

Nexus of ICT & Entrepreneurship Education in Nigeria: A Critical Review

Muhammad Muhammad Suleiman

School of Computer Application, Lovely Professional University, Phagwara, India

(+91) 8264436830, muhddkd@gmail.com

Haruna Salihu Bakin Zuwo

Department of Local Government Studies, School of Rural Technology and Entrepreneurship Development, Rano, Kano State Polytechnic, Nigeria.

Magaji Babayo

Department of Business Administration & Management, School of Rural Technology and Entrepreneurship Development, Rano, Kano State Polytechnic, Nigeria.

Abstract

Information and information technology is experiencing significant strides and the international culture has experienced a profound transition. Activities, careers, talents, lifestyles, desires, and expectations have evolved and have been influenced by this development. Entrepreneurship is certainly a significant contribution and has played a special role in the growth of these innovations; furthermore, these innovations do affect entrepreneurship and have generated a sense of contemporary entrepreneurship education in the Nigerian education system. In this context, the goal of this article is to explore the relationship between ICT and entrepreneurship education in Nigeria. Small business growth, growth remains a viable strategic choice in most industry fields, ICT Entrepreneurship Curriculum requires to be provided more focus, because governments cannot have the requisite placement for our students. ICT technology is one of the fields of creativity that is spreading quite quickly across the globe. Using new technology, this article explores the relationship between ICT and creativity in entrepreneurship.

Keywords: ICT; ITF; Entrepreneurship Education; NDE; Job Creation

Introduction

Information and Communication Technology (ICT) consists of a broad range of technical tools and services used to develop, archive, interact, disseminate, and handle information. Enhanced exposure and skills to such innovations are changing countries' economies by creativity in the development and distribution of resources and producing new entrepreneurs (Jorgenson & Vu, 2005). This ICT-driven entrepreneurship is the capacity to develop and accelerate an ICT-based market strategy that uses such innovations to manufacture and distribute products and services (Koellinger, 2005). The Internet has been described

as one of the main generators of entrepreneurship (Castells, 2011) [1], [2], [3].

Information and Communication Technology (ICT) has been, in a relatively limited period, one of the fundamental foundation blocks of contemporary society. Many countries already see ICT learning and mastering essential ICT skills and principles as part of core schooling, including reading, writing, and numeracy. Data and Networking Systems (ICTs) are computer devices used for retrieval and recovery [2], [4]. Design is partially defined by the potential to create a synergistic relationship between scientific advances and human values. The

accelerated pace at which ICT has developed since the mid-twentieth century, the proliferation and pervasiveness of ICT, has provided them a significant position in growth and globalization (Nwagwu, 2006). LCTs have a major effect on all fields of human life in the 21st century [2], [5], [6].

The ability of information and communication technology (ICTs) to change societies and economies has been demonstrated in the literature. The expectation that ICT will play a transformative role is more evident in Africa. Africa, the last frontier of development and known as the poorest continent, has begun to look at ICT as a magic bullet to solve its developmental problems. A recent publication in 2007 by the Africa Capacity Building Foundation argued that there is a high degree of interest in technology solutions to critical growth problems in Africa, which raises the need to accelerate the penetration and deployment of technology on the continent, especially in the public sector. Technology helps to increase the efficiency and quality of public institutions by providing an enabling environment for the region to increase its competitiveness [3], [5].

Iwu and Ike (2009) described ICT as the collection, processing, and delivery of a speech, practical; textual, and numerical knowledge through a microelectronic combination of computing and telecommunications. ICT is essentially the use of computer-based information and communication technologies to collect, store, and transfer data. It explains exciting and innovative ways to provide students with global access to information, learning, and support [2]. It is a general term that covers all communication devices or applications, including, but not limited to, radio, television, cellular phones, computer network, hardware, software, electronic mail, fax, satellite systems, as well as the various services and applications associated with them. The field of education has been affected by ICT, which has undoubtedly had an impact on teaching and learning. ICTs can improve, enhance, and expand capabilities, inspire and educate pupils, and help connect school interactions to work practices. It also creates economic viability for future employees, as well as strengthening and helping schools to change. Consequently, entrepreneurship education is needed to ensure this (Dawodu 2005) [2].

Entrepreneurship can be defined as a privatization process to turn a company into a venture or to increase and diversify assets or business units with high growth potential. Entrepreneurship is a topic

that dominates the world's education circles from the late twentieth century [6], [7]. Entrepreneurship literature analysis shows that this concept was initially established in economic theory by economists and later reached schools and other scientific theories. Cantillon, who coined the term entrepreneurship, knows needs to know entrepreneur as a venture person who buys goods at a specified cost and sells goods at an undisclosed price. Knows the entrepreneur as the planner and the integrator of the variables of output, but does not find the unique features. In other words, a person who incorporates factors of production (land, labor, and capital) into production, business, or services is called an "entrepreneur" and his job is called an "entrepreneur" [2], [5], [7].

Schumpeter has proposed a more comprehensive definition of entrepreneurship. In his essay, *The Theory of Economic Growth*, the differentiation is made between creativity and development, and he considers progress as a possibility of development for the production of a good or consumer service. In his view, innovation is the main factor in the creation of wealth and demand. Entrepreneurs, then, are administrators or founders who, by building up a production company, leverage the product as a business entity [6], [7], [8]. Jeffrey Teymunz recognizes the capitalist as the maker of something useless out of nothing. Peter Drucker (1985), who is regarded as the father of entrepreneurship, recognizes the entrepreneur as the individual who will establish a small and new company with his money, but according to Joseph Schumpeter (1934), Professor at Harvard University, and economic needs in the teaching-learning cycle are different [7].

