Sustainability of women-owned engineering enterprises in the housing sector in South Africa

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DECLARATION

I Nkosingabele Constance Ramagoma, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

(Nkosingabele Constance Ramagoma)

Signed at …..Kempton Park………………………………………………….

On the ……..17th …………………. Day of …..June………. 2018.
SUPPLEMENTARY INFORMATION


Supervisor / Co-author: Zukhanye N. Kwinana

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ABSTRACT

Background: The sustainability of women-owned small, micro and medium enterprises (SMME) in the housing sector in South Africa is critical to reduce the current housing backlog in a sustainable manner. This has prompted both the public and private sector to invest in programmes which are designed to support women to start, grow and sustain their enterprises. These programmes have been in place for over a decade and it is thus critical to know if these support programmes are yielding the required results of supporting the sustainability of women-owned enterprises. In the engineering sector there are women-owned enterprises which are experiencing growth and there is a need to understand what have contributed to their growth and sustainability.

A number of studies have been conducted to identify factors that contribute to the failures of these enterprises but there are limited studies conducted to identify factors that are contributing to the sustainability of women-owned enterprises especially in the male dominated sectors like engineering and construction. Studies have shown that women in the built environment have a potential to play a critical role in solving issues related to housing delivery in the country. Therefore there is a need to understand the factors that are contributing to the sustainability of women-owned engineering enterprises in the housing sector to ensure that women play a meaningful role in the sustainable delivery of houses.

Aim: The aim of this study was to identify factors that support the sustainability of women-owned engineering enterprises.

Setting: The study focused on women-owned engineering enterprises in the housing sector.
**Methodology:** The study sample consisted of 200 women who own engineering enterprises and who were sampled from the National Home Building Registration Council (NHBRC, 2017) database. A survey questionnaire was drawn up using the Likert scale to elicit responses from these women entrepreneurs. Secondary data from literature informed the questionnaire. Respondents were asked to select factors that they perceive to support the sustainability of their enterprises in the questionnaire. A quantitative research method was used to analyse the data. The data from respondents were then ranked based on the level of agreement by respondents. Data was subjected to a number of statistical analyses to measure statistical significance of each factor.

**Results:** The findings highlighted five factors which respondents indicated that they are contributing to the sustainability of their enterprises. These factors are: family support; relevant technical skills, industry networking, women empowerment programmes, legislations and regulations. However some of the factors like the ability to secure finance and training were the least supported factors by respondents.

**Conclusion:** The findings of this study revealed that all support programmes which are linked to enable family support, improvement of technical skills of enterprises owners and their teams, participation in networking programmes, knowledge of legislation and regulation and implementation of women empowerment programmes have a positive impact on the sustainability of women owed enterprises. However all support programmes which were earmarked to improve access to finance were found not to be significant compared to other identified factors in terms of ensuring the sustainability of their enterprises.
**Recommendations:** The study recommends that there is the need for both public and the private sector to continuously review the performance of these enterprises and identify factors that need to be strengthened in terms of support. Direct engagement with women whose enterprises are sustainable is imperative in order to draw lessons learned and sharing of their experiences to determine the support that struggling women enterprises need and to focus specific interventions based on the challenges that a specific enterprise is facing.

**Keywords:** women-owned engineering enterprises, enterprise sustainability, housing sector, SMME
1. Introduction

The advent of a democratic dispensation in South Africa since 1994 has relaxed many barriers which prohibited the majority of people from opening their own enterprises, particularly people from previously disadvantaged groups. The proliferation of these companies has made few entrepreneurs’ successful business men and women. The recorded successes do not reflect a significant number of women business owners, particularly in infrastructure sector like housing. Women entrepreneurs are growing in a snail’s pace in the formal economy throughout the world and are making a contribution to the growth and development of the economy (Herrington & Kew, 2015).

Sustainability of women-owned engineering enterprises in the built environment is critical for job creation, poverty reduction and economic recovery to be sustainable (Construction Industry Development Board, 2015; Small Enterprise Development Agency, 2016). Engineering enterprises incorporates all enterprises that are involved significantly in the housing sector, including construction and consulting engineering enterprises. Government is dependent on the development and sustainability of small, micro and medium enterprises (SMMEs) to play a key role in the delivery of houses, growing the economy and job creating (Madzivhandila & Dlamini, 2015).

The public and the private sector have made a number of investments in areas like government funding, women specific training, policy amendments and others in order to support these enterprises to grow and be sustainable. This includes the setting up of government funding that is aimed at assisting women to have capital to start and grow their business, women specific training programmes that are aimed at empowering them on how to start and manage their businesses and others.
In South Africa, the Department of Human Settlement (DHS) is the custodian tasked to make sure that all people in the country are provided with decent and habitable houses (DHS, 2016). DHS has since established different programmes like Breaking new ground, Finance Linked Individual Subsidy Programme (FLISP), Social Housing Programme, Rural Housing Programme, and others that are aimed at eradicating the housing backlog and encouraging the involvement of SMMEs as well.

Government’s determination to provide opportunities for women-owned engineering enterprises in the housing sector has been shown by the amount of tenders that has been awarded to these enterprises, since the year 2004 which are estimated to be worth over R359 million (SEDA, 2016). This is an indication that women-owned engineering enterprises in the built environment have played a critical role in solving the issue of housing delivery in the country, but the question is what is behind these enterprises success and what makes them to be sustainable. If this question can be answered it will encourage other women to start more of these enterprises in the sector which in turn will benefit the industry by creating sustainable employment and delivery of houses in this sector.

