Effective Poverty Reduction Strategies Using Fragmented Data for Low-Income Economies

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Abstract: *OECD states, "Data - driven innovation is a key pillar in the growth of the economy… data sets are becoming an important asset in the economy, helping new industries, processes, and products and creating significant competitive advantages. " In the global pursuit of economic growth and societal progress, data - driven innovation has become a foundational pillar in the 21st century. This paper explores the intersection of data - driven innovation and poverty reduction, highlighting how comprehensive data analysis - from surveys and censuses to administrative records - provides critical insights into the complex landscape of poverty. The paper talks about traditional and modern data collection and analysis and the impact of real - world analytics on poverty alleviation.The paper also sheds light on how climate change and poverty are interlinked and how data can help mitigate climate change. It also touches upon the rise of AI and how it can transform policymaking as we know it.*

Keywords: data driven innovation, poverty reduction, data analysis, climate change, AI in policymaking

1. Introduction

Modern technology is more and more linked to the administration of the country, and administration with the help of modern technology not only enables more convenient public services for citizens but also brings with it the innovative initiatives and determination of the country to create modern administrative tools. Aware of the importance of using big data technology in management, we can promote the progress and development of management information technology, including big data technology. Data has become an indispensable tool in modernised precision poverty alleviation, which can effectively improve the efficiency of poverty alleviation and enhance the quality of government governance. Using data to make decisions is not new, but we have seen the Internet and mobile technology generate data at an unprecedented rate. Indeed, this increase in the amount of data produced has caused many industries to review their strategies and adopt new business methods.

Modern analytics has reached almost every field, from public health, law enforcement, economics and sports to political campaigns. For example, forest and swamp fires spread yearly to Kalimantan and Sumatra, mainly caused by draining swamps and land conversion for palm oil cultivation. To better support the Indonesian government in managing forest and peat fires, UN Pulse Lab Jakarta surveyed social media interactions on Twitter during and immediately after three fire - related blackout events between 2011 and 2014. The study found more concerned tweets during twilight events associated with significant fires. A simultaneous analysis of more than 4, 000 tweets from February to March 2014 during a dark incident in Riau revealed even more common patterns between tweets and locations that spread during the fire. "Wildfire status" was the most talked about topic (nearly 1, 200 tweets), followed by "Government support", "Range status" and "Community support" (400 - 600 tweets). Analysis of Twitter in combination with other real - time data sources (such as remote sensing, cell phone calls to 911 or movement traces) can also provide additional insights into disaster impact and on - the - ground recovery. (UN Global Pulse, 2017). In Singapore, the Housing Development Board (HDB) partnered with GovTech to use machine learning to identify customer concerns better and tailor its policies to citizens' needs. Similarly, there has been an uptick in the use of data to fight and reduce poverty.

The World Bank has talked about data being a convenient tool in the fight against poverty. In Haiti, technology has helped mango farmers trace their products to the final sale, cutting out many intermediaries and allowing them to keep more profits. In India, with the support of the World Bank, tools have been developed to meet the challenges of information literacy. They allow residents to express their preferences in easily digitised ways, encouraging community conversations to be prioritised. Many countries have used data to manage the COVID - 19 pandemic. This use includes tracking people's locations to understand movement patterns during lockdown better or to help trace contact with diseases. Policymakers in the Gambia could view maps showing people's movement across administrative borders using Call Data Records (CDR) compiled between March and May 2020 to mask individual - level data. These maps helped them understand the extent to which closures successfully reduced movement and helped them identify drivers of adherence and non - compliance to closures and plan accordingly.

Further in this paper, we will talk about the rise of AI and how data systems can help mitigate climate change. We will also look at case studies of fragmented data being used.

2. Background

Big data has been defined as massive amounts of observational data or a large volume of data in various formats, which may yield data of high velocity, veracity (valid and reliable), and significant business value. Although the high poverty data includes all five Vs, the value component is different because it aims to meet the basic needs of people experiencing poverty regarding income, food, housing, education, health, nutrition, and more. Extensive data on poverty differs from traditional big data because it reflects socioeconomic inequality in resource - rich environments. As such, situating and examining research from a BPDA capability perspective, we define it as a combination of leadership, infrastructure (platform) and talent (personnel) (Akter et al., 2023) to provide creative proposals to the socioeconomic needs of people experiencing

poverty that improve both business and quality of life. In the initial stage of poverty alleviation work, because there is a lot of data on poverty alleviation, and the traditional way of keeping farm data is mainly based on paper materials or tables, there are problems such as inaccurate and opaque, incomplete or incorrect data collection, resulting in relatively disorganised storage of farm household files, which quickly leads to poverty alleviation to the falsification of information about objects. Therefore, information about poverty alleviation needs to be completed and made more accessible to search for (Yao et al., 2018).