The partnership between ICT entrepreneurship and small business growth has stimulated research issues in the creation of entrepreneurship and, in particular, the idea of ICT entrepreneurship has drawn a great deal of research attention over a decade. A variety of scholars in the world of business have concluded that the growth of entrepreneurship may lead to small business success through the skills it allows to grow inside the company (Morgan and Sanchez 2008 in Amue et al 2013; Tamil and Bartus 2006). In reality, ensuring the performance of organizations can be seen as the primary aim of small business growth initiatives in entrepreneurial firms. Most research on the partnership between ICT entrepreneurship growth and small business creation remains far from being thoroughly clarified. The research of Migisha (2011) suggests that ICT is a medium for

growth, but that it can only flourish if small tech start-ups expand and generate new employment by creativity, and that technology is not the only problem, but also entrepreneurship. The opinions of Migisha (2011) face very contradictory observations and claims in the literature (e.g. Adewale Adeniyi-kie 2004; Jackson and Markfish 2010; Marchese and Polter 2010). Again, Kola-Ogunlade (2014) suggests that the Web can radically transform the way citizens find and navigate resources [9].

Again, Kola-Ogunlade (2014) suggests that the Web can radically transform the way citizens find and navigate resources. Eduardo (2006) suggests that google.com is one of the effective tales of young businessmen leveraging ICT expertise. Kofi and Anns (2010) claim that the diffusion and implementation of ICT entrepreneurship in Western business organizations may be deemed comparatively more established and developed, although its possible effect on less created countries' market networks still needs to be properly stimulated, re-engineered and re-evaluated. The aim of this study is therefore to examine the development of ICT entrepreneurship and small business innovation in Nigeria.[9], [3].

Increased awareness and enormous potential of ICT entrepreneurship, only very few are taking advantage of and taking advantage of its benefits. The goals are thus threefold; firstly, we are aiming at fields of ICT development in the sense of Nigeria. Third, we are creating a metric of creativity for the ICT entrepreneurship market. Third, we assess the predictive validity of small business innovation on the likelihood of supporting the development of ICT entrepreneurship. Proposals are created to direct potential work and to address the consequences for development at the corporate and public policy levels [2], [9].

Concepts

Entrepreneurship

Orthodox economics has largely ignored the crucial role that the entrepreneur plays in the development of industry and the growth of new markets. This has been especially the case, until recently, in development economics, which appeared to concentrate on macro-economic research and less on microeconomics as a human-driven operation. Entrepreneurship, though, is seen as a crucial contextual part of a variety of economic growth

frameworks that understand the complexity of incomplete knowledge. Knight, 1921; Mises, 1966; Kirzner, 1979; Casson, 1982) [10]. Drucker (1983) defines an entrepreneur as someone who manages development functions together and shares the burden or insecurity of spending his finite capital in business projects. By doing so, it incorporates the administrative roles of arranging, scheduling, hiring, monitoring, and handling the company. Odusina (1975) sees Entrepreneurship as a mechanism. Usage of usable resources of some way in a transparent and free-market system for the sole purpose of generating income [11].

Entrepreneurs have been defined in a variety of different forms [10]:

- ✚ *As imaginative and inventive prime movers, push the economy forward through productivity by technological and administrative advancement and the creation of modern technologies. (Schumpeter, 1943; Williamson, 1983) Entrepreneurs are seen to embody special qualities, distinct from those of managers or owners, which lead to the formation of new products and services, the exploitation of emerging businesses, and greater economic efficiency [10].*
- ✚ *As a fulfillment of a solely functional economic position by planning and distribution of capital within a business setting marked by instability. (Casson, 1982) Businessmen are used here primarily as executives [10].*
- ✚ *As an investment hunter. (Knight, 1921; Mises, 1966; Kirzner, 1979) We find the capitalist to be essentially a profit-seeking person whose efforts may not generally contribute to economic growth and do not lead to*

greater productivity in the distribution of capital [10].

Entrepreneurship has often been identified with a collection of generally optimistic, though primarily inherent, human characteristics that characterize a specific category of person. Can include creativity, enthusiasm, and tolerance to fresh concepts, diligent work, commitment into the future, desire to conserve and spend, leadership, acknowledgment of threats, and also selfishness or greed. (Grindle, 1989; McClelland, 1976) Theoretical theories for entrepreneurship appear to imply that entrepreneurs are born and not produced and that the financial, economic, and cultural forces that occur inside and within cultures are sometimes not deemed significant. Nevertheless, work in industrialized and developing countries indicates a broad variety of motivating variables that motivate a large range of individuals, from a broad range of social, economic, and educational backgrounds, to become self-employed/small business owners. (The Storey, 1990) [10].

The position of an entrepreneur, whether creative, profit-seeking, or bureaucratic, would be essential to the collection and usage of knowledge. The entrepreneur will be at the center of the 'enterprise-specific' set of information networks. The entrepreneur must perform the task of finding and defining potential business opportunities; monitoring and organizing reports on the distribution and effective usage of resources; and gathering and utilizing knowledge on new product, process, and management technologies [10].

Entrepreneurship is characterized as anticipation of benefit from the use of resources (Schumpeter 1934; Hayek 1945; Kirzner 1973, Casson 1982, Shane 2003). The entrepreneur can use tools such as financial aid, low-interest loans, or government funding to operate their company. Law and Macmillan (1998) define entrepreneurship as the creation of a new business venture, which means an entrepreneurial effort at the source of a person to start a business. Krueger et al (2000) said that entrepreneurial intent is very significant because it is the primary predictor of future entrepreneurial behavior. The entrepreneurship aim is very critical for the growth of entrepreneurship [2], [9].

Entrepreneurs in Nigeria in the early years usually begin their business ventures in small capital, low value-added, and it takes time to set up a business. This type of entrepreneurs needs to collect money, a source of a better place, deal with suppliers and

other intermediaries, manpower problems, and other relevant issues while setting up their enterprise [2], [9], [12]. Technology now lets companies save time and money during the start-up phase of e-business. Information and networking systems have allowed today's entrepreneurs to succeed rather than conventional entrepreneurs. Such rising technology enables conventional businessmen to enter ICT entrepreneurship (Cheng and Chang 2004) [2], [9].