It is estimated that the survival rate of women-owned construction enterprises are low with some of them not making it to their second birthday, while others fail within 5 years of starting (Ferreira, 2007; Njogu, 2016). According to the Construction Industry Development Board (2017) there is currently approximately 50% (grade 2-4), 45% (grade 5-6), 40% (grade 7-8) and 31% (grade 9) registered women-owned contractors. This gives an indication that the number of women enterprises reduces as they move to higher level of CIDB grading which is a sign that these enterprises either do not grow or do not last long in the industry.
The same trend is noted at Consulting Engineers South Africa (CESA) whereby only few of their members are women-owned (CESA, 2017). It can be noted though that there are women who still survives amidst these challenges and grow their business in this sector and it is important to find out what has supported them throughout their journey so that this help others to learn from this and grow their business as well.

There are limited studies which have been conducted to identify the factors that impact on the sustainability of the women-owned engineering enterprises in the built sector specifically in the housing sector, United Nations Educational, Scientific and Cultural Organisation (UNESCO) reported that South Africa has one of the best transformation policies in place but it is estimated that about 70% of women graduate engineers leave the profession due to isolation and this impacts negatively the number of future engineering enterprises (UNESCO, 2014).

South African Government has done a number of initiatives, policies and programmes which are earmarked to develop support and grow women entrepreneurs (CIDB, 2016). The Department of Human Settlement has also joined forces with a number of different academic institutions and are offering women empowerment programmes (WEP) in order to improve the management skills of the women-owned engineering enterprises (Ferreira, 2007).

1.1. **Aim of the study**

The aim of this study was to identify factors that support the sustainability of women-owned engineering enterprises.
1.2. **Rationale of the study**

South African Government has done a number of initiatives, developed a number of policies and programmes which are earmarked to develop and support and women entrepreneurs (CIDB, 2016). There are limited studies which have been conducted to determine the impact of all these interventions on the sustainability of the women-owned enterprises in the built sector specifically in the housing sector. Some studies have indicated that if SMMEs are sustainable it will result in the sustainable growth of the economy and reduction of unemployment and poverty in South Africa.

The construction and built industry accounts for approximately 11% of formal employment and 17% of informal employment of which 89% are male and 11% are female (Statistics South Africa, 2017). CESA (2017) indicate that from 543 of their consulting engineering companies members, only 4-6 % are women owned and the same can be seen with the number of professionally registered engineers which are currently 5919 and only 12% are women and this is an indication that this sector is still male dominated.

Therefore based on the scarcity of the technical skills in the country and in order to ensure long term sustainability of women-owned enterprise in the engineering sector more efforts needs made to encourage girls and women to enrol for technical courses as this will not only add value to the current challenge of shortage of skills but it will also improve the sustainability of these enterprises. Women are a vulnerable group and are still dependent on men for financial support, there is a need to enable them to earn their own money and to be capacitated to solve societal problems like poverty and to close the unemployment gap (Madzivhandila & Dlamini, 2015).
This is indicative of how this sector is still male-dominated and creates more employment opportunities for men than women; therefore there is a need to identify factors that are perceived to be supporting the sustainability of women-owned engineering enterprises.

**Significance of the study**

Women are a vulnerable group and are still dependent on men for financial support, there is a need to enable them to earn their own money and to be capacitated to solve societal problems like poverty and to close the unemployment gap (Madzivhandila & Dlamini, 2015). This study is of value to the South African government as it provides the factors that they can look into in order to improve the sustainability of these enterprises and avoid their closing down or liquidation. It also shows which factors are impacting positively to the sustainability of women-owned enterprises and how this assists in eradicating unemployment and poverty in the long term.

This study will serve as a guideline to all existing women-owned engineering enterprises and aspiring entrepreneurs in this sector. This study will enable DHS to address current shortage of sustainable women-owned enterprises thus creating sustainable employment opportunities and reducing the current housing backlog. The study will also be beneficial to all public and private stakeholders responsible for development of policies, legislation, training, mentoring, and transformation as it will give guidance to what factors are critical to be considered when supporting women-owned enterprises.

**1.3. Delimitations of the study**

This study only focused on women-owned enterprises in the housing sector which are active in the NHBRC database. Another limitation was with regards to the low response rate from the 200 respondents identified.
In order to improve the response rate, the researcher contacted the respondents to remind them about completing the questionnaire electronically. Respondents were reminded telephonically, by emails and text messages. Only 50 out of 200 responded to the questionnaire. This was potentially caused by poor internet network accessibility of the questionnaire link by respondents due to the nature of their work as they spend most of their time on construction sites. The study sample included women-owned engineering enterprises in the housing sector registered with NHBRC that can be regarded as operating during the time of the research; therefore all the identified factors are representative of the perception of women engineering entrepreneurs operating in the housing construction sector only.

1.4. Definition

- **Entrepreneur**

An entrepreneur is defined as a person/people who start and develop an enterprise, identify opportunities, avail appropriate resources, create value for their customers and make profit (SEDA, 2016)

- **Enterprise**

An enterprise is an entity or business organisation which provides services, create jobs and contribute to a country’s sustainable economic development, it can also be referred to as a business venture (Ferreira, 2007)

- **Sustainable enterprises**

Ferreira (2007) defines a sustainable enterprise in the construction industry can be defined as the business that grows, viable and earns profit while realizing the economic and social desires of its employees. This definition is adopted for this study.
- Woman-owned engineering enterprise

A woman-owned engineering enterprise is the one where a woman or group of women control, manage and own 30% or more of the enterprise within the built environment profession (CIDB, 2015).

- SMMEs

In South Africa, SMMEs are defined as per Section 1 of the National Small Business Act of 1996, as amended by the National Small Business Amendment Acts of 2003 and the 2004 (NSB Act) as a single and diverse business entity, which is inclusive of non-governmental organisations and co-operative enterprises, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or sub sector of the economy. SMMEs can also be defined by their annual turnover and the number of employees as indicated in Table 1 (SEDA, 2016).

