results towards the agenda 2030. Similarly, the 'Big Data' is also an ecosystem with data

sources, the interaction among the sources, techniques and methodology. As more and more data is produced at the blink of an eye, through the 'Internet of Things', the 'big data' reservoir keeps on increasing, thereby becoming omnipotent for the international planning and development.

The characteristic features of the Big Data, the 7Vs (United Nations Global Pulse (2013) Big Data for Development: A primer. https://www.unglobalpulse.org/document/big-data-for-development-primer/), are briefed as below (United Nations Global Pulse (2013) Big Data for Development: A primer. https://www.unglobalpulse.org/document/big-data-for-development-primer/) are v**olume, velocity, variety, veracity, variability, visualization and value** (https://impact.com/marketing-intelligence/7-vs-big-data/)

Sustainable Development & Big Data: Digital Divide and Stakeholders

World is unequally divided in the understanding, using and leveraging the big data methods for development. The usage gap is depicted in the figures given below:



GEOGRAPHICAL IMBALANCE OF DIGITAL ECONOMY
FAVORING OF USA & CHINA AGAINST RESTOF THE WORLD

Source: Digital Economy Report 2019 - United Nations Conference on Trade and Development
https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2466

The big data ecosystem comprises of many stakeholders, the nomenclature may differ on the basis of the country specific environment. The major stakeholders in the ecosystem are as follows:

1. **Policymakers/Government/Regulators**
   They are responsible to provide a level playing field in harnessing of the technology in order to make a significant impact.
2. **Private Sector/Organizations**

The use of big data in sustainable development has the potential to generate massive opportunities for profitable businesses coupled with the attainment of the corporate social responsibility.

3. **NGOs/Philanthropic Organizations**
   These connect with the people at the level of faith and confidentiality unlike anyone else, and this positive aspect can be used in furthering the cause of the sustainable development through the big data revolution.
4. **Science Fraternity/Research & Development Officers/Statistical Professionals/ Data Brokers**
   These stakeholders have the adequate knowledge, skills, capability, understanding and finances to provide for data driven solutions the societal problems. They have required data pertaining to specific sections of the people and therefore can play a very prominent role in policy provisioning for these sections.
5. **Society/Public**
   It is highly desirable that the bottommost level of the data pyramid is data conversant, ethical and prompt in understanding the pros and cons of the developmental policies. There should be a timely and proper response for the policy measures to fine tune the measures of sustainable development.

Relevance of New Technology in UN Goals

The 17 goals of Agenda 2030 can be understood in the light of big data solutions as follows:

Goal 1:' No Poverty'	The big data can be a suitable technology to trace the mobility patterns, socioeconomic levels, the socio economic status of people and thereby identifying them through mobile and satellite data, especially after the natural calamity since it impacts the human beings for a longer time period. Spending patterns can be analyzed to decipher the income levels and target poverty alleviation.
Goal 2: 'Zero Hunger'	The big data can come to the rescue through the tracing of the food expenditure levels in different households across income brackets, checking and accounting for the drought/famine conditions, analyzing the consumer and wholesale price indices with the help of mobile and satellite data. Besides, the tracing of the food prices through list available online can also contribute towards monitoring of food prices in real time.
Goal 3: 'Good Health & Well Being'	Monitoring of the epidemic outbreak and resultant mobility, the analysis of the disease penetration rates and trend of spreading can save people.

Goal 4: 'Quality Education'	The mobile phone data and search engine data can be optimally analyzed to make predictive assessment of the literacy levels, quality of education achieved, dropout rates, and the interest of people in the open courses for employment.
Goal 5: 'Gender Parity and Female Empowerment'	Mobile phone and search engine data can be traced and analyzed for gender prediction of the users, gender specific policy initiatives, and related spending patterns.
Goal 6: 'Clean Water and Sanitation'	The satellite data and the social media posts can be analyzed for analyzing the water ecosystem and underground water levels. The problems related to equitable water and sanitation arrangements for all can be analyzed. The water wastage can also be stopped with the help of public engagement.
Goal 7: 'Affordable and Clean Energy'	The access to electricity and residential power supply can be analyzed; problems and shutdowns can be resolved. The data from satellite and smart meters can help trace the night-time luminosity, factors affecting electricity consumption, and stop the wastage.
Goal 8: 'Decent Work and Economic Growth'	The data related to GDP, unemployment, tourism patterns are analyzed to study the work conditions and provide relief measures.
Goal 9: 'Industry, Innovation and Infrastructure'	The novel technology can lead to study the access to roads, rural population movement patterns, road usage, traffic monitoring through the analysis of data from satellite, sensor, mobile phone and GPS.
Goal 10: 'Reduced inequalities'	The big data solutions can analyze the socio-economic status and trace the pattern with the use of mobile phone data. the 'speech-to-text' analytics can provide patterns of discrimination and the accurate policy measure to tackle it.
Goal 11: 'Sustainable Cities and Communities'	The remote sensing, mobile phone, satellite data can be used to analyze the poverty areas in the cities, the population trouble spots, the social events, home locations, land use and coverage area patterns etc.
Goal 12: 'Responsible Consumption and Production'	The satellite data, mobile data, and search engine data can trace the food wastage and provide suitable solution for it. The green consumption can also be traced by the e-commerce transactions and pattern of sustainable buying and usage endorsed.
Goal 13: 'Climate action'	The mobile phone and satellite data can help to analyze the mobility patterns of the humans after a natural disaster, the

	changes in the geological characteristics, changes in water bodies and drought related issues.
Goal 14: 'Life below water'	The satellite data can be used to monitor the bio-diversity changes and related dangers impacting human life and sustainability of the planet.
Goal 15: 'Life on land'	Using the satellite data, the forest mapping and vegetation pattern can be studied to take timely action along with related disasters.
Goal 16: 'Peace, Justice and Strong Institutions'	The big data can be used for the purpose of predictive policing and recognizing the potential crime spots. The public opinion can be mined and sentiment analysis can reveal the patterns of unrest or support among the people.
Goal 17: 'Partnerships for the Goals'	The countries need to partner with each other if they want to achieve the sustainable development agenda by 2030. The proliferating partnerships can function smoothly at various levels like government, private, public, non-governmental agencies and local level administrative machinery or even people's group.

Conclusion

The big data and the digital revolution is here to stay, rather it is going to grow rapidly with time. The people of all nationalities have to learn to live 'dangerously' with data. The United Nations Agenda 2030 has been set with a deadline, but the measurement in 2030 is not the end. Similarly, the big data is now an inseparable part of our lives and the generations after generations will now be born with the heritage. To summarize, the big data may help in achieving the sustainable development agenda of the UN, but this process is not going to end here, rather it will become a way of life, which the current generation is finding a bit hard to adjust with. The sustainable development and big data is not for only few groups or countries, but it is an all encompassing mode of living which will reap the best results only when everyone adopts an enthusiastic and aware approach towards it. The new revolution has made the world all the more inter-dependent and there has to be an equal and alert partnership of the private sector and public sector in extending the benefits to everyone and everywhere. This partnership will strengthen with the support and timely vigilance of the government, nongovernmental organizations, and civil society bodies. The system works best when there is an inherent system of checks and balances, hence, the interaction of all the stakeholders in the big data for sustainable development will necessitate the proper functioning of the digital fabric.