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Digital innovation: A catalyst and enabler of achieving business sustainability

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DIGITAL INNOVATION: A CATALYST AND ENABLER OF ACHIEVING BUSINESS SUSTAINABILITY

CHAPTER 1

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Business sustainability

Today, many companies are actively incorporating sustainability principles into their business strategies. This movement is likely to have resulted from an ongoing shift in the demands and behaviours of customers, employees, partners, governments, investors and other stakeholders that expect companies to act with integrity and in a way that benefits wider society. The emphasis on achieving sustainability goals has led to increasing adoption of "triple bottom line", which suggests that companies ought to pay attention to more than just the bottom-line, but also measure their environmental and societal impacts that may help to achieve long-term business growth. Typically, companies with high environmental, social, and governance (ESG) ratings have consistently outperformed the market in medium and long term horizons[1].

A recent survey on business sustainability[2] has reported that 73 per cent of global consumers, particularly millennials, were willing to alter their consumption habits to minimise negative impacts on the environment. In addition, sustainable product sales had grown by nearly 20 per cent yearly. In light of this development, more companies have embarked on a journey to establish sustainable business objectives and practices. For instance, Unilever has committed to only using palm oil from certified sustainable sources. The company has been working closely with its stakeholders to lead an industry-wide adoption of sustainable palm oil. Despite such commitment, Unilever's business continues to thrive and the world has reaped the environmental benefits of sustainable palm oil harvesting practices. This example shows that in order to facilitate sustainable growth, today's business must strive to create positive societal impact. It will be increasingly challenging for a company to remain a viable brand with good reputation if its business practices in some way exacerbated inequality or exploited natural resources.

To date, digital technologies have played a useful role in enabling business sustainability. For instance, the main output of digital technologies is information rather than physical goods. Therefore, digital technologies contribute by reducing the emissions and physical waste that emanate from almost every sector of the economy. However more can be done to integrate digital innovation with sustainability practices. To achieve sustainability objectives, it is therefore crucial to utilise the full potential of digital innovation, with active digital cooperation and interaction among stakeholders in the ecosystem.

Digital sustainability

Digital sustainability refers to a holistic approach a company can take in achieving better sustainability through wise technology investments. It involves organizational activities that seek to advance sustainable development goals through creative deployment of technologies that create, use, transmit, or source electronic data[3].

The examples below illustrate how Internet of Things (IOT), blockchain and big data analytics play active roles in enabling sustainable practices and objectives[4].

[1] *Sheila Bonini and Steven Swartz (2014) Profits with Purpose: How Organizing for Sustainability can benefit the Bottom line. Mckinsey & Company. https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Profits%20with%20purpose/Profits%20with%20Purpose.ashx. Accessed on 4 May 2021*

[2] *Nielsen (2019) A Natural Rise in Sustainability around the World. https://www.nielsen.com/eu/en/insights/article/2019/a-natural-rise-in-sustainability-around-the-world/. Accessed on 5 May 2021*

[3] *Gerard George, Ryan K. Merrill., and Simon, J. D. Schillebeeckx (2019) Digital Sustainability and Entrepreneurship: How Digital Innovations are helping Tackle Climate Change and Sustainable Development, Entrepreneurship Theory and Practice, 00(0), 1-28.*

[4] *Sykes, Nathan (2019) What is New in Digital Transformation? How about Digital Sustainability? https://www.thedigitaltransformation people.com/channels/enabling-technologies/whats-new-in-digital-transformation-how-about-digital-sustainability/. Accessed on 7 May 2021*

IoT and Sustainability Solutions. IOT is an expressway within companies' existing architecture that channels mission critical data from one end of operation to the other. It is becoming increasingly common for companies to apply IoT technologies to existing networks and assets in order to achieve significant time and cost savings. For example, smart heating, ventilation, and air conditioning systems may optimize performance across a building's physical environmental controls, turning on and off according to occupancy or interfacing with company or personal schedules. With the cyber-physical systems design mindset becoming more popular, one would envisage more digital technologies will be entwined with mechanical systems and information infrastructure to offer sustainability solutions.

