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Information Technology Usage for Sustainable Development: Strategies and Implications

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Abstract: *The adoption and utilization of information technology (IT) have emerged as crucial drivers for sustainable development in the contemporary global landscape. The paper explores the multifaceted ways in which IT is harnessed to address pressing socio-economic and environmental challenges. It also discusses the strategic approaches employed by organizations, governments, and individuals to leverage IT's potential for sustainability. Furthermore, the paper elucidates the far-reaching implications, both positive and negative, that stem from the integration of IT into sustainability initiatives. The evolving role of IT in shaping sustainable development practices is examined, emphasizing the need for a balanced and ethical application of technology to ensure a harmonious coexistence between economic progress and environmental preservation. This abstract offers a glimpse into the complex and evolving landscape of IT's role in advancing sustainable development, shedding light on key strategies and the resulting impact on societies and ecosystems.*

Keywords: *Information Technology Usage, Sustainable Development.*

INTRODUCTION

Organizations worldwide have an ongoing challenge of sustaining corporate performance. corporate managers worldwide often face challenges in consistently achieving desired corporate performance due to the dynamic nature of the sector, intense market competition, and the effects of globalization in the 21st century. Organizations across various industries globally have encountered volatile performance, exhibiting uncertainty in their approach towards adapting to flexible policies and addressing the instability stemming from issues within the local and international business environment (Gölgeci, Arslan, Dikova & Gligor, 2020).

Parast and Safari (2022) asserts that the diminished performance of firms is a widespread phenomenon observed in both developed and developing nations. This decline can be attributed to inadequate sustainable development and a suboptimal response to various microeconomic and macroeconomic challenges. These challenges encompass factors

such as the performance industry's environmental conditions, the task environment, the natural and technological environments, the social environment, the economic and cultural environments, and the political, legal, and security environments. Additionally, the management of marketing content and product marketing also contribute to this decline.

The advent of information technology has facilitated the ability of corporations and organizations to effectively tap into a global pool of talented individuals. Knowledge-sharing platforms have grown widely prevalent in the field of information technology, playing a crucial role in problem-solving across multiple geographically distant office locations (Colbert, Yee & George, 2016). Academic scholars specializing in the field of leadership and management commonly designate those operating inside the realm of information technology as the digital workforce. In the realm of the digital workforce, the younger cohort is commonly denoted as "digital natives," whereas the elder generation is referred to as "digital immigrants" (ibid). The differentiation of digital laborers pertains to the patterns and utilization of technology within a given society. According to Colbert *et al.* (2016:731), it is argued that those classified as digital natives lack the ability to recall their initial encounter with the Internet. The younger generation exhibits a high level of proficiency and comfort in utilizing digital devices, relying extensively on technology for educational purposes, communication, and entertainment. In contrast, digital immigrants are characterized as individuals who have swiftly embraced technological advancements as they have emerged, gradually becoming more at ease with and dependent on technology (ibid: 731). Digital fluency encompasses the skills, capabilities, and attributes that individuals acquire through their utilization and engagement with technology. Those who possess digital fluency have attained a high level of proficiency, enabling them to effectively manipulate information, generate ideas, and leverage technology to accomplish strategic objectives (ibid, 2016). The purpose of this paper is to examine information technology usage for sustainable development.

LITERATURE REVIEW

Theoretical Foundation

Technological Acceptance Model (TAM) The Technology Acceptance Model (TAM) proposed by Davis (1985) is the most widely used and recognized model for Information Technology (IT) (Awa, Ukoha, & Emecheta, 2012). The model points out that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are critical to the use of IT adoption (Davis, 1989). Davis, defined Perceived usefulness as "the degree to which an individual's perception for particular system enhances job performance" (p. 34), and Perceived Ease of Use "as the degree to which an individual's intuition determines the use of a particular system" (p. 34). TAM has helped scholars understand the acknowledgement of various types of information systems, and also used to evaluate the acceptance of eLearning (Taylor & Todd, 1995). The goal of this model is to predict, explain, analyze and explore factors influencing the adoption of information technology (Liao, Hong, Wen, Pan & Wu, 2018).

Information Technology Usage

The field of information technology (IT) plays a crucial role in driving several socioeconomic transformations (Selase, Selase, Ayishetu, Comfort, Stanley & Ebenezer, 2019). According to Carr and Smeltzer (2002), information technology (IT) includes the utilization of automated purchasing systems, electronic data interchange (EDI) for establishing connections with suppliers, computer-to-computer communications with important suppliers, and information systems. Information Technology Adoption (IT adoption) is viewed by Tan, Chong, Lin and Eze (2009) as application of Information and Communication Technologies (ICT) tools including computer hardware, software, and networks required for connecting to the internet.

