A Path Towards Sustainability in the Era of Data-Driven Big Data Analysis

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1 Introduction

Brundtland Commission report defines sustainability as "filling existing demands without sacrificing future generations."

Social, cultural, environmental, and economic concerns are the cornerstone of sustainability. Social sustainability is treating ourselves and others fairly and with respect. The cultural factor promotes varied attitudes and beliefs. Environmental sustainability is about protecting the Earth's biophysical system. Economic sustainability requires using existing resources efficiently to generate products and services that bring value to people's lives. Modern socioeconomic systems are based on linear economics, or use and throw. High resource depletion and escalating environmental challenges require circular economic frameworks. Circular economy is a regenerative and restorative system. Recent corporate models have featured environmental advances.

Big data analytics is a twenty-first-century business innovation. This study examines big data's business, socioeconomic, and environmental sustainability consequences.

Big data is a new term, but collecting large amounts of data for analysis is not. Big data is extremely large datasets that can be computationally analyzed to reveal patterns, trends, and associations, especially relating to human behavior and interactions. Big data analytics is the process of analyzing big data to find underlying patterns, correlations, trends, and preferences that help organizations make more efficient and informed business decisions.

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Big data is often defined by three features: volume, velocity, and variety. Data volume is measured in petabytes, exabytes, and terabytes. Velocity describes the pace of data collection, and variety its heterogeneity (Russom, 2011).

Veracity can be applied to illustrate data accuracy or factual consistency (Abbasi et al., 2016). The efficiency of creating and transporting information has increased from 0.3 exabyte in 1986 to 65 exabytes in 2007 (Manyika, 2011). Many firms utilize massive amounts of data to make better business decisions. Walmart utilized 2.5 petabytes of consumer data to change prices in 2012.

Improving speed and efficiency is linked to cost-cutting in the competitive world. Big data analytics allows businesses to make rapid, accurate choices, providing them a competitive edge that they did not have previously. This helps with cost savings, decision-making, and product development. Many industries, including healthcare, travel and hospitality, government, and retail, employ big data analytics today. Huge and diverse data makes sense when it can deliver insights unthinkable with little pieces of data.

Big data overcomes the limitations of traditional sampling approaches by analyzing the whole population. This allows diverse viewpoints, precise output, and accurate predictions (Varian, 2014). Big data analytics challenge academics who link results to old hypotheses. In most cases, we need more theoretical ideas to understand big data's complex reality.

Big data analytics affects everything tech related. Sustainability is similar. Many governments are studying big data analytics to promote sustainable development in smart cities worldwide. Governance, resilience, quality of life, effective use of natural resources, and civic amenities are possible applications of big data analytics (Khan et al., 2013). Big data analytics will help with diagnosis and environmental sustainability.

2 Prospects of Data-Driven Sustainability in the Corporate Sector

Digitalization boosts the current circular economy. "Take, make, and waste" is being replaced with "recycle, reuse, and restore."

How can corporations promote sustainability while maximizing profits? It is big data.

3 Big Data and Sustainability Within the Organizations

Effective corporate sustainability can only be achieved by understanding how business and nature affect each other. Complex interactions between natural and commercial worlds suggest big data analytics applications. Businesses struggled to

understand their environmental implications until the previous decade. Big data gives them access to different datasets that may be utilized to increase performance efficiency and meet sustainability goals (John Hsu, 2014).

Profit drives business. It does not always help the environment. Big data can solve some of the challenges current businesses confront. Businesses are integrating sustainability into their plans and strategies. Big data analytics helps them maximize earnings while conserving the environment. This is more significant in cases of big companies which are responsible for most of the environmental degradation as they can be more responsible in their own operations, thereby nurturing sustainability.

The scope of big data in guaranteeing sustainability is broad. Big data starts with intraorganizational processes. The deployment of smart sensors improves the systems to optimum efficiency and provides the essential components at times when and where they are needed.

Big data's most important application for businesses is providing more realistic and reliable sales forecasts, which reduces energy and resource waste and maximizes stock usage. Big data ensures environmental and economic viability in the supply chain by establishing the most efficient transit between raw material allocation, production areas, warehouses, and customers. Real-time stock dispatches can update the movement path of forklifts and other vehicles, minimizing fuel and energy consumption (Nancy Master, 2017).

4 Big Data and Sharing Economy

Collaborative consumption is growing in popularity. Successful platforms like Uber, BlaBlaCar, Ola Cabs, and Airbnb use the above concept. Companies collect and use several sources of comparable data to create profitable business plans (Dror & Alberto, 2016).

Sharing economy is eco-friendly. By reducing car usage, carbon footprint is reduced. Big data enabled efficient and profitable collaborative consumption.

Big data informs even these firms' pricing strategies. A complicated algorithm uses real-time data on automobile rental demand and availability to change pricing at regular intervals.

