

PUBLIC OUTLOOK ON CREATIVE METHODOLOGIES FOR THE 4TH INDUSTRIAL REVOLUTION IN SOUTH AFRICA

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ABSTRACT

Many prior studies show that, with technology embedded in all we do, and more than half of the world's population now connected to the internet, forecasts of the global economy being 60% digitised by 2022, means the era of the 4th Industrial Revolution (4IR) is upon us. The readiness of countries, including South Africa (SA), and whether and how they have prepared, planned and organised for this revolution, offers little empirical research. To date, no clarity exists with regards to social re-skilling, infrastructural adjustments, technology up scaling, and human resource readiness, as well as economic re-capitalisation. This study aims at providing input to assist with closing this research gap, seeking understanding and knowledge around creative methodologies for 4IR in SA, and the extent of perceived readiness and various factors confronting the country's readiness in the coming industrial revolution. The study population consisted of 287 participants from seven selected business areas in the province of KwaZulu-Natal (KZN, SA). The target population was determined by quota sampling method, while the measuring instrument was a 3-point Likert-scaled questionnaire, designed and personally administered to respondents, allowing 10 days for completion. The Statistical Package for Social Sciences (SPSS version 24.0) was used for data analysis and research findings presented in tables. The study highlighted that many respondents do not believe SA is ready for 4IR. The findings of this research should be used with care, as the sample is very small; the study recommends further empirical studies with larger numbers, which will include other provinces.

Keywords: 4th Industrial Revolution, 4IR, Readiness, Public Outlook, Social Re-Skilling, South Africa, WC 249.

INTRODUCTION

The term Fourth Industrial Revolution (4IR) encapsulates the concept of new technologies converging and how this collectively impacts our world (SA department of Science & Technology, 2019). Where the social and technological economic systems' transformation of the industry is concerned, it is referred to as the 'industrial revolution', with emphasis on any living condition or work circumstance, as well as changes in economic wealth (Dombrowski & Wagner, 2014). In being defined by innovative and disruptive trends and technologies, the 4IR has the capacity to not only improve efficiency but also our quality of life. There is, nonetheless, the threat by this new era to deepen global inequality (Business in Society Conference, 2018).

The evolution of technology makes for exciting times, in this case, a revolution: The Fourth Industrial Revolution. Our lives are being fundamentally changed by this revolution, as is the way we work and the way we interact. Through 4IR, a new and all-inclusive range of opportunities is introduced resulting in societal transformation. Moreover, advances and innovations in domains, for example, blockchain, artificial intelligence (AI), the Internet of

Things (IoT), and self-driving vehicles, further entrench technology in our day-to-day living, improving the manner in which we perform as a society (Ramkumar, 2017).

While the first industrial revolution saw production mechanised, the second employed electric power for mass manufacturing, with the third industrial revolution automating production through the use of information technology (IT). By all accounts, boundaries between the realms of digital, physical and biological will be distorted by 4IR (Falcioni, 2016). In addition, the 4IR is a basic shift in how virtually all aspects of the economy and society are impacted by technology, data, and analytics, as well as communications (Rabana, 2018). A growing understanding is also being advised, of there being only one economy and it is being digitised at erratic speed; with internet connectivity now a reality for more than 50% of the world's population, and the World Economic Forum (WEF) estimated that 60% of the global economy will be digitised by 2022 (WEF, 2018b). As the 4IR becomes more entrenched, there is wider access with faster, more efficient innovations than before, with observation and experience showing increased connectivity of technology; specifically, the integration of digital, biological and physical areas.

Societal shifts are being enabled by new technologies, impacting future generations' identities, values, economics, and possibilities (WEF, 2017a). The speed at which a country masters 4IR technologies quite possibly defines its future development (SA Science & Technology Minister Mmamoloko Kubayi-Ngubane, 2019). This industrial revolution denotes, among other areas, improved automation, AI and sustained technological improvements, and its impact on society, businesses and on workers, will be immediate (The Economist Intelligence Unit, 2018). In support of the above statements, South Africa's Communications Minister, Stella Ndabeni-Abrahams, is reported by the government news agency, to have said that, digital technologies can generate more than R5 trillion in values for industry, consumers and society in SA (Ndabeni-Abrahams, 2019).

