The Significance of Big Data in the Success of SMEs in Emerging Markets: A Case of South Africa

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Abstract

The purpose of this study is to examine how SMEs in emerging markets can benefit from the use of big data and to look at challenges that SMEs encounter when using big data. SMEs play a critical role in growing the economy of developing, emerging, and also developed countries. In South Africa, SMEs account for 98.5% of the total businesses. This study is exploratory and adopted a desk-review approach where journal articles and government reports were reviewed. It was found that SMEs that use big data are more profitable, productive, and innovative. SMEs find it difficult to use big data tools and technologies. This study recommends that institutions of higher learning should introduce short learning programs or continuous education programs to train SMEs on how to use big data tools and technologies. The government should provide both financial and non-financial support to SMEs so that they are able to use advanced technologies and compete with big corporations. Future studies should look at refining big data tools and technologies for SMEs to provide them with technologies and tools that they can easily use.

Keywords: Big Data, SMEs, Productivity, Profitability, Decision-making

1. Introduction

In the world we live in today, things are rapidly changing and are becoming more and more digital. This is leading to the daily creation of massive amounts of data. Particular data can be of great value to organizations in making decisions that will enable them to be productive, proactive, competitive, and profitable. Big data, as the generation of data is called, has received attention from scholars, organizations, and individuals over the past few years, in the belief that data helps with making decisions that are supported by facts and not gut feeling or intuition. The data estimated to have been created by the whole world by 2020 is 40 zettabytes. This means that the data that was created per individual was 5 200 gigabytes. Data that could previously be created in 20 years, at the moment, organizations create in one day (Shah et al. 2017) and it is expected that the use of big data will increase with time (Ahmadi et al. 2016). Haleem et al. (2020) state that "Big data is an innovative technology which can digitally store a large amount of data. It helps to computationally analyze to reveal patterns, trends, associations, and differences." Big data may have improved drastically since the start of the COVID-19 pandemic, which has forced organizations around the world to work remotely and employees to work at home using different devices, with the result that far more data is being generated during this pandemic.

Small Medium Enterprises (SMEs) are acknowledged for the massive role they play in both developed and developing countries. They are praised for creating employment for many people in developing countries and for boosting the economy. In South Africa, SMEs account for 98.5% of the total businesses, they contribute 25.8% to private jobs, and they contribute 39% to the gross domestic product (GDP) of the country. It is indisputable that their contributions are felt and they play a crucial role in the country (Kalidas et al. 2020). Moreover, SMEs are known for being innovative, flexible, and productive, for alleviating poverty and for minimizing inequality (Maroufkhani et al. 2020). South Africa has one of the highest unemployment rates in the world (Naidoo 2020), with the unemployment rate reaching 30.8% in the third quarter of 2020 for the first time in the history of the country. This was exacerbated by lockdown restrictions caused by the COVID-19 pandemic that forced the world to come to a standstill. The number of people without jobs increased by 2.2 million to 6.5 million (Trading Economics 2020), where many businesses were not able to bounce back owing to financial challenges (Smit 2020). However, since we are in an era where digitalization is

transforming the way businesses are doing things and has presented us with many opportunities, organizations are using big data for decision-making (Maroufkhani et al. 2020). The purpose of this study is to examine how SMEs in emerging markets can benefit from the use of big data and to identify challenges that they encounter when using big data tools and technologies. This paper is structured in the following way: introduction, which presents the background of the study, similar studies, research questions, and objectives of the study; literature review; methodology; findings and discussions; improvement areas; conclusions; future studies; and references.

Similar studies

Study 1

The most recent similar study identified was the study conducted by Maroufkhani et al. (2020), reported on in an article entitled "Big data analytics adoption model for small and medium enterprises". A quantitative study was carried out in Malaysia, in which 112 manufacturing SMEs were surveyed. The purpose of the study was to help SMEs adopt the use of big data. A framework to help with the adoption and application was developed in the study.

Study 2

A second similar study was conducted by Shah et al. (2017), reported on in a conference paper entitled "Is Big Data for Everyone? The Challenges of Big Data Adoption in SMEs". This study was carried out in the United Kingdom. The research aimed at investigating the implementation of big data in manufacturing SMEs, looking at research gaps. A framework was proposed for SMEs to use in implementing big data.

Study 3

The third similar study identified was conducted by Potter (2015) and presented as a Master's dissertation entitled "Big Data Adoption in SMMEs". The purpose of the study was to explore factors that contribute to the adoption of big data by SMEs. This study was conducted in South Africa. A qualitative approach was adopted and interviews were used to gather data. A framework that could serve as a roadmap for SMEs to implement big data was proposed and developed.