The development of ICT entrepreneurship is becoming the order of business days. Reports (e.g. Mzekandaba, 2013; Austins and Tygris 2010; Eduardo 2006; Kollmann, 2006) suggest that ICT entrepreneurship is rapidly relevant and useful; proof of the growth of ICT entrepreneurship can be seen from active entrepreneurs in Western countries such as the United States [9]. Successful companies in the United States include google.com, yahoo.com, Amazon.com, eBay.com, Twitter, Instagram, etc. Google.com is one of the positive examples of young people with ICT expertise who have been interested in ICT entrepreneurship (Eduardo, 2006). Digital trade is much simpler and cost-saving relative to conventional forms of doing business (Marks and Albert 2009). Digital company doesn't take too much manpower. Technologies play a supporting function in enabling companies to grow quickly and effectively (Kollmann, 2006) [9].

ICT entrepreneurship is the creation of new businesses in the Net Economy (Matlay, 2004). The Net Economy has a strong impact on creative market growth focused on the online knowledge and connectivity network. The information society is characterized by rigorous use of information technology and a shift from an industrial to a knowledge-based economy (Evans and Wurster, 1997) [9]. Kollmann (2006) claims that the knowledge market is moving from conventional economic sectors (production, services, agriculture). Electronic communication networks and the development of IT have generated a modern market layer named Net Economy [9].

Framework for an Entrepreneurship Curriculum

Entrepreneurship is defined in the literature as the opportunity to implement "fresh combinations" – new goods, manufacturing processes, industries, sources of supply, or industrial combinations, or so Entrepreneurship is the "warning" to benefit

opportunities. It means creativity, it means having the confidence to lead a company [13].

The Entrepreneurship Education Curriculum will encourage the entrepreneurial actions of applicants and improve their entrepreneurial skills, including the behaviors, skills, and expertise required to run a company. In other terms, candidates will become creative entrepreneurs, have the expertise and resources to set up and operate their own companies [12], [13], [14].

While Entrepreneurship Curriculums can differ widely in content and methodology, after graduation, students should be able to apply simple and practical economic principles, to draw up a business plan, to apply marketing strategies, to apply accounting principles, to manage risk, to recognize useful concepts, ethical opportunities and valid sources of capital [13].

The writers classify the components of the Program in Entrepreneurship into four sections [13]:

- a. Management of available resources;
- b. Obtaining additional resources;
- c. Identifying current gaps and developing fresh ones;
- d. To bear uncertainty, exercise alertness, foster technological or organizational innovation, and adapt to change.

Entrepreneurship Education in Nigeria

The term entrepreneurship derives from the term "entrepreneur." According to Encyclopedia Americana (1989), the entrepreneur is a businessman who assumes the risk of bringing together the factors of production and receives his reward in the form of profit from the market value of his products. Okeke (2007) describes entrepreneurship as the acquisition and management of a private enterprise and the creation of a small-scale company directed towards the development of products and services to fulfill the needs and desires of customers. Dawodu (2005) indicated that entrepreneurship promotes economic growth, provides employment prospects, replaces conventional markets and boosts innovation, and raises capital production and performance [2], [4], [14].

But on the other side, entrepreneurship skills are specific skills and competencies that will allow a

person to effectively undertake and operate an enterprise. Richen and Salagrik (2003) observed that entrepreneurial skills are learned by training that stresses the acquisition and growth of suitable information and skills that will allow a person to optimize the resources around him within the limits of his or her abilities. Entrepreneurship curriculum is thus a concerted initiative directed at the preparation and growth of entrepreneurship awareness, expertise, and capabilities that are important to the management of an economic enterprise [2].

Entrepreneurship learning is crucial to us because it is training and education that enables students to develop and use their creativity to initiate responsibilities and risks. It has social and economic importance. It helps train the adult for college, and more significantly, it offers a job chance to graduates or people who might otherwise go to higher institutions. Onwukwe (2008) correctly identified the value of entrepreneurship education as an education capable of mitigating deprivation within the community and motivating the deprived section of the society [2]. An instructor who is well educated in business techniques utilizing knowledge and digital technologies would give students the qualities that can be of benefit to them, as well as transform culture for the better. Not just the deteriorating economic fortunes and increasing waves of unemployment can be reduced by entrepreneurship education, but the large emphasis of the policy must be on reorientation towards entrepreneurship education. There needs to be a change from currently entrepreneurship education in our institutions, which is technically as normal, to entrepreneurial spirit/skills creation in institutions [2], [3], [4], [14].

Aims of Entrepreneurship Education in Nigeria

Entrepreneurship Education goals involve but are not linked to [2]:

1. Identify and solve problems using critical and creative thinking.
2. Examine the link between Science, Vocational, and Technical education, small business, and entrepreneurship.
3. Organize and manage oneself and one's activity.

4. Develop the spirit of creativity, logical thinking, self-reliance, independence, and freedom of making one's own decision.

