Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.11, No.2, 2021

Jobs 4.0: Are Botswana Workers Ready?

Stewart Muchuchuti[1*] Patrick Ebewo (JR)[2] Kudzanai C. Muchuchuti[3] Wilbert R. Mutoko[4]
1.Snr Lecturer, School of Computing and Information Systems, Botswana Accountancy College
2.Snr Lecturer, Centre for Entrepreneurship Development, Tshwane University of Technology, South Africa
3.Lecturer, Department of Accountancy and Finance, BA ISAGO University
4.Snr Lecturer, School of Business and Leisure, Botswana Accountancy College

Abstract
This paper attempts to unravel the potential social effects of the fourth industrial revolution (4IR) on Botswana employees. The authors investigated employees' level of awareness and preparedness for an era of full blown 4IR adoption. Utilizing purposive sampling, a self-administered questionnaire was distributed to a sample of 52 employees in Gaborone. This work employed the Unified Theory of Acceptance and Use of Technology model (UTAUT). The major findings of the study are: 50% of respondents confirmed their preparedness for the adoption of 4IR technologies; 48% believed that the rest of employees in their organization were prepared for 4IR; 65% said they were prepared to embrace and take advantage of the efficiencies brought about by 4IR; job roles are likely to change significantly with some roles disappearing and new roles emerging; and critical thinking, complex problem solving, innovation and digital related skills are bound to be more in demand. The outcomes of this research will serve as a wakeup call to Botswana employees, to equip themselves and future generations with requisite skills, for the changing roles. Furthermore, organizations will also use the outcomes to consider reskilling their employees accordingly. For educators, the study will encourage consideration and alignment of the curricular while in terms of and for policy formulation, it will engender reflecting on the regulatory frameworks to align them to the demands of the new era.
Keywords: Fourth Industrial Revolution, industry 4.0, jobs4.0, future of jobs
DOI: 10.7176/DCS/11-2-05
Publication date: February 28th 2021

1 Introduction

The past three industrial revolutions, which were driven by the advent of steam engines, the discovery of electricity and the possibilities around the transistor and electronics respectively, led to phenomenal booms in industrial production. In the said revolutions, machines substituted manual labor, with the living standards of people improving over time because value added jobs were created (Simic, et.al., 2019). The first industrial revolution (1IR) disrupted jobs in agriculture and processing industries, with the inventions of new machinery. However, workers could still find jobs in industries with strong physical components (blue collar jobs). The second industrial revolution (2IR) saw a surge in the number of both physical (blue collar) jobs and office (white collar) jobs. There was a significant reduction of blue-collar jobs during the third industrial revolution (3IR) and an explosion in the white-collar jobs sectors. Evidently, with the shift and turns in the IR's workers continued to adapt to the changing work environments with more and more warming up to more intellectual jobs, particularly in the 3IR.

With the Fourth Industrial Revolution (4IR) imminent, defining new business models, commonly known as industry 4.0, powered by advances in Artificial Intelligence (AI), the Internet of Things (IoT) and other technologies and leading to the convergence of the physical and the digital, is predicted to rattle the status quo of not only established businesses but also the complexion of the job market. This new complexion of the job market, which we call jobs 4.0 in this study, will call for a paradigm shift by employees as they prepare for the new demands of the new jobs. The employer on the other hand will also need to retool employees to make them relevant to the new environment. Organizations will also have to recalibrate their policies to align them with the new employment laws, taxation and legal structures. Bonciu, (2017) postulates that 4IR will potentially eliminate not only the physical jobs but also intellectual jobs. What makes the changing nature of jobs mysterious and therefore hard to prepare for, is the exponential speed of propagation of the changes, the unprecedented scope of the envisaged changes and the huge impact on economic and social systems, according to Schwab, (2016).

The Bank of England, as noted by Bonciu, (2017) predicted a loss of about 80 million jobs in the USA and about 15 million jobs in the UK in the next 10-20 years' time. According to Kozul-Wright, (2016), developing countries are likely to lose the larger proportion of jobs, up to two thirds as robots would replace the low and medium skilled jobs.

To remain relevant and competitive, African nations, particularly Botswana, must play a significant role in the 4IR and avoid being left behind just as what happened with the other revolutions. This might prove to be a challenge because some parts of the country still do not have electricity and Internet connectivity remains a challenge. There are some positives though that raise optimism for Africa. Many African countries are working to reduce the digital

gap. The period between 2005 and 2017 saw a 122 % increase in home Internet access, 41% increase in mobile telephone subscriptions and a 170% increase in mobile broadband subscriptions. Ericsson predicts that, around 80 percent of mobile phone subscriptions in Africa will be equipped with 5G technology, LTE and WCDMA/HSPA and an annual growth of 55% in mobile-data traffic by 2022 (Naudé, 2019).

In this study, we attempt to unravel the potential social effects of the 4IR on employees in Botswana. We investigate employees' level of awareness and preparedness for the revolution and attempt to answer several pertinent questions in this space. We also note that research in this space in Botswana at its infancy. To carry out research in the area, we ask the following questions:

1. Do Botswana employees know about the fourth industrial revolution?
2. Do they have what it takes to adapt?
3. Are they aware of the possible repercussions to their jobs?
4. Are they engaging in lifelong learning, in their professions, to prepare for the challenges ahead?
5. Are academic institutions producing 4IR ready employees?

The second section of this paper critically reviews literature on the potential effects of the 4th industrial revolution on jobs; the third section discusses the methodology adopted; the forth section analyses the outcomes of a survey on employee awareness and readiness and finally, the fifth section draws the conclusions and make the necessary recommendations.

2 Literature Review

Industry has experienced massive changes from the advent of the 1IR through the 2IR to the 3IR resulting in very significant efficiency improvements and corresponding improvements in the quality of jobs. 1IR entailed knowledge formulation which led to steam mechanization in accordance with Newton's law of motion. Whilst the 2IR resulted in mass production stimulated by the discovery of electrical power, 3IR led to automated production based on the discovery of the transistor and the resultant proliferation of the use of electronic circuits and Internet technologies. The three revolutions not only influenced production but also induced changes to the labour market and the educational sectors, howbeit manageable. Some professions and jobs disappeared, with the blue-collar jobs mostly affected. There was a shift from the traditional industrial jobs as more white-collar jobs were created. It is worth noting though that as these changes took place, there was a net improvement in the quality and number of jobs created with the quality of life improving (Simic, et.al., 2019). This section introduces the fourth industrial revolution, including its benefits and challenges. It then discusses the changes that are likely to take place in the labour market and concludes by highlighting what policy makers, employers, employees ought to do to prepare for the envisaged changes.