**Table 1:** SMME definition based on number of employees and annual turnover

<table>
<thead>
<tr>
<th>Company size</th>
<th>Number of employees</th>
<th>Annual turn over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>51-200</td>
<td>64 million</td>
</tr>
<tr>
<td>Small</td>
<td>21-50</td>
<td>26 million</td>
</tr>
<tr>
<td>Very small</td>
<td>6-20</td>
<td>3 million</td>
</tr>
<tr>
<td>Micro</td>
<td>0-5</td>
<td>0.2 million</td>
</tr>
</tbody>
</table>
1.5. Literature Review

This section reviewed literature and research work conducted on the importance, development, growth, needs and challenges of SMMEs in South Africa. It also looked into different interventions and programmes by public, private and professional bodies which is earmarked to assist all SMMEs (more focus on women-owned enterprises in the built environment) and how these have impacted on their growth and sustainability.

It explained the current status of the housing backlog and the role that the engineering SMMEs played in eradicating the backlog. SMMEs play an important role in job creation, economic development and growth, and increase the level of innovation and international competitiveness (Brijlal, Naicker & Peters, 2013; Kelly, Singer & Herrington, 2016). Therefore the growth of SMMEs can be directly linked to the growth of employment (Wiese & Lotriet, 2014). Mining and industrial enterprises have been playing a key role in creating employment and growth in the economy but there seem to be a gap which can be filled with the prioritization of SMMEs worldwide because they improve the skill and have high labour absorptive capacity (Ferreira, 2007).

1.5.1. SMME support programmes in South Africa

The South African government has since developed and implemented a number of policies and programmes from 1994 which are earmarked to develop, support and grow SMMEs (Ferreira, 2007, Mazhivhandila & Dlamini, 2015). A number of studies have been done which highlights the importance of SMMEs in the growth of social and economic development and the role that they plays in the implementation of black economic empowerment in South Africa (Ferreira, 2007).
Certain policies have been put in place to encourage women to start their own enterprises even in the male dominated sector like engineering (Kelly, Singer & Herrington, 2016). The South African government is working on availing even more opportunities for women to participate in construction projects and have ensured that women-owned engineering enterprises are given access to government tenders (SEDA, 2016). The South African government has also created a number of institutions like Ministry of small business development, Small Enterprise Development Agency (SEDA), Small Enterprise Finance Agency (SEFA), National Empowerment Fund (NEF) and others which are aimed at providing financial and non-financial support to entrepreneurs that want to start and grow their enterprise in different sectors (Mazhivhandila and Dlamini, 2015, SEDA, 2016).

According to Ferreira (2007) different intervention strategies has been developed by the South African public and private sector which are aimed at developing, growing and sustaining SMMEs and that includes access to credit, education and training, mentoring and networking. The Integrated Small Business Development Strategy formulated in 2005 till 2014 was designed to focus on improving the access to financial and non-financial support for the SMMEs, increase demand to SMMEs products/service and to reduce regulatory constraints so as to support the SMMEs in South Africa (Mahembe, 2011).

There have not been many studies done to give an indication whether the assistance/opportunities given impacts positively to the long term success and sustainability of SMMEs (Ferreira, 2007). Mahembe (2011) also agrees that there is a need to evaluate effectiveness of each and every programme which has been put in place to support SMMEs and to also set up continuous monitoring and evaluation of these programmes. It is thus important to determine if some of these programmes and interventions are impacting positively to the sustainability of the SMMEs in South Africa.
This study provides an insight into the progress made to date and to establish whether women-owned enterprises are benefiting from these programmes on a long term basis.

1.5.2. Overview of SMMEs sustainability

The SMMEs play a critical role in poverty alleviation and employment creation thus it is critical that they are sustainable. Wiese & Lotriet (2014) observe that for any SMME to have long term success it requires sustainability and competitiveness. In order to achieve high employment rate and sustainable livelihood of South Africans there is a need for investment in the sustainability of SMMEs in the country (NDP, 2017).

The survival rate of SMMEs is dependent on the growth and age of the enterprise and sustainability for all enterprises should be part of any enterprise start up and this should be evaluated and be monitored on continuous basis so as to make adjustments where required timeously (Wiese & Lotriet, 2014 and Njogu, 2016). There is a general observation that for an enterprise to be sustainable, it is imperative that its employees are equipped with relevant knowledge. Sustainability of any enterprise is measured by the quality, skills, commitment and motivation of its personnel (ILO, 2007).

Women and youth are the ones most affected by unemployment and poverty thus there is a need for sustainable job creation which prioritizes women and youth. The studies which have been carried out established that this can be achieved if the country has a number of sustainable SMMEs in place. Njogu (2016) also recognise that, for the enterprise to improve development, success, growth and sustainability it is important that continuous investment is done through professional training for the owner and all the employees.
This is supported by Irene (2017) that the sustainability of SMMEs is dependent on the capabilities of the owner therefore the owner’s competencies can be equated to the enterprise competencies.

1.5.3. Sustainability of women-owned enterprises

The South African government has invested in number policies and empowerment programmes, which are earmarked at empowering and encouraging women to start and sustain their own enterprises in all sectors. A number of women have benefited from these initiative and this can be seen by a number of businesses which owned by women which are growing and are sustainable. However there is a need for regular monitoring and evaluation of these programmes in order to improve them and to make sure that they address challenges of women which might hinder their progress (BIAC 2015). A number of studies have been conducted which indicate that the sustainability of women-owned enterprises in South Africa is starting to grow especially in the male dominated sectors like engineering and construction (Jonas, Netshandama and Mudau, 2014).