Government Agencies for Promoting Entrepreneurship Education in Nigeria

Several organizations have been set up in Nigeria to encourage entrepreneurship and self-employment. We shall have [2]:

- 1) **Small and Medium Enterprises Development Agency of Nigeria (SMEDAN):** The SMEDAN was created by the 2003 Act as revised in 2004. It is responsible for supporting and fostering the growth system in the small and medium-sized manufacturing sub-sector. The goal is to make it easier for micro, small, and medium-sized entrepreneurs to have access to all the tools required for SMEDAN (2007) growth. SMEDAN offers market support facilities. The Department organizes skill-building activities for aspiring entrepreneurs to raise awareness of market prospects in various fields (fish farming, waste disposal, snail farming, etc.) and SMEDAN has established two entrepreneurial growth initiatives – public sector entrepreneurship targeted at public servants who are retiring from the public service and young coppers to assist them [2], [11].
- 2) **National Directorate of Employment (NDE):** The National Directorate of Employment was founded in 1986 by the Federal Government of Nigeria in its efforts to ensure that its people are self-employed. The government expects that this organization would reduce homelessness, which is a restriction on our culture [11].
- 3) **Special Public Works Programme:** A system has been set up to recruit displaced people in the development and renovation of socially beneficial programs. f. Routes [11].
- 4) **Industrial development Centers:** Industrial Development Centers (IDCs) have been set up to offer free technical management assistance to small and medium-sized enterprises for the creation of new enterprises as well as for the production, modernization, and growth of established enterprises. IDCs were founded in 1962/1963 under regional governments as a small-scale industry promotion agency and

were taken over by the federal government in the 1970s. They operate as consulting and technical support hubs for small-scale businesses [2].

- 5) **National Development for Employment Entrepreneurship Development Programme (DEEP):** NDEEDP runs an Entrepreneurship Development system for students of tertiary institutions and former public / private sector employees to allow them to recognize market opportunities. Participants are marked through awareness-raising preparation during the NYSC orientation program. Which is accompanied by the Start-Your-Own-Business Learning Course. In 2004, 37,687 NYSC participants benefited from the Entrepreneurship Training System, while 15,374 students of tertiary institutions benefited from Start-Your-Own Company Training (NDE, 2004 cited in Onwukwe 2008) [2].
- 6) **Entrepreneurship Development Studies in Universities (EDS):** The National Universities Commission has made it compulsory for all students to be subject to university-level entrepreneurship training. Many colleges have centers for entrepreneurship research in place. Several courses are offered to students in their third year of study. Courses are compulsory for all students, regardless of discipline [2].
- 7) **Industrial Training Fund (ITF):** The Industrial Training Fund was founded by Decree No 47 of 8 October 1971, to foster and facilitate the acquisition of skills in Industry and Commerce to generate a pool of indigenous skilled staff necessary to meet the needs of the economy (ITF Pamphlet) [11].
- 8) **Private Entrepreneurship Development Programmes (PEDP):** Some NGOs also provide programs for the growth of entrepreneurship, like the FATE Base in Lagos, which supports market and entrepreneurial creation. It equips young entrepreneurs with the expertise, resources, networking, and funding they need to develop productive companies. It is aimed at young people between 22 and 23 years of age with a university degree. This is a mentoring system as well as a loan assistance scheme for young entrepreneurs [2].

Role of Entrepreneurship in the Economic Development of Nigeria

- 1) **Economic and Support Facilities Linkages:** Every company operates on its own without consulting any organizations or companies for one reason or another. The various aspects of the economy tend to be interlinked in the fields of growth, delivery, and conservation. Entrepreneurs or corporate associations have the local expertise, technological skills, and resources required to run and sustain a continuous production plant [2].
- 2) **Rural Saving Mobilization:** Establishing community banks is a program to further generate rural resources for economic purposes. Such savings help to improve economic growth in rural areas [2].
- 3) **Utilization of Local Resources and Raw Materials:** The development of small businesses has helped to reduce the number of local agricultural products because these companies make use of local products and this helps to control pollution [2].
- 4) **Generation of Employment Opportunities:** Both small and medium-sized businesses produce more job prospects than any big companies. Most people rely on their companies for their work and can employ someone to support them [2].
- 5) **Stimulation of Indigenous Entrepreneurship Development:** The knowledge and expertise acquired in small companies assist in the activity and management of big enterprises [2].
- 6) **Modification of Traditional Industries:** The creation of indigenous and local businesses and technology can be accomplished by entrepreneurship education. Countries like Japan, Taiwan, Singapore, South Korea, and so on have made significant improvements in their local and traditional industries through indigenous entrepreneurship education [2].

Problems of Entrepreneurship Education

- a) **Lack of mentorship:** A mentorship plan for educational programs needs to be implemented so that aspiring companies can benefit from established businessmen. [2].

- b) **Institutionalizing Business Training in skills acquisition programs:** The business school will be a central component of both technical and skills development initiatives since most students of such initiatives are likely to wind up in self-employment [2].
- c) **The short duration of Programs:** Most services are limited in length, varying from one week to a few weeks/months. There will be ample room for functional components to be integrated [2].
- d) **Inadequate funding and capacity:** Considering the extent of the issue of youth jobs in Nigeria and the number of possible beneficiaries, further studies are expected to hit a greater number of young people annually [2].
- e) **Absence of linkages between training agencies and institutions:** Most educational institutes have almost no proof of collaborative arrangements between them and growth agencies in the country [2].
- f) **Linkages between Entrepreneurship Development Agencies** Different laws have been established for the executing agencies and care has been taken to ensure that there is little overlap between their mandates. There is a need for more collaboration between them to exploit each other's strengths for different activities [2].
- g) The weak infrastructure of the three main organizations, even the SMEDAN website, and only the one that has to sign as a participant for access to details, is a very specific activity [2].

Concept Architecture for ICT Entrepreneurship Education

ICT may be described from information technology (IT) and communications technology (CT). IT contains various categories of technologies used for data or database processing (e.g. computer and device devices, data storage, and repair devices) (IT Standards 2012) while CT involves specific forms of video and audio transmission systems (e.g. internet, e-mail, telephone) (Education-Portal 2012). Seen (1997) states that the ICT term can be used to define the capacity to produce, store and transfer data and information, whereas the most critical components of these technologies are

mechanical and electronic hardware, networks, and expertise of how to utilize ICT devices. Throughout his view (ibidem), one of the main aspects of ICT would be its user-friendliness [15].