4IR) is inspired by the convergence of the physical and the digital worlds. The major drivers of 4IR include AI, IoT, 3D printing, Autonomous vehicles (AVs), Bio printing, gene editing technologies, material science, to name t a few. Many of these technologies build upon each other in a convergence of technologies across the biological, digital and physical realms. It is this fusion and interaction of these technologies across different domains: physical, biological, digital that make them fundamentally different from the previous revolutions (Schwab, 2016). Schwab, (2015) had this to say regarding 4IR:

> "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society"

From the quote above, 4IR is bound to fundamentally change all sectors of the economy, bringing with it some benefits and serious challenges and uncertainties as the technological revolution unfolds.

Simic, et al (2019) highlights some benefits and challenges that come with 4IR. With CPS, global networks for business, incorporating machinery, warehousing systems and production facilities are created, giving rise to tremendous optimization and production efficiencies. They noted that the Internet of Things brings together machines, equipment, networks, the cloud and terminals, products can be personalized. Chou, (2019) added that all sectors of the world economy would derive huge benefits from 4IR with huge positive effects expected. Traditional physical medical systems can be digitally transformed into CPS medical systems for improved quality and efficiencies. Smart factories will increase production efficiencies and reduce costs. A lot of benefits are expected in education, commerce, finance, tourism, transportation, construction and agriculture, as a result of digital transformation of physical operations through Big Data, IoT and Artificial Intelligence.

Regarding challenges, Simic et al (2019) have noted that 4IR challenges will manifest as technology, economic, political and social challenges. Whilst all the challenges highlighted here are of paramount importance, this study will focus on the social impact of the 4IR on the future of employment, particularly in Botswana.

2.1 Technology challenges

As businesses network more with customers, suppliers and even competitors, more transparent business ecosystems are created, increasing the risk of cyber-attacks and industrial espionage. Established companies which fail to transform to these business models may have their unique selling propositions eroded and eventually driven out of business. A lack of global standards, data sharing protocols and existing data quality may hamper seamless integration into these business models.

2.2 Economic challenges

The world is witnessing an unprecedented rise in start-ups since the advent of the 4IR. This surge is also being witnessed in Botswana, albeit at lower scales compared to the hype in countries like Kenya, Rwanda and South Africa, to mention a few. The life spans of businesses have been predicted to drastically reduce from the 60 years of the 1960s to 10 years by 2020. To remain in business, companies ought to view themselves as collections of start-ups, each at different maturity levels. They must constantly deal with competitors who endeavour to continue reducing the time to market, have shorter product life cycles and are constantly reducing costs. Markets have become more volatile and more heterogeneous than ever before with customers demanding more customized goods and services. Entirely new industries are being created with established businesses being presented with new competitive challenges. To remain competitive, businesses are collaborating with suppliers and competitors and in the process increasing the complexity of processes and exerting financial pressure on the business.

2.3 Political Challenges

Policy makers are faced with fresh challenges relating to the use of big data and protection of privacy thereof. They also need to create new legal frameworks to facilitate coordination and collaboration of different business units. With growing work flexibility grows the need for expansion of regulatory frameworks for employees for their protection from unwarranted exploitation.

2.4 Social Challenges and the future of jobs

One of the greatest challenges to the implementation of a digital regime of the 4IR is the unavailability of skilled digital workers compounded by a general lack of a digital culture in organizations. Schwab, (2015), Simic, et al (2019) and Bonciu, (2017) all concur that the number of workers will substantially decreases when it comes to use of automation, with the remaining jobs becoming more knowledge based, more short term tasks and tasks which are hard to plan. Soon, laborers performing low skill, repetitive tasks will be replaced. Demand for software development, monitoring, collaboration, training, creative skills will be on the rise as processes become more complex. Engineers will be required to design and implement the new technologies and industrial data scientists will be required to analyse data and improve processes. One serious challenge as noted by Chou, (2019) is how to manage worker displacements as they constantly face stigma and discrimination on the job market. Studies show that displaced workers tend to receive fewer interview invitations than their currently employed counterparts. With time their self-esteem gets depleted owing to social pressures that include mounting financial woes.

According to Chou, (2019), there will be fundamental reduction in the labor market rather than incremental. The 4IR affects all industries in all countries transforming production, management, and governance systems in the process (Schwab, 2015). Examples of transformed systems include medical imaging, warehouse management , receiving orders at fast foods restaurants (BSR, 2016), physical and manual work (Manyika and Sneader, 2018), repetitive work, white collar roles, including telemarketers, data entry clerks, sales workers, and even lawyering (Chadwick, 2018) and creation of jobs in both low and skilled roles (OECD, 2017b). The 4IR technologies will likely affect the quantity and types of jobs available, with automation of routine tasks replacing both high skilled and low skilled jobs with total displacement of workers by automation estimated at 47% in the coming decades and as low as 9% in the US (BRS, 2016). It will be challenging to automate jobs that require more complex perception and manipulation, or high levels of creativity or social intelligence (Manyika, et al, 2018).

Manyika, et al (2018), based on three scenarios, found out that about 400 million workers (15% of the world workforce), could lose jobs courtesy of automation, in the period 2016–30 with 30 percent (800 million workers) under the fastest scenario and only about 10 million people displaced under the slowest scenario.

While majority of authors (Schwab (2015), Manyika, and Sneader (2018) and BSR (2016)) expect mostly low-level jobs to be replaced by machines, Chou, (2019), argues that even tasks requiring acuity, deftness, and flexibility can now be carried out by machines. Today's tech enhanced systems can perceive, learn, and carry out complex tasks requiring beyond just physical precision and capability. These CPS systems can interface and interact with customers and collaborate without human intervention. These changes are bound to affect a significant number of employees. Chou (2019) further argues that there was displacement of jobs during

the first three industrial revolutions, but their repercussions were easily managed because of the limited speed and comprehensiveness of changes to the labor market. This might not be the case with the repercussions of 4IR technologies.

