Big Data for the Environment: Opportunities and Challenges from an Islamic Perspective

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Big Data: New Opportunities

The world is increasingly data-driven. So much has been said about environmental data sets capable of yielding greater insights into water conservation, irrigation systems, medicinal knowledge and agriculture. It is no secret now that organisations are using various techniques – such as algorithms, cloud computing and sentiment analysis – to discover new practices that can aid business operations, research projects and inform policymaking. Characterised by the high volume, variety and velocity of data, environmental information from the internet is growing and changing minute by minute. Inadvertently, the introduction of the Internet of Things (IoT) continues to confirm its grand position in Industry 4.0. Herein, various data types have been revolutionised, helping researchers to see environmental problems in a whole new light.

Advancement in big data has massive benefits for the environment. For instance, satellite data not only tells us about the temperature of the sea or the condition of the cloud cover over cities, but also detects relationships between a large subset of data, wrangling answers to pressing environmental issues with real-time insights from global supply chains. This increasing amount of data comes from numerous sources, including sensor networks, government data holdings, company databases, public profiles and social media postings. It was also similar advancement in data availability and data storage quality that made it possible for Alibaba to deploy its smart city artificial intelligence (AI) platform in Kuala Lumpur, Malaysia. Operated by resources that are retrieved from the internet (*cloud technology*), this AI-powered platform analyses large volumes of data (*machine learning technique*) and retrieves them from video, image, and speech recognition.

Moreover, social media updates and tweeting on environmental issues have also proliferated. Realising this growing trend and its potential to aid research, Grifith University's researchers are using social media sites to investigate environmental conditions at the Great Barrier Reef, Australia. Combined with meteorological data, tourism statistics, water quality reports, and coral cover, the big data from Twitter, blogs, Facebook pages and images are currently helping researchers to monitor local ecology. In turn, big data analytics on social media

platforms offer complete images about the environment, allowing researchers to understand human behaviour within a particular environment. While a large data output is passively growing from everyday human interactions with the digital world, researchers are actively utilising it for sustainable action. Therefore, it is evident now that an open source of data continues to create unprecedented opportunities for innovative research projects for the environment.

New Challenges

While big data analytics present opportunities, there are challenges too. The massive volume of available data is extremely rich and growing exponentially, making it difficult to process with old databases and software. This raises a particular challenge that education and research institutions will have to meet. Setting aside the infrastructure overhaul, which is always a requirement for change, the real issue here is readiness to get involved in analytics solutions, including AI, machine learning, sentiment analysis, natural process learning – hence the digital transformation in higher institutions.

Another challenge presented by this extremely data-rich era is the increasing use of surveillance technology, which has enhanced the capacities of states, corporations, and research institutions to profile, store, and maintain individuals' info. How precisely will the information be used? Of course, businesses hope that the benefits of using big data will outweigh any harm. Research institutions will profess benevolence if they plan to instigate behavioural change towards the environment. But privacy issues have sparked ethical concern, as big tech giants (Facebook, Amazon and Google) have learned the hard way. Consider the $16 billion acquisition of WhatsApp by Facebook. An article from the Economist magazine, entitled 'The techlash against Amazon, Facebook, and Google,' lambasted Facebook's anti-competitive strategy prior to the acquisition, accusing it of using data to spot business rivals and buy them up. Therefore, to avoid such a conundrum, large data centres have an obligation to inform stakeholders about what is going on, their obligation to be transparent being greater than before.

Finally, the arrival of big data in Malaysia presents a huge challenge to higher education and businesses. Talents are scarce and demand is growing. Countless reports have concurred that more talents are needed to fill the positions in this data-driven age. For example, an article from The Malaysian Reserve, entitled 'Growing demand for big data expertise,' reported that Malaysia Digital Economy Corp Sdn Bhd (MDEC) currently has 6,000 data professionals. Through its training programmes, MDEC aims to have 20,000 professionals by 2020, which is a positive sign that it is leading the country towards a consortium, comprising government, the private sector, investors, and perhaps the country's

higher learning institutions. More importantly, it leads the way in providing big data analytics solutions to the nation.

Islamic Perspective

Big data is changing the business landscape, thereby challenging today's education system to embrace this technological disruption. No country would want to be left behind in this data-driven era, making a case for a stronger competitive edge and the opening up of space for creativity and opportunity for innovation. For instance, a supplier of fresh vegetables can anticipate weather events and their impact via cloud technology so that he can reduce wastage of his highly perishable product. A planner of a renewable energy project can via machine learning quantify how much energy can be generated from natural resources (sun, wind, and wave) so he can administer an effective plan and offer future prediction. Such thorough understanding of business is only possible if they 'read' the availability of data, and analyse its exponential growth. Recount the first revelation in the Quran (Al-'Alaq 96:1) that encourages human beings to read; deep reading is indispensable in the age of big data. People from the business and education sectors need to distil insights (*tabassur*) to boost their enterprises and learning outcomes significantly. Therefore, this writer contends that, firstly, education in a data-driven era must continue to diffuse knowledge so no one will be left behind and everyone stands a chance to thrive because, as the Qur'an states, 'are those who have knowledge equal to those who do not have knowledge?' (39:9). Secondly, education must continue to provide creative students and entrepreneurs capable of innovation that will benefit the people. As the Prophet said, 'When a man dies, his acts come to an end, except three: recurring charity, or knowledge, or a pious son, who prays for him' (*Sahih Muslim*). Thirdly, education must continue to be shared, created and reproduced so that justice prevails and monopolies are deterred. The Prophet demonstrated this sharing attitude when he said that 'the most generous people after me will be those who will acquire knowledge and then disseminate it.'

Although the breakthrough of technology has been spectacular, and although it creates infinite space for knowledge sharing and other opportunities, big data raises ethical issues. Concerns that big data analytics reinforce prejudice, biases, and that they compromise identity are part of potential abuses that could undermine privacy, confidentiality and transparency. Islam negates such irresponsible acts. Therefore, it is essential to apply Islamic ethics in the virtual world, including not taking something without permission ('Do not spy on one another,' 49:12); making sure that the terms and conditions for data use are understood ('Do not enter any houses except your own homes unless you are sure of their occupants'

consent,' 24:27); and remembering that every action is recorded and will be accounted for ('And indeed, we have [appointed] over you are keepers, watching you, they know whatever you do,' 82:10-12).

To conclude, big data is the reality of today's digital age. Mining it will enhance a state's status quo, as much as analysing it will give a competitive edge to the nation and its people. No doubt, organisations that are ready to invest, create, analyse, reproduce, and share data will be the key focus of current policy. Nations have come to realise that without big data analytics, they will be miles away from innovations and possibly fail to gain significant prominence in today's gargantuan digital transformation.

Notes

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