ICT has undergone very rapid development in recent decades and has been introduced into all segments of people's lives. It also created new possibilities for companies and individuals (e.g. social networks, knowledge quest, and sharing) and increased quality of life (Bučar, 2001). New ICT methods can minimize costs as well as improve profitability and performance at the level of individuals and organizations (Hengst & Henk 2001). ICT has also caused fundamental developments in the area of connectivity, usability, and quality of information (OECD, 2001a, b; Pinterič & Grivec 2007, 33-34) [15].

ICT Entrepreneurship Development

Research by Melfrad and Piffaz (2004) have shown that effective growth of ICT entrepreneurship depends on the importance of ICT technology, technical expertise, and useful resources and that organizations with higher rates of technological competence are likely to innovate. Software refers to ICT infrastructures, networking expertise, and e-commerce know-how. ICT infrastructure offers a foundation on which e-commerce is developed. Internet skills provide the technical know-how needed to develop entrepreneurial applications (Manny et al, 2008; Zhy et al, 2002; Zhu and Kraemer, 2002). As a consequence, technological capability goes beyond physical infrastructure to provide intangible capital that can create competitive advantages for entrepreneurs. The acquisition of entrepreneurial expertise and team-based entrepreneurial practices are the key determinants of the advancement of ICT entrepreneurship in an organization. However, developmental practices in terms of research and prototyping, exposure to tools, coaching, and exchange of knowledge are core structures that define the growth of ICT entrepreneurship [2], [9].

ICT and Development of Entrepreneurial Competencies

Numerous tasks can be achieved more effectively and with better results thanks to the production of ICT. For eg, ICT allows it easy to evaluate various decision-making situations. This is why many people assume this ICT should be used as a resource for the growth and creation of

entrepreneurship skills. ICT will provide learning experiences, strategic strategy approaches, management resources as well as company preparation programs with the aid of business plan simulators. ICT will also help to build and strengthen connectivity and social networks [15].

In the last decades, the EU has gradually pushed towards a service-oriented economy focused heavily on the growth and usage of ICT. Governments promote the production of new skills for EU residents as training for addressing the demands of the labor market. By incorporating unique ICT resources, entrepreneurship capabilities can also be encouraged and youth unemployment can. The EU adopted a resolution "New technologies for modern employment – 2007" in which the European Commission aims to support Member States in the usage of ICT resources to improve overall capabilities in the working community (European Commission 2007) [15].

Current ICT should be seen as a way of developing ties between business and higher education. It is a significant chance to provide young people with entrepreneurial knowledge and entrepreneurship awareness. This also affects a wide range of stakeholders, not just students – such as faculty, other educational institutions at all stages, corporations, etc. (Hynes & Richardson, 2007). Effective learning should be implemented to achieve continuous improvement in entrepreneurial skills. Educators would also be conscious of instructional approaches that could be updated to satisfy business expectations to provide students with a range of competencies. Of this cause, the only approach seems to be the usage of ICT software (Galloway et al., 2005). Entrepreneurship preparation includes mastering a range of business-related abilities, such as enhancing decision-making capabilities or exposure to knowledge skills and utilizing various ICT resources to build a better workplace (DeFaoite et al. 2003) [15].

ICT as an Entrepreneurial Device

Better entrepreneurship education is necessary for the development of productive human resources in every country (Eroh, 2007). The need for ICT as a platform for entrepreneurship education cannot be overemphasized. In this technology-driven era, everybody requires ICT skills to thrive. Entrepreneurship educators find it important to train and re-train their workers to grow, enhance their knowledge of computers and other ICT facilities (Adomi and Amic, 2006) [2]. It calls for

the early learning of ICT expertise by entrepreneurship education graduates. The ability to use technology efficiently has been a vital aspect of everyone's schooling. Skills such as accounting, clerical and administrative jobs, stocktaking, and so on, are now a collection of computerized activities that shape the center IT skills package: spreadsheets, word processors and databases (Adomi 2005) [2].

In Nigeria, the market for computer / ICT literacy is growing, as educators understand that computers and other ICT resources will improve entrepreneurial education. On the other side, educators have now learned that technology can be a challenge to their work, and the best way to increase job protection is to become tech literate. With a growing demand for digital literacy, the training and development of these abilities is a priority of entrepreneurs' educators (Brakel, 2003). It is also valid for certain elements of ICT [2].

Current teaching methods that utilize ICTs have a particular modality of resources. For pupils, the usage of ICT makes it easier to increase the individualization of learning. In schools where emerging technologies are used, students have exposure to resources that adapt to their attention span and provide useful and immediate feed for literacy growth, which is currently not completely applied in the Nigerian school system (Enuku & Emuka, 2000). ICT as a resource should prove helpful in developing Nigeria's education system and providing students with better entrepreneurship education [2], [4].

Measures of ICT Entrepreneurship

The ICT entrepreneurship indicators may not be compatible with the previous ICT entrepreneurship study. Our initiatives for this analysis involve the growth of entrepreneurship abilities, team-based entrepreneurship practices, and creative activities [9].

Environmental factors that affect ICT entrepreneurship

The Digital Opportunity Strategy of the United Nations Development Program (UNDP) identified five main structural aspects that need to be tackled to establish effective ICT approaches to accelerate economic growth. Those include adequate resources, human ability, public policy, industry, technology, and applications (UNDP, 2001) [1].

Reliable and inexpensive telecommunications and energy services are essential to the growth of ICT-driven entrepreneurship. Infrastructure offers room for sufficient community coverage (Choudrie & Middleton, 2013). Rapidly decreasing telecommunications development costs make it feasible for developing countries to utilize state-of-the-art technologies, although private sector participation has facilitated the rollout and implementation of such technologies, especially in the case of wireless and mobile technologies (Anju, Kanesathasan & Patel, 2012) [1].