Prescaru (2016) foresees an increase in better paying, safer, new roles compensating the lost low-level jobs. Furthermore, employees may require completely different skills and some jobs might become completely redundant. (BRS 2016; Chou (2019)). Research has shown that the rise of ATMs in the US led to an increase in the demand for relationship managers and therefore who employees became redundant as tellers had to be reskilled to take up these new responsibilities. Manyika et al. (2018), also argue that there is work for all now and in the future with automation. The labor force should be able to adapt and embrace new skills. They argue that there will be a surge in the demand for advanced technological skills higher cognitive, emotional, programming and social skills.

BSR (2016) states that 50% of Americans are doing jobs that did not exist 25 years ago and that number is likely to increase significantly in the next 25 years. App developers, cloud computing specialists, and data scientist professions were created by the advent of new technologies (Baldassari and Roux (2017). From the research carried on by Manyika et al. (2018), there might be additional labor demand of between 21% and 33% by 2030 and this will offset the number of jobs lost. Such gains are already being witnessed in India where the working population is increasing rapidly. They argued that the 4IR will revitalize economic growth.

Other schools of thought stipulate that the 4IR technologies will not displace workers but will complement them and increase productivity and efficiency. The Chartered Institute of Personnel and Development did a literature review on the three emerging 4IR technologies and found out that technology is augmenting what people are doing and enables some degree of role expansion for employees (de Ruyter, 2019). There will be a requirement for finance professionals, for example, to have a deeper understanding of the technological drivers of the digital age to effectively manage the finance function. (Farrar, 2019).

In the manufacturing sector, there will be increased demand for workers with hard skills to manage, maintain, and work alongside robots and another demand for workers with soft skills like creativity, flexibility, openness to change and teamwork. Demand for engineers, programmers and data scientists will also increase. (BSR, 2016). Manyika et al. (2018) predicts that only about 5 percent of occupations could be fully automated even though almost all occupations will be affected by automation. This implies that most workers will work alongside rapidly evolving machines resulting in changes in their occupations.

2.5 Preparation for jobs 4.0

According to Schwab (2015), the response to 4IR should be across-the-board, and should involve all stakeholders of the global community, across sectors of the economy, to academia and to civil societies. Germany introduced an Industry 4.0 in 2011, which involved contributions from industry, government and unions on its implementation within a much broader digitalization strategy (Federal Government of Germany 2014) and quite several other European nations have followed suite. (Digital Transformation Monitor 2017). This helps all stakeholders to show commitment in unlocking the potential of 4IR.

2.5.1 Employers

Farrar (2019), opines that employers should appreciate the disruptive impact of digital technology on their organization's business model and study the technology solutions used by their supply-chain partners and other industry players. There is also need for critical thinking regarding building and retaining the right skills and talents for employees. WEF (2016) suggests that employers should consider whether to prioritise automation or augmentation to prepare for the future of work and hence carefully consider investing in reskilling their workforces. Extensive training will be required to transform the skills and knowledge of the current workforce to prepare them for the 4IR new jobs (Chou 2019).

2.5.2 Regulators and policy makers

According to Farrar (2019), regulators and policy makers should understand the influence of technology in redefining the relationship between organizations and regulators. There is need for cross- industry and policymaker collaborations using digital technologies. They need to think about how to address and offer incentives for the re-skilling of labor for the 4IR including movement to a lifelong learning philosophy in anticipation of future skill requirements. The International Labor Organization (ILO 2018) advocates for lifelong learning, substantial public funding, robust vocational education provision, business participation incentives, and dialogue on the developments on the labor market for skills policies and the systems that are required for sustenance of digital workforces.

Regulators and policy makers need to implement political and social policies to alleviate the negative effects of 4IR and take proactive actions on job education and training. The current education and training systems focus on jobs which are already available in the market. This shows that there is need redefine learning outcomes by replacing the current mainstream pedagogical process, mainly lectures and examinations, to help students pursue learning outcomes which are more consistent with the Fourth Industrial Revolution (Chou, 2019).

Some governments are coming up with digital strategies to unlock the benefits of 4IR to their economies. The Australian government came up with a number of initiatives which include a National Innovation and Science agenda, the Next Generation Technologies Fund of the department of Defense to assist SMEs in supplying digital products to the defense forces, the Prime Minister's Industry 4.0 Taskforce and agreements with the German on collaboration among others (Dean & Spoehr, 2018).

2.5.3 Academics and tuition service providers

Farrar (2019), proposes collaboration between academics and tuition service providers with organizations to provide documentation on the best practice on the changing nature of jobs, help change, revitalize and instruct learners on tools and techniques critical for future employees to survive in the digital world. This applies to all organizational functions and the need for promotion of lifelong learning.

2.5.4 Employees

Farrar (2019) advised management accountants to review their work activities most prone to automation and enhance employee soft skills since the same are not easily substituted by technological solutions. In his view, tertiary education training providers should develop their own adaptation pathway to reflect the changes in the digital world and keep their subject areas broad in their lifelong learning because in the digital world, the more one specializes, the easier it is for them to be substituted by a machine. This advice applies to all people who occupy all occupations affected by 4IR. Employees are advised to embrace more than one profession.

Botswana's main contributor to GDP is the diamond mining sector. We predict that with the discovery of synthetic diamonds, there is bound to be pressure on the Botswana diamond extraction and polishing processes to take advantage of the 4IR in order to introduce efficiencies and reduce waste and costs. Robots could take over some repetitive manual tasks at the mines, such as big data analytics, artificial

Intelligence. The IoT will take centre stage in all areas of business, from financial decision making, human resource optimization, plant predictive maintenance, among others. While de Ruyter, et al. (2019) expects the 4IR technology to augment what people are doing and to enable some degree of role expansion, low level employees devoid of the required digital skills or the creative, collaborative, monitoring or critical thinking skills are at great risk of losing their jobs.

In preceding section, we argued that the 4IR will bring with its huge benefits to industry and commerce just as it would result in comprehensive and far reaching changes to the nature of jobs as we know it today.

2.6 Theoretical Framework

It is appropriate to take note that user acknowledgement and confidence are imperative for any new technology. In the process of structuring, assessing and predicting the reaction of clients to new inventions, fundamental understanding of why individuals accept technology is crucial. Different innovation acceptance models and hypotheses have been applied in a wide assortment of territories to comprehend and foresee client practices, for example, dieting, family planning, casting of votes, blood donation, breast cancer testing, turnover, the utilization of contraceptives. Their importance in adoption of technology cannot be overemphasized. Some of these theories incorporate for example, Fishbein and Azjen (1975) proposes Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) by Ajzen (1985; 2012), Davies (1989) Technology Acceptance Model (TAM), Ventakesh and Davis (2000) Extension of Technology Acceptance Model (ETAM), Rogers (1995) Innovation Diffusion Theory (IDT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003).