Table 1		
THE FIVE PATTERNS OF 4IR		
Fourth	Autonomy	self-driving vehicles; drones; space exploration; blockchain
	Hyper connectivity	internet-of-things; social media; wearable technology
	Adaptability	app computing; virtual/augmented reality; 3-D printing
	On-Demand S	cloud computing; ubiquitous mobile search; streaming media
	Renewability SI	clean energy; smart cities; electric vehicles; organic/fair trade
Source: Rooka et al. (2017)		

PROBLEM STATEMENT

While humanity continues with a time of incomparable technological advancement, both significant challenges and opportunities will be presented in the next five, 10 and 20 years. The private sector, governments, entrepreneurs and academics are all searching for directions or a guide, to aid them in traversing and negotiating these significant shifts in the world of work. This type of guidance and directions must be collaboratively created by all involved (Hinton, 2018). The reality is that many jobs for humans that are either clerical or routine physical, could be replaced by robots, software or both. Previously, countries may have been able to keep wages low to industrialise, nonetheless, there is no country with the ability to maintain wages lower

than a robot's, specifically not when the priority is to protect workers' rights and the dignity of all (Tshabalala, 2017).

On the educational front, globally, programmes offered at tertiary level are being customised to become increasingly inventive and aligned with the demands of 4IR, with findings highlighting the potential failure of programmes locked into traditional and staid methodologies, as they do not embrace innovation and creativity (Oxford, 2019).

OBJECTIVES

The study objectives aim to determine the following:

1. To establish public perceptions on SA's readiness for the 4IR;
2. To identify creative methodologies SA has put in place for the 4IR; and
3. What are the outstanding challenges for SA's 4IR?

RESEARCH QUESTIONS

1. Is SA ready for the 4IR?
2. What creative methodologies have been put in place for the 4IR?
3. What are economic sectors doing to prepare for the 4IR?

LITERATURE REVIEW

Previous South African rapid growth periods saw vast majority of benefits accrue to the elite, with most of the populace only marginally better off, if at all. Research shows that both investor confidence and demand are reduced through mass exclusion, which tends to be the impetus for governments to implement bad-for-growth, populist policies. Recommendations are that everything we can should be done, to make certain that growth creates new enterprises, jobs that are decent, with relevant, useful skills, and a sense of social solidarity and fairness (Tshabalala, 2017).

POLICY REFORM PROCESS

A presidential Commission, appointed by President Cyril Ramaphosa late in 2018, will develop SA's national strategy plan through a comprehensive action plan to deal with 4IR. This will be coordinated by the Department of Telecommunications Services (DTPS), as the ICT sector's role underpins an enabling capacity for 4IR. The Commission is tasked to determine and recommend strategies, policies and plans needed for SA to position itself as among the leading countries in 4IR development and its evolution.

In a Government Gazette Notice on 4 December 2018, the terms of reference for the presidential commission stated that SA, has different elements of the 4IR spread across Government, the private sector and civil society but there is currently no single plan or blueprint which brings together all key role players into a single focus (Government Gazette, 2018). The minister stated that the Department of Telecommunications, assisted with advice from the 4IR Commission, has been tasked to develop both a strategy and framework for the country.

A strategy and framework will be developed for government, according to the Minister, Stella Ndabeni-Abrahams, who further stated that basic rules will be set by government to manage externalities of 4IR, distribute the benefits thereof and address structural market issues, such as curbing monopolies and making infrastructure rollout pervasive. The 30-member Commission is chaired by SA's President and collectively viewed, comprises eminent persons

from different society sectors, reflecting a balance in gender, youth, labour and business, including digital start-ups as well as digital entrepreneurs (Ndabeni-Abrahams, 2019).

SOCIAL RE-SKILLING

Due to existing business models being disrupted, and innovation's potential negative effects on society, 4IR impacts society's outlook (Research-analysis, 2019). Unfortunately, there will also be negative impacts. One of the main explainers of wage stagnation is that of technology, specifically where lower skilled workers are concerned, with a warning by economists of the likelihood that, as automation becomes more prominent, labour markets will experience significant disruption and inequality, in turn, leading to social unrest. Even though the providers of physical and intellectual capital will likely be the main beneficiaries of 4IR, from a wage perspective the most likely outcome is one of separation into low-pay for low-skill and high-pay for high-skill sectors (Citadel, 2019).