The human capital dimension includes building up a critical mass of skilled staff, growing technological skills among computer users, and improving local entrepreneurial and managerial capacities. The critical mass of inspired entrepreneurs who can exploit emerging ICT opportunities is also required to drive ICT-led entrepreneurship (Kushida, 2012) [1], [2].

Developing ICT entrepreneurship needs enforceable support for government policies and legislation that encourage free and accessible competition (uneca.org, 2008). Policies to boost exposure to finance, business penetration by ICT entrepreneurs, and sufficient tax opportunities are recommended (Mutula, 2008). Business incubation also plays a nurturing function for nascent ICT enterprises; thus, a concerted local content strategy will have to be adopted to encourage ICT entrepreneurship (Linden, 2011) [1].

Personal Traits which affect ICT Entrepreneurship

Various opinions have been expressed as to what drives entrepreneurship. Within such viewpoints are economic perspectives that say that businessmen are profit-driven in their entrepreneurial practices (Kearney & Hisrich, 2014). Therefore, an entrepreneur is a person who explores improvement, reacts to it, and utilizes it when an opportunity is available. Entrepreneurs are also developing new companies for a variety of purposes, such as self-sufficiency, the need for a lifestyle, and a need for riches (Drucker, 1994) [1].

However, the social philosophy of entrepreneurship describes entrepreneurship as a psychological characteristic, as well as the socioeconomic and cultural background in which it exists. Among the main psychological characteristics associated with entrepreneurs are honesty, self-learning, bravery,

conscientiousness, flexibility, perseverance, self-discipline, and self-respect (Chell, 1991) [1].

Psychologically, it tries to explain the thought of businessmen from the internal and exterior experiences of the particular entrepreneur. Internal point of view looks at human personality

characteristics such as locus of influence, risk-taking, desire for success, problem-solving, ingenuity, sense of imagination and job principles, whereas the external point of view explores such issues as history, role models, work experience, employment and the world (Shaver, 1992) [1].

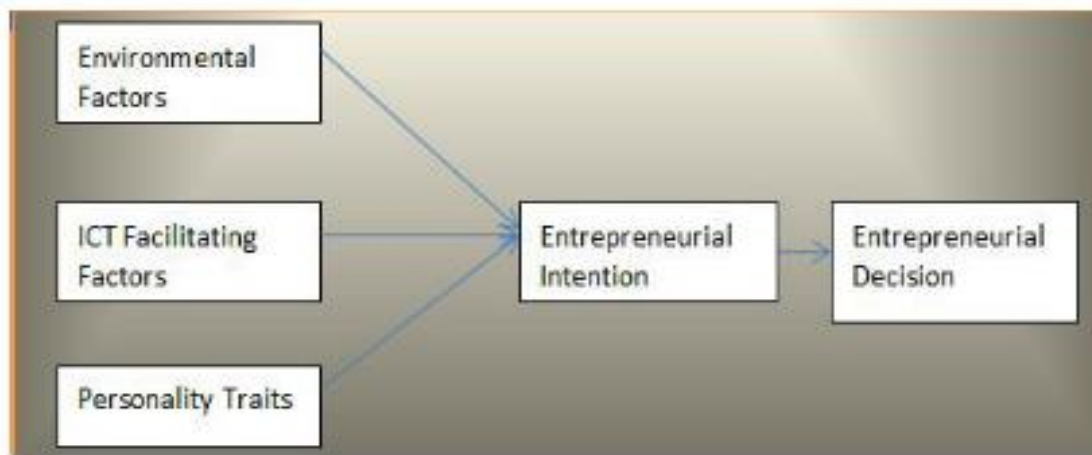


Figure 1: Concept Architecture for ICT Entrepreneurship Education Adapted, cited in [1].

The conceptual structure for this research describes environmental variables as well as the personality traits that affect ICT entrepreneurship in Ghana. The research also explores unique ICT pull factors such as increased smartphone penetration, enhanced Internet performance, and demand for ICT services that lead to the decision-making of ICT entrepreneurship in Ghana. This research claims that, in addition to environmental influences and personality characteristics (Mazzarol, Volery, Doss, & Thein, 1999), other ICT influencing variables are guiding people's entrepreneurship, which eventually contributes to the decision to start-up IT companies [1].

Effective Characteristics of ICT in Entrepreneurship

ICT with various features and capabilities could have shown remarkable flexibility in the field of ICTs with various features and skills that may have demonstrated exceptional versatility in the area of entrepreneurship. Such innovations have contributed to an improvement in the productivity of this product in industry and work growth. Many of these characteristics can be used in an overview [7]. Increase pace, enhance consistency and minimize the physical size of data archives, eradicate managerial bureaucracy, make it easier to

operate full-time, enable online communication, reduce program or organization costs, In turn, increase the speed with which much research is performed and function full-time, increase machine productivity and therefore reduce the amount [2], [7].

ICT Entrepreneurship Education in developing nations

The significance of ICTs for changing culture is a topic that has gained a great deal of attention in contemporary development studies. There are several examples of the influence of various ICTs on growth. Murphy (2006) argues that mass media can have many purposes, but points out that it can be used as a tool for the government or other organizations to create common norms and values in society, such as in sub-Saharan Africa, to demonstrate the use of condoms through TV soap operas. Another significant area in development studies is the "ICTs for Growth" (ICT4Dev) which encompasses multidisciplinary work centered on poverty reduction [2], [16].

Bridging the "internet gap" between the developed world and the developing world is an area with multiple focal points. One aspect is purely technological demands, and according to Richard

Heeks (2008), several hardware innovations are needed. This recognizes three key fields that are becoming extremely relevant and need to be applied creatively: (1) low-cost terminals, such as the One Laptop per Child (OLPC) project; (2) networking and cellular technology; and (3) rural power supply and low-energy equipment [16].