1.5.4. South African social-economic challenges

SMMEs survival in South Africa is a challenge; SMMEs operate within a complex commercial, economic and social pressure from society, clients, suppliers, civil society groups and workers (ILO, 2007). The South African government has spent a number of years investing in a number of initiatives which includes enabling legal framework, improve procurement to accommodate SMMEs, improve access to finance and required infrastructure, and improved access to relevant advice and information to count a few in order to support the start, growth, success and sustainability of the SMMEs in the country (Mahembe, 2011).
High unemployment rate, poverty and inequality have persisted since the dawn of South African democracy in 1994 (Amra, Hlatshwayo & McMillan, 2013, Madzhivhandila, 2015).

The country is currently experiencing a number of violent service delivery protests dominated by unemployed youth which is an indication that lack of delivery of basic services and high unemployment rate are frustrating the communities (le Roux, 2011). The country has also recently been experiencing an economic growth which is lower that their population annual growth (Kelly et.al. 2016). The rating agencies have downgraded South Africa due to the insecurity surrounding the country’s ability to honour its debt and associated interest which will also impact negatively to both the employed and unemployed citizens as some of the companies will start to cut some of their staff in order to reduce cost of producing goods (Luus, 2017).

According to Statistics SA (2017) South African population is approximately 57 million (51% female and 49% male) of which approximately 27% are unemployed (24 % male, 28% female and 51% youth). This gives a clear indication that more youth and women than men are affected by unemployment which result in them not being able to have access to decent houses. These conditions require a number of intervention programmes that are aimed at identifying, encouraging and supporting women and youth SMMEs which have growth aspirations so as to maximise impact of economic growth and creation of employment thus improving the socio-economic development in South Africa (Kelly, Singer & Herrington, 2016).

The studies also indicate that the numbers of male formal enterprises are still higher than women formal enterprises in most industries (Kelly, Singer & Herrington, 2016).
This is an indication that men are the ones currently contributing to the economy and unemployment eradication in the formal sector while women prefer informal enterprises as a means of surviving and in order to provide for their families.

The South African government is currently putting a number of programmes and policies in place to prioritize women and youth SMMEs in all industries (SEDA, 2016). Women and youth enterprises are a solution to the current high unemployment and poverty in the country as they can create employment for themselves and others (Amra, Hlatshwayo and McMillan, 2013). It is thus important that the women-owned engineering enterprises especially in the built sector be sustainable so as to eradicate some of the wicked socio-economic challenges in South Africa.

1.5.5. Housing challenge around the world

A number of countries like Brazil, Columbia, Sweden and others are having challenges with housing delivery, but each country has their own unique influencing factors, thus it is important that each country find solutions that suit their country’s specific circumstances (De Souza, 2003). Access to housing by the poor is not the only service delivery challenge they are faced with, it is linked to other services like, insufficient or ageing infrastructure, water shortages, electricity shortages, traffic congestion, waste removal problems and crime. Although the South African government has made progress with regards to providing houses to the people, provision of affordable public transport, land reform and others, there is still a long way to go (NDP, 2017).
People who are primarily affected by the lack of access to decent houses are mainly women and children, thus it is critical to look into how their involvement can contribute to the delivery of the houses and how they can empower them to be sustainable in this sector (le Roux, 2011).

1.5.6. Current housing status in South Africa

Lack of decent housing is a worldwide problem. More than a billion people in the world have no access to decent houses (le Roux, 2011). The South African government has been struggling to eradicate housing backlog in urban areas since 1994 when a democratic dispensation took power (le Roux, 2011). Twenty years into democracy approximately 4.3 million houses have been built which has benefited approximately 20 million South Africans, but more houses still need to be constructed as the backlog has grown from 1.5 million to 2.1 million and this number is growing every year (DHS, 2016).

This is an indication that the demand rate for houses is higher than the current supply rate which is also a reflection that more enterprises are needed to be involved in the delivery of houses than the current ones in the sector. Approximately 41% of housing demand is in the R0 to R500 000 per annum per household and approximately 28% of housing demand is in the R500 000 to R 1 million per annum per household (DHS, 2016). This gives an indication that most demand for houses is within the poor, unemployed communities and the ones who are earning less salaries and that there is a need for creation of employment for people to afford to fund or build their own homes.

There are a number of factors that influence the delivery of houses like geographic location, availability of construction material, poverty, corruption, construction skills shortage, unemployment, health, education, infrastructure, fluctuating economies, and government politics (Le Roux & Roux, 2011).
Initiatives which consist of accommodating the lower income groups into the cities and create employment opportunities for the poor communities to afford their own accommodation are some of the initiatives that can solve the housing challenges (Mickensy and Company, 2014).

Housing problem is one of the pressing service delivery challenges faced by the democratic dispensation and the solution to it lies in the amicable engagement between the government and relevant stakeholders including the SMMEs in this sector (DHS, 2016). According to Statistics SA (2016) there is approximately 16.9% of houses are women-owned and 11% are men-owned and this is as a results of government giving priority to previously disadvantaged group (i.e. women, children, people living with disabilities). Majority of the houses delivered by government have also been handed over to women headed households (DHS, 2011).

This indicates that women are the ones which are mostly affected by poor access to housing and thus it is important that women-owned engineering enterprises play a role in a sustainable manner in eradicating the housing backlog.

1.5.7. Role of SMMEs in the housing delivery

Human settlement can be defined as a well-managed settlement where social development and growth are in balance with the natural systems on which they are dependent on for their existence which will result in a sustainable development, wealth creation, equity and poverty alleviation (DHS, 2011). The Department of Human Settlement developed a framework for the empowerment and participation of women in human settlements delivery.
This framework is divided into mobilisation of women as a collective to participate, raising consciousness on gaps & opportunities for women in this sector, creation of access to human settlement opportunities, and women to participate both as collective and as individual to the delivery of sustainable human settlement. This initiative was established to resolve the non-involvement of women in the delivery of the houses (DHS, 2011).

