POTENTIAL ENTREPRENEURSHIP CAREERS OF FOURTH INDUSTRIAL REVOLUTION-BASED IN SAUDI ARABIA

Yusuff Jelili Amuda, Prince Sultan University

ABSTRACT

Several scholarly studies have investigated entrepreneurship in the context of Saudi Arabia. Since few years ago, there is an emphasis on need to meet the requirement of the fourth industrial revolution. Nonetheless, little focus is given on the potential of entrepreneurship careers of fourth industrial revolution (i.e. acceleration of digitization of socio-economic development as well as automation of different careers) in the country. The primary objective of this paper is to examine the potential entrepreneurship careers of fourth industrial revolution in Saudi Arabia. Systematic literature review (SLR) Qualitative library-based content analysis is employed in this research. The findings of the paper demonstrate that, there will be change in careers in Saudi Arabia, when organizations subscribed to 4th IR and automation. It is further reiterated that, there will be new careers as an integral part of fourth industrial revolution and old careers will be disappeared. Nonetheless, it is established that human roles will be needed in different aspects such as managerial skills and high decision making skill that cannot be digitized or automated. As a result of this, there is need for companies to utilize cyber physical space to in order to plan new careers that will include females in entrepreneurship activities in the country. Therefore, it is suggested that, the policymakers should be acquainted with the potential entrepreneurship careers of the fourth industrial revolution in fostering socio-economic development of the country.

Keywords: Fourth Industrial Revolution, Entrepreneurship Career, Digitization, Automation, Cyber Physical Space and Socio-Economic Development.

INTRODUCTION

The central focus of the fourth industrial revolution by the world leaders and technological experts is towards acceleration of digitization of socio-economic development as well as automation of different careers. In so doing, it will surely have significant impact on entrepreneurship career of most youths in the context of Saudi Arabia. Since the emergence of the 4th industrial revolution, many studies have emerged to offer substantial contributions to career development towards meeting the challenge of workforce in the nearest future (Schwab, 2016; Hirschi, 2018). Literature have been frequently referring to digitization and automation of various works as the core aspects of current industrial revolution. This means that, in the nearest future, most of the middle or low skilled jobs shall be digitized and automated but the high skilled works such as decision making and managerial skills will still be required in the workforce. It is undoubtedly noted that, the aforementioned factors (i.e. digitization and automation of work) shall substantially play significant role in the nature of discharging tasks or works, trade, commerce and business in the nearest future (Hirschi, 2018). This consequently will bring about changes in the way we tend to carry out some task and work.

As a result of changes that will occur in the workforce may lead to many people losing jobs that need human involvement in discharging their responsibilities. This means that, most current occupations may not be able to withstand the overwhelming changes that will occur in the workforce. It is noteworthy to say that, literature acknowledges that, it is not all about bringing changes but the sad changes will lead to the emergence of news industries that will lead to new ways of carrying out tasks in the industries. In this regard, digitization or digital economy thus may play an important role in shaping the future career in most developing and developed countries.

Nonetheless, overwhelming literature on entrepreneurship in Saudi Arabia largely focuses on female (Salem, 2014) and educational entrepreneurship (Henry, 2012) and there is an insufficient literature in the recent time that will cater for need to examine the potential of the 4th industrial revolution on entrepreneurship career in the county as Hirschi (2018) specifically and lucidly investigated the issues and effects of 4th industrial revolution on career research and practice. Hence, the discourse on entrepreneurship in the context of Saudi Arabia does not substantially provide a framework within the lens of digital economy and automation as earlier study by Hirschi (2018) emphatically stressed on this with regard to the career research and practice. It is on this note that several issues surrounding potential entrepreneurship of the 4th industrial revolution-with specific focus on digitization and automation of work- in connection with the viability of on entrepreneurship career in Saudi Arabia. Thus, the potential of entrepreneurship programmes especially as being championed by Prince Sultan Entrepreneurship Institute (SPEI) in the country. Hence, review of related literature is explored.