5 Big Data and the Socioeconomic Aspects of Sustainability

5.1 Big Data and Sustainable Development Goals

UN Global Pulse (2012) demonstrates how big data may be used to monitor sustainable development goals. This means big data can improve people's lives. Big data examples include the following. To measure poverty, cell phone spending is considered. Spending on mobile phone services can be used to estimate national

income levels. Online food price tracking helps determine a country's hunger index. It monitors real-time food security.

Seventeen SDGs exist. These aims have been measured using certain criteria and indicators. Policy judgments are made after analyzing each parameter's massive amount of data. Many governments lack adequate demographic statistics, which is a major barrier to UN Global Pulse (2012).

6 Big Data and Environmental Aspects of Sustainability

6.1 Monitoring and Assessing Environmental Situations

Big data analytics is used to analyze and monitor environmental concerns and dangers. Real-time satellite images, drone help, and sensors deployed in critical and sensitive regions can be used to discover deforestation and other environmental hazards. There are technologies that monitor and analyze environmental hazards such as water dangers and pollution levels, utilizing a wide variety of indicators and parameters. Aqueduct maps water danger. This program analyzes global water risk using multiple metrics. Big data-based platforms track agriculture. Farmer on is a cloud-based program that tracks livestock data, including health (Fig. 1).

Farmers may efficiently manage resources by tracking real-time livestock data. IW Financial Staff (2016) big data improves farming methods. Big data analytics can automate irrigation system and manure application based on weather forecast, soil conditions, temperature and moisture levels, harvest time, etc. (Dror & Alberto, 2016).

The model described above is based on that of Gartner that has been brought forth to the original model to meet the fundamental data analysis: process that happens, what will happen, and how can we make it happen, culminating in prescriptive analytics model which is undertaken to explore choices.

With big data and sustainability, human interventions may be investigated, and effective solutions can be implemented to meet the most discussed challenges of

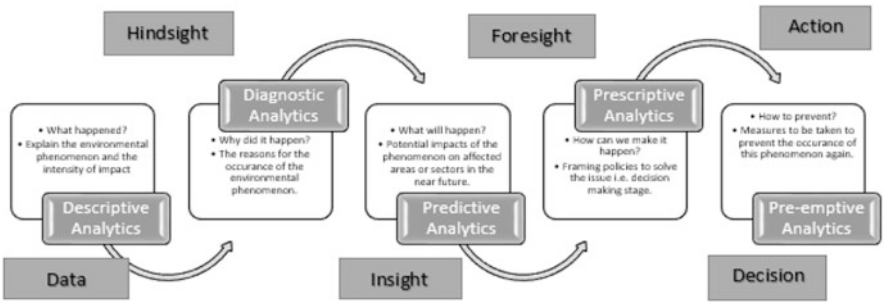

Fig. 1 Big data analytics for milk production, reproduction, nutrition, etc.

historical and real data availability to support sustainable growth. Preemptive analysis is important for predicting issues that may arise in the future. Programming languages have been created for this reason.

7 Risks and Challenges

Both big data and sustainability face hurdles. Notable macro-level difficulties include using big data to acquire socioeconomic and environmental data from countries (ICSU, 2015). Gartner's model divides the less economically developed nations in search of big data analytics for environmental concerns. Above is Gartner's concept of data analysis phases. The original model was modified for this investigation. The process includes answering why, what, when, and how questions. Prescriptive analytics follow descriptive analytics (Taras Kaduk, 2016). Add-on preemptive analytics explores preventative methods. With big data and sustainability, environmental phenomena may be investigated, and effective actions can be made to address global warming, pollution, etc. Big data analytics may now be used to cope with present and projected environmental challenges due to the availability of historical and real-time data. It would help define future policy to cope with the situation. Big data insights demand technological knowledge. There are many sophisticated programming languages developed for this purpose. R programming, Python, SAS, etc. are some of the programming languages used to handle the enormous amounts of data.

Micro- and macro-obstacles must be solved to make big data viable. Here are the highlights. Global big data concerns are macro-level issues. To use big data to promote sustainability, a varied mix of economic and environmental data is needed (ICSU, 2015). Less developed countries lack data-driven technologies and infrastructure. This divides nations pursuing global aims.

8 Conclusion

According to the report, corporations are embracing big data to develop environmentally friendly business strategies. Pro-environmental attitudes have led enterprises to switch from damaging old technologies to eco-friendly alternatives with higher application costs. Big data gives the most effective company solutions that blend environmental, cost, and profitability considerations. Big data analytics used to analyze sustainable development goals and identify environmental hazards give us hope for a people- or environment-focused big data revolution. The corporate world might also design and use the new big data ecosphere to boost the welfare of people, especially disadvantaged groups. Regional open-data platforms that handle data mobilization for global aims should be prioritized. More research is needed to prevent big data misuse.

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