In the 2017 budget speech approximately R3.9 billion was set aside to benefit SMMEs. Government has also gazetted new procurement regulations whereby for every contract of R30 million and more, 30% of that contract value will be allocated to either women owned, youth, disabled or black owned SMMEs (DHS, 2016). It has also been indicated that there is also skills shortage such as scientists, engineers, artisans, IT technicians, financial managers and project managers in women which has resulted prompted government to invest in education and training programmes which prioritises women.

The government has also joined forces with academic institutions like the University of Pretoria and sponsored the programme called Women Empowerment Programmes (WEP) which assists in developing and training women entrepreneurs to start and develop their own businesses; it also offers post training business mentoring and advisors (Ferreira, 2007).

The Department of Human Settlement realised that women are under-represented in the human settlements and housing construction sector which meant that the department is also losing out on potential capacity to eradicate the housing backlog in the midst of growing housing demand (DHS, 2011). Government then set aside 30% of their projects specifically for women owned enterprises as per the new procurement regulations. They have also put in place different payment systems in order to improve their payment turnaround time of their suppliers (e.g. part payment or after work completed as per agreement).
Due to high level of fronting and corruption in the industry the department of human settlement has put systems in place which is aimed at reducing this (DHS, 2016). All of this is intended to encourage women to be involved in the delivery of housing and human settlement opportunities. The Minister of Human Settlement has since signed memorandum of understanding with South African Women in Construction (SAWIC) to assist in empowering women contractors in the country (DHS, 2015).

A number of professional bodies like SAWIC, CIDB, CESA and others have been formed to empower and protect women entrepreneurs especially in the male-dominated sectors like engineering and construction (Verwy, 2007). Women participation and empowerment in all sphere of society is important to the sustainability of human settlement development.

Their main objectives is to protect women entrepreneur against discrimination especially in the male dominated sectors, to make sure they have access to business opportunities, to assist them to be competitive and successful in the male dominated sectors (SAWIC, 2017).

A number of factors are perceived to be contributing to the sustainability of the SMMES in the housing sector especially women-owned SMMEs. It is important to identify what these factors are so that all programmes and policies are tailor-made to improve on these factors as they are critical to the sustainability of these enterprises. This study will focus on identifying these factors which are contributing positively to the sustainability of the women-owned engineering enterprises in the housing sector. Knowing these factors will assist in exposing whether the current support given to these enterprises is yielding any positive results or not.
2. Research methods and design

This is a quantitative study. The quantitative research approach method was employed in this study in order to obtain representative opinions of women who currently own sustainable engineering enterprises about factors that they perceive to be contributing to their sustainability. Descriptive approach was adopted for primary data collection using a web based survey. Ferreira (2007) states that a descriptive approach is the one that collects data using e-mail surveys, web-based survey, personal interviews, telephone interview or online panel. The research approach for this study consisted of using secondary data from the literature to inform a survey questionnaire which was used to collect primary data.

Primary data is collected when it is found that the secondary data is not sufficient to answer the main objective of the study (Tustin, Ligthelm, Martins, Van Wyk, 2005). The survey questionnaire was used to collect primary data from a large population of women who own engineering enterprises within the housing sector with the aim of generalising the results to a specific population of women entrepreneurs.

2.1. Study population and sampling strategy

The target population on this study entailed women who are owners of engineering enterprises which have been providing either consulting, construction or turnkey services within the housing sector in South Africa. A request was made to use the NHBRC database from all provinces to identify engineering enterprises that are women-owned. A total of 200 respondents which own different enterprises were identified and their contact details obtained and they were requested to participate in the research.
Majority of the respondents who participated in the study were based in larger metropolitan areas where the current housing backlog is higher than other parts in the country, for example: Johannesburg, Durban and Port Elizabeth. These enterprises were chosen because before housing projects can be awarded to enterprises they are required to first register with the NHBRC as it regulates the housing industry on behalf of the Human Settlement. The sampling criteria for this study took cognisance of the fact that the engineering enterprises operate largely in metropolitan areas where they are mostly based.

### 2.2. Data collection and analysis

A survey research methodology was adopted in order to cover a large geographic scope in South Africa. Structured and closed ended questionnaires was used as a measurement tool to collect data as it is the most cost effective method of collecting data (Ferreira, 2007). Blumberg, et al. (2008) observe that in a survey research, the researcher determines the data collection approach largely by identifying the types of information needed, investigative questions which the researcher must answer and the desired data type (nominal, ordinal, interval or ratio) for each of these questions.

This method of collecting data has some disadvantages, for example: it has low response rate and the fact that no probing or clarification of misunderstanding can be done (Ferreira, 2007). In order to enhance a high response rate the researcher used emails and contacted the respondents telephonically and text messages. Literature was reviewed which consisted of books, journals and articles on the subject and published research work and annually published reports from CESA, Engineering Council of South Africa (ECSA), CIDB, the provincial and National Department of Human Settlements and all Human Settlement entities.
A questionnaire was used to collect data and the copy of the questionnaire is attached in Appendix A. The questionnaire consisted of two sections with 11 multiple choice questions whereby 5 of the questions consisted of demographic information and 6 questions were statements relating to factors that improve sustainability. The questionnaire did not allow respondents to move to the next following questions before completing the previous section and this assisted in having fully completed questionnaire. Ferreira (2007) indicate that it is important to keep questionnaire short, simple and clear without compromising the objective of the study.

During the pilot phase, the researcher conducted five interviews with informal women entrepreneurs in the area to refine the questionnaire and identify any other relevant concepts that needed to be addressed in the survey. In order to validate the questionnaire, it was sent to 15 people within the built industry and they gave their inputs before the questionnaire was finalised and distributed. Qualtrics research survey software was used as a collection tool whereby a Uniform Resource Locator (URL) of the questionnaire was emailed to the sampled population. The questionnaire only took approximately 10 minutes on average to complete. The collected responses data was captured automatically and converted into a Statistical Analysis System (SAS).