Blockchain and Supply Chain Sustainability[5]. Blockchain functions as a database of public ledger for all transactions that integrates with a distributed time-stamping server and a peer-to-peer network. The transaction records, called blocks, are linked with one another. It is important to note that transaction records, captured by the distributed ledger, are permanent and verifiable.

In supply chain, each block or packet of transaction records is related to a stakeholder ranging from a raw material supplier to producer to wholesaler to retailer. At each stage, a new permanent block of information is created. Each block is sent to all supply chain participants to verify and is then added to the chain. Subsequent stakeholders such as retailers, would contractually be permitted access to agreed-upon data in the previous blocks, such as product origin, temperature control or other business-critical information. This would provide important visibility into supply chain operations.

A major benefit of blockchain is that it helps to improve visibility in sustainable supply chains. Through blockchain ledger, all parties involved in a transaction, the state, quality and price of the products as well as the date and location of the transaction will be identified. The availability of information about the product to all parties helps to ensure data integrity. As blockchain is decentralized in structure, no single party will be able to have ownership of data or manipulate it for his or her personal advantage. The immutable and cryptography-based nature of data will make it completely impossible to compromise the ledger. From manufacturing to the final sale of the product, every time a product changes hands, the details will be documented in the blockchain database, so there will always be a permanent history. The unique nature of blockchain can help identify and correct contract violations, redundancies, and bottlenecks in the flow of goods. From a supply chain sustainability perspective, such visibility will ensure efficient transactions, while promoting food safety, efficient recalls, the elimination of counterfeits, and the assurance of ethical trading partners.

While blockchain technology looks promising in enhancing supply chain, some academics have raised the worry of bitcoin mining, enabled by blockchain technology, contributing to enormous energy consumption[6]. This perception has somewhat affected rapid adoption of blockchain technology by businesses[7].

[5] *https://www.thebalancesmb.com/blockchain-and-supply-chain-sustainability-4129740*

[6] *Dittmar L, and Praktiknjo A (2019) Could Bitcoin Emissions Push Global Warming above 2C? National Climate Change, 9(9), 656–657*

[7] *Sedlmeir, J., Buhl, H.U., Fridgen, G., and Keller, R. (2020). The Energy Consumption of Blockchain Technology: Beyond Myth. Business & Information Systems Engineering, 62, 599–608*

Big Data Analytics. From a digital sustainability perspective, big data could help a company such as Philips Electronics, to gain a better understanding of how consumers interact with their products after the sale, and whether, where, how and why they engage with the "secondary market" for repairs, replacement parts, maintenance or modifications. By leveraging data from secondary market, Philips Electronics has discovered ways to better work with consumers and companies to extend the lifetime of their electronic devices such as electric shavers and X-rays. Instead of simply dumping these used devices in the landfill if they still have some usefulness left, making product service, maintenance and repair parts easier to handle, extends the company-customer relationship and potentially opens up new revenue streams. As a result, Philips Electronics is able to pursue greater efficiency, lower costs and a longer and more productive relationship with its core customers. The best part of such data-driven insights is that it helps to achieve better profitability and also lead to a healthier planet.

Digital sustainability case study 1: SATS's digital integrated supply chain[8]

SATS is the chief ground-handling and in-flight catering service provider at Singapore Changi Airport. It controls about 80 per cent of Changi Airport's ground handling and catering business. SATS maintains an extensive and complex supplier network with more than 3,700 suppliers globally. Its suppliers range from farms in Singapore to multinational companies. SATS strives to establish sustainable practices and production methods as the company firmly believes that a sustainable supply chain is one that not only benefits its customers and its business' long-term viability, but also supports its suppliers' livelihoods and protects the environment.