The UTAUT is amongst the most popular frameworks in the system adoption of general technologies. The theory looks to explain user expectation to utilize a data framework including the resulting behavior of users. The theory reflects several other theories (Venkatesh et al., 2003). This theory is incorporated model, which presents a superior image of the acceptance model than other theories. It represents an integrated merger of eight previous proposed models in IS theory. These models are: Technology Acceptance Model, Theory of Reasoned Action, combination of TAM and TPB, Theory of Planned Behaviour, Model of PC Utilization, Diffusion of Innovation, Motivational Model and Social Cognitive Theory. UTAUT distinguished four precursors of the acknowledgement of information systems. They were created by tailoring the fourteen initial constructs from eight acceptance theories (Venkatesh et al., 2003). The major constructs are effort expectancy, performance expectancy, social impact and encouraging conditions. As per Venkatesh et al. (2003), the four constructs are:

i. Performance Expectancy (PE): characterized as "the degree to which an individual believes that using the system will help a person to attain gains in job performance" (Venkatesh et al., 2003; p. 447). PE is considered a significant determinant of adoption aim, since people are bound to embrace technology when they anticipate it to be useful towards their jobs (Brown et al., 2010; mcKenna et al., 2013).
ii. Effort Expectancy (EE): defined as "the degree to ease associated with the use of a system" (Venkatesh et al., 2003, p. 450). Many, for example, Venkatesh et al. (2003) have demonstrated that effort expectancy had a significant influence on behavioural intention (e.g. Alsaif (2013), Alanazi, (2013), Hariri (2014), and Davis (1989)). Previous research speculates effort expectancy to negatively impact

adoption intention. Particularly when new technologies are seen as exceptionally unpredictable and difficult to be incorporated into day-to-day business activities, employee satisfaction reduces bringing about lower levels of reception expectation (Oliveira et. al. (2014); Choi et. al. (2010); Son & Benbasat (2007)). However, Chau and Hu (2002) are of a different opinion and they contend that effort expectancy has no huge impact on intention to use behavior.

iii. Social Influence (SI): characterised as "the degree to which an individual perceives that others believe a person should use the new system" (Venkatesh et al., 2003; p. 451). Social influence is significant in persuading individuals to acknowledge and utilize new technology, for instance, Al Awadhi and Morris (2008), Rogers (1995 & 2003), Taylor and Todd (1995), Venkatesh et al., (2003) and Lakhal et al., (2013). Social Influence happens when the goal to embrace a technology is influenced by the assessment of significant others and mirrors the degree to which clients accept that reference persons (e.g. managers, colleagues) figure they should utilize a technology. It depends on social influence theory, which recommends that users will in general carry on in accordance of important other opinions to comply with their expectations (Alwahaishi and Snasel, 2013; Mun et. al., 2006). This suggestion may influence people's perception and adoption intention if seniors or peers see technology as valuable (Mun et. al., 2006).

SI indicate how much a user perceives that significant others accept the individual could utilize the new system. The construct avows that an individual is affected by the way a user figure other will view the new technology. Social influence is spoken to (as subjective norm) in six of the theories adding to the UTAUT. According to Venkatesh et. al. (2003), social influence incorporates consideration of the individual's view of the opinion of others, their reference gathering's subjective culture, and specific relational concurrences with others, as well as the degree to which innovation is considered to enhance one's image or status in one's social framework.

iv. Facilitating Conditions (FC): as defined by Venkatesh et. al. (2003; p. 453), it is "the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system". Researchers in the information technology adoption field, such as Mutlu and Der (2017) and Imtiaz (2018), have discovered that the facilitating conditions theory positively impacts adoption of innovations. Chong's (2013) application of the ATAUT model on m-commerce adoption discovered that facilitating conditions had an impact on user behaviour intention to utilize m-commerce. Results from the UTAUT validation recommend that FC was noteworthy in both deliberate and compulsory settings in the underlying usage period, yet its effect on usage intentions disappeared after this.

2.7 Research Model

The research model utilized in this study depended on the Unified Theory of Acceptance and Use of Technology (Venkatesh et. al., 2003). This study applies the UTAUT model as a theoretical driver for this investigation: the study will follow the original model the original model, measurements, and analyses of Venkatesh et. al. (2003) as closely as possible in terms of reliability, validity, correlations, factor analysis and regression analysis. The independent variables in the proposed research model are presented below: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC). The dependent variables in the proposed research model are introduced as follows: (Behavioural Intention (BI) – is characterized as the individual's subjective chance that the person will play out the conduct being referred to (Venkatesh et. al., 2003). BI will be estimated by the expectation, prediction, and planned use of 4IR technologies.

The research model for this study is introduced in figure 1 below. The components of the model and its interaction is discussed in the following sections.