3. Results

The responses were analysed and interpreted and the descriptive statistical analysis was conducted to determine whether the objective of the study was met or not. The questionnaire was divided into two sections where Section A consists of business demographic information and section B consists of multiple choice for the rating of sustainability factors. Summary of the results are discussed in details below.
3.1. **Validity of research instrument**

The validity of the research instrument was strengthened through extensive review of the literature. Relevant literature on women-owned enterprises was reviewed and it provided secondary data which was then used to design questionnaires in order to collect primary data for the study. Piloting of the questionnaires ensured that the questions were clear and understandable. The questionnaire had 13 questions with three related sub questions, this was done to test the consistency of the responses and to improve validity of the research instrument.

A total 50 respondents answered the questionnaire in full and this is an indication that the instrument had fair content validity. In order to enhance construct validity, business demographics questions, Likert scale measured questions were used and 50 respondents fully answered the questions in a consistent manner.

3.2. **Respondents’ Business profile**

The questionnaire URL link was sent to a total of 200 of women who own different enterprises within the housing sector. The questionnaire was available to all respondents for duration of two months. A total of 50 respondents completed the questionnaire which amount to 25% response rate. There were challenges relating to the completion and returning of questionnaires during the data collection phase. Some of the respondents indicated that they had network challenges as they were based on construction sites with poor/no connection to the internet. This resulted in 11 respondents not completing the questionnaire in full and their incomplete responses do not form part of this study. This resulted in low response rate especially from owners of turnkey enterprises.
The information on business demographics of the respondents consisting of the age of the enterprise, type of the enterprise ownership and the results are presented in Table 3.1. Four different enterprise type respondents were targeted which are: construction, consulting, turnkey and both construction and consulting. The results show that 66% of the respondents are owners of the construction enterprises whereas only 16% of respondents own consulting enterprises, followed by 12% of respondents own both construction and consulting enterprises and lastly 6% of respondents own a turnkey enterprise.

This gives an indication that more of the women entrepreneurs are more attracted to the construction phase of the houses other than the design or planning phases.

Table 3.1: Enterprise type

<table>
<thead>
<tr>
<th>Enterprise type</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner of the construction only enterprise</td>
<td>33</td>
<td>66%</td>
</tr>
<tr>
<td>Owner of the consulting only enterprise</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>Owner of both construction and consulting enterprises</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td>Owner of a turnkey enterprise</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Since the objective of this study was to identify the factors that are perceived to be contributing to sustainability of the women-owned enterprise it is important to determine how long has each enterprise been operating for in the housing sector.
Table 3.2 illustrates the details of the enterprise age demographics. The majority of the respondents 18 (36%) indicated that their enterprise have been in operation in the housing sector between 2 to 5 years, while 14 (28%) indicated that their enterprises were more than 5 but less than 10 years old, followed by 9 (18%) indicating that their enterprises have been operating for more than 10 years and only 2 (4%) indicated that their business has been in operation for less than a year.

This is an indication that majority of the respondents which is 96% have enterprises that have been in operation for more than two years. This means that their perception on the factors that has contributed to the sustainability of their enterprises in the housing industry will be valuable to this study.

Table 3.2: Enterprise’s age

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>1-2</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>2-5</td>
<td>18</td>
<td>36%</td>
</tr>
<tr>
<td>5-10</td>
<td>14</td>
<td>28%</td>
</tr>
<tr>
<td>More than 10</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

This study is based on women who own enterprises; therefore it is critical to know the percentage that each owner has of the company. Table 3.3 gives details of the enterprise shareholding percentages that each respondent own. The results indicate that 37 (74%) of the 50 respondents own more that 50% of the enterprise, followed by 7 (14%) who own more that 30% and 6 (12%) who own less than 30% of the enterprise.
This gives an indication that the respondents have been directly involved in the starting, growing and daily operations of the enterprise and thus they know what has made the enterprise to be sustainable.

Table 3.3: Enterprise shareholding percentage

<table>
<thead>
<tr>
<th>Shareholding percentage</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30%</td>
<td>6</td>
<td>12 %</td>
</tr>
<tr>
<td>30-50 %</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>50-100%</td>
<td>37</td>
<td>74%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

This study was based on women who own enterprises in the housing sector; but there was also a need to establish whether the owner owns more than one enterprise of which not all are engineering enterprises. This is important as it gives an indication whether the sustainability is from the engineering enterprise only or it is due to a combination of other enterprises which are not in the engineering sector. The responses indicated that 39 (78%) of the respondents have only one enterprise which is the engineering enterprise while 11 (22%) has other enterprises including the engineering enterprise. This is valuable to the study as majority of the respondents own engineering enterprises.

3.3. Statistical analysis

3.3.1. Distribution fitting curve analysis

A descriptive statistics was conducted in order to obtain the mean and standard deviation of the data. According to Leedy & Ormond (2005) descriptive statistics gives a description of the data by determining point of central tendency, level of variability and the relations among different variables.
The questionnaire had multiple choice questions with factors that each respondent was requested to rate based on their perception of each factor’s contribution to the sustainability of their enterprises. Rank ordered data of responses from the survey was done based on the order of strongly agree, agree, neutral, disagree and strongly disagree. According to Stacey (2005) data from respondents should be organized in such a way that it shows the pattern of the responses. A total of six factors each with three questions formed part of the questionnaire which required to be measured using a five point Likert scale of 1(agree) to 5 (disagree) on how they perceive each factor as contributing to the sustainability of their enterprises. The responses have been summarized in Table 3.4. The data for the respondents was categorized into three groups which consisted of the ones who agree (score 1-2), neutral (score 3) and disagree (score 4-5).

