Information Technology for Sustainable Development In Vocational Education

David Nwanna Dumbiri¹, Septian Aji Permana²

¹Department of Vocational and Technical Education University of Benin, Benin City, Nigeria,
²Universitas PGRI Yogyakarta, Indonesia
aji@upy.ac.id

Abstract. Over the years the path to global development has been set up so as to address the developmental needs of every nation in the world. The dynamic nature of the society has consistently made this developmental trajectory to experience change that will meet the needs of the society. Trainings, practical, workshops and different hands on deck activities have been made available with vocational education for interested individuals to equip themselves based on dynamic nature of the society. Recent use of information technological device by different sectors of life has contributed its developmental quota to the society by making life tasks easy. Also, the contribution of information technology has solved lots of issues in diverse sector of life which could jeopardize the interest of the present and future generation. Thus, this paper used qualitative approach to ascertain the role of information technology for sustainable development in vocational education.

1. Introduction

The term information technology (IT), involves the use of technology to solve problems, create, store, exchange and utilize information in improving livelihood. This will be discussed mainly on the use of IT for sustainable development of vocational and technical education. This is because IT plays a vital function in removing distance from education and in developing a lifelong learning culture. Buttressing this, [1] [2] [3] narrated that IT empowers both people and machines with information, which is transformed into knowledge and intelligence. Khan further stressed that appropriate use of the knowledge by both people and machines contributes to sustainable development. This implies that sustainable development may be achievable when IT is properly utilized especially in the area of training an individual to become employable or self-employed (i.e. vocational education).

It is generally believed by many that employers of labour do not only seek for potential graduates with good grades in the university but those with practical knowledge. This is because many of them do not have the practical know-how on their area of specialization which has led to the
preference of many organizations paying higher salary to their technicians than university graduates. To this reason, many individuals (school dropouts, students, and graduates) have engaged themselves with one or two skill acquisition, having known that a skillful person is self-employed and can never go hungry. This implies that a skilled person enjoys benefits of working from home because they are their own bosses and have more benefit that an employed person does not have. Therefore, vocational education comes to play as the process of engaging learners into rigorous training so as to become craftsmen or artisans. [4] [5] an education system which aims at equipping people with knowledge, know-how, skills and/or competences required in particular occupations or more broadly on the labour market is known as vocational education. According to [6] [7] [8] vocational education involves educational training which comprehends knowledge, skills, competencies, structural activities and all other structural experiences acquired through formal, on-the-job or off-the-job which is capable of enhancing recipient’s opportunity for securing jobs or even enabling the person to be self-dependent by being a job creator. In the same vein, [9] [10] [11] [12] sees vocational education as; an integral part of general education; an aspect of lifelong learning and preparation for responsible citizenship; and a means of preparing for occupational fields for effective participation in the world of work; and an instrument for encouraging environmentally sound sustainable development.

This shows how vital vocational education is in a society that needs development. Nevertheless, the importance of vocational education cannot be over emphasized. Some of them are as follows; it brings about rapid development; decrease the number of individuals who depends on white collar jobs; bring about rapid growth in economy and develop indigenous technicians and technologist; above all, it is needed in every aspect of our life. This paper therefore discussed IT and its role in both developed and developing countries, sustainable development and challenges of vocational education towards achieving sustainable development. To this end, it will be intellectually prudent to denote the meaning of IT for in-depth understanding of the discuss in the article.

2. Methods

2.1 What is Information Technology (IT)?

Regarding this article, the word information technology would be broken down into its distinct parts so as to aid in the understanding. This means that we would first conceptualize the meaning of information and also that of technology before joining them together for better understanding. According to Vigo (2011) information is derived from the Latin word “informare” which means to inform and can also be seen as that which provides answer to the unknown or to an unanswered question. It implies that information gives form, knowledge, mental stimuli, perception, instruction and discipline to an individual. On the other hand, technology is the sum of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation [13] [14]. Technology also comes in form of material and immaterial entity for achieving human purpose.