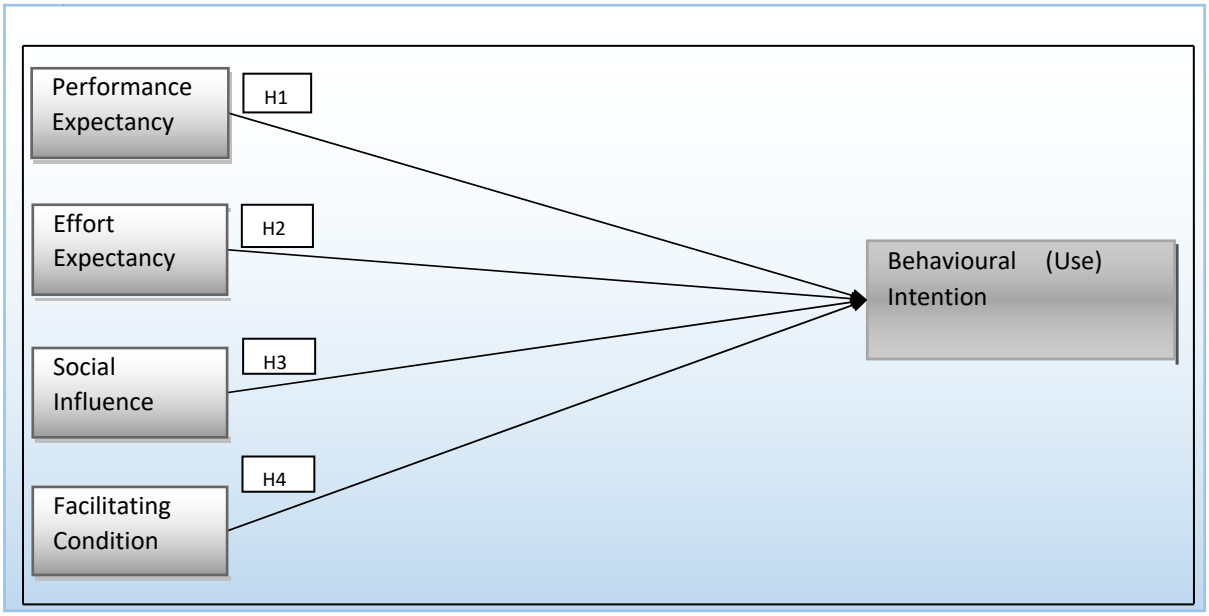

Figure 1: The research model (Venkatesh *et al*., 2003)

Based on the above, the following hypotheses have been proposed for this study.

H_1: Performance expectancy will have direct effect on the employees' intention to use 4IR technology.
H_2: Effort expectancy will have direct effect on the employees' intention to use 4IR technology.
H_3: Social influence will have direct effect on the employees' intention to use 4IR technology.
H_4: Facilitating conditions will have direct effect on the employees' intention to use 4IR technology.

3 Research methodology

This research adopted the positivistic paradigm, which mostly makes use of quantitative techniques in data gathering and analysis (Babbie & Mouton 2009), and tests theories by validating hypotheses and the identification and analysis of the relationships among the variables. The quantitative approach was deemed suitable for this research as it is used in testing objective theories deductively by analyzing the connections among factors (Creswell 2014), given that the model developed earlier shows relationships between constructs.

This study employs a descriptive survey design that was cross sectional in nature (Malhotra & Briks, 2007). The utilizartion of a cross-sectional plan was considered as appropriate for this research as this procedure has been used in past research on 4IR including UTAUT (Babbie & Mouton, 2009; Blumberg et al., 2011; Venkatesh et. al., 2016; Septiani, 2017; Xu et. al., 2018). In cross-sectional studies, Babbie & Mouton (2009) are of the view that factors of influence in a sample of subjects are evaluated once and the connections between them are resolved. Simple random sampling was utilised to collect data from employees in Gaborone, Botswana. The decision for simple random sampling is informed by the way that a representative group is obtainable, the chance of classification error is eliminated, most affordable and least time consuming.

The proposed conceptual model highlights five main variables of behavioural intention. These are: effort expectancy, performance expectancy, social influence and facilitating conditions, operationalised by behavioural intention. Scales developed in previous studies were adapted to suit the respective conditions in Botswana, thus the inclusion of self-efficacy and attitude towards 4IR technologies. In total, the questionnaire comprised of two sections: the demographic of respondents and measurement scales sections. A Likert scale (1 = Strongly Disagree; 5 = Strongly Agree_ and structured questions were employed.

Data from the questionnaires was captured on a spreadsheet and analysed using the Statistical Package for the Social Sciences (SPSS) version 25. Multivariate techniques including descriptive analysis, correlational analysis, autonomous t-tests and a variety of regression analysis were conducted. Cronbach's alpha was utilized to quantify the reliability of the multi-item scales of the questionnaire.

4 Results

4.1 Demographics characteristics of the Sample

Among the participants, 56% were males and 44% were females. There were more participants in the 36-45 years' age group (36.5%), followed by 26-35 age group (34.5%). Majority of the participants were from the following sectors in descending order of importance: Education (30.8%), ICT (13.5%), Construction & Engineering (13.5%), Finance & Banking (9.6%), and Management & Business Consultancy (7.7%). Majority of the participants (26.9%) had working experience of 10 to 14 years, followed by 0-4 years (19.2%), 15-19

years (17.3%), 5-9 years (15.4%). The qualification that had the highest number of participants was bachelor's degree (48.1%), followed by master's degree (38.5%) and lastly, diploma (11.5%).

4.2 Descriptive Analysis

- **Self-efficacy**

Concerning high understanding of 4IR technologies, majority of the participants (38.5%) were neutral, which means that they were not sure. This was followed by those that agreed and strongly agreed at a total of 38.5%. A total of 65.3% of the respondents either agreed or strongly agreed that they would utilize 4IR technologies. A total of 48.1% of the respondents either disagreed or agreed that in their organization, majority of employees were ready for the industrial revolution. A total of 50% of the respondents either agreed or strongly agreed that they are prepared for 4IR. A sum of 65.4% of the participants either agreed or strongly agreed that they are ready to take advantage of 4IR.

- **Performance Expectancy**

A total of 65.4% of the respondents either agreed or strongly agreed that they find 4IR technologies applicable in their jobs. A total of 65.3% of the respondents either agreed or strongly agreed that using 4IR technologies enables them to accomplish tasks more quickly. A total of 63.4% of the respondents either agreed or strongly agreed that using 4IR technologies increases their productivity. A sum of 67.3% of the respondents either agreed or strongly agreed that if they used 4IR technologies, they would have more chances for career development.

- **Effort Expectancy**

A total of 55.8% of the respondents either agreed or strongly agreed that their interaction with 4IR technologies would be clear and understandable. A total of 61.5% of the respondent either agreed or strongly agreed that it would be easy to become skillful in exploiting 4IR technologies. A total of 46.1% of the participants either agreed or strongly agreed that they find 4IR technologies easy to use. However, 36.5% of them were neutral. A total of 59.7% of the respondents either agreed or strongly agreed that learning 4IR technologies would be easy for them.

- **Social Influence**

A total of 51.9% of the participants either agreed or strongly agreed with the notion 'People who influence my behavior think that for me, it would be easy to use 4IR technologies'. However, 44.2% were neutral. A total of 53.9% of the respondents either agreed or strongly agreed with people who are important to me, believe that I should use 4IR technologies. A total of 40.4% of the participants either agreed or strongly agreed that management motivated them to use 4IR technologies.