A substantial number of today's students could thus become part of future unemployment numbers. While we are still reliant on traditional methods in one way or the other, the next generation cannot be equipped with the necessary 4IR skills by instructive and rote learning. Some attributes necessary to succeed will be vital for this new era, such as critical thinking, as well as creativity and innovation and the generating of solutions. In the UAE, researchers have complete confidence that the appropriate authorities are making every effort to develop the requisite skills, in the belief that entry into AI and the 4IR era will necessitate modernised education (Al Suwaidi, 2019).

Globally, it is reported that tertiary level programmes are being adapted and tailored to progressively become more inventive and supporting of 4IR demands. When programme methodologies remain staid and locked in tradition, they are unlikely to deliver either business or individual benefits (Oxford, 2019).

INFRASTRUCTURAL ADJUSTMENT

Digital progress has, in the past decade, transformed entire industries, signalling a new technological era referred to as the 4IR (Buehler et al., 2018). Central to digitization is the infrastructure needed to connect everything and everyone, the IoT. Comprised of a network of sensors and deployed to collect data, the IoT offers a better understanding of the flow of information, products and materials, with data analysed to enable smarter decision-making as to how we design our systems and our resource consumption habits (Ramkumar, 2017). For an infrastructure programme to be successful it requires relevant strategic planning, which entails identifying the best investments to undertake, finalising indispensable components, trade-offs, needs and the way they should be ranked (OECD, 2016). Where infrastructure is concerned, on 15 May 2019, Communications Minister, Stella Ndabeni-Abrahams, reiterated that SA ...is not starting from a zero base, as various elements of 4IR are already being implemented across the country (Ndabeni-Abrahams, 2019).

TECHNOLOGY SCALING PROCESS

To create a circular economy, universal shifts must be accelerated by society; Circle Economy's 7 Elements framework highlights the incorporation of digital technology. The use of technology facilitates greater knowledge sharing through collaboration, better resource and asset

use, along with enhanced well-being for all, allowing us to accomplish goals in social development, as well as in the environment and economy (Ramkumar, 2017). With a technological transformation currently being experienced by the world, we can expect the way we live and work to be profoundly altered (Rashid & Urbanice Malaysia, 2018).

Characterised by the merging of breakthrough technologies, 4IR includes advanced robotics, additive manufacturing, virtual and augmented reality, and AI, along with wearable's and the IoT. Across different industries these developing technologies are changing business models and production processes. Business leaders can thus no longer focus only in their own sectors, where developments and trends are concerned, as they need to be familiar with and aware of possible transformations and disruptions along the entire supply chain, from suppliers to customers, as well as in contiguous markets (World Economic Forum, 2017b).

It is through new and highly anticipated waves of innovation that 4IR builds on the digital age, which UL CEO, Keith Williams, explained as connecting the physical, digital and biological to create technologies such as the IoT, 3D printing, AI and robotics, along with autonomous systems, energy storage, and materials science, as well as bio- and nanotechnology (Williams, 2017).

HUMAN RESOURCE RE-CAPITALISATION PROCESS

In order to secure and enhance the technological and human capital assets needed to channel the 4IR's power, the role of the government is critical (Rabana, 2018). The introduction of Information and Communication Technology (ICT) has globalised the planet, changing both socio political and business settings. Consider too that ICT adoption ...often serves as a proxy for a country's general level of technological adoption (WEF, 2018a). In either case, human effort has been the focus, with every business needing physical assets and human resources to operate successfully. Physical assets, such as buildings, land, machines and manufacturing and processing plants, as well as items not usually considered, for instance; electronic gadgets, become unproductive without human efforts and resources (Basse Eyo Basse, 2012). When the aim is to alter the capital structure of a company, a type of a corporate restructuring, known as recapitalisation, is employed; this is normally done when companies need to optimise their capital structure or to be more stable (Recapitalization, 2019). This process may be useful in re-capitalisation of the country's human resources.