From the above definitions we can deduce that information technology means the use of skills, methods and process towards provision of answer to an unanswered question. In the same view, [15] [16] perceives information technology as all forms of technical know-how used to create, store, exchange and utilize information in its various forms including business data, conversations, still images, motion pictures and multimedia presentations. IT consists of computers and microelectronics device usage which include; computer systems, computer networks, and equipment used for input, output, processing, storage, display, scanning, and printing.

The impact of IT around the globe cannot be over stressed since it aids in communication between people in different parts of the globe and has become an easy and fast process, via different ways such as instant messaging, phone calls or video calls. In addition, some of the roles of IT in both developed and developing countries are highlighted in this paper.
2.2 Role of IT in Developed and Developing Countries

We are in the era of globalization where investment, products and services move across national borders and cultures. Information technology (IT) is said to be the driving force. This is because innovations in the world of IT supplies trans-global connections among all nations of the world. IT plays different role in various aspects of life across many cultures and traditions in the world. The role of IT to the world focuses more on easing human task and also getting the desired result timely. They include but not limited to the following; efficiency in communication, management of information, remote banking, centralized information, data management, online study, easy access to educational materials, smart cards for withdrawal and online purchase. It would be well said that once all the outlined roles are met, the economic, social and cultural development of that society is guaranteed and preserved. However, in spite of these benefiting features of IT, some countries have not yet maximally utilized IT towards boosting their industrial and economic activities. Such countries are referred to as developing countries since they have low industrial base and human development caused by underutilization of IT [17] [18]. Developing countries have recorded high rate of poverty, gender based violent, human resources weakness, economic and security vulnerability as a common challenge (Agarwal, 2017). It is also important to note that the use of IT in developing countries would play a vital role towards:

- Attracting investment
- Reducing unemployment and poverty.
- Increase in industrial production to meet the growing number of populations
- Facilitating the cross-border sale of services, and protections for domestic service providers
- Easy access to educational materials and online study in the educational sector
- In farming, the use of data driven farming technique which is an IT device helps farmers to achieve high yield
- Developing regional trade links and boost industrial co-operation

It is not an unrealistic assumption to denote that good use of IT in developing countries would help mitigate or remove inequality among different nations of the world. This is because, some countries across the globe see themselves as more superior than the other thereby leading to economic, financial and educational dependant of other countries on them. Those high advanced countries are mostly referred to as developed countries.

In the developed countries, it is always assumed that things are moving on well from the manufacturing and production sector to economic and financial sector, and down to educational sector. The security and health system are guaranteed here. Thereby, the role of IT is to help ensure that the rate of mortality, accident, and crime is suppressed to its barest form. High income per capita, low rate of unemployment, high level of export, mastering of science and technology are normally characterized with developed nations. Innovations in IT helps countries that are within this category to maintain their statuesque while other countries that lack such features look up to them. Also, developed countries uses IT to create device that would aid in solving both environmental and personal needs of man since they have experts in the field of science and technological development. Such innovations in IT would help provide solution to environmental challenges that can stand the test of time without causing any harm when properly utilized. That advancement which in not prune or vulnerable to any danger for the upcoming generation, taking cognisance of the immediate societal progress and an increase in quality of life is termed sustainable development.

3. Results and Discussion

3.1 Sustainable Development (SD)

The word sustainable development was initially used in 1987 during UN Brundtland Commission while trying to refer to the development that meets the need of the present generation without in anyway compromising the future generation to meet their own needs [19] [20]. SD has received
different definitions from researchers in the field of education. [21] defined SD from the aspect of economic advancement and progress while protecting the long-term value of the environment. Stoddart further explained that SD provides a framework for the integration of environment policies and development strategies. In the same vein, [22] sees SD as a long-term stability of the economy and environment; this is only achievable through the integration and acknowledgement of economic, environmental, and social concerns throughout the decision-making process. Also, some authors see SD as vision 2030 agenda proposed by United Nations commission on the verge of salvaging environmental degradation and economic meltdown which have led to extreme poverty and hunger [23] [24] [25].

