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A Literature Review of the Effect of Productivity Improvement Systems on Productivity Growth of the Masonry Brick Construction , Small and Medium Scale Enterprises in South Africa

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Abstract

The masonry brick manufacturing small and medium scale enterprises SMEs contribute significantly towards the socio and economic development of the Republic of South Africa (RSA). The masonry brick manufacturing industry assists in the development of construction and is a source of income for SMEs, as well as creating employment opportunities for the uneducated, unskilled, semi and skilled human capital. However, there are productivity challenges that negate growth in productivity. The methodology proposed for the study is based on reviewing literature whereby the main question is "How do productivity improvement systems influence productivity growth of the masonry brick construction SMEs?" The study explores productivity improvement systems that can be used to improve the productivity of masonry brick SMEs. Based on the results of the review, the study recommends that the masonry brick SMEs identify latent variables that impede productivity growth within their organisations in order to attain long-term term market and financial feasibility.

Keywords
Productivity, Ergonomics, Construction

1. Introduction

According to Mafundu and Mafini (2019) the masonry brick manufacturing small and medium scale enterprises (henceforth-abbreviated SMEs) contribute significantly towards the socio and economic development of the Republic of South Africa (RSA). This is despite the brick manufacturing industry's negative contribution towards the environment and producing gas emissions in the atmosphere (Nepal et al. 2019). The masonry brick manufacturing plays a very important role in that it creates employment opportunities for the unskilled, semi and skilled employees (Windapo, Omopariola, Olugboyega and Moghayedi 2021).

South Africa has one of the strongest economies across the African continent. Real Gross Domestic Product (henceforth-abbreviated GDP) was R1 131 billion in the second quarter of 2021 and the economy recorded its fourth

consecutive quarter of growth, expanding by 1,2 percent in the second quarter of 2021 (April–June). However, The South African GDP decreased by 1.5 percent on quarter in the three months to September of 2021 and GDP from the construction sector in South Africa decreased to 110 760 ZAR million in the third quarter of 2021 from R111 306.36 million in the second quarter of 2021 according to a report by trading economics (2021).

Statistics SA (2021) report that production output declined from 3.6% in 2017 to 2.7% in 2021, which is a challenge for the masonry brick manufacturing SMEs industry. In addition, there was a decrease of approximately 0.7 percent recorded in the second quarter of 2022 in South Africa's gross domestic product (GDP) as a result of numerous circumstances involving load shedding and floods that devastated some parts of KwaZulu Natal (Statistics SA 2022). Based on the total value report and GDP report, it is anticipated that the production output is decreasing, which is a challenge for construction industries within the masonry brick production environment in South Africa.

The South African construction sector contributed approximately 83 billion rand (roughly 5.4 billion U.S. dollars) to the country's GDP in 2020, according to Galal (2021), a research expert covering the economy and society in Egypt, South Africa, and Ethiopia. However, this represents a decrease in comparison to the previous year 2019, when the sector's added value to the country's GDP added up to approximately 104.1 billion rand.

1.1 Problem Statement

Based on the above-mentioned reports, South Africa's production output has been on a downward trajectory as it decreased by 3.9 percent in 2017 to 2.7 in 2021. In the second quarter of 2022, the country's gross domestic product (GDP) declined by roughly 0.7 percent due to the country experiencing power outages and irregular variations involving floods. The construction industry is not covered in glory, even though the sector contributed approximately 83 billion rand (roughly 5.4 billion U.S. dollars) to the country's GDP in 2020. This was a shortfall in comparison to the previous year of 2019, when the industry's added value was 104.1 billion rand. Furthermore, there are perennial causes of deviation that negate productivity of the masonry brick manufacturing SMEs, undermining the significant impact that productivity improvement systems and value-adding drivers have on productivity growth, market and financial feasibility. Add research objectives here. Make sure to fulfil all the research objectives at the end and articulate in the conclusion.

1.2 Research aim, objective and question of the study

The study explores the role of productivity improvement systems and value-adding drivers in influencing the productivity growth of the masonry brick construction small and medium scale SMEs in Gauteng, South Africa.

Research Objective:

To examine the perennial causes of deviation from expected productivity and the benefits of productivity systems and value-adding drivers in the masonry brick construction SMEs.