**Table 3.4: Summary of responses for the whole sample**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family support</td>
<td>56%</td>
<td>36%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>10%</td>
<td>18%</td>
<td>18%</td>
<td>24%</td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>Relevant technical skills</td>
<td>56%</td>
<td>36%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Industry networking</td>
<td>42%</td>
<td>40%</td>
<td>14%</td>
<td>2%</td>
<td>2%</td>
<td>100%</td>
</tr>
<tr>
<td>Regulations and legislations</td>
<td>20%</td>
<td>36%</td>
<td>22%</td>
<td>16%</td>
<td>6%</td>
<td>100%</td>
</tr>
<tr>
<td>WEP</td>
<td>20%</td>
<td>44%</td>
<td>26%</td>
<td>8%</td>
<td>2%</td>
<td>100%</td>
</tr>
</tbody>
</table>
A total of 92% agree that family support have contributed to the sustainability of their enterprises, 6% were not sure and 2% disagree that this factor has contributed to their sustainability. A total of 92% agree that relevant technical skills have contributed to the sustainability of their enterprises, 6% were not sure and 2% disagree. The findings show that majority of respondents (92%) view family support and relevant technical skills as critical to the sustainability of women entrepreneurs in the housing sector.

A total of 82% agree that industry networking has contributed to the sustainability of their enterprises, 14% were not sure and 4% disagrees which indicates a growing trend of networking benefits that these women have benefited from. A total of 56% agree that regulations and legislations have contributed to the sustainability of their enterprises, 22% are neutral and 22% disagree.

A total of 64% respondents agree that women empowerment programmes have contributed to the sustainability of their enterprises, 26% were not sure and 10% disagree which means that these programmes are providing the required management skills to the owners of these enterprises which enables them to be sustainable. This also means that government should continue to subsidise these programmes so that more women can have the opportunity to enrol and benefit.

A total of 28% agree that ability to secure finance contributes to the sustainability of their enterprises, 18% are not sure and 54% of the responses disagree that this factor contributes to their enterprise sustainability. This indicates that most of the respondents (54%) are still finding it difficult to access finance for their enterprises and that maybe their enterprises have been funded using other instruments other than the current public and private institutions.
This indicates that five of the six factors which are: family support, relevant technical skills, industry networking and women empowerment programmes, are perceived to be contributing to the sustainability of these enterprises with family support and relevant technical skills having the highest score of 92%.

These four factors are perceived to have been contributing to the sustainability of these enterprises if these factors were not present these enterprises would have closed down. Regulations and legislations are also making some positive contribution with 56% agreeing that this factor has positive impact to their sustainability. Ability to secure finance is the only one rated low (28%) on its contribution to sustainability the majority of respondents do not regard this factor to be adding value or impacting to the sustainability of their enterprises.

This is an indication that even though the ability to secure finance is not viewed as supporting the sustainability of these enterprises their impact is not that strong as these enterprises are still in existence and they are sustainable.

It can also be noted that 60% of the identified factors which contribute to the sustainability of women-owned engineering enterprises can be regarded as internal factors which are within the owner control and only 40% of the identified factors which contribute to the sustainability of these enterprises can be regarded as external factors and they are not within the owner control. This is an indication that most future intervention programmes designed to assist these enterprises should give more focus to the enterprise owner’s needs or are to be aimed at closing the shortcomings of the owners.

However this does not mean that the ones which were rated low are not playing any role, this is an indication that more work still needs to be done to improve all policies, intervention and support with regards to ability to secure finance of the women entrepreneurs.
The ranking of the factors based on their mean is done and presented in Table 3.5. An analysis of each factor based on their responses percentages of agree, neutral and disagree together with their associated calculated mean was done to rank and prioritize how each factor is perceived to be contributing to the sustainability of women-owned engineering enterprises.

**Table 3.5: Ranking of factors per mean and response percentage**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Total</th>
<th>Population Mean</th>
<th>Population variance</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant technical skills</td>
<td>92%</td>
<td>6%</td>
<td>2%</td>
<td>100%</td>
<td>0.66</td>
<td>0.36</td>
<td>1</td>
</tr>
<tr>
<td>Family support</td>
<td>92%</td>
<td>6%</td>
<td>2%</td>
<td>100%</td>
<td>0.52</td>
<td>0.17</td>
<td>2</td>
</tr>
<tr>
<td>Industry networking</td>
<td>82%</td>
<td>14%</td>
<td>4%</td>
<td>100%</td>
<td>0.36</td>
<td>0.33</td>
<td>3</td>
</tr>
<tr>
<td>WEP</td>
<td>64%</td>
<td>26%</td>
<td>10%</td>
<td>100%</td>
<td>-0.12</td>
<td>0.35</td>
<td>4</td>
</tr>
<tr>
<td>Regulations and legislations</td>
<td>56%</td>
<td>22%</td>
<td>22%</td>
<td>100%</td>
<td>-0.28</td>
<td>0.37</td>
<td>5</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>28%</td>
<td>18%</td>
<td>54%</td>
<td>100%</td>
<td>-1.01</td>
<td>0.79</td>
<td>6</td>
</tr>
</tbody>
</table>

The ranking of results indicate that relevant technical skills has the highest population mean and has the highest number of ranking. Family support skills has the second highest population mean and as the second most preferred factor. The third factor is industry networking which is ranked as the third preferred factor, followed by empowerment programmes and regulations and legislations. Ability to secure finance had the lowest population mean and ranked the least preferred factor of them all. The variance of the family support factor is the lowest, followed by industry networking, women empowerment programmes and relevant technical skills. The variance of ability to secure finance factor is the highest.
This means that even though relevant technical skills is the most preferred factor and is ranked the highest, its population variance is the fourth highest. Family support is ranked the second preferred factor but its variance is the lowest of them all.