- **Facilitating Conditions**

A sum of 25% of the participants either agreed or strongly agreed that they had the reasons and resources to use 4IR technologies, while 44.2% of the participants were neutral and 30.8% disagreed. A total of 59.7% of the participants either agreed or strongly agreed that it would be good to use 4IR technologies at work even if it was voluntary. 40.4% of the participants were neutral, while a total of 38.4% of the participants either disagreed or strongly disagreed that management does not require them to exploit 4IR technologies during work time. 44.2% of the participants were neutral and a total of 38.5% of the participants either disagreed or strongly disagreed that it is compulsory to use 4IR technologies at work. A total of 59.6% of the participants either agreed or strongly agreed that they would be using 4IR technologies.

- **Attitude toward Using 4IR Technology**

A total of 71.2% of the respondents either agreed or strongly agreed that using 4IR technologies is a good idea. A total of 65.4% of the participants either agreed or strongly agreed that exploitation of 4IR technologies makes my job more interesting. A total of 59.6% of the participants either agreed or strongly agreed that they will use 4IR technologies with pleasure.

- **Behavioural Intention**

A total of 50% of the participants either agreed or strongly agreed that they intend to use 4IR technologies in the next 12 months. A total of 46.1% of the participants either agreed or strongly agreed that they predict that they would use 4IR technologies in the next 12 months. A total of 40.4% of the respondents either agreed or strongly agreed that they will use 4IR technologies in the next 12 months. A total of 38.4% of the participants either agreed or strongly agreed that they will always try new advanced 4IR technologies. A total of 46.1% of the participants either agreed or strongly agreed that they must buy their own devices of 4IR technologies. A total of 50% of the participants either agreed or strongly agreed that they will not regret money for new 4IR. However, 40.4% of the participants were neutral. A total of 67.3% of the participants either agreed or strongly agreed that they want to have the most advanced means of communication. In addition, based on findings (figure 2 below), organisations ought to ensure that adequate long-term resources are available for upskilling (training & development) of their employees as well as acquisition of the necessary fourth industrial revolution technologies.

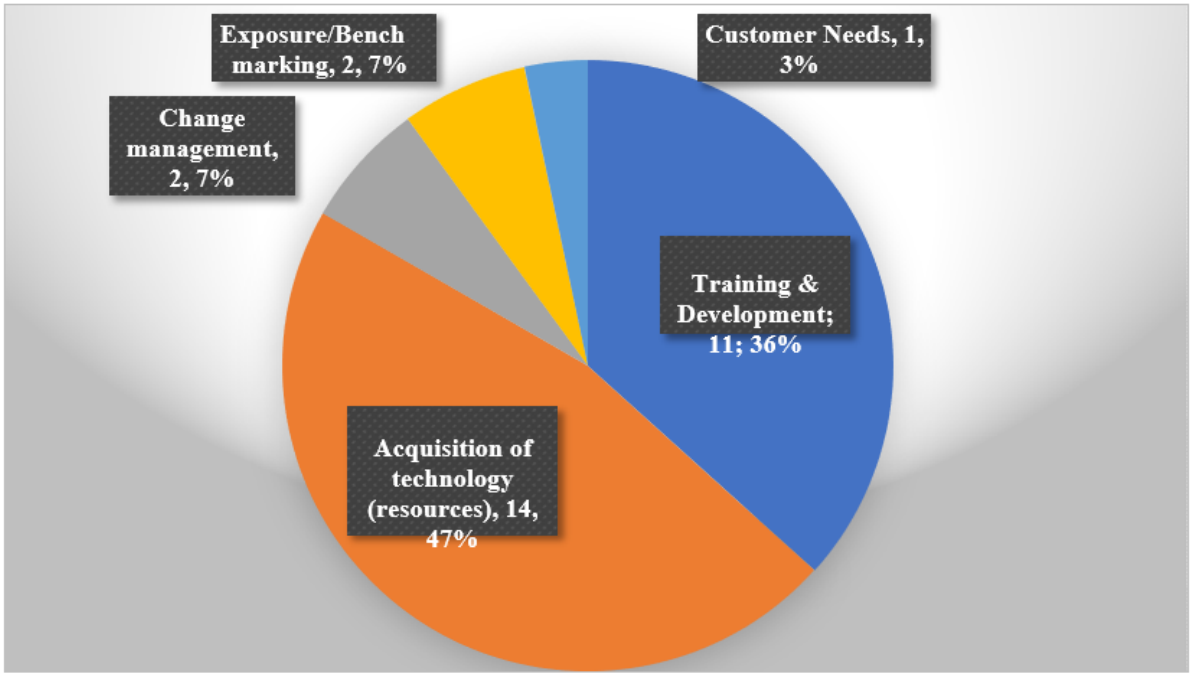

Figure 2: Respondents Recommendations

4.3 Reliability Analysis

The consistency of the variables were checked with the Cronbach's alpha statistics, tested using SPSS 25.0. It was essential to determine the dependability of the measurement items used to collect data, since the quality of any study relies on accurately measuring constructs under study. Cronbach's alpha was used to quantify the reliability of the multi-item scales of the questionnaire (Babbie & Mouton, 2009). Ensuring high levels of reliability was critical in order to minimise bias and to provide a rigorous test for theory (in-theory falsification) (Field, 2013). Except for Social Influence, whose reliability score fell below 0.7, all remaining scales were seen to have high proportions of reliability, exceeding 0.7. Table 3 illustrates the Cronbach's alpha associated with each of the 7 scales comprising the questionnaire.

Table 3: PCA Loadings of Variable Constructs (Cronbach's Alpha for the Sub-scales)

Variables	Factors retained	% variance	Cronbach's Alpha
Dependent Variable			
Behavioural Intention	7	53%	0.902
Independent variable			
Self-efficacy			
	15	46%	0.912
Performance Expectancy	4	82%	0.928
Effort Expectancy	4	81%	0.920
Social Influence	3	61%	0.666
Facilitating Conditions	8	36%	0.717
Attitude toward Using 4IR Technology	4	74%	0.884

In all cases, the scales exceeded 0.5, which according to Malholtra, (2010), Field, (2009) and Hair, et al. (2010) should be considered as absolute minimum. Inter-item correlations of the items surpassed .4; thereby suggesting a satisfactory measure of internal consistency (Pallant, 2010). The positive nature of these inter-item correlation matrices indicates that the items measure the same underlying characteristics confirm the internal consistency of the scales.