To enhance visibility and traceability along the supply chain, SATS has invested in Digital Integrated Supply Chain (DISC) to build its capability in realising full traceability, centralised procurement and distribution. The purpose of DISC is to enhance demand and procurement planning as well as production efficiency. With improved batch traceability and quality assurance integration, DISC assures SATS' customers of the origins of their meals. In addition, the robust supply chain allows quick identification and remediation of root causes of defective products, hence improving the level of service recovery and product quality that SATS offers to its customers.

By collaborating with a third-party logistics provider, DISC is able to offer improved inventory planning and forecasting to its airline customers, allowing SATS to augment the passenger experience with a wider range of food & beverage offerings and amenities. DISC also allows SATS to accelerate end-to-end traceability of raw materials for its customers, and deploy data analytics to achieve greater efficiency and quality, while reducing food waste. Figure 1 below illustrates SATS' Digital Integrated Supply Chain.

[8] *https://www.sats.com.sg/sustainability/sustainability-reports*

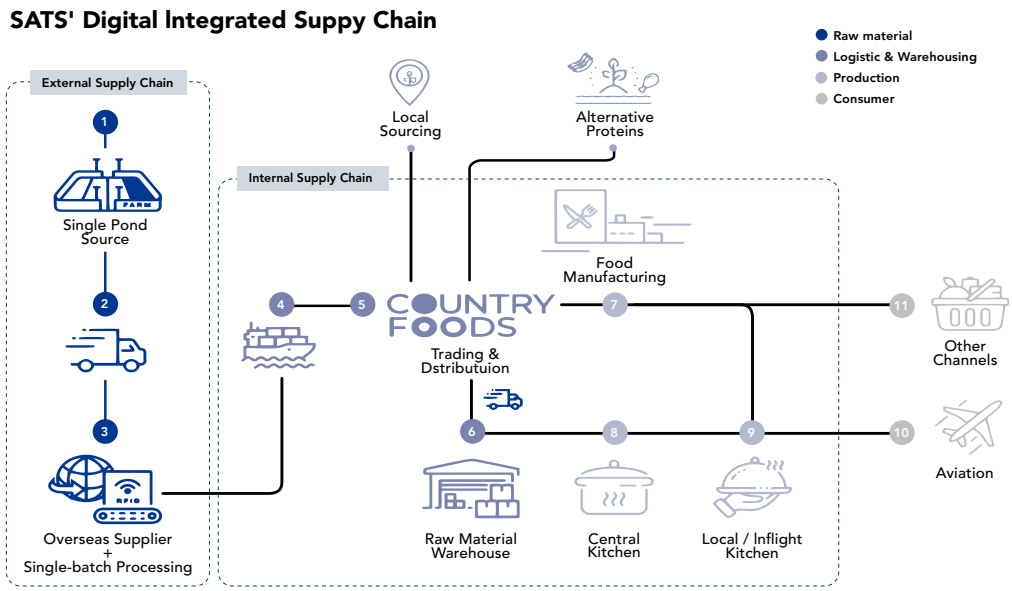

Figure 1: SATS' Digital Integrated Supply Chain

Digital sustainability case study 2: Twiga food supply app[9]

A banana farmer in Kenya, Mary Murthoni Ndon'go, used to struggle to get a fair price for the bananas she grows. According to her: "we used to sell to brokers. The brokers come and take big bananas for only $200 or $300 Kenyan Shilling. They often say they sell at a loss at the market. So they give us as little money as they feel like."

Over 75 per cent of Kenya's population makes some part of their living from agriculture. However, the Kenyan agricultural sector can be inefficient and complex, and food waste is high due to inefficient handling practices. At the same time, small- and medium-sized fruit and vegetable vendors often lack access to a reliable supply of affordable and quality products.

A mobile-based cashless business-to-business food supply app called Twiga, was created in 2014 to connect Kenyan farmers directly to vendors paying farmers twice as much money as they would normally make for their produce. As of January 2018, the platform has become the largest seller of bananas in Kenya. It has sourced more than 245 tonnes of bananas each week from over 3,000 farmers. These bananas are distributed through 7,000 weekly deliveries to more than 3,500 registered vendors who re-order every two days, on average. The app has reduced typical post-harvest losses in Kenya from 30% to 4% for produce brought to market on the Twiga network.