Research Question:

How do productivity improvement systems influence productivity growth of the masonry brick construction SMEs?

1.3 The scope of the Study

The study is not limited to South Africa, but also draws focus on Africa and global masonry brick construction SMEs. However, more weight is placed on the masonry brick construction SMEs that operate within the Gauteng region of South Africa.

1.4 Significance of the Study

The study seeks to highlight the benefits of implementing productivity improvement systems and value-adding drivers within the masonry brick construction SMEs. In addition, identifying some the perennial causes of deviation from expected productivity, which underestimate the significance of improvement systems and value-adding drivers in enhancing productivity growth.

2. Literature Review

The Small Enterprise Development Agency suggests that, the definition of SMEs covers a wide range of non-registered, registered and non-value added tax registered brick construction SMEs in South Africa (SEDA 2016:5). The SMEs are defined by various countries in accordance to their size and profit margin. For example, Berisha and

Pula (2015) suggest that SMEs employ approximately 63 percent of the global workforce and account for 90 percent of firms. Berisha and Pula (2015) further allude that SMEs are non-subsidiary, independent firms, which employ less than a given number of employees and this number varies across countries.

The National Small Enterprise Act, 1996 (Act No. 102 of 1996), define the small and medium scale SMEs as a category that involve a separate and distinct business entity and any of its subsidiaries or branches, as well as cooperative enterprises managed by one owner or carried on in any sector or subsector of the national economy. Table 1 below demonstrates the total number of full time equivalent paid employees and the profit projections for micro, small and medium size construction SMMEs in South Africa.

Table 1. South Africa, Republic (RSA) Construction Manufacturing SMEs quantitative articulations

Construction size/ class of enterprise	**Total full time equivalent of paid employees**	**Turnover Less than**
Medium	51-250	Approximately R170.00 million
Small	11-50	Approximately R75.00 million
Micro	0-10	Approximately R10.00 million

Source: National Small Enterprise Act (2019:2).

The National Small Enterprise Act, 1996 (Act No. 102 of 1996) (2019) mentions that In South Africa, medium enterprises are those that employ 51 to 250 people and have a turnover up to R170 million followed by small enterprises, which employ 11 to 50 people and have a turnover up to R75 million. While micro enterprises employ 10 or less employees with a turnover of approximately R10 million (see table 1 above).

Productivity is defined in numerous ways within industries including small and medium scale enterprises SMEs based on the in depth background of what it entails depending on one author or country to the other. As is described by Lawaju, Parajuli and Shrestha (2021), the term "productivity" in construction is often used in conjunction with performance factor, production rate and unit person-hour rate.

Further literature read report that productivity in the masonry brick manufacturing SMEs industries refer to the quantitative relationship between bricks generated and resources used that involves coal, clay or sand, water and pipes to utilize water (Islam et al. 2019).

Based on the literature explored (Moswane, Aigbavboa and Mewomo 2018; Zhan and Pan 2020), productivity is an operational concept that is measured as “the ratio of output to input”.

2.1 A Brief Historical View of Bricks

It has been cited in (Murmu and Patel, 2018; Aniyikaiye et al. 2021) that clay/mud bricks were used to build the first brick buildings around 4000 Before Christ (BC), in what is now known as Iraq (formally known as Mesopotamia). According to (Sayyed et al. 2021), throughout the history man and dating as far back as 7000 BC, masonry brick has been used in construction of building structures, making it the oldest building material known to man. China's Great Wall, the world's largest brick-built construction, the ancient Babylonian garden, Taj Mahal in India, and the Chrysler Building in New York were all constructed using bricks (Fiala, Mikolas and Krejsova 2019). Clay Brick Association of Southern Africa, (2017) report that, in South Africa, it was around August 1654 that marked the beginning of construction of the first Cape brick house under the watchful eye of Jan van Riebeeck's in Cape Town.

2.2 Production Process in the Masonry Brick Small and Medium Scale SMEs

Masonry simply means the art of building a structure such as a house or a wall using bricks (Almssad, Almusaed and Homod 2022). According to Almssad et al. (2022), throughout its inception, the methods used to manufacture masonry bricks have not changed that much. A process of the masonry brick construction starts by extracting sand using digging, sand is then placed on a roller using a metal grid to remove unwanted particles, sand is then mixed with water, moulded to the correct specification, goes through the firing/burning process, drying, packaging, and delivery to

potential customer (Pengoriya 2016). Figure 1 below illustrates the production process that a masonry brick goes through from the initial phase all the way to the end product.