Yan, Yingwu, and Changfeng (2007) proposed that the adoption of information technology (IT) involves the utilization of information, computing, and communication infrastructure, such as computer hardware, software, and networks, with the purpose of establishing connections with the global community. According to Shaharuddin, Kassim and Ibrahim (2023) the implementation of information technology (IT) not only facilitates the emergence of novel business prospects but also strengthens the competitive standing and financial viability of organizations. Kwabiah (2019) believe that the implementation of information technology (IT) yields enhanced efficiency and productivity through several mechanisms, resulting in reduced transaction costs, improved resource allocation, and advancements in technological capabilities. Panda and Rath (2021) assert that organizations embrace information technology (IT) due to its capacity to facilitate swift product development and enable the efficient gathering and distribution of market, product, and process information. This, in turn, enables enterprises to successfully adapt to unforeseen changes in the business environment.

In addition, the adoption of information technology (IT) carries notable implications. These encompass enhanced decision-making capabilities (Hanelt, Bohnsack, Marz and Antunes Marante, 2021), increased organizational adaptability (Benzidia & Makaoui, 2020), decreased production and labor expenses (Nguyen, Pham & Tram, 2020), identification of novel business prospects and access to market intelligence (Carson, O'Connor & Simmons, 2020).

Dimensions of Information Technology Usage

Information Technology Infrastructure

The concept of Information Technology Infrastructure (ITI) refers to a collection of IT resources that are shared among individuals or organizations. These resources can be categorized into two main types: technical/physical resources, which include hardware, software, and technological tools for communication, data management, and core applications; and human resources, which encompass the skills, knowledge, aptitude, attitudes, competencies, commitments, values, and norms of individuals involved in IT operations (Byrd & Turner, 2000). The primary objective of ITI is to establish robust and unique IT services that are difficult to replicate for a given firm. According to the study conducted by Davenport, Hammer, and Metsisto (1989), the concept of IT infrastructure encompasses several components such as electronic data interchange, common databases, networks, and research and development activities aimed at identifying

emerging technologies. Ofoegbu and Princewill (2022) assert that a significant portion of an organization's financial resources allocated to information technology is dedicated to the development and maintenance of its information technology infrastructure. The importance of ITI encompasses the exchange of information and the integration of activities across several departments, as well as the implementation of novel internet applications (Ofoegbu & Princewill 2022). In addition, the utilization of IT infrastructure empowers organizations to efficiently carry out operations with agility and rapidity, develop necessary diversities, obtain pertinent knowledge to capitalize on emerging chances, and promptly adapt to the preferences and tastes of customers.

Technology Alignment

Technology alignment is the degree to which the information technology adopted is integrated with the all-functional domains of the organization. The degree to which Information Technology facilitates or hinders corporate procedures, mission, objectives, and plans is referred to as its impact. According to Tsou (2022) the influence of information technology on a firm's performance and success is contingent upon the alignment between information technology and the firm's business strategy, structure, and procedures. According to Ghonim, Khashaba, Al-Najaar, and Khashan (2022), the enhancement of profitability and revenue in organizations is contingent upon establishing a harmonious alignment between information technology (IT) and business strategy, rather than only adopting IT. According to Belete and Hagos (2020), the successful alignment of information technology and business goals can be achieved by integrating the business and information technology domains. Moreover, Belete and Hagos (2020) argued that the alignment of technology facilitates the updating of applications to align with strategic goals, the deployment of information for business processes, and is positively correlated with enhanced operational performance (Chan, Huff, Barclay & Copeland, 1997).