On the other side, Oshikoya and Hussein (2007) tightly connect ICT problems with the broader growth concerns confronting sub-Saharan Africa; they do not distinguish between them. According to them, the main goal of Africa is to introduce ICT and to promote economic development and rising suffering on its own. Some of the challenges they see ICT can improve are: (1) integrating Africa into global trade and finance. (2) Creating efficient governance of the macroeconomic and public sector. (3) Promoting the growth of the private business. (4) The success of rural production and food security. (5) Ensure the safety of the climate. (6) Encouraging the creation of human resources and encouraging schooling and health management. Although this may be an exaggeration of what technology alone is capable of, I believe that this could be a possible outcome with the right knowledge [16].

Rewards of ICT Entrepreneurship Training

There are several potential ways for an entrepreneur to invest in ICT to improve himself and those in his field to expand because of his impact. The following are the different prospects for ICT entrepreneurship open to an entrepreneur. [6].

- 1) **Business:** It is an ICT company owned by an entrepreneur. Photocopying equipment, laptops, typewriters, routers, printers, telephones, and other ICT devices are used in this center to provide customer services. The developer recruits other people to work with him in the middle and to adjust programs in a pattern of items depending on the customer's expectations and demands [6].
- 2) **Internet centers:** The person operating this center usually offers Web access to the locals. The company needs more than one employee to operate, which ensures that at least two to ten employees would be required, impacting people's lives and decreasing unemployment. This company offers people the ability to make

electronic transfers from their locality to the globe without actually flying or meeting face to face. It rising the expense period and the difficulty inherent in commuting.

- 3) **Graphics Centre:** The developer utilizes ICT resources to develop graphics applications such as CorelDraw, Photoshop, Photopaint, and others and deliver facilities for companies, businesses, and printing presses. This will produce videos for television stations and other items that may be seen within and outside the world. Adewale (2004) pointed out that one field of ICT has increased the number of citizens in a country like Nigeria, for example, by utilizing ICT resources for computers, scanners, and other accessories to produce graphics that are now being exported to other countries, notably Africa. He gave an illustration of how an instant business that generated a lot of money from this entrepreneurship scheme is named the popular Design Limited. The company currently employs more than 20 young brilliant graphic designers and, over the years, has benefited from the center of the graphic, has been able to expand and move to other related companies.
- 4) **Online Travelling Agency:** Though this is not common in the rural areas big cities travelers book and liaise with national airlines and other airlines operating within the country through the entrepreneur running such a business by making traveling arrangements for them. He can provide the service of ticketing and booking of airlines through net provided they are ready to pay.
- 5) **Online Tourist Agency:** An entrepreneur with a website can link visitors interested in visiting the country by providing them with details about the country and the accommodation and transport they can need while in the country, including food and other items they need while in the country.
- 6) **Computer Teaching Centre:** It is one of the positions the ICT entrepreneur plays in building work for citizens and training people who want to understand ICT or just knowledge-based consumers. The entrepreneur makes a lot of money in this, particularly if he has enough employees and students to educate and know.

7) **Computer Technicians:** The technicians who repair and operate the machinery are businessmen who make a living from this operation. It is also the easiest since you don't need a lot of resources, you need software and outstanding knowledge of the machine and its components. They get a lot of revenue out of that because the hardware needs to have issues, because they have to call them because tax them because they won't, because you have to play as you don't learn. There are so many possibilities for ICT startups that one might go on and on to talk on.

Challenges of ICT Entrepreneurship

While several resources are open to entrepreneurs, they are not without any restricting factors. There are plenty of these variables [6]:

- 1) **The quality of learners:** Most students in tertiary institutions are not qualitative enough to justify viable enterprises at a primary and secondary level due to their poor background. This issue has left some of them unwilling to read and comprehend what is needed of them or to produce items that an entrepreneur requires. They, therefore, lack the confidence needed to establish viable businesses or consult with people who would help them, because it would be difficult to communicate with people from other places who may not understand their language to help.
- 2) **Insurance protection:** The employer does not receive protection against robbery accidents and natural disasters. In the case of all of these, he's doing things alone and beginning from scratch again. When he'd lent or stolen from somewhere, he'd have to pay for anything he'd invested or lent.
- 3) **Crimes and Insecurity:** Cybercrimes and Insecurity, which are the key problems in the world, may force the entrepreneur to quit everything he has worked for in less than an hour. It isn't a good experience for him. Many states are not heading to Nigeria now because of the bombing and abduction that is normal to them, because citizens will not like to spend in those countries or be glad that their money has gone down the drain in those areas. This will have an effect on growth in these regions, and deprivation would be on the rise.

4) **Tax System:** The developer has the issue with various taxes and several incomes to compensate. For certain instances, they prevent the developer from starting up. There is little or no tax incentive for an employer to enable him to make a meaningful impact on the economy.

5) **Cost of Facilities:** ICT devices are costly owing to product prices. This dilemma is leading certain aspiring businessmen to be frustrated by the costs involved in starting this up.

6) **Failure of Power:** The ICT company can not work without a sufficient supply of energy, so that is a huge problem as the energy system in the world has been in a coma and is still there. The cost of acquiring, charging, and operating a backup generator is high.

7) **Novel technology:** The developer does not have enough resources to keep adapting to the new inventions that are being pushed into the market every day. There's also a fresh one on a weekly or monthly basis.

8) **Shortage of qualified technicians:** An entrepreneur suffers at times when there is a fault in the ICT tools because some of the technicians are not specialists in the maintenance of these tools which delays operations and services. This affects the livelihood of the entrepreneur.

Conclusion

Data and communication technology is perceived to be the result and actions of developing countries and is used by them to boost RICH and REACH on their goods and services. ICT, though, has contributed to significant advances in all societal practices, including entrepreneurship, and is known to be the most powerful method in contemporary entrepreneurship. ICT entrepreneurship still has quite a huge amount of development. Entrepreneurship is a prerequisite for the development of technology, and the development of technology is a foundation for entrepreneurship education. Government agencies should develop and strengthen the entrepreneurial background in computer technology, which is communication and information networks, and provide easy access to these networks while developing and developing

the use of networks, as well as design and evaluate rules and regulations.