LITERATURE REVIEW

This part presents review of related literature. The literature is presented under the following subheadings: An Overview of the Fourth Industrial Revolution, the Emergence of Cyber-Physical Systems (CPS) in the Industry 4.0, and Changing the Structure of Entrepreneurship Career in Saudi Arabia. Then, conclusion is suggestions are presented thereafter.

An Overview of the Fourth Industrial Revolution

An overwhelming literature on entrepreneurship in the country remarkably does not capture this trend. It is important to stress that, some vital potentials of the 4th industrial revolution in building career programmer that will revolutionize the discourse on entrepreneurship in Saudi Arabia. Similarly, the existing frameworks of entrepreneurship will be fostered through the perspective of integrating them with the requirements of the 4th industrial revolution as advocated for by the experts.

Prior to the discourse on the 4th industrial revolution, there were three successive industrial revolutions since few centuries ago which have significant impact of human endeavours. For proper understanding of the industrial revolution, literature such as Frey & Osborn (2013) adequately put successive main industrial revolution as follows: the mechanical production was predominant in the late 18th Century which is considered as the first industrial revolution. In the late 19th Century, there was predominant mass industrial production and the predominant use of personal computers and Internet in the 1960s could be considered as third industrial revolution.

The 4th industrial revolution or otherwise tagged as Industry 4.0 is a current phenomenon that is expected to bring changes to all faces of human endeavours. Precisely, the first reference

to the fourth industrial revolution became a subject to research on by the Federal Ministry of Education in German since 2011. It was subsequently acknowledged that different countries began to explore the potentialities of integration of Internet with the industries in order to maximize the benefit of digitization with current technology by rapidly expansion the scope of socio-economic changes in different parts of the world. Geoff (1999) contends that:

The world has moved from industrial age to the information age. The environment within which nations, governments, organizations, and individuals live has changed-and indeed is changing already. The skill and knowledge described earlier will be applied to new purposes. Old purposes will disappear and with them old jobs. As workers around the world are already discovery, they must be adaptable, prepared to change jobs several times during their working lives, prepared to be re-educated or retrained, or risk being shunted aside by unceasing and accelerating.

The above-quotation is very succinct that the change is inevitable and there is need to be responsive to the change. However, Geoff (1999) made a distinction between industrial age and information but studies have demonstrated that information age is an integral part of fourth industrial revolution because digitalization and automation are essential underlining dimensions of the 4.0 industry (Cardenas et al., 2009; Fletcher & Liu, 2011; Hirschi, 2018).

With this trend, Saudi Arabia should creatively and innovatively tap from this potential by envisaging the future of workforce in the country. This can be adequately explored from fostering entrepreneurship career in the context of Saudi Arabia. There are various elements inherent with the 4th industrial revolution such as: artificial intelligence, cloud computing, biotechnology and many others.

It should be stressed that the position of Hirschi (2018) is in consonance with earlier assertion of Brynjolfsson & McAfee (2014) that the current emphasis of technological changes is to eliminate cognitive and human works (Hirschi, 2018) instead of supporting human engagement in works with technological use which is predominant in the third industrial revolution as being referred to as 'second machine age' by Brynjolfsson & McAfee (2014). The assertion about elimination of cognitive and human works as being incessantly mentioned in studies require policy formulation that will bring about new entrepreneurship career development in the context of Saudi Arabia. This is essentially important in order to respond to the technological and socio-economic needs of the country.

It is as a result of paramount needs that literature such as Ford (2015) contends that the advancement of technology will bring new dimension to new emergent socio-economic development of the next generation in both developed countries like U.S., German, Australia, South-Korea as well as developing countries like Africa (such as Saudi Arabia, South-Africa, Ghana etc.) and Asian countries (such as Malaysia, Singapore and Saudi Arabia). This should not only be the focus of developed countries but developing countries like Saudi Arabia should also make its entrepreneurship programmes specifically as demonstrated by Prince Sultan Entrepreneurship Institute (SPEI) (2011) which other institutions of higher learning should emulate in making the programmer viable alongside with the country's motive to attain vision 2030 as studies contend (Henry, 2012; Salem, 2014).