"Think about in some of these economies, if you're spending 55% of disposable income on food, if that number were to go down to 40% — because of…gaining efficiency — what you've done is to release 15% for consumers to spend on other things." said Njonjo, the co-founder of Twiga.

[9] *Business Insider Today, 12 Oct 2019. How an App Helps Kenyans Get Higher Quality Food and Pay Farmers Fairly. Accessed on 10th May 2021*

What makes this digital innovation all the more impactful and sustainable is that it is life changing as it has prevented Kenyan banana farmers from entering a poverty situation. These farmers now have reasonable compensation for their labour which represents a stable source of income. From a societal perspective, the digital platform has helped to ensure responsible consumption and production as it reduces post-harvest losses and waste by matching demand and supply. There is no doubt that digital innovation has helped to improve existing supply chain and catalyses supply chain restructuring.

Digital sustainability case study 3: Air pollution management system in Beijing-Tianjin-Hebei region in China[10]

Big data analytics can play a major role in managing air pollution. A good example is air pollution management in the Beijing-Tianjin-Hebei (BTH) region in China. The BTH region is home to eight of China's 10 smoggiest cities. In China, air pollution accounts for an estimated 1.1 million deaths per year, while the annual costs of death, suffering, and decreased food production due to air pollution are approximately US $38 billion. As one of the greatest sustainability challenges, air pollution management has attracted much attention from the Chinese government and the public. The governments in the BTH region have been collecting huge amounts of data to monitor and predict air quality in real time and are exploring ways to generate novel data driven insights for air pollution management.

By putting in place air pollution monitoring systems at many sites in the BTH region, and with the data collected and reported by these sites, Chinese governments can better understand the air pollution situation at a certain place in real time. Essentially Chinese governments would know where it was being most polluted at the time and what kinds of pollutants casued this situation. The data are important to assist in developing cost-effective policies and solutions. The real-time data has also helped Chinese governments to provide public information on existing air quality. Through calculating the data on different air pollutants, Chinese governments could update real-time air quality index in places on a hourly basis via the official website to inform citizens to take necessary actions whenever they are out-door. Figure 2 below shows the user interface of air pollution management system.

[10] *Dan Zhang, Shan L Pan, Jiaxin, Yu., and Wenyuan, Liu. (2020) Orchestrating Big Data Analytics Capability for Sustainability: a Study of Air Pollution Management in China. Information & Management, http://dx.doi.org/10.1016/j.im.2019.103231*