Individual Learning

Individual learning can be defined as a form of self-directed learning in which individuals engage in educational activities without direct interaction with others. According to Chen, Nunes, Ragsdell (2019), these characteristics indicate a learning process that is more focused on personal reflection, internal exploration, and self-reliance. Furthermore, these attributes are closely tied to an individual's unique experiences, level of motivation, and cognitive capabilities. According to Kusemererwa, Munene, Laura, and Balunywa (2020), the phrase "an exclusive and habitual manner of acquiring knowledge, skills, and attitude development" is used to describe a particular approach to learning. In order to effectively navigate the ever-changing and complex business landscape, it is imperative for enterprise managers to foster a culture of individual learning behavior (Kusemererwa, *et al.,* 2020). Multiple researchers have shown that in order for companies to effectively leverage information technology, it is important for both end-users and information technology staff to possess contemporary skills and knowledge in the field of information technology (Scott Morton, 1995; Grover, Fiedler & Teng, 1999). In order to facilitate individual learning (IL), firms must be willing to adjust their practices and offer comprehensive assistance and training to their employees. According to Van Riel, Lemmink, and Ouwersloot (2004), engaging in this channel facilitates rapid acquisition of

contemporary IT applications. Additionally, it enhances personal skills and competences, as well as contributes to improved work effectiveness (Chonko, Dubinsky, Jones, & Roberts, 2003). Moreover, it has the potential to optimize enterprise performance.

Concept of Sustainable Development

Sustainable development entails a collection of fundamental ideas and objectives that strive to attain a state of harmonious equilibrium between economic advancement, environmental preservation, and social fairness. One of the core tenets of sustainable development is the imperative to safeguard the environment for both current and future generations. According to Hediger (2000), the recognition of the finite character of natural resources and the emphasis on their sustainable use are key components of environmental protection, which is an integral feature of sustainable development. The primary objective of environmental conservation is to safeguard the integrity of ecosystems, the diversity of species, and the overall well-being of the Earth (Kastner et al., 2021). This principle underscores the significance of embracing environmentally sustainable behaviors, mitigating pollution, and advocating for the judicious utilization of resources in order to mitigate adverse effects on the environment. Social equity is a fundamental tenet of sustainable development that underscores the imperative of ensuring a just allocation of resources and opportunities across all segments of society. According to Hediger (2000), the attainment of sustainability is contingent upon the presence of social equity, as it encompasses concerns related to poverty, inequality, and social justice. The objective of social equality is to provide universal access to fundamental necessities, including sustenance, water, healthcare, education, and work, irrespective of an individual's socioeconomic standing. This principle acknowledges the interconnectedness of social and environmental systems, emphasizing the significance of eliminating social disparities in order to attain enduring sustainability.

In the contemporary dynamic global landscape, the pursuit of sustainable development presents a myriad of obstacles and prospects. One of the primary obstacles encountered is the escalating strain on natural resources as a consequence of population expansion and the process of urbanization (Goswami & Nautiyal, 2020). With the ongoing increase of the world population, there is an escalating need for energy, food, and water resources, hence exerting significant pressure on the environment. The aforementioned difficulty is compounded by the imminent danger of climate change, necessitating immediate measures to alleviate its consequences and shift towards sustainable energy alternatives. Furthermore, the presence of an imbalanced allocation of resources and income gives rise to social disparities and impedes advancements in the pursuit of sustainable development (Fuchs, 2021). However, amidst these problems, there are also possibilities. Technological developments and innovation present novel avenues for the pursuit of sustainable development.

In addition, the transition towards a circular economy, characterized by the reuse and recycling of resources, offers a viable approach to achieving sustainable patterns of consumption and production (Marrucci, Daddi, & Iraldo, 2019). This method not only mitigates waste but also generates economic prospects and employment chances.

The concept of sustainable development is a crucial framework that seeks to achieve a harmonious equilibrium between the immediate requirements of the present generation while safeguarding the capacity of future generations to fulfill their own demands (Fallah Shayan, Mohabbati-Kalejahi, Alavi & Zahed, 2022). The concept acknowledges the interdependence of environmental, social, and economic elements, and underscores the significance of strategic foresight and conscientious utilization of resources. The adoption of sustainable practices facilitates the pursuit of a more egalitarian and resilient global society, characterized by the harmonious integration of economic growth, social advancement, and environmental preservation (van Niekerk, 2020). Collaboration among governments, businesses, and individuals is of paramount importance in fostering sustainable development and guaranteeing a sustainable future for all stakeholders involved.

Information Technology Usage for Sustainable Development

The application of information technology is of paramount importance in the promotion of sustainable development as it enables the effective management and utilization of resources. According to Mansell and Wehn (1998), the incorporation of information technology tools and systems facilitates the acquisition, examination, and distribution of pertinent data by businesses and governments, hence improving the efficacy of decision-making procedures. One example of how policymakers can utilize Geographic Information Systems (GIS) is by accessing precise and up-to-date data regarding the environment, population distribution, and natural resources. This enables them to make well-informed decisions that prioritize sustainability (Mathenge, Sonneveld & Broerse, 2022). In addition, the utilization of information technology facilitates the mechanization of procedures, hence diminishing the requirement for human effort and mitigating the utilization of resources (Dao, Langella, & Carbo, 2011). Hence, the field of information technology plays a pivotal role in facilitating sustainable development through the provision of tools and systems that enhance resource management and decision-making processes (Mansell & Wehn, 1998).