The Emergence of Cyber-Physical Systems (CPS) in the Industry 4.0

Notably, cyber-physical systems (CPS) is commonly used in connection with the forth industrial revolution specifically considering the roles of smart industry with specific focus on social and technological expectations in making most of smart factories achieve their targets

(Cardenas et al., 2009). Since the smart factories are emerging, also, the clients of the factories have cyber-technological orientation. This basis has posed the challenge of reviewing the entrepreneurship orientation of the citizens in the context of Saudi Arabia in order to respond to the needs of near future as an integral part of industry 4.0. This is necessary because there is increase in what Pirvi & Zamfirescu (2017) termed as "*Experience Economy*" specifically among Y generations (those that were born between 1980 and 2000) and Z generation (those that were born after 2000) are considered as clients to products from smart factories because their desire to buy a particular product is triggered by their clicks on the Internet Browser in ordering for the product of their interest. With this trend, most literature on entrepreneurship skills in the context of Saudi Arabia (Salem, 2014; Prince Salman Entrepreneurship Institute, 2011) keeps silent of this.

Hence, the country needs to speed up about reviewing its entrepreneurial programmes in order to achieve its vision 2030s on sustainable development. In spite of this assertion, this does not means that, there is no literature emphasizing on the significance of Information and Communication Technology (ICT) and it is the progress in ICT that promote the socio-economic digitalization. However, the current trend on digitization and automation as an integral part of the Industry 4.0 provide powerful computational technological capacities (Industry 4.0., 2014). It is in this regard that, there is need for policy formulation that will specify and prioritize cyber-physical in the context of Saudi in order to meet up the global trend in responding to the needs of 4th industrial revolution (Cardenas et al., 2009; Fletcher & Liu, 2011).

Lessons from Changing the Structure of Entrepreneurship Career in Saudi Arabia

The paramount importance of entrepreneurship as an essential factor in building economy that will fulfil the needs of the nations has been elaborated in the study of Saleem (2014) as evidence from developing countries. Notably, studies have explored academic entrepreneurship and the roles of Prince Salman Entrepreneurship Institute (2011) pertaining to strategic plan on integration of entrepreneurship into academic rigour in the country. In the past, women are not considered as important contributors to a nation building in different parts of the world. However, in the context of Saudi Arabia, there is an advocacy for women's involvement in entrepreneurial activities in order to address the rate of unemployment in the country (Muhammad & Basheer, 2010; Yousuf & Lawton, 2012). Similarly, It is not disagreeable to say, literature contends that planned behaviour of entrepreneurial activities is determined by intention about entrepreneurial activities as the theory of planned behaviour is explicated (Aloulou, 2016a; Aloulou, 2016b). Little effort is made with regard to the need to respond to the challenge of forth industrial revolution by responding to the entrepreneurship of the citizens.

Furthermore, as the phenomenon of occupation is drastically changing in most advanced countries. The face of labour market too is also changing in countries like U.S. and Europe as a result of technological advancement or clamour for Industry 4.0. This change necessitates the need that entrepreneurship career should be made viable by considering the need of nearest future as literature claims (Brynjolfsson & McAfee, 2014). This is necessary because, literature contends that, most of many middle skills jobs such as computer operators, office administrators are considered to be automable as a result of with the trend of technological advancement. It is thereby noted that most employment being done by human beings is at risk of being taken as automation in the nearest future. This position, for instance, has been established in a report given by Frey & Osborne (2013) that almost 47% of most employment in the U.S. is a risk of

being considered as automation as a result of digitization of most occupations being carried out by humans such as middle skilled workers.

Nonetheless, studies have identified that despite the fact that there is an emphasis on automation, certain jobs such as creative intelligence, social intelligence and perception and manipulative skills cannot totally be automated. Nevertheless, study conducted by Arntz et al. (2016) lucidly shown that 70% of the current occupations in the U.S. have potential of being taken as automated. Nonetheless, 9% of individual workers are at risk, German and Austria have 12% while South Korea and Estonia have 6% of jobs that have potential of digitization and automation as literature explicates Arntz et al. (2016).