ECONOMIC IMPROVEMENTS

Much complexity and uncertainty exist within 4IR's future developments, more so where global economics of scale indirectly impact Cultural and Creative Industries (CCIs) (Adendorff et al., 2018). General consensus is that, should we set a 4IR-specific agenda and do things right, we can advance our province and country's development. In reference to the country's oceans economy and SA's Operation Phakisa that was launched in July 2014, it was stressed that underpinning by technological innovation would be required, in conjunction with all the country's green economy sectors: its unexploited ocean economy, as well as climate change and agriculture (Zikalala, 2019). From experience, we have learnt there can be no success when work is done in silos. The government and the private sector need to collaborate more, with globalisation demanding countries collaborate better to realise inclusive development (Address by Mr Sihle Zikalala, KZN MEC for Economic Development, Tourism and Environmental Affairs, at the Durban ICC 2019, during the 4IR Summit for Economic Development).

The concept of Operation Phakisa, being a results-driven approach, drew heavily on Malaysia's Big Fast Results Methodology. The motivation lies in it being a results-driven approach to development, involving various sectors such as business, labour, academia, civil society and government. Launched in July 2014, the methodology for Operation Phakisa consists of establishing unambiguous plans and targets, ensuring constant progress monitoring, with public disclosure of these results; a total of eight consecutive steps. The focus, as set out by the Department of Planning, Monitoring and Evaluation (2018), is on bringing together key public and private sector stakeholders, along with academia and civil society organisations, to ultimately protect at least five percent of our ocean space through the creation of Marine Protected Areas. Collaboration between these parties would result in detailed analysis of problems and problem-areas; setting of priorities; planning interventions and ultimately, delivery.

Economic growth is fuelled by four factors of production, namely enterprise, land, capital, and labour. Currently, the world falls short with regards to entrepreneurial capacity, attaining only 52% of its entrepreneurial capacity, with a decline in this number year-over-year. The advantage held by established enterprises is significant in comparison to smaller companies, such as in the future of work, for example, where they can adjust to changes in technology. Nonetheless, economic success that is both long-term and sustainable cannot be achieved, and there is consensus that the support of independent entrepreneurs is vital, due to small and medium-sized businesses today considered "the fuel" of most economies globally (Hinton, 2018).

SOCIAL-ECONOMIC UPGRADING PROCESS

It has been reported that small businesses will be crucial in SA's 4IR, with access to information revolutionising education (Business Report–Technology, 2018). Rural areas are, however, not confronted by the same type of questions, in fact, the opposite holds true for several of the most severe challenges in rural development, as these results from its peripheral locality and scarcity.

Additionally, the perception still exists that rural areas are somewhat backward and traditional, with the countryside often perceived as an antidote to technology-where you might go to get away from it. Rural areas thus do not feature in debates with regards to 4IR's trajectory and implications. It is generally thought that it will be mainly in urban areas or even solely in major where 4IR will take place (Cowie, 2018).

Continued change in societal values will result from technology. Freelancers today comprise in excess of a third (36%) of the United States (US) workforce, attributed to motives that include independence or self-sufficiency, as well as additional income and flexibility. The popularity of co-working spaces is exploding globally and is often fully subscribed prior to commencing operations. Technology has empowered people, enabling them to work anywhere and at any time. It is projected that where American workers are concerned, more than half will be occupied as freelancers by 2027 (Hinton, 2018).

Locally, the picture has been illustrated somewhat differently by the WEF's Global Competitiveness Report and SA still has much to improve on, ranking 67th out of 140 countries world-wide and scoring 60.8 out of 100, and in Sub-Saharan Africa, being ranked second (WEF, 2018b). Adoption of creative methodologies will be well met in some sectors, as SA's strengths include good infrastructure (68.6), market size that is both large and local (68.4), and a well-developed financial system (82.1, 18th). More specifically, access to diverse sources of finance

is offered by SA's financial sector, which are relatively balanced, such as credit (100.0; 11th), venture capital (33.0; 63rd), equity (100.0; 2nd) and insurance (100.0; 3rd) (WEF, 2018b).

PROBLEM STATEMENT AND OBJECTIVES

With incomparable technological advancement anticipated over the next five, 10 and 20 years, there will be diverse and noteworthy opportunities and challenges on offer. Guidelines and directions to navigate the changes brought about by the 4IR are being sought by the private sector, governments, entrepreneurs and academics and the recommendation is to collaboratively develop these 'navigational aids' with all stakeholders (Hinton, 2018). A diverse range and number of repetitive physical work and clerical jobs are in danger of being done by robots or software. Previously, low wages may have enabled countries to industrialise, however, wages lower than a robot are not plausible when preserving human dignity and workers' rights (Tshabalala, 2017).