The backwardness of data collection tools, inappropriate updating of poverty data, and lack of dynamic management make it difficult for all levels of departments responsible for poverty alleviation to accurately determine the actual situation of farm households. There is also a need for more data application services for poverty alleviation, which cannot meet the needs of rapid data serving, data mining, statistical analysis, etc., and cannot provide accurate estimates of missing data based on inspection results. It has the advantage of good stability and flexibility. The model was implemented in an accurate data analysis system for poverty alleviation and showed promising results. Therefore, whether it is about the identification of poor households or the direction of discovering the causes of poverty, there needs to be more accurate identification tools, which makes the final definition of poor household candidates imprecise, both in the research and formulation process. As for the poverty criteria system needs to comprehensively consider the indicators affecting the standard of living, including multidimensional indicators such as the number of family members in the labour force, education level, housing conditions, and policies and subsidies. This may also result in a lack of precision in determining whether a farm household is poor (Majeed, 2020). The rapid digitisation of the global economy, the exponential increase in the usage of mobile devices and the ever - increasing number of digitised records in the cloud have led to an explosion of data in vast amounts and various forms. We recognise this phenomenon as a solid alternative to traditional data collection and analysis platforms to address significant challenges. In developing countries, big data can come from various sources that provide demographic, geographic, psychographic and behavioural information. This data can be a valuable, profitable resource and a sure tool for eradicating poverty. In the absence of traditional statistics on resource - poor conditions, mobile phone data in the form of detailed call data and airtime credit purchases are used to understand socioeconomic conditions such as food consumption, economic density or wealth and poverty levels (Ernst & Soerakoesoemah, 2021).

Public intent data hold great potential for designing, executing, and evaluating public programs and policies. Because public intent data is a prerequisite for many government functions, government agencies are the primary producers of this data based on censuses, administrative data collection, and more. An example from Nigeria illustrates the power of public intent data to improve and target service delivery. The 2015 National Water Supply Survey commissioned by the government of Nigeria gathered data from households, water points, water schemes, and public facilities. These data revealed that over 65% of Nigerians did

not meet the standard for sanitation set out by the Millennium Development Goals and that inadequate access to clean water was especially an issue for poor households and in some geographical regions. In response to the findings from the report based on these data, a National Action Plan was launched.

3. Discussion

Climate change is inextricably linked to extreme poverty, creating a cycle that traps vulnerable populations. For example, in sub - Saharan Africa, where the poverty rate is alarmingly high at 41 per cent, changing weather conditions are disrupting agricultural productivity and increasing food insecurity. The World Bank predicts that by 2030, the effects of climate change could expel over 100 million more people into abject poverty. The interaction between extreme poverty and climate change increases vulnerability and creates uncertainty. The Asian Development Bank reports that a 1 - meter rise in sea levels could displace 11 per cent of the country's population, many of whom already struggle to meet basic needs. This scenario highlights the need to address both poverty and climate change simultaneously. A data - driven approach assumes that climate solutions must be localised, responding to the unique challenges of each community. For example, Usman et al. created a model that could predict malaria outbreaks in India, Pakistan and Bangladesh. Extreme environmental changes caused by climate change can affect the spread of vector - borne diseases such as malaria. Accurate epidemic forecasting is essential to protect the 50 per cent of the world's population currently considered at risk of malaria, mainly in Africa and South Asia. Another data model uses satellite imagery to identify illegal brick kilns, many of which are unregulated small - scale industries. Although these stoves are a major employer, they are a significant source of air pollution, including smoke, which harms human health. They are also responsible for much of modern slavery and child labour and cause severe environmental impacts through soil degradation and water extraction.