1.1 Objectives

While SMEs are considered the greatest contributors to employment and for boosting the GDPs of countries worldwide, particularly developing countries (Potter 2015, Kalitanyi 2019), it has been noted that research on the adoption of big data by SMEs is scarce (Potter 2015, Maroufkhani et al. 2020). This suggests that this study is useful and will be of significance to emerging markets.

The following research questions were developed for the study:

RQ1: How can SMEs in emerging markets benefit from big data?

RQ2: What are the challenges that lead to the non-adoption of big data by SMEs in emerging markets?

The objectives of the study are as follows:

- ✓ Identify benefits for adopting big data
- ✓ Identify challenges faced by SMEs
- ✓ Identify challenges for adopting and using big data in SMEs

2. Literature Review

The state of SMEs in South Africa and the economy

SMEs are forced to be innovative so that they can be unique from their competitors. However, they must also be efficient and effective (Loon and Chik 2019). According to Kalitanyi (2019), in South Africa entrepreneurial activity needs to be increased and current businesses assisted for them to grow and subsequently help in alleviating unemployment and inequality, reducing poverty, driving innovation, and contributing to the GDP of the country (Kalitanyi 2019). When COVID-19 hit all sectors and industries, the South African government introduced a debt-relief financial scheme through the Small Enterprise Financial Agency (SEFA). The plan was to help small businesses affected by the pandemic. However, a criterion was set to be followed and met by potential recipients of the scheme (The South African Government 2020). The criterion is as follows: "The business must have been registered with CIPC by at least 28 February 2020; Company must be 100% owned by South African Citizens; Employees must be

70% South Africans; Priority will be given to businesses owned by Women, Youth and People with Disabilities; Be registered and compliant with South African Reserve Bank (SARS) and Unemployment Insurance Fund (UIF); Seda will assist micro-enterprises to comply and request for assistance must be emailed to debtrelief@seda.org.za(linksendse-mail); Whereas small and medium enterprises must ensure own compliance; Registration on the National SME Database — https://smmesa.gov.za; Proof that the business is negatively affected by COVID-19 pandemic; Complete the supplied online application platform; Company Statutory Documents; Federal Insurance Contributions Act (FICA) documents (e.g. Municipal accounts, letter from traditional authority); Certified Identity Copies of Directors; 3 months Bank Statements; Latest Annual Financial Statements or Latest Management Accounts not older than three months from date of application — where applicable; Business Profile; 6 months Cash Flow Projections — where applicable; Copy of Lease Agreement or Proof ownership if applying for rental relief; If applying for payroll relief, details of employees - as registered with UIF and including banking details — will be required as payroll payments will be made directly to employees; SME employers who are not compliant with UIF must register before applying for relief; Facility Statements of Other Funders; Detail breakdown on application of funds including salaries, rent etc."

Recognizing the importance of SMEs in the country, the government has introduced several initiatives that are aimed at assisting SMEs to flourish by providing them with financial or non-financial support (Mathibe and van Zyl 2011). "Financial support" refers to loans and grants that are given, provided an applicant (SME) meets the requirements set. Non-financial support takes the form of training and workshops. The government understands that SMEs have to be supported so that they flourish and help reduce unemployment and drive innovation in the country (The South African Government 2020). Interestingly, governments generally are recognizing the role played and contribution made by SMEs (Ghobakhloo and Tang 2015). Figure 1 illustrates the financial and non-financial support that is provided by the South African government to SMEs.

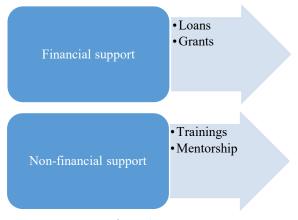


Figure 1. SME support

With South Africa facing a high unemployment rate of 30.8%, the youth is most affected. The unemployment amongst the youth is at 63% (Stats SA 2020b). South Africa has nine provinces. However, not all of them are highly economically active and many people move from their provinces to flock to the provinces that are highly entrepreneurially active, seeking greener pastures. Gauteng Province is regarded as one of the highly entrepreneurially active provinces. This province is dominated by a large number of SMEs and this means that most people leave other provinces (such as Limpopo in the far north of the country) for Gauteng because there are fewer opportunities in their provinces. As a result, Gauteng contributes substantially to job creation and to the GDP of the country (Kalitanyi 2019). While Gauteng is the smallest province in the country, it has a far larger population than the other provinces. The number of people residing in the province is estimated to be 15.5 million, which makes up 26% of the total population of the country. The second most highly populated province is KwaZulu-Natal with 11.5 million, with the rest of the population scattered across the remaining seven provinces. Gauteng and the Western Cape Province are expected to have had an influx of migrants estimated at 1 553 162 and 468 568 respectively from 2016 to 2020 (Stats SA 2020a). Figure 2 presents a map of the South Africa with its Province, indicating different regions and municipalities.