Literature contend that certain jobs especially high skilled jobs such as: educators, managers, technicians) and low-skilled jobs (e.g. security guards, cleaners are difficult to automate with the current discourse on technological advancement and digitization because most of highly-skilled jobs require social interaction of high level as well as creative and problem solving skills (Hirschi, 2018). But contrarily, most people that involve in middle-skilled jobs will be systematically reduced as lower paid occupations in the nearest future.

With all the foregoing assertions, since most of the advanced countries like U.S., German, Australia, South Korea among others have potentials that some jobs will be automated with technological advancement, it is important therefore developing nations like Saudi Arabia work assiduously to ensure that it rises to this challenge that most recent studies have made clarion call for (Frey & Osborne; 2013; Ford, 2015; Arntz et al., 2016; Hirschi, 2018).

It is not deniable that, the extent by which the most important elements of the 4th industrial revolution (i.e. digitization and automation) would hinder the demand of workforce has not been clearly established in the literature. It is due this fact, that the analysis done according to the studies conducted by European Commission (2016) demonstrated that there is an estimate of 110 billion Euro of revenue generated annually in Europe until 2021 pertaining to the impact of digitalization. Thus, Saudi Arabia can also emulate this trend specifically by providing an enabling environment in improving existing as well as creating more entrepreneurship programmes that will go alongside with the contentions of digital economy as well as cyber-physical systems the literature emphatically stressed (Lee, 2008; Pirvi & Zamfirescu, 2017). In not shell, literature review has presented that, this paper undoubtedly, should be considered as a model for addressing pressing issues of entrepreneurship career in the context of Saudi Arabia as response to the advocacy of different studies on entrepreneurship in the country.

METHODOLOGY

The methodology employed in this paper is systematic literature review (SLR) Qualitative library-based content analysis. More importantly, studies such as Pittaway, & Cope (2006) have demonstrated the significance of SLR in order to show clarity of ideas. As part of the methodology, the research identified some essential key words namely: The themes are follows: fourth industrial revolution (FIR) (digitization & automation); cyber physical system (CPS), Entrepreneurship career (ETC). The aforementioned keys are considered as the major themes generated from the review. Hence, the findings of the review of literature is explained based on different keys identified in the paper. Nonetheless, it should be demonstrated that, there are different limitations with regards to the use of systematic literature review (SLR) and qualitative library-based content analysis. The researchers cannot claim that all essential studies on the fourth industrial revolution are accessible to the researchers but the present research will show a direction for the future research respect to the need of the fourth industrial revolution in the

aspect of entrepreneurship career in the context of Saudi Arabia. It is also important to say that, this paper is not equating the use of both systematic literature review (SLR) and qualitative library-based content analysis with an empirical data. Hence, the analysis of this paper is based on the basic themes generated in responding to the overall thesis of the study. As a result, potential entrepreneurship careers can be improved as a response to the fourth industrial revolation in the context of Saudi Arabia.

RESULTS AND DISCUSSION

This part presents the overall findings and discussion of this paper. Based on systematic literature review (SLR) and qualitative library-based content analysis, a number of themes generated were analyzed. The themes are follows: fourth industrial revolution (FIR) (digitization & automation); cyber physical system (CPS), Entrepreneurship career (ETC). Each of these is explained in the subsequent paragraphs.