4.4 Regression Analysis

For the final analysis of the proposed research model, linear regression was used for the statistical analysis. For testing the hypothesis, the base research model was used. The regression statistics (Table 4 below) explains the antecedents of Behavioural Intention as it incorporates UTAUT (Venkatesh, et.al. 2016; Septiani, 2017; Xu, et.al., 2018).

TABLE 4: Model summary and ANOVA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.657[a]	.431	.383	4.47544

a. Predictors: (Constant), Facilitating Conditions, Social Influence, Performance Expectancy, Effort Expectancy

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	714.360	4	178.590	8.916	.000[b]
	Residual	941.390	47	20.030		
	Total	1655.750	51			

a. Dependent Variable: Behavioural_Intention

b. Predictors: (Constant), Facilitating_Conditions, Social Influence, Performance Expectancy, Effort Expectancy

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	4.599	3.705		1.241	.221
	Performance Expectancy	.408	.218	.287	1.870	.068
	Effort Expectancy	.254	.262	.154	.972	.336
	Social Influence	.086	.311	.034	.277	.783
	Facilitating Conditions	.373	.178	.308	2.096	.041

a. Dependent Variable: Behavioural Intention

The regression output in Table 4 above generally supports hypothesis 1 and 4. Performance expectancy (β=0.287) and Facilitating conditions (β = 0.301) both positively influence behavioural intentions of adopting 4IR technologies. Both hypotheses 1 and 4 can be accvepted at a p<0.068 and p<0.041 significance level respectively. These findings correspond with past research (Venkatesh, et al., 2003; Brown, et al., 2010; McKenna, et.al., 2013; Chong, 2013; Imtiaz, 2018; Mutlu & Der, 2017). This confirms that performance expectancy and facilitating conditions can be viewed as the steppingstone to behavioural intentions. Thus, to increase the level of usage of 4IR technologies among employees is necessary to increase employees' believe that: (i) using 4IR related technoplogies will help them to improve their job performance and (i) an organizational and technical infrastructure exists to support the use of 4IR related technologies.

The regression table also shows a positive relationship for effort expectancy (β=0.154) and social influence (β=0.034). However, at a p<0.336 and p<0.783 significance level respectively, effort expectancy and social influence yielded non-significant results. Therefore, hypothesis 2 and 3 are rejected. Other studies do not support a significant impact of effort expectancy on intention to use behavior (Chau & Hu, 2002). This is also the case with social influence. In their validation tests, Venkatesh, et al. (2003) found that social influence is not significant in voluntary contexts but becomes important when its use is mandated. It is to be that this study was conducted under voluntary contexts of implementing 4IR.

5 Conclusion

Although technological advancement (in 4IR) plays an important role in the organisational development and growth, organisations are now faced with new challenges such as changes in production systems, design, processes and operations. Thus, management must consider the impact of the implementation of 4IR on organisational business models and jobs. In concurrence with the findings of extant research, we confirm that performance expectancy and facilitating conditions are the strongest and most significant predictor of behavioural intentions. Whereas effort expectancy and social influence yielded non-significant results and effect on behavioural intention.

The research presented in this paper shows the attitude and self-awareness of employees to the concept of 4IR, indicates readiness for the implementation of 4IR in organisations, as well as the barriers which may threaten its achievement. In addition, organisations should possess enough funds to invest in modern technologies. Based on findings, organisations ought to ensure that adequate long-term resources are available for upskilling

(training & development) of their employees as well as acquisition of the necessary fourth industrial revolution technologies. Constant training of employees could help create increased awareness and familiarity with the 4IR dynamics, inspire more openness for acceptance, and increase their morals to become actively engaged with the 4IR dynamics. Management should also consider instituting measures that are tailored towards resources mobilization and technical support developments to trigger the acceptance and use of the 4IR. This is considering the direct positive effect of facilitating conditions on behavioural intention to use 4IR.

Despite the significant contributions of this study, we recommend that some degree of care should be taken in terms of results generalization. This is because, only 52 participants took part in the study from an individual level of analysis and no specific sector or organisations was investigated. Therefore, future studies should endeavour to probe into specific sectors and organisations across Botswana, and attempt initiating an organisational level analysis. We employed a cross-sectional research design, which might have inhibited the chances of yielding a more robust finding. Therefore, we advise that future research should attempt a longitudinal research in order to yield better results. We also did not examine the probable impact habits may have on the use of the 4IR. Therefore, future studies should also consider investigating these variables, as they may play significant roles in fostering the acceptance and use of the 4IR. Lastly, further research should consider the moderating effects of gender, experience, age, self-efficacy and attitude on behavioural intentions.

6 Conflict of interest

None of the authors has any conflict of interest.

References

Ajzen, I. 1985, From intentions to action: a theory of planned behavior. In J. Huhl, & J. Beckman (Eds.), Will; performance; control (psychology); motivation (psychology) (pp. 11–39). Berlin and New York: Springer-Verlag.

Ajzen, I. 2012, The theory of planned behaviour. In *Handbook of Theories of Social Psychology*, edited by P.A.M. Lange, A.W. Kruglanski and E.T. Higgins, 1: 438 459. London, UK: Sage

Alanazi, J., 2013. E-government continuance from an expectation confirmation theory perspective: survey research on citizen experience.

Alsaif, M., 2014. Factors affecting citizens' adoption of e-government moderated by socio-cultural values in Saudi Arabia (Doctoral dissertation, University of Birmingham).

Alwahaishi, S. and Snášel, V., 2013. Modeling the determinants affecting consumers' acceptance and use of information and communications technology. International Journal of E-Adoption (IJEA), 5(2), pp.25-39.

Baldassari, P. and Roux, J.D., 2017. Industry 4.0: preparing for the future of work. *People & Strategy*, *40*(3), pp.20-23.

Blumberg, B., Cooper, D.R. & Schindler, P.S., 2011, *Business Research Methods* 3rd ed., London: McGraw Hill.

Bonciu, F., 2017. Evaluation of the Impact of the 4th Industrial Revolution on the Labor Market. *Romanian Economic and Business Review*, *12*(2), pp.7-16.

Brown, S. A., Dennis, A., & Venkatesh, V. 2010, Predicting collaboration technology use: Integrating technology adoption and collaboration research. *Journal of Management Information Systems*, *27*(2), 9-53.