Recommendations

In the light of the critical reviews addressed, the following suggestions would be rendered to enhance the standard of ICT Entrepreneurship Education in Nigeria and thereby alleviate deprivation among graduates of colleges and universities in Nigeria, as follows:

1. The government and private sectors will create a central institution for the creation of entrepreneurship that will generate mentors and encourage a large number of entrepreneurs in various economic sectors.
2. Power deficiency should be tackled to ensure that businesses stay in the company, generate money, hire others, and rising deprivation in the region.
3. The government needs to make provision for financial help in the event of soft loans to aid and encourage students and other members of the public who may enter the self-reliance industry.
4. Educators with appropriate expertise in entrepreneurship education should be equipped with mandatory kits for the development of a small-scale enterprise for ICT concern.
5. Any tertiary graduate student should be encouraged to own simple hand and machine tools suitable to his or her field of knowledge for entrepreneurship after graduation.
6. The nation's professional and vocational education curricula will be checked and supplemented with both the theoretical and functional elements of the entrepreneurship curriculum.

Acknowledgment

We are grateful to our teachers and senior colleagues who are helping us in one way or another to make an effort to create this piece of the manuscript. We also appreciated the sponsorship of Kano State Polytechnic Management for its important state aid.

References

- [1] P. O. Gyaase and A. Asante, "Stimulating ICT Entrepreneurship In Ghana , The Long Way Forward," *Res. J. Inf. Technol.*, vol. 1, no. 2, pp. 1–14, 2014.
- [2] A. O. Iwu and R. C. Nzeako, "ICT as a Viable Tool for Entrepreneurship Education," *J. Educ. Soc. Res.*, vol. 2, no. 9, pp. 125–131, 2012, doi: 10.5901/jesr.2012.v2n9p125.
- [3] Jainaba M.L. Kah and M. M. O. Kah, "ICT and Socio-Economic Development : a University' S Engagement in a Rural," 2008.
- [4] F. G. Oladimeji TT, "ICT and Its Impact On National Development in Nigeria -A Conceptual Analysis ICT and Its Impact On National Development in Nigeria – A Conceptual Analysis," *Res. Rev. J. Eng. Technol.*, vol. 7, no. 1, pp. 83–90, 2018, doi: 10.22624/AIMS/iSTEMS-2019/V15N1P9.
- [5] P. M. Cunningham, M. Cunningham, and L. Ekenberg, "Factors impacting on the current level of open innovation and ICT entrepreneurship in Africa," *Electron. J. Inf. Syst. Dev. Ctries.*, vol. 73, no. 1, pp. 1–23, 2016, doi: 10.1002/j.1681-4835.2016.tb00526.x.
- [6] E. Ngozi, "ICT ENTREPRENEURSHIP DEVELOPMENT: A WAY OF ALLEVIATING POVERTY IN NIGERIA," *J. Manag. Entrep. Dev.*, vol. 2, no. 1, pp. 27–32, 2012.
- [7] A. Tavakoli, "Impact of information technology on the entrepreneurship development," *Adv. Environ. Biol.*, vol. 7, no. 8, pp. 1421–1426, 2013.
- [8] S. A. Gedeon, "Measuring Student Transformation in Entrepreneurship

- Education Programs," *Educ. Res. Int.*, vol. 2017, pp. 1–12, 2017, doi: 10.1155/2017/8475460.
- [9] G. John, P. D. Igwe, and S. R. P. D. Abiye, "ICT Entrepreneurship and Small Business Innovation: A Mechanism for Sustainability," *Eur. J. Bus. Manag.*, vol. 3, no. 6, pp. 103–112, 2014.
- [10] R. Duncombe, "The Role of Information and Communication Technology for Small, Medium and Micro Enterprise Development in Botswana," 1999.
- [11] A. T. O and O. Grace, "Entrepreneurship development in business education in Nigeria," 1986.
- [12] A. S. Garba, "Refocusing education system towards entrepreneurship development in Nigeria: A tool for poverty eradication," *Eur. J. Soc. Sci.*, vol. 15, no. 1, pp. 140–150, 2010.
- [13] D. A. Crisan, A. C. Joita, H. Zwaga, and M. Sebea, "Integration of Entrepreneurship With Ict Competencies Into Higher Education Institutions Curricula: a Proposal," *J. Inf. Syst. Oper. Manag.*, pp. 1–12, 2014, [Online]. Available: [http://search.proquest.com/docview/1537948158?accountid=14744%5Cnhttp://fama.us.es/search*sipi/i?SEARCH=18434711%5Cnhttp://pibserver.us.es/gtb/usuario_acceso.php?centro=\\$USEG¢ro=\\$USEG&d=1](http://search.proquest.com/docview/1537948158?accountid=14744%5Cnhttp://fama.us.es/search*sipi/i?SEARCH=18434711%5Cnhttp://pibserver.us.es/gtb/usuario_acceso.php?centro=$USEG¢ro=$USEG&d=1).
- [14] P. Sharma and Jaipur, "Women entrepreneurship Development in India," *Glob. J. Manag. Bus. Stud.*, vol. 3, no. 4, pp. 371–376, 2013, doi: 10.11113/jt.v64.2289.
- [15] G. Jagodič and V. Dermol, "ICT tools for the development of entrepreneurial competencies," in *Joint International Conference, 2015*, no. May, pp. 2123–2129, [Online]. Available: <http://www.toknowpress.net/ISBN/978-961-6914-13-0/papers/ML15-455.pdf>.
- [16] M. Lind, "The Role of Institutions and ICT Entrepreneurship in Developing Countries - The case of Cameroon," 2011.