First, based on the findings of the paper, it has been demonstrated that fourth industrial revolution is linked with the use and application of computers and Internet as an integral part of third industrial revolution (Frey & Osborn, 2013). An inference can be drawn that, Saudi Arabia should formulate a policy in making a central focus on research about the fourth industrial revolution especially. The sub-components of industrial revolution (i.e. digitization and automation) are identified in utilizing technology for socio-economic development (Geoff, 1999). Despite the fact, literature acknowledges industrial revolution, Geoff (1999) said that industrial age of the past is different from the current information age. Nonetheless, information as argued by Geoff (1999) is still an integral part of the fourth industrial revolution. Hence, the elements of the fourth industrial revolution (i.e. digitization and automation) (Fletcher & Liu, 2011; Hirschi, 2018) can be incorporated into entrepreneurship career in Saudi Arabia. The findings have further demonstrated that, digitization and automation are indicators of technological tools for enhancing socio-economic development (Ford, 2015) whereby, studies have shown that, there would be elimination of some works that need human involvement (Brynjolfsson & McAfee, 2014; Hirschi, 2018). Despite the fact, the literature envisages that some human works would be eliminated, nonetheless, work that require highly managerial skills and decision making cannot be eliminated with digitization and automation as core elements of fourth industrial revolution. It is in this regard, that entrepreneurship career should be improved for instance with the role of Prince Sultan Entrepreneurship Institute (SPEI) (2011) in responding to the needs of the fourth industrial revolution. This is in line with the position of Centobelli et al. (2018) advocating for the development of entrepreneurship universities.

Second, there are various smart industries in the modern time across the world. It is noteworthy to say that, cyber-physical systems (CPS) is promoted in order to enable them achieve their target. An inference can be made that, cyber-physical systems (CPS) can be used in the context of Saudi Arabia in fostering the economy as literature contends (Pirvi & Zamfirescu, 2017). Integrating this into entrepreneurship career will improve the overall socio-economic development of the country. It is noted that Industry 4.0 (2014) provides an opportunity for powerful computational technological capacities in order to provide efficiency for the industries.

Third, regarding entrepreneurship career, it is important to stress that, the findings of this paper showed that, there will be change in careers in Saudi Arabia, when organizations subscribed to the element of 4^{th} industrial revolution (digitization and automation), there will be new careers in the country and old careers will not be able to withstand the challenge of the fourth industrial revolution. The new careers should also be planned for inclusion of female

citizens in the entrepreneurship programme in order to solve the problem of unemployment in the country as literature explicates (Muhammad & Basheer, 2010; Yousuf & Lawton, 2012).

CONCLUSION

This paper has explored different perspectives on 4th IR to accelerate digitalization on social economic development and different careers. Similarly, the paper has explicated on the essential components (digitization and automation) of the 4th industrial revolution and its implication for the entrepreneurship career in the context of Saudi Arabia has been explicated. It has been argued that studies have demonstrated that the aforementioned components (i.e. digitization and automation) have potentials in bringing desired changes to the pattern of works in the nearest future. The paper has further shown that cyber-physical systems (CPS) are an integral part of industry 4.0 which instrumental in helping factories have their goals. It has been explained that, cyber-technological mindset is an important element for the success of the 4th industrial revolution. It is therefore noted that any scholarly discourse of recent in Saudi Arabia pertaining to entrepreneurship career should be cognizance of cyber-technology. It is suggested that, the policy-makers and stakeholders should be cognizance of the need to be responsive to the need of fourth industrial revolution by integrating entrepreneurial skills into the schemes of things in the country. Also, this study should be investigated empirically in the context of Saudi Arabia.

LIMITATIONS AND POLICY IMPLICATIONS

The prime limitation of this paper lies on the fact that, it is not an empirical paper that relies on empirical data, however, the use of systematic literature review as methodological approach of shows that, it still contributes to potential entrepreneurship career as a response to the 4th industrial revolution in the context of Saudi Arabia. This paper has provided theoretical basis for the direction towards policy formulation that will cater for the extinction of certain jobs as a result of digitization and automation as projected by the experts in the fourth industrial revolution. The policy makers should consider cyber-physical systems (CPS) as part of policy formulation in promoting smart factories in Saudi Arabia with specific focus on the potential entrepreneurship career in the country. Citizens should be equipped with necessary technological skills that will promote digitization and automation in the country.

REFERENCES

Aloulou, W.J., (2016a). Predicting entrepreneurial intentions of freshmen students from EAO Modeling and personal background: A Saudi perspective. *Journal of Entrepreneurship in Emerging Economies*, *8*(2), 180-203.