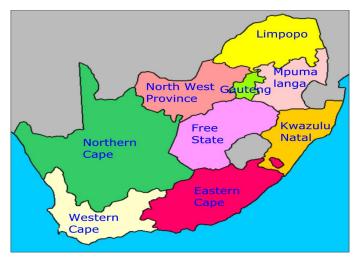


Figure 2. Map of South Africa

Source: https://www.southafrica.to/provinces/provinces.php

The above literature indicates the need for providing SMEs with attention across the whole country so that they can help solve problems that are faced in the country.

Big data

Ahmadi et al. (2016) argue that there is no universal definition for the term "big data". From the different definitions that are available, the three key words that surface are: volume (high volume – number of data), velocity (high velocity – the speed of data), and variety (variety – different data generated). This means that big data can be summed up as data that is generated in high volume, at a very fast speed and that varies. Companies need to mine and analyze the data and need the tools and skills to do this. However, they must have the relevant resources for it. The world is currently data-driven. It is stated that organizations must use big data so that they can remain competitive at all times (Kobayashi et al. 2018). This includes SMEs among the organizations that should gain leverage from big data. Ahmadi et al. (2016) state that SMEs need training and the transfer of skills to be able to make sense of the data they mine and analyze. This will help them to gain a clear picture of what their customers or clients want and need. Ahmadi et al. (2018) find that big data can play a critical role in the following three areas:

- 1) **Business efficiency** big data can improve the efficiency of the business by understanding customer intelligence by predicting buying behavior using augmented social media profiles. This can also be improved by detecting fraud and improving the supply chain.
- 2) **Business innovation** big data can lead the organization into innovative products or services or even to introducing new products into the organization.
- 3) **Business creation** big data decreases the entry barriers to business and it also helps in identifying signals and areas that are profitable in the market.

Figure 3 illustrates these benefits of using big data.



Figure 3. Benefits of big data

In addition to these benefits, big data increases the productivity and also the profitability of the organization; therefore, it is extremely important to organizations, as they have to remain competitive, relevant, and responsive to the wants and needs of their customers (Maroufkhani et al. 2020, Shah et al. 2017). Additionally, data that is of high quality must be used so that the organizations can improve their strategies and subsequently improve their performance (Santoro et al. 2018).

The use of big data by SMEs

SMEs are looking for ways that can help them to remain competitive, innovative, and profitable. Big data incorporates future technologies that will help SMEs to access and analyze data that will lead them to prosperity. This means that big data can be adopted as a strategy of business growth. However, big data is not sufficiently used by SMEs (Maroufkhani et al. 2020), even though technology and innovation have the potential to grow them as they improve their performance and create new knowledge that can be used to grow the business (Shah et al. 2017). Loon and Chik (2019) argue that when SMEs are innovative, when they acquire and use appropriate technology that is efficient and innovative, they will have a better chance of becoming efficient at what they do. However, a relatively low number of SMEs in developing countries are using big data (Potter 2015).

Challenges of using big data

SMEs generally struggle to collect and analyze data for a number of reasons. First, as Luciano et al. (2018) point out, "one of the primary impediments to the examination of dynamic phenomena has been challenges associated with collecting data at a sufficient frequency and duration to accurately model such changes." Both collecting and analyzing data are difficult tasks for SMEs. Second, they lack the tools and skills to mine the data, make sense of the data they mine, and be able to make decisions that will benefit the organization. Third, data needs to be safeguarded against theft. Data can be used inappropriately if it falls into the wrong hands. This can make people vulnerable by using their data for fraud and identity theft. Since most big data is unstructured, resources must be used to clean the data before it can be processed (Ahmadi et al. 2016). Fourth, identifying quality and reliable data can present a problem (Moral et al. 2017). Lastly, since data is massive, storing it is a serious challenge and the techniques that are used are often too complex for SMEs and require the user to understand computers in detail (Khan et al. 2017). Figure 4 sums up the challenges of using big data.