In this article, SD would be defined as the act of changing an activity so as to maintain a steady level of impact that is not capable of damaging the environment for both the present and the future generation. This implies that there are some existing activities like in the IT sector which could cause harm to the environment but SD comes in when such device or gadget is appropriately used for the interest of the existing and next generation. The above definition does not limit the scope, aims and principles of sustainable development as it relates to information technology usage towards its actualization.

3.2 Aims of Sustainable Development (SD)

The main aim of SD is to balance our economic, environmental and social needs, allowing prosperity for now and future generations [5]. These include social progress and equality, environmental protection, conservation of natural resources and stable economic growth. SD also captured 169 targets and 500 indicators in its aim which covers a wide range of economic, social and environmental issues. Sustainable development goals (SDG’s) which are 17 in number where given as a working blueprint towards achieving SD within the said time (i.e. vision 2030). These goals are;

- End poverty in all its forms everywhere
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Ensure healthy lives and promote well-being for all at all ages
- Ensure inclusive and equitable quality education and promote lifelong learning opportunity for all
- Achieve gender equality and empower all women and girls
- Ensure availability and sustainable management of water and sanitation for all
- Promote sustained, inclusive and sustainable economic growth full and productive employment and decent work for all
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Reduce inequality with and among countries
- Make cities and human settlements inclusive, safe, resilient and sustainable
- Ensure sustainable consumption and production patterns
- Take urgent action to combat climate change and its impact
- Conserve and sustainably use the oceans, seas and marine resources for SD
- Protect, restore and promote sustainable use of terrestrial ecosystem, sustainably manage forest, combat desertification and halt and reverse land degradation and halt biodiversity loss
- Promote peaceful and inclusive societies for SD, provide access to justice for all and build effective accountable and inclusive institutions at all level
- Strengthen the means of implementation and revitalize the global partnership for SD (Horoszowsk, 2015)

However, actualization or achieving SD is not a rocket science and cannot be futile when a laid down stepwise process is adhered to. Such stepwise procedures are discussed as below.

3.3 Steps to Sustainable Development (SD)

The United Nations (UN) sustainability development submit which took place in 2015 at New York, gave all heads of state and government of the participating Nations guideline or step towards
achieving SD in their respective countries. [26] [27] [28] report, outlined some of these steps as follows, thus to;

- Recognize the urgency of the 2030 agenda and seize the momentum
- Set up clear implementation mechanisms and accountability channels at national and sub national levels.
- Allocate appropriate funds for the sustainable development goals.
- Communicate the new agenda and the SDGs at national, sub national and local levels.
- Ensure broad participation.
- Commit to accountability.
- Respect the universal, interlinked and indivisible nature of the agenda.

In the account of [29] [30], on a report submitted to European Union commission on science and knowledge services, stipulated some vital steps that would also aid in achieving SD. They follow thus;

- SD would be achieved through improvements in education and healthcare sector. This would reflect on higher income and better environmental decisions among citizens.
- Responsible consumption and production of food.
- Access to nutritional food and clean water for all, while protecting the biosphere and the oceans, requires more efficient and sustainable food systems.
- Smart cities like decent housings and infrastructure would transform our settlement patterns enabling benefit to our world population and the environment.
- Digital revolution: Science, technology, and innovation need to support SD. Much depends on the way the world will put the IT revolution to use – continuing present trends or inverting them by asserting societal control over them.

3.4 Principles of Sustainable Development (SD)

The United Nations Conference on Environment and Development (UNCED) called Earth Summit which was held in Brazil precisely Rio de Janeiro in 1992 fleshed out 18 principles of SD [28]. They include thus;

- People are entitled to a healthy and productive life in harmony with nature.
- Development today must not undermine the development and environment needs of present and future generations.
- Nations have the sovereign right to exploit their own resources but without causing environmental damage beyond their borders.
- Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders.
- Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.
- In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.
- Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and to meet the needs of the majority of people.
- Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth’s ecosystem. The developed countries acknowledge the responsibility of sustainable development.
- Nations should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.
Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.

Nations shall enact effective environmental laws and develop national law regarding liability for the victims of pollution and other environmental damages. Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact.

Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an unjustifiable means of restricting international trade.

The polluter should, in principle, bear the cost of pollution.