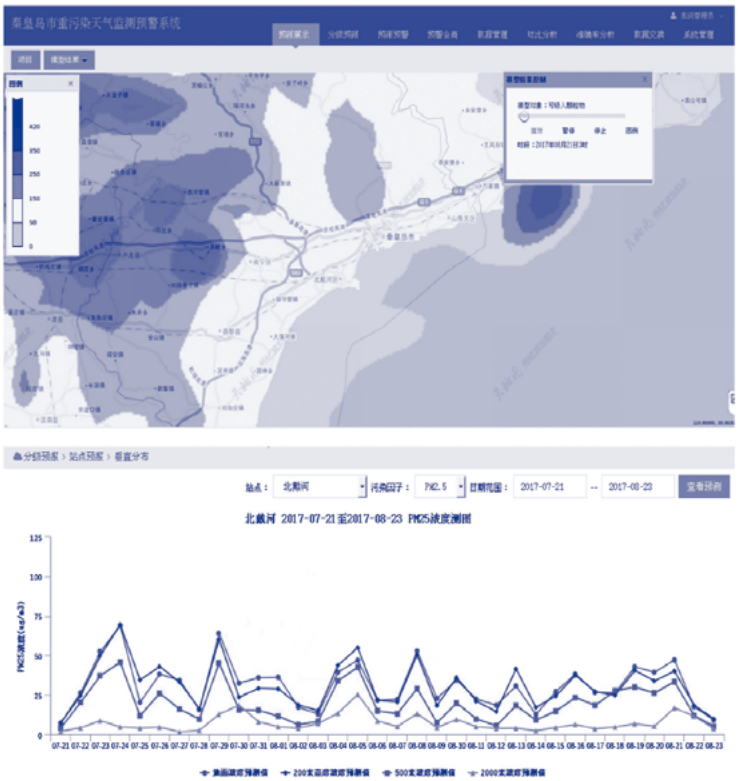

Figure 2: User Interface of Air Pollution Management System (Adapted from Zhang et al., 2020)

Having realised the great potential of big data in air pollution management, Chinese governments started to take further action. For example, the State Council of Chinese government recently made an announcement requiring construction of an air pollution management system that could provide early warning of heavy air pollution scenarios.

Both meteorological data (e.g., air temperature, wind direction, wind speed, and humidity) and pollution source data (e.g., the pollutant emission inventory of the pollution source), are needed for data analysis. To collect these data, the Provincial Governments have to coordinate with other departments of the local city government, such as the Meteorological Bureau and Environmental Protection Department, to receive relevant data in a timely manner. With IT support from the cooperating IT companies, gathered data are further processed by refining and restructuring them to meet the required data input format. By integrating the data from various sources into the air pollution management system for processing, the prediction results are presented as outputs for stakeholders.

The idea of using data analytics for identifying the pollutant dispersion pathways is derived from the process when the governments implemented the province-level air pollution management system, as required by Central government. At that time, they realised that the quality of data on air pollution was very significant for predictive accuracy. As there is a coverage limitation for the monitoring sites, higher data quality requires a more representative siting of the air quality monitoring systems, which can cover the majority of key sites prone to pollution. Due to the consideration of saving cost and increasing efficiency, it is essential to understand the pollutant dispersion pathways to optimise the regional monitoring network and forecast air quality more accurately. This could help to figure out how air pollution of a certain city influences its adjacent cities. The air pollutant dispersion pathways are expected to help Chinese governments understand this question, which would assist them in distinguishing the respective responsibility of the cities and help related cities take measures in advance of any upcoming heavy air pollution.

This case example suggests that management needs to focus on developing big data analytics capability to deeply unearth big data value so that it can assist decision making and solutioning for sustainability. By referring to data analytics, Chinese governments can select sources of data (e.g., sensor data, meteorological data, and pollutant source data), conduct data-focused actions (e.g., collecting, cleaning, integrating, processing, coordinating, and reusing data), and make data specific investments (e.g., investments in data infrastructire, data systems and data analytics) based on their realities and the data analytics capability they need to develop, so as to achieve specific sustainability goals.

Conclusion

Using digital innovation as enablers to achieve business sustainability objectives may turn out to be a competitive advantage for companies. This is not just a case of shifting bricks and mortar business models online, but reimagining ways of doing business and engaging with customers in a way that benefits wider society. Exploring and realising the potential of digital innovation to meet sustainability goals involves embracing a new mind-set that challenges companies to not only apply digital technologies to existing activities, but to ‘unlearn’ old way of doing things and relearn different ways of working. This is becoming key to maintaining efficiency and agility especially when establishing sustainable business practices is increasingly critical for companies to remain competitive.

For digital sustainability to work, companies need clarity and commitment from the leadership to drive sustainability initiatives with digital technologies; to inculcate the spirit of innovation by being open and always experimenting new ideas; and to nurture a digital mindset by creating the space in which innovation, partnerships and new business models can flourish. By conceiving entirely new ways in which the company operates and engages with its wider ecosystem, with digital innovation at its heart, digital technologies may transform the company and enable it to achieve sustainable business objectives and practices.

DATA ANALYTICS IN AUDIT

CHAPTER 2

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