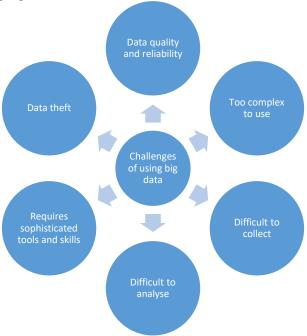


Figure 4. Challenges of using big data

3. Methods

An exploratory approach was adopted for this study. Sekaran and Bougie (2014, pp. 96-97) explain that exploratory study is applicable when much is not known about the topic at hand. This type of study can take the form of a qualitative approach, where a desk review is conducted. Exploratory research usually depends on secondary data such

as literature, informal discussions, interviews, case studies, focus groups, and projective methods, with qualitative data taking the form of government publications, journal articles, conference proceedings, internet articles, and other sources of such data (Sekaran and Bougie 2014, pp. 336-337).

4. Data Collection

This study gathered data from journal articles, conference proceedings, and government publications. With government publications, authors were interested in examining the unemployment rate in the country and understanding the financial and non-financial support that the government is providing to SMEs. Other publications were from the private sector that research SMEs in South Africa. Their reports and their websites were checked for current information regarding SMEs. Lastly, the authors looked at journal and conference publications for the latest peer-reviewed work regarding the topic at hand. The authors limited the search to articles of no older than five years. Only articles that were published from 2015 to the present were accepted. The plan was to identify current solutions for a current problem. Emerald, Ebscohost, and Elsevier databases were used to find quality articles. Table 1 lists the factors (variables) that were investigated, the authors and year of publication of the studies consulted and the titles of the publications that reported the studies.

Table 1. Desk-review sources consulted

Variables	Authors	Title
Analyzing data	Kobayashi et al. (2018)	Text mining in organizational research.
	Luciano et al. (2018)	A fitting approach to construct and measurement alignment: The role of big data in advancing dynamic theories.
Big data	Potter (2015)	Big Data Adoption in SMMEs.
	Santoro et al. (2018)	Big data for business management in the retail industry.
Business creation	Ahmadi et al. (2016)	A SWOT analysis of big data.
Business efficiency	Ahmadi et al. (2016)	A SWOT analysis of big data.
Business innovation	Ahmadi et al. (2016)	A SWOT analysis of big data.
	Loon and Chik (2019)	Efficiency-centered, innovation-enabling business models of high tech SMEs: evidence from Hong Kong.
Mining data	Kobayashi et al. (2018)	Text mining in organizational research.
Productivity	Shah et al. (2017)	Is big data for everyone? The challenges of big data adoption in SMEs.
	Maroufkhani et al. (2020)	Big data analytics adoption model for small and medium enterprises.
Profitability	Shah et al. (2017)	Is big data for everyone? The challenges of big data adoption in SMEs.
	Maroufkhani et al. (2020)	Big data analytics adoption model for small and medium enterprises.
Quality and reliable data	Moral et al. (2017)	A visual UML-based conceptual model of information-seeking by computer science researchers.

SMEs	Ghobakhloo and Tang (2015) Kalitanyi (2019)	Information system success among manufacturing SMEs: case of developing countries. Enterprise Propellers (EP) and identity of SMMEs, informal business and cooperatives in Gauteng Province of South Africa.
Tools and techniques	Khan et al. (2017)	A survey on scholarly data: from big data perspective.

5. Results and Discussion

Productivity and business innovation

The literature makes it clear that organizations that use big data are productive. They are productive because they continuously identify new ideas in the organization through the use of data and act on these ideas early. They respond to the needs and wants of their customers and this makes them agile, proactive, and innovative. Organizations that are like this are usually successful and they usually lead the industries in which they operate.

Business efficiency

It was found that businesses that use big data are more efficient in the sense that they always respond to the needs of their customers; they understand their customers' profiles, needs, and wants; and they are more likely to be efficient in what they do at all times. Things are done on time in the organization, and this ultimately leads to happy customers or clients and increased profits.

Business creation

The organization can use the data that is mined and analyzed in the organization and the market to identify new areas that can lead to greater profits and other areas that can be improved on. Furthermore, big data makes it easier for SMEs to enter new markets as it eradicates entry barriers to those markets.

Profitability

From the literature, it is clear that organizations that use big data are more likely to make a profit. The profitability of a company will increase in line with its level of innovation, flexibility, efficiency, and productivity. In other countries (such as United States of America and United Kingdom), companies that employ big data increase their profitability. This means that SMEs will make sufficient money to buy recent technologies, employ people with the relevant skills, and also create employment in the country in which they work.

Sophisticated skills, mining and analyzing data

It is evident from the literature that dealing with big data requires a person who has concentrated skills in data mining and analyzing along with using big data techniques and tools. SMEs are not resourced enough to be able to buy big data tools and technologies. Moreover, employees in these SMEs do not have relevant skills in mining, analyzing, and using big data tools. It is reported that mining and analyzing data involve complex procedures that require specific skills.