BSR - Good Jobs and the Changing Nature of Work Emerging Issues and Opportunities for U.S. Business Leaders, Dec 2016

Chadwick Jonathan.,2018. Future of jobs: CEO need to prepare

Chau, P.Y.K., & Hu, P.J. 2002, Investigating healthcare professionals 'decisions to accept telemedicine technology: an empirical test of competing theories. *Information & Management,* 39(4), 297–311.

Choi, J., Nazareth, D. L., & Jain, H. K. 2010, Implementing service-oriented architecture in organizations. Journal of Management Information Systems, 26(4), 253-286.

Chong, A. Y. L. 2013, Predicting m-commerce adoption determinants: a neural network approach.
Expert systems with Applications, 40(2): 523 530.

Chou, S.Y., 2019. THE FOURTH INDUSTRIAL REVOLUTION: DIGITAL FUSION WITH
INTERNET OF THINGS. *Journal of International Affairs*, *72*(1).

Creswell, J.W., 2014, *Research design: qualitative, quantitative and mixed methods approaches* 4th ed., California: SAGE Publications.

Davis, F. D. 1989, Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

de Ruyter, A., Brown, M. and Burgess, J., 2019. GIG WORK AND THE FOURTH INDUSTRIAL
REVOLUTION. *Journal of International Affairs*, *72*(1), pp.37-50.

Dean, M. and Spoehr, J., 2018. The fourth industrial revolution and the future of manufacturing work in Australia: challenges and opportunities. *Labour & Industry: a journal of the social and economic relations of work*, *28*(3), pp.166-181.

Farrar Martin., 2019. Re-inventing finance for a digital world - the future of finance; CGMA Field, A. 2009, *Discovering Statistics Using SPSS.* 3rd ed. London: Sage.

Field, A. 2013, *Discovering statistics using IBM SPSS statistics.* 4th ed. London: Sage.

Fishbein, M. & Ajzen, I.1975. *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Hair J, Black B, Babin B & Anderson R. 2010, *Multivariate Data Analysis*. 7th edition. Upper Saddle River, NJ, USA: Pearson Prentice Hall.

Hariri, A. A. 2014, Adoption of learning innovations within UK universities: validating an extended and modified UTAUT model. PhD thesis, University of Warwick.

Imtiaz, S. 2018, The Studies of Unified Theory of Acceptance and Use of Technology (UTAUT) in M-Commerce Context. *International Journal of Information Communication Technology and Digital Convergence, 3*(1): 42-56

Kozul-Wright, R., 2016, October. Robots and industrialization in developing countries. In *United Nations Conference on Trade and Development* (No. 60).

Lakhal, S., Khechine, H., and Pascot, D. 2013, Student behavioral intentions to use desktop video conferencing in a distance course: integration of autonomy to the UTAUT model. Journal of Computing in Higher Education, 25(2), 93–121.

Malhotra, N. & Birks, D., 2007, *Marketing research: An applied approach* 3rd ed., Harlow: Pearson Education.

Malhotra, N. 2010, *Marketing Research: An Applied Orientation, 6th Edition*. Upper Saddle River, NJ, Pearson.

Manyika, J. and Sneader, K., 2018. AI, automation, and the future of work: Ten things to solve for. *McKinsey Global Institute: June*.

Mckenna, B., *Tuunanen*, T., & *Gardner*, L. *2013*, Consumers' adoption of information services. Information & Management, 50(5), 248-257.

Mun, Y. Y., Jackson, J. D., Park, J. S., & Probst, J. C. 2006, Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management,* 43(3), 350-363.

Mutlu, H. M., & Der, A. 2017, Unified theory of acceptance and use of technology: the adoption of mobile messaging application. *Megatrend Review,* 14(1), 169–186.

Naudé, W., 2019. Brilliant Technologies and Brave Entrepreneurs. *Journal of International Affairs*, *72*(1), pp.143-158.

Nübler, I., 2016. New technologies: A jobless future or golden age of job creation. *International Labour Office Research Department Working Paper*, *13*, pp.22-23.

OECD.,2017. POLICY BRIEF ON THE FUTURE OF WORK - Going Digital: The Future of Work for Women

Oliveira, T., Thomas, M., & Espadanal, M. 2014, Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & Management,* 51(5), 497-510.

Pallant, J. 2010, *SPSS Survival Manual: A step by step guide to data analysis using SPSS.* 4th ed. Berkshire, UK: McGraw Hill.

Prescaru, P., 2016. Challenges of the fourth industrial revolution. *Knowledge Horizons. Economics*, *8*(1), p.57.

Rogers, E. M. 1995, *Diffusion of Innovations*, 4th edition. Free Press, New York. Rogers, M. E. 2003, Diffusion of Innovations (5th ed.). New York: Free Press

Schwab, K., 2015. World economic forum. *Global Competitiveness Report (2014-2015) Retrieved http://www3. weforum. org/docs/WEF_GlobalCompetitivenessReport_2014-15. pdf*.

Schwab, K., 2016. The Forth Industrial Revolution/Klaus Schwab. In *Geneva: World Economic Forum*. Schwab, K., 2016. The Fourth Industrial Revolution/Klaus Schwab. In *Geneva: World Economic Forum*.

Septiani, R., Handayani, P. W., & Azzahro, F. 2017, Factors that Affecting Behavioral Intention in Online Transportation Service: Case study of GO-JEK. Procedia Computer Science, 504-512.

Simic, M. and Nedelko, Z., 2019. DEVELOPMENT OF COMPETENCE MODEL FOR INDUSTRY
4.0: A THEORETICAL APPROACH. *Economic and Social Development: Book of Proceedings*, pp.1288-1298.

Son, J. Y., & Benbasat, I. 2007, Organizational buyers' adoption and use of B2B electronic marketplaces: efficiency-and legitimacy-oriented perspectives. Journal of management information systems, 24(1), 55-99.

Taylor, S. & Todd, P. A. 1995, Understanding information technology usage: A test of competing models. Information Systems Research, (6)2, 144-176.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. 2003, User Acceptance of Information Technology: Toward A Unified View. MIS Quaterly, 27(3), 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. 2016, Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead. Journal of the Association for Information Systems, 17(5), 328-376.

World Economic Forum, 2016, January. The future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution. In *Global Challenge Insight Report, World Economic Forum, Geneva*.

Xu, L. D., Xu, E. L., & Li, L. 2018, Industry 4.0: state of the art and future trends. International Journal of Production Research, 1-22.