Aloulou, W.J. (2016b). Predicting the entrepreneurial intentions of final year' business students' applying the theory of planned behavior in Saudi context. *The Journal of Small Business and Enterprise Development, 23*(4), 1142-1164.

Arntz, M.T., Gregory, T., & Zierahn, U. (2016). The risk of automation for jobs in OECD countries: A comparative analysis *(OECD Social, Employment and Migration Working Papers, No. 189)*.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York, NY: Norton.

Cardenas, A., Amin, S., Sinopoli, B., Giani, A., Perrig, A., & Sastry, S. (2009). Challenges for securing cyber physical systems. *In Workshop on Future Directions in Cyber-Physical Systems Security, 5*(1).

Centobelli, P., Cerchione, R., & Esposito, E. (2019). Exploration and exploitation in the development of more entrepreneurial universities: A twisting learning path model of ambidexterity. *Technological Forecasting and Social Change, 141*, 172-194.

Dries, N., & Verbruggen, M. (2012). Fresh perspectives on the 'new' career: Introduction to the special section. *Journal of Vocational Behavior, 81*, 269–270.

European Commission (2016). *Digitising European Industry* (European Commission Digital Economy & Society).

Fletcher, K.K., & Liu, X. (2011). Security requirements analysis, specification, prioritization, and policy development in cyber-physical systems. *In 5th Conference on Secure Software integration and Reliability Improvement Companion*, 106-113.

Ford, M. (2015). *Rise of the robots: Technology and the threat of a jobless future*. New York, NY: Basic Books.

Frey, C.B., & Osborne, M.A. (2013). *The future of employment: How susceptible are jobs to computerizatio*n? Retrieved from University of Oxford, Oxford Martin School website: https://www.oxfordmartin.ox.ac.uk

Geoff, S. (1999). *Future Schools: Getting the Balance Right* in Education and the Arab World: Challenges of the next millennium. Abu Dhabi: United Arab Emirate, 184.

Henry, C. (2002). *Closing remarks at Research Forum: Promoting Female Entrepreneurship-Implications for Education, Training and Policy*. Centre for Entrepreneurship Research, Dundalk Institute of Technology, Dundalk, 19 November.

Hirschi, A. (2018). The Fourth Industrial Revolution: Issues and Implications for Career Research and Practice. *Career Development Quarterly, 66*, 192-204.

Industry 4.0. (2014). *The new industrial revolution How Europe will succeed*. Retrieved from: https://www.rolandberger.com/publications/publication_pdf/roland_berger_tab_industry_ 0_20140403.pdf.

Lee, E.A. (2008). Cyber Physical Systems: Design Challenges. *Technical Report* (Berkeley, University of California).

Muhammad, A.A., & Basheer, M.A. (2010). Doing business with impudence: A focus on women Entrepreneurship in Saudi Arabia. *African Journal of Business Management*, *4*(1), 1-11.

Pittaway, L., & Cope, J. (2006). Entrepreneurship Education: A Systematic Review of the Evidence. *National Council for Graduate Entrepreneurship Working Paper series* accessed from http:// www.ncge.org.uk/research.php on 16th March, 2020.

Prince Salman Entrepreneurship Institute (2011). *Strategic Plan (2011-2016)*. Kingdom of Saudi Arabia: King Saud University.

Pirvi, B.C., & Zamfirescu, C.B. (2017). Smart factory in the context of 4th industrial revolution: challenges and opportunities for Romania. *Series: Materials Science and Engineering, 227*, 1-10.

Salem, M.I. (2014). Building an Entrepreneurial Economy: Evidence from Developing Countries. *International Business & Economics Research Journal*, *13*(3), 629-636.

Schwab, K. (2016). The fourth industrial revolution. New York, NY: Crown Business.

Szirmai, A. (2011). Entrepreneurship, innovation, and economic development. Oxford: Oxford University Press.

Yousuf D.A., & Lawton S.H. (2012). Female entrepreneurship in Saudi Arabia: opportunities and challenges, *International Journal of Gender and Entrepreneurship*, *4*(3), 216-235.