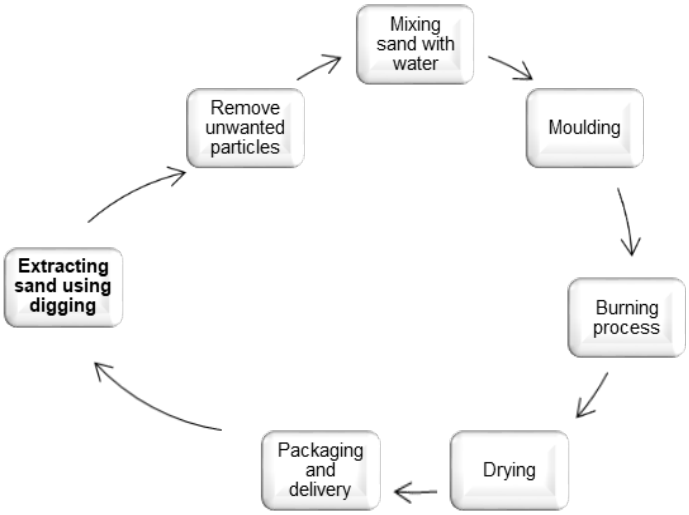

Figure 1. Masonry brick production process

2.3 Background of Productivity Improvement Systems

Productivity improvement systems or programs are functions used in the production process to transform inputs into value-added outputs by the masonry brick manufacturing SMEs to achieve the current market demand for competitiveness (Gavrila and Lucas Ancillo 2021). Productivity improvement systems include adopting innovative technologies and workplace systems that will radically enhance the masonry brick manufacturing SMEs operational practices and productivity (Kyakulumbye and Pather 2022; Vrontis et al. 2022).

The following productivity improvement systems are presented according to numerous literature review studied. These various productivity improvement systems involve ergonomics, human resource management (HRM) and business process re-engineering (BPR).

2.4 Definition of productivity improvement systems- Ergonomics, human resource management and business process re-engineering

Ergonomics practices are generally associated with the creation of a safe and conducive working environment for employees (Banstola, Acharya and Shin 2019). Human Resource Management (HRM) means that planning used to hire candidates for the job is prepared in order of recruitment, orientation, induction (training and developing employees) and these employees are exposed to the performance appraisal to show their key performance indicator for the job they carried out throughout the year (Bennett 2021:6). Heizer and Render 2017 explain that business process re-engineering (BPR) is a radical overhaul of operational processes to bring about far-reaching advancements for organisational performance.

2.5 Productivity improvement systems challenges - Ergonomics, human resource management and business process re-engineering

2.5.1 Ergonomic challenges in the Masonry Brick SMEs

Chakraborty et al. (2017) discusses that ignoring prevalent ergonomic factors that trigger musculoskeletal disorders (MSD) tend to contribute negatively towards mental, physical and socio development of the workers, conversely impacting on their overall productivity. Small and medium-scaled brick masonry production SMEs differ from larger and more established companies because of limited operational functions, not having enough workers, being faced

with inadequate training and lack of investment from the government which makes it difficult to apply productivity systems (Rauch, Linder and Dallasega 2020; Khouja, Lehoux and Cimon 2022).

Human Resource Management (HRM) challenges in the Masonry Brick SMEs

Evans and Lindsay (2017) mention that a lack of concentration, emotional and physical stress may affect consistency of human capital (machine operators). Research work by Kolodziejek and Tey (2016); Adu, Oladele and Lashinde (2019) report that productivity growth is weighed down by human resource management (HRM) lacking the capability to enhance the skills of brick and masonry block employees and incompetent management within the small and medium scale industry.