Nonetheless, although held back by a lack of research and development (37.5%), SA's innovation capability was determined to be relatively advanced (44.3%, 46th/140). Further restraints include reportedly low ICT adoption (46.1%), with a mere 54% of adults being able to go online, and mobile-broadband services only subscribed to by 70 out of 100 people in SA. Moreover, it was likewise found that the digital skills (116th) and critical thinking skills (78th) of today's South African workforce are insufficient to enable the progress of a successful economy in the 4IR (WEF, 2018a:36).

The study objectives were:

1. To establish public perceptions on SA's readiness for the 4IR.
2. To identify creative methodologies SA has put in place for the 4IR.
3. To determine what the outstanding challenges for SA's 4IR.

RESEARCH METHODOLOGY

The study was conducted within Durban metropolitan areas, with data collected from the areas' residents. Empirical data were collected from 287 people from all sectors of society. A convenience sampling technique was followed and a 3-point Likert-scaled questionnaire distributed to participants. To formulate the questions for the survey/questionnaire, a literature review was used as a source of information. The sample questionnaire used (Table 2) is presented:

Table 2			
SAMPLE QUESTIONNAIRE			
Please indicate your response to the following statements regarding creative methodologies for the 4th Industrial Revolution in South Africa			
Statement	Agree (1)	Neutral (2)	Disagree (3)
South Africa is ready for the 4 th Industrial revolution			
Technology infrastructure has been upgraded in South Africa to meet the 4 th Industrial revolution needs.			
New policy development has been made to address the 4 th Industrial Revolution in South Africa.			
New societal development and training systems are in place to prepare local people for the 4 th Industrial revolution in South Africa			
Human resource recapitalization programs are in place from all sectors of economy in South Africa			

RESEARCH FINDINGS

An inclusive literature review was conducted (outlined in the previous sections), regarding public perceptions on SA's readiness for 4IR, with feedback of completed questionnaires received from 287 (n=287) respondents. The key findings of this research revealed the following results as tabled.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	152	52.1	53	53
	Neutral	77	26.4	26.8	79.8
	Agree	58	19.9	20.2	100
	Total	287	98.3	100	
Missing	System	5	1.7		
Total		292	100		
(Sig(2-tailed)=0.000; mean=1.6725; df=0.79159; Pearson Correlation= 0.937**)					

The question was aimed to find out from respondents how ready SA is for 4IR. The required response to statements/questions by respondents ranged from disagree (1), to neutral (2), to agree (3). More than half of the respondents (152 or 52.1%) disagreed, while 77 (26.4 percent) of the respondents remained neutral, and 58 (19.9 percent) agreed with the statement (Table 3). Based on participants' responses, SA is perceived as not ready for the 4IR, with results statistically tested and found to be significant at the 95% level.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	138	47.3	48.1	48.1
	Neutral	99	33.9	34.5	82.6
	Agree	50	17.1	17.4	100
	Total	287	98.3	100	
Missing	System	5	1.7		
Total		292	100		
(Sig. (2-tailed) =0.000; mean=1.6934; df=0.75033; Pearson Correlation=0.937**)					

The question aimed to determine whether respondents perceived Technology infrastructure as having been upgraded in SA to meet 4IR needs. Respondents had to show their disagreement (1), were neutral (2), or agreed (3) with the statement. While most respondents (138 or 47.3%) disagreed, with the statement, a large number (99 or 33.9 percent) remained neutral, with 50 (17.1 percent) respondents indicating agreement (Table 4). Based on the

respondent's answers, SA is perceived as not ready for 4IR. Results were statistically tested and found to be significant at the 95% level.

Table 5 POLICY					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	159	54.5	55.4	55.4
	Neutral	67	22.9	23.3	78.7
	Agree	61	20.9	21.3	100
	Total	287	98.3	100	
Missing	System	5	1.7		
Total		292	100		
(Sig. (2-tailed) =0.000; mean=1.6585; df=0.80760; Pearson Correlation=0.973**)					

The aim of this question was to determine whether respondents knew of new policy development to address SA's 4IR. It was required of respondents to reveal that they disagreed (1), were neutral (2), or agreed (3) with the statement. Most respondents (159 or 54.5%) disagreed, with 67 (22.9 percent) of the respondents that remained neutral, while 61 (20.9 percent) agreed with the statement (Table 5). Based on the response from participants, SA is perceived to not be ready for the 4R. The results were statistically tested and found to be significant at the 95% level.