Nations shall warn one another of natural disasters or activities that may have harmful transboundary impacts.

Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability.

The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.

Warfare is inherently destructive of sustainable development. Nations shall respect international laws protecting the environment in times of armed conflict and shall cooperate in their further establishment.

Peace, development and environmental protection are interdependent and indivisible.

Stoddart (2011) argued that the above stated principles of SD could be summarized by integrating environmental, social, and economic concerns into all aspects of decision making. It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy.

Having discussed about the concept of vocational education, IT, SD and its principles, aims, goals and steps or ways of achieving it. Knowing full well from the discussion that SD is an agenda that is expect to be accomplished on or before 2030. It would be scholarly wise to note if use of IT in vocational education serves as a means in actualizing most of SDGs. Therefore, the researcher at this juncture denotes the impediment or issues that surround the use of IT in vocational education as a tool for achieving SD. Hence, the discussion below emerged.

3.5 Challenges of IT Usage in Vocational Education Towards Achieving Sustainable Development (SD)

Vocational education as an educational system which targets on preparing people with knowledge, know-how, skills and/or competences required in our competitive world could be said to serve as a tool for achieving SD. This is because when an individual has successful undergone the processes involved in vocational education with the use of IT and is satisfied, such person has made his or her contribution towards achieving SDGs especially goal 1, 2, 4, 5, 8, 9, 10 &17. To this end, such individual has improved in major global needed skills and competencies like, expert or critical thinking, complex communication skill, information technology application, and innovation/creativity.

Despite these contributions of IT usage in vocational education towards achieving SDGs, it is not devoid of challenges. This is because some factors pose as stumbling block which hinges vocational education from contributing its maximum quota in achieving SDGs. Some of these challenges are as follows;

- Inadequate training facilities and equipment for vocational teachers.
- Brain drain: This implies acute shortage of vocational technical teachers in schools caused by movement of quality teachers and lecturer from teaching occupation to other fields.
• Inadequate funding of vocational education: This occurs as a result of negligence received by vocational teachers towards availability of money for purchase of essential apparatus for swift flow in the teaching and learning process.
• Poor remuneration of vocational teachers: Vocational teachers are not proper motivated by increasing and prompt payment of their salaries. This could lead to carefree behaviour of teachers to learning activities.
• Poor public impression and indifference to vocational education: Never to do well course has been the name given to the study of vocation education in the higher institutions. Parents talk their children out of choosing such course to study.
• Poor emphasis on the practical aspect of vocational education.
• Apathy of Political holders/law makers.
• Loopholes in vocational education curriculum of most developing Nations. They are based on foreign model and most time too academic and overloaded.

4. Conclusion

Based on the above discussion, we can conclude that information technology plays vital role towards sustainable development in vocational education. Having discussed the role of IT in both developed and developing nations, we can infer that IT could serve as a means for ensuring equity among all nations of the world be it developed or developing nation. Our discussion on SD indicates that it is a development that revolves round three cardinal points which are economy, culture and environment. Integrating environmental, social, and economic concerns into all aspects of decision making is the value projected by SD. Also, from the discussion, despite the laudable contribution of IT in vocational education towards achieving SD; it is still not devoid of issues. Therefore, the following recommendations were made:

• Government should improve the remuneration package for vocational education teachers so as to curtail the movement of qualified and skilled teachers from teaching field to other areas of endeavour due to poor motivation. And also, such improvement would help achieve SDG’s 1, 2, 4 &10.
• Stakeholders in the field of vocational education should organize sensitization movement for the society, inculcating them with the benefits involved in studying vocational education as it relates to SD. This would the address the abnormally of the value system placed on vocation educational courses.
• Government should make available, adequate funding for vocational courses since it helps both educated and non-educated citizens to be self-employed as different skilled are taught. Negligence should not be noticed on this area since unemployment and underemployment could be averted via this means, hence addressing SDG’s.
• Curriculum planners should take cognisance of practical activities in vocation education curriculum as this would help in grooming its learners to the level of expertise.
• IT facilities and equipment’s for proper teaching and learning of vocational education should be made available by the government. This would also aid in achieving SDG’s.

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