2.5.2 Business Process Reengineering (BPR) challenges in the Masonry Brick SMEs

Businesses operate in an era where they have to cope with uncertainties that stem from global economic challenges, technological advancements, and competition from rival companies (Hashem 2019). Many companies all over the world have shown interest in business process re-engineering (BPR) because of unpredictable global economic challenges and relentless competition from other organizations (Shahul Hameed, Salamzadeh, Abdul Rahim and Salamzadeh 2022). Singh, Kumar, Verma and Kandasamy (2022) asserts that integrating new brick production process with older process by the SMEs using smart-technology (industry 4.0) in order to improve the efficiency of operational process and productivity is difficult and challenging to implement. The table 2 below highlights some challenges that confront the masonry brick construction SMEs.

Table 2. Challenges that are faced by the Masonry Brick Construction SMEs

Author(s)	Challenges
Evans and Lindsay (2017)	A lack of concentration, emotional and physical stress
Chakraborty et al. (2017)	Musculoskeletal disorders (MSD)
Adu et al. (2019)	Incompetent management
(Hashem, 2019; Shahul Hameed et al. 2021)	Economic challenges, technological advancements and competition from rival companies
(Rauch et al., 2020; Khouja et al. 2022).	Inadequate training and lack of investment from the government
Singh et al. (2022)	Integration of smart-technology (industry 4.0) in order to improve the efficiency of operational process and productivity

2.6 Application of Productivity Systems - Ergonomics, Human Resource Management and Business Process Re-Engineering.

2.6.1 Ergonomics on the Productivity Improvement

In a comparable direction, other research work propose that by improving ergonomic interventions through adopting innovative methods of working, creating conducive working environment, better health and safety measures and improving employee posture will result in better work efficiency and aggregate brick productivity of SMEs (Chakraborty et al. 2017; Calzavara et al. 2020).

2.6.2 Human Resource Management (HRM) on the Productivity Improvement

Adu et al. (2019:31) state that brick masonry manufacturing SMEs must possess the necessary skills to successfully manufacture their products. Adu et al. (2019:31) further add that education is part of a social infrastructure that involves accumulation of knowledge and development of skill over a given period through various educational systems that are designed to increase the likelihood of population employability). Human resource management (HRM) needs to ensure that employees are properly trained and that the quality of training is maintained (Heo, Han, Shin and Na 2021).

2.6.3 Business Process Reengineering (BPR) on the Productivity Improvement

The masonry brick construction SMEs all over world are constantly striving to attain market related excellence that gives them a superior edge over their competitors (Singh et al. 2022). A radical redesign of brick production processes by SMEs can lead to an achievement in higher levels of productivity (Pakhomova, Dubrakova and Aseev 2021).

3. Research methodology

The study explored research constructs using a meticulous review of literature. Accredited journals, national and local articles, books, government publications that related to the research topic, aligned with the research aim and objective of the study, were used. In addition, to answer the research objective, numerous research platforms involving Google scholar, Elsevier, MDPI, Emerald publications etc. were also utilized.

4. Discussion and conclusion

The explored literature demonstrated how instrumental identified productivity improvement systems (ergonomics, human resource management and business process re-engineering) are in driving productivity within the masonry brick construction SMEs. In accordance to the review of applied literature, productivity improvement systems are lean manufacturing mechanisms that coherently contribute significantly towards the productivity growth and efficacy of the masonry brick manufacturing SMEs. However, literature read also highlighted key challenges involving a lack of concentration, emotional and physical stress, musculoskeletal disorders (MSD), incompetent management, economic challenges, technological advancements and competition from rival companies, inadequate training and lack of investment from the government and not being able to integrate smart-technology within operational process that negate growth in productivity. Thus, undermining the significant impact that these productivity improvement systems have on aggregate productivity. It is then pivotal that the masonry brick construction SMEs identify latent variables that impede productivity growth within their organisations in order to attain market and financial feasibility.

5. Future Research

The study explored research constructs using a qualitative methodology through reviewing accredited journals, articles, government documents etc. Thus, empirical findings could not be drawn. Furthermore, this research work is part of an ongoing study. The research study does not account for all productivity improvement systems that undermine the significant impact that productivity systems have on productivity. In addition, the study only employed a qualitative review of the literature. This limits the study's generalisability to other masonry brick construction SMEs in South Africa, Africa and globally. Thus, opening up other future research prospects. Research in the future should focus on quantitatively assessing the impact of productivity improvement systems on productivity growth of the masonry brick construction SMEs.

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7. Biography

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