Table 6 TRAINING					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	178	61	62	62
	Neutral	83	28.4	28.9	90.9
	Agree	26	8.9	9.1	100
	Total	287	98.3	100	
Missing	System	5	1.7		
Total		292	100		
(Sig. (2-tailed) =0.000; mean=1.4704; df=.65712; Pearson Correlation=0.862**)					

The question aimed to establish whether respondents were aware of new societal development and training systems in place to prepare local people for 4IR in SA. Respondents were requested to show whether they disagreed (1), were neutral (2), agreed (3) with the statement. Most respondents (178 or 61 %) disagreed with the statement, with 83 (28.4 percent) of the respondents that remained neutral, while 26 (8.9 percent) agreed (Table 6). Based on participants' responses, SA is perceived as not ready for 4IR. Results were statistically tested and found to be significant at the 95% level.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	185	63.4	64.5	64.5
	Neutral	69	23.6	24	88.5
	Agree	33	11.3	11.5	100
	Total	287	98.3	100	
Missing	System	5	1.7		
Total		292	100		

The question's aim was to find out from respondents whether human resource recapitalisation programmes are in place throughout all sectors of SA's economy. Respondents were asked to indicate whether they disagreed (1), were neutral (2), agreed (3) with the statement. Most respondents (185 or 63.4%) disagreed, with 69 (23.6 percent) of the respondents remaining neutral, while 33 (11.3 percent) agreed with the statement (Table 7). Based on respondent replies, South Africa is perceived as not ready for 4IR. The results were statistically tested and found to be significant at the 95% level.

	N	Minimum	Maximum	Mean	Std. Deviation
Readiness	287	1	3	1.6725	0.79159
Infrastructure	287	1	3	1.6934	0.75033
Policy	287	1	3	1.6585	0.8076
Training	287	1	3	1.4704	0.65712
Resource	287	1	3	1.4704	0.69337
Valid N (listwise)	287				

(Sig. (2-tailed) =0.000; mean=1.4704; df=0.69337; Pearson Correlation=0.861**)

To measure central tendency and data variability, descriptive statistical analysis was done (Table 8). The mean, median and mode were thus included, along with variability, such as the minimum and maximum variables, as well as standard deviation.

		Readiness	Infrastructure	Policy	Training	Resource
Readiness	Pearson Correlation	1	0.937**	0.973**	0.862**	0.861**
	Sig. (2-tailed)		0	0	0	0
	N	287	287	287	287	287
Infrastructure	Pearson Correlation	0.937**	1	0.911**	0.832**	0.836**

	Sig. (2-tailed)	0		0	0	0
	N	287	287	287	287	287
Policy	Pearson Correlation	0.973**	0.911**	1	0.877**	0.875**
	Sig. (2-tailed)	0	0		0	0
	N	287	287	287	287	287
Training	Pearson Correlation	0.862**	0.832**	0.877**	1	0.948**
	Sig. (2-tailed)	0	0	0		0
	N	287	287	287	287	287
Resource	Pearson Correlation	0.861**	0.836**	0.875**	0.948**	1
	Sig. (2-tailed)	0	0	0	0	
	N	287	287	287	287	287
** Cordrelation is significant at the 0.01 level (2-tailed)						

Correlation analysis was performed to measure the relationship of identified variables (Table 9). The purpose of this is to determine which variables that are strongly correlated with each other, might be associated with the 4th industrial revolution.

RESEARCH IMPLICATIONS

The study implications take account of critical 4IR theory and practice issues, in addition to matters associated with not only the theory of viral marketing but also its practical application. Implications for 4IR Theory: To enhance the understanding and knowledge of 4IR and its impact in SA, companies, local communities, as well as the corporate world, should be familiarised with the government's strategic vision and how to prepare for 4IR challenges. As a new concept, 4IR requires proper theories and strategies to articulate it, as well as a well-formulated guide with directions for its implementation.