A graphical illustration of the study findings is presented in Figure 5 below.

5.1 Graphical Results

Figure 5 illustrates the findings and their relationship to each other.

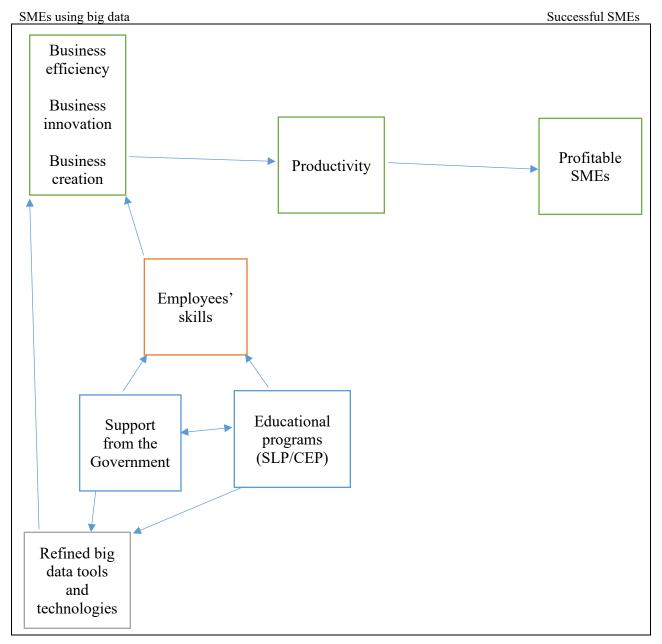


Figure 5. SME framework for using big data

Figure 5 above depicts the relationship between the variables explored. Financial and non-financial support by the government will lead to employees having the right skills for mining, analyzing, and storing datasets. It will also help refine the tools and technologies of big data while leading to business efficiency, innovation, and creation. Support also contributes to the creation of short learning programs (SLPs) or continuous education programs (CEPs) that provide employees with the skills that are needed. Employees' skills contribute to business efficiency, innovation, and creation, which lead to the productivity of SMEs and ultimately to profitable SMEs. These variables are extremely important to each other and the success of SMEs in emerging markets.

5.2 Proposed Improvements

Short Learning Programs (SLP)/Continuous Education Programs (CEP)

The study recommends that institutions of higher learning should consider introducing SLPs on big data with a focus on SMEs that are based in emerging economies. This will make it easier for SME owners to take CEPs or SLPs so that they learn how to mine, analyze, and interpret data. Policymakers should also recommend big data analytics as a critical skill for SMEs and this should be adopted by government departments that support small businesses (SMEs).

Support (financial and non-financial)

As part of the government's financial and non-financial support to SMEs, funding of the SLPs on big data that are introduced by higher learning institutions should be considered. Mentorships should also be provided to those who complete the program. The South African Service Sector Education and Training Authority (SETA) focuses on training SMEs on critical skills and could assist with this program.

Refining big data tools and technologies

It is no secret that most of the technologies and tools are created by big companies and for big companies. These technologies and tools are very beneficial and help take companies to the next level. However, SMEs struggle to use these technologies because they are not compatible with SME dynamics. This is so because big companies and SMEs are not the same. Technology creators must consider SMEs when they create technologies. After creating technologies for big companies they should consider refining them to suit SMEs so that they too can gain leverage from these technologies.

6. Conclusion

With the purpose of this study being to examine how SMEs in emerging markets can benefit from the use of big data and to look at challenges that SMEs encounter when using big data, the study developed two research questions: RQ1: How can SMEs in emerging markets benefit from big data? and RQ2: What are the challenges that lead to the non-adoption of big data by SMEs in emerging markets? The three objectives of the study, 1. Identify benefits for adopting big data in SMEs; 2. Identify challenges faced by SMEs; and 3. Identify challenges for adopting and using big data in SMEs, were addressed through a desk-review approach, using an explorative method. Several articles, government reports, and related publications were reviewed. It was discovered that SMEs find it difficult to use big data tools and technologies because of they do not have the relevant skills and sufficient money to purchase them. However, big companies and SMEs that use big data analytics are succeeding and have a higher chance of increasing their profit. The study recommended that custom-designed training be made available for SMEs. Higher learning institutions should assist in making such programs available. The government needs to provide financial and non-financial support to SMEs that enables them to purchase and use big data tools and technologies. The field would benefit from future studies that look at refining big data tools and technologies for SME purposes. This would give SMEs the technologies and tools that could be easily used by them. An action research approach would be useful when such technologies and tools are created, so that they can be tested on SMEs.

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Biographies

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