The strategic usage of information technology (IT) has become a critical aspect in the pursuit of sustainable development. According to Mansell and Wehn (1998), there are several ways that may be utilized to effectively leverage information technology (IT) in order to advance sustainability objectives. One such approach involves the implementation of intelligent systems and technologies that enhance the optimization and efficiency of resources. The implementation of smart grid systems enables efficient energy consumption control, resulting in waste reduction and decreased carbon emissions (Mansell & Wehn, 1998). Furthermore, the integration of information technology (IT) enabled monitoring and control mechanisms facilitates the monitoring and management of resource utilization, hence allowing firms to identify potential areas for enhancement and adopt sustainable practices (Kisan, Dadabhau & Singh, 2013). In addition, the utilization of information technology (IT) can effectively enable the distribution of information and knowledge, hence playing a role in enhancing awareness and education regarding sustainable development (Kisan, Dadabhau, & Singh, 2013). The utilization of internet platforms, educational materials, and digital campaigns enables

individuals and groups to effectively acquire information, develop a deeper understanding, and make well-informed choices in the pursuit of sustainability.

The utilization of information technology (IT) holds considerable ramifications in the pursuit of sustainable development. In the study conducted by Nizam, Zaman, Khan, Batool, Khurshid, Shoukry, and Gani (2020), it was found that information technology (IT) plays a pivotal role in effectively resolving environmental concerns and facilitating the adoption of sustainable practices. One of the primary ramifications is to the capacity of information technology (IT) to enable the gathering and examination of data, a critical component for the purpose of monitoring and assessing advancements made towards the attainment of sustainable development objectives. The utilization of information technology systems enables the acquisition of substantial volumes of data in real-time, hence facilitating the ability of policymakers and stakeholders to make well-informed decisions and formulate efficacious policies pertaining to sustainable development. Moreover, information technology facilitates the widespread distribution of information and knowledge, a critical factor in increasing consciousness and advocating for sustainable behaviors among both individuals and groups. The dissemination of information regarding sustainable practices to a broad audience can be facilitated using several digital platforms, including websites, social media platforms, and mobile applications. This widespread accessibility has the potential to foster behavioral modifications and advocate for the adoption of sustainable lifestyles. In addition, information technology (IT) has the potential to improve resource efficiency and mitigate waste by incorporating intelligent systems and advanced technologies. The utilization of smart grids and energy management systems has the potential to optimize energy usage, resulting in a decrease in greenhouse gas emissions and the establishment of a more sustainable energy sector. The broad-ranging ramifications of information technology (IT) utilization in the pursuit of sustainable development are extensive and involve multiple dimensions, such as the gathering and examination of data, the dissemination of information, and the enhancement of resource efficiency (Nizam et al., 2020).

Moreover, the utilization of information technology in the context of sustainable development offers significant prospects and ramifications for our society (Pan & Zhang, 2020). Through the utilization of technological advancements, it is possible to devise novel approaches aimed at addressing urgent global issues, including but not limited to climate change, resource depletion, and social injustice (Amoak, Luginaah & McBean, 2022). According to Mageto (2021), the incorporation of information technology into endeavors aimed at achieving sustainable development facilitates the improvement of operational effectiveness, the advancement of openness, and the cultivation of cooperation among various sectors. Nevertheless, it is imperative to acknowledge that technology in itself is not a universal remedy. In order to ensure equitable distribution of benefits and mitigation of potential hazards, the implementation of this initiative necessitates the presence of comprehensive policies, ethical considerations, and active engagement from all relevant parties. Through meticulous strategizing and execution, the

field of information technology have the potential to function as a driving force for sustainable growth, thereby fostering an improved future for forthcoming generations.

CONCLUSION

The paper concludes that the utilization of information technology (IT) holds immense potential for advancing sustainable development across various domains. This comprehensive exploration of IT strategies and their implications in the context of sustainability has shed light on the multifaceted role that IT plays in addressing socio-economic and environmental challenges.

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