From a practical perspective, it appears many people are not aware of 4IR; most local people, including some politicians, as well as policy makers, do not have knowledge about what the concept is all about. SA business communities need to be strategic and logically prepare, by initiating upgrades of infrastructure and through preparation of their labour force. Due to the lack of knowledge and understanding of 4IR challenges, SA society and business communities have seemingly not done much in preparation. The practical implications of this study will provide much needed information for future consideration.

LIMITATIONS

This study was confined to the province of KZN only and did not include other provinces. As a result, the study findings cannot be generalised to the populace of South Africa. Further research is thus needed, which should focus more on government officials and other people who are leaders in the private business sector.

RECOMMENDATIONS

It is clear from the findings that 4IR is perceived as a difficult concept, poorly understood by many South Africans. Therefore, this study recommends that community education on the topic should be introduced. Use should be made of social media platforms, while also utilising community and national radio stations, along with national television to build much needed awareness regarding 4IR and its implications. SA's national government, through its local government, should conduct workshops with business communities, as well as leaders from the broader community.

CONCLUSIONS

This study concludes that South Africans believe the country is not yet ready for 4IR, with more than half the respondents agreeing and a quarter remaining neutral and indicated infrastructure as a challenging factor for 4IR readiness, highlighting the need by SA to improve infrastructure development. The study further found human resource re-capitalisation, and new policy development to be some of the challenging aspects for SA's 4IR. The lack of knowledge and a thorough understanding of what is needed for the new Industrial Revolution among South African communities have seemingly created a negative attitude towards preparing for its challenges.

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REFERENCES

- Adendorff, C., Lutshaba, U., & Shelver, A. (2018). Policy implications of the 4th industrial revolution for the cultural and creative economy. Submitted in Department of Arts and Culture, Nelson Mandela University.
- Al Suwaidi, J.S. (2019). *Societal development: a gateway to fourth industrial revolution*. Retrieved May 24, 2019, from <https://gulfnews.com/opinion/op-eds/societal-development-a-gateway-to-fourth-industrial-revolution-1.63052916>.
- Bassey Eyo Bassey. (2012). Capitalized human resources cost and its influence on corporate productivity: A study of selected companies in Nigeria. *International Journal of Financial Research* 3(2).
- Buehler, M., Buffet, P.P. & Castagnino, S. (2018). *The fourth industrial revolution is about to hit the construction industry. Here's how it can thrive*. Retrieved June 05, 2019, from <https://www.weforum.org/agenda/2018/06/construction-industry-future-scenarios-labour-technology/>.
- Business in Society Conference. (2018). *Inclusive growth in the fourth industrial revolution*. Retrieved May 22, 2019, from <https://dialogue.co.za/inclusive-growth-in-the-fourth-industrial-revolution/>.
- Business Report-Technology. (2018). *Small businesses in SA critical to the 4th Industrial Revolution*. Retrieved August 12, 2019, from <https://www.iol.co.za/business-report/technology/small-businesses-in-sa-critical-to-the-4th-industrial-revolution-15867017>.
- Citadel. (2019). *The Fourth Industrial Revolution* Retrieved May 21, 2019, from <https://www.citadel.co.za/insights/articles/the-fourth-industrial-revolution/>.
- Cowie, P. (2018). Rural areas risk missing out on the Fourth Industrial Revolution, Retrieved May 22, 2019 from https://apolitical.co/solution_article/rural-areas-risk-missing-out-on-the-fourth-industrial-revolution/.
- Department of Planning, Monitoring and Evaluation. (2018). *Operation Phakisa*. Retrieved May 21, 2019 from <https://www.operationphakisa.gov.za/operations/oel/pmpg/MPGPerformance/Pages/default.aspx>.
- Dombrowski, U., & Wagner, T. (2014). Mental strain as field of action in the 4IR. *Procedia CIRP*, 17:100-105. Retrieved August 12, 2019.
- Economist Intelligence Unit, The. (2018). *Navigating the fourth industrial revolution: is all change good?* Retrieved May 21.
- Falcioni, J. (2016). Mastering the fourth industrial revolution. Retrieved from <https://memagazineblog.org/2016/03/>.