In addition to data, Artificial intelligence (AI) has come up as a probable solution to the significant effect of global economic development on developing economies. The topic of AI's effect on poverty alleviation is new, and more studies are currently being undertaken to determine the impact of AI on poverty issues. For example, in 2020, researchers at Carnegie Mellon University worked with agricultural leaders and scientists to solve the global food crisis by developing a comprehensive system of robots and AI to improve breeding and crop management practices to fight the crisis. One example is using automation and data - driven tools to increase the output of heat and drought - tolerant crops. For instance, by taking pictures of grains and analysing the data, then processing the information, data can help producers grow more food with less water. However, AI has shortcomings, and it is necessary to consider its risks when using it to address socioeconomic issues. AI can be useful in poverty mitigation efforts if relevant policies, regulations, and governance structures exist.

Due to the growing recognition of the use, abuse and misuse of data, responsible data management has become increasingly important, leading to new global legal and

regulatory standards. The movement was fuelled by US whistleblower Edward Snowden's revelations about global surveillance by Western democracies in 2013, followed by the Cambridge Analytica scandal in 2018. In response, countries have adopted significant policies to protect data. Several landmark decisions by the Supreme Court of India have recognised the constitutional right to privacy, and the country is currently considering a new data protection law. In the European Union (EU), its General Data Protection Regulation (GDPR) came into effect in 2018 when it applied outside the borders of the EU, inspiring similar legislation in other jurisdictions, such as the US state of California. Despite these significant advances in personal data, the legal framework for data management still needs to be revised in many developing countries, raising concerns about the ability of low - income countries to benefit from the development opportunities offered by the emerging global information economy. Trust in data transactions can be supported by a solid legal and regulatory framework that includes safeguards and enablers. Work is still underway to create such a framework for all income groups in the country.

Security measures increase trust in data communications by preventing or limiting damage caused by data misuse. Cybersecurity is a fundamental condition for trust in information systems. To achieve adequate cyber security, creating a legal framework that obliges data processors and processors to implement technical systems to protect data is necessary. To date, only a few low - and middle - income countries have adopted an adequate legal framework for cybersecurity. Kenya's new data protection law is an excellent example of comprehensive cyber security rules. It is also vital to create an appropriate legal framework for data protection. In such a framework, a clear distinction must be made between personal data (data that identifies a person) and non - personal data (data that cannot identify a person). Among middle - income countries, Mauritius stands out for its relatively well - developed protection of personal data. It was distinguished as one of the first sub - Saharan countries to ratify the Convention of the Council of Europe.

4. Conclusion

Hossin et al. talk about the big challenges of using data in policy. The biggest challenges would be data security, privacy and sharing. The government must invest in maintaining the security and privacy of citizens. A mandate must be created, and the public should trust government agencies as safe havens. From the point of view of information exchange, readily available information is a critical factor in achieving a sustainable economy. The government must comply with data protection laws when collecting/acquiring, using and storing data. It is also essential to provide high - quality, cost - effective and reliable data storage and access, and to protect its privacy, security and intellectual property. In addition, it is important to maintain information search and discovery from different sources and to combine datasets from different domains to create open linked data spaces (unstructured or semi - structured). For example, in March 2020, the Israeli government passed emergency regulations allowing personal data collected from phones to be used to track people and contact tracing to prevent the spread of COVID - 19. However, the use of this data to monitor a large part of Israel's population has sparked debate and opposition that the government could misuse the data. Many lawmakers raised privacy concerns in Israel, and the Supreme Court eventually ended the program. In late April 2020, the court ruled that the government must regulate telephone surveillance and that "an appropriate alternative consistent with privacy principles must be found.

The World Bank's Data for a Better World reports talk about the need to create an integrated national data system. Such a system would rely on an approach to data governance that is intentional, whole - of - government, multistakeholder, and collaborative. An integrated national data system serves several essential functions; it incorporates various participants from government, civil society, and the private sector. It would serve the following functions: data protection, data production, data openness and flow, data quality control and data use and reuse. A successful national data system creates an environment where data value for development can be maximised. The impact of data on development increases with the number of participants safely producing, exchanging, using, reusing, and repurposing the data. Incorporating the various participants in the national data system is central to building an integrated system. Some interlinked themes critical to the system are data literacy and data education, a stringent approach to data protection and data openness and accessibility.

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