- Government Gazette. (2018). Department of Telecommunications and Postal Services Notice 764 Of 2018, Invitation to Nominate Candidates for the Presidential Commission on Fourth Industrial Revolution. *Government Gazette 42078*, 4 December 2018.
- Hinton, S. (2018). *How the fourth industrial revolution is impacting the future of work*. Retrieved May 23, 2019, from <https://www.forbes.com/sites/theyec/2018/10/19/how-the-fourth-industrial-revolution-is-impacting-the-future-of-work/#26b6017a65a7>.
- Kubayi-Ngubane, M. (SA Science and Technology Minister). (2019). *Fourth Industrial revolution centre launched in South Africa*. Retrieved May 11, 2019, from https://www.engineeringnews.co.za/article/fourth-industrial-revolution-centre-launched-in-south-africa-2019-04-16/rep_id:4136.
- Ndabeni-Abrahams, S. (SA Communications Minister) (2019). Preparing SA for 4IR. *sanews.gov.za*, Wed. May 15, 2019. Retrieved July 19, 2019.
- OECD. (2016). Getting infrastructure right: The 10 key governance challenges and policy options. Retrieved May 22, 2019, from <https://www.oecd.org/gov/getting-infrastructure-right.pdf>.
- Oxford, T. (2019). *Mail & guardian special report is the MBA dead?* 31 May 2019.
- Rabana, R. (2018). *The impact of the 4th industrial revolution on economic development developing a country agenda*. Retrieved from http://sascenarios2030.co.za/wp-content/uploads/2018/02/Phindile_Dyani1.pdf.
- Ramkumar, S. (2017). *The fourth industrial revolution and the circular economy*. Retrieved May 21, 2019, from <https://circulatenews.org/2017/12/fourth-industrial-revolution-circular-economy/>.
- Rashid, A.A., & Urbanice Malaysia. (2018). *The Fourth Industrial Revolution Impact to the Future of Sustainable Urban Development in Malaysia*. Retrieved August 12, 2019.
- Recapitalization. (2019). *Recapitalization defined*. Retrieved August 12, 2019, from <https://corporatefinanceinstitute.com/resources/knowledge/finance/recapitalization>.
- Research-Analysis. (2019). *Research Update: How did the financial crisis and 4th Industrial Revolution get WEF to rethink competitiveness?* Retrieved August 12, 2019 from <https://www.brandsouthafrica.com/about-brand-south-africa/research-analysis-whoweare/research-update-how-did-the-financial-crisis-and-4th-industrial-revolution-get-wef-to-rethink-competitiveness>.
- Rooka, D., Salvatori, A., Van Moyland, J., & Rosa, P. (2017). The five patterns of 4IR. *Working Paper - v.7.0*, as at March 2017. Retrieved August 12, 2019, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2928335.
- SA Department of Science and Technology. (2019). *The 'fourth industrial revolution': potential and risks for Africa*. Retrieved May 23, 2019, <http://www.naci.org.za/nstiiip/index.php/analytical-contributions/technological-progress/40-the-%27fourth-industrial-revolution%27-potential-and-risks-for-africa>.
- Tshabalala, S. (2017). *South Africa in the fourth industrial revolution: A new opportunity to create more jobs and a better society*. Retrieved May 24, 2019.
- World Economic Forum (WEF). (2017a). *Harnessing the Fourth Industrial Revolution for Sustainable Emerging Cities*. Retrieved August 12, 2019, from http://www3.weforum.org/docs/WEF_Harnessing_the_4IR_for_Sustainable_Emerging_Cities.pdf.
- WEF. (2017b). *Impact of the Fourth Industrial Revolution on Supply Chains*. Retrieved August 12, 2019.
- WEF. (2018a). Insight Report: Our Shared Digital Future: Building an Inclusive, Trustworthy and Sustainable Digital Society. Retrieved July 22, 2019, from <https://www.weforum.org/reports?page=2>.
- WEF. (2018b). *Insight Report. Global Competitiveness Report*. Schwab, K. Editor. Chapter 2: Regional and Country Analysis pp. 35-36 ISBN-13: 978-92-95044-76-0.
- Williams, K. (2017). *Fourth Industrial Revolution Key Priority for Achieving More Economic Growth*. Retrieved May 21, 2019, from <https://news.ul.com/news/fourth-industrial-revolution-key-priority-achieving-more-economic-growth>.
- Zikalala, S. (MEC). (2019). *Fourth Industrial Revolution Summit for Economic Development*. Retrieved May 21, 2019, from <https://www.gov.za/speeches/fourth-industrial-revolution-summit-25-mar-2019-0000>.