3.4. **T-test and p-test for the sample**

Normal distribution fitting curve algorithm was used to determine the population mean and standard deviation. According to Stacey (2005) using normal distribution fitting algorithm to estimate mean and standard deviation is more reliable and valid as opposed to other methods. The mean gives the arithmetic average of the responses and the standard deviation gives an indication of how responses vary from the mean for each factor.

As shown in Table 3.6, family support has the least standard deviation of 0.17 which indicates that most of the responses fall closer to the mean of 0.4 thus there is minimal variation of the responses. However the ability to secure finance factor negative mean and the standard deviation is higher than all the six factors (0.79) and this can be interpreted as that the spread of the responses is higher than the mean. The relevant technical skills and industry networking factors have approximately the same standard deviation of 0.3 and this mean that their responses had similar spread and their responses are closer to the mean for each factor.

The regulations and legislation and women empowerment programmes had similar spread as well and both have negative mean which means that their responses were not varying that much. The t-test and p-test was also conducted whereby each factor is to be regarded as statistical significant if their p<0.05.
The family support, ability to secure finance, relevant technical skills, regulations and legislations have a p<0.05 which means that the responses for these factors are statistically significant. This can be interpreted that there is a relationship between these factors and the sustainability of these enterprises. The industry networking and women empowerment programmes have p>0.05 and are not showing any significance which gives an indication that there is no relationship between these factors and the sustainability of these enterprises based on the responses.

Table 3.6: Response data mean, standard deviation, t-test and p-test results

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family support</td>
<td>0.400</td>
<td>0.170</td>
<td>9.5</td>
<td>*** 0.02</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>-0.790</td>
<td>0.790</td>
<td>-6.3</td>
<td>***0.00</td>
</tr>
<tr>
<td>Relevant technical skills</td>
<td>0.490</td>
<td>0.360</td>
<td>5.9</td>
<td>***0.00</td>
</tr>
<tr>
<td>Industry networking</td>
<td>0.250</td>
<td>0.320</td>
<td>4.1</td>
<td>0.28</td>
</tr>
<tr>
<td>Regulations and legislations</td>
<td>-0.230</td>
<td>0.360</td>
<td>-2.2</td>
<td>***0.00</td>
</tr>
<tr>
<td>WEP</td>
<td>-0.100</td>
<td>0.350</td>
<td>-1.2</td>
<td>0.35</td>
</tr>
</tbody>
</table>

***P- Statistically significance difference (less than 0.05)

The t-test for all six factors were conducted to determine whether the population mean values for these factors can be regarded as either positive, neutral or negative. The t-test results for the family support, relevant technical skills, and industry networking are all positive which is an indication that majority of respondents’ perception on these factors do contribute to the sustainability of women-owned engineering enterprises.
The t-test results for ability to secure finance, regulations and legislations and women empowerment programmes are all negative which is an indication that majority of respondents do not perceive that these factors play any role in the sustainability of women-owned engineering enterprises.

Factors have been ranked based on their population mean and the standard deviation in Table 3.7. The results indicate that a relevant technical skill has the highest mean and ability to secure finance has the highest standard deviation. This is in agreement with the ranking done in Table 3.5.

Table 3.7: Sample Mean and standard deviations of the responses

<table>
<thead>
<tr>
<th>Factor</th>
<th>μ</th>
<th>σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant technical skills</td>
<td>0.631</td>
<td>0.77</td>
</tr>
<tr>
<td>Family support</td>
<td>0.515</td>
<td>0.53</td>
</tr>
<tr>
<td>Industry networking</td>
<td>0.318</td>
<td>0.73</td>
</tr>
<tr>
<td>Women Empowerment Programmes</td>
<td>-0.125</td>
<td>0.76</td>
</tr>
<tr>
<td>Regulations and legislations</td>
<td>-0.289</td>
<td>0.77</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>-1.007</td>
<td>1.14</td>
</tr>
</tbody>
</table>

3.5. **Exploratory factor analysis**

The exploratory factor analysis was also conducted in order to determine the similarities and the differences of the responses to each question from the survey. Exploratory factor analysis is used to explore the structure of the dataset (Costello & Osborne, 2005). It involves assessing if the format of the data is suitable for analysis, the next steps are factor extraction and rotation and interpretation (Henning & Akoob, 2017). If the responses from survey question are similar it is an indication that the question is related to the underlying construct but if the responses differ it indicates that that research question is distinct (Stacey, 2016).
According to Stevens (2002) for a sample of 50 respondents the responses can be categorized to be statistically significant from 0 if they are equal to/more than 0.7 and Hatcher (1994) states that there should be at least 3 variables loading on each factor.

The total responses to this study consisted of 50 and each factor had 3 sub-questions each. Factors scores from Table 3.8 were used to analyse and interpret responses based on how statistically significant each factor is whereby relevant technical skills, ability to secure finance and women empowerment programmes can be categorized as statistically significant based on their factors loadings. This means that the responses from the 3 questions for each of these factors are similar and that they relate to one factor.

**Table 3.8: Factor correlations for rotated factors**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family support</td>
<td>0.084</td>
<td>0.011</td>
<td>0.027</td>
<td>0.591</td>
</tr>
<tr>
<td></td>
<td>-0.017</td>
<td>-0.070</td>
<td>0.239</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>-0.132</td>
<td>0.110</td>
<td>-0.045</td>
<td>0.726</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>0.165</td>
<td>0.795</td>
<td>-0.012</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>0.106</td>
<td>0.716</td>
<td>-0.024</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>0.376</td>
<td>0.715</td>
<td>0.144</td>
<td>0.061</td>
</tr>
<tr>
<td>Relevant technical skills</td>
<td>-0.072</td>
<td>-0.003</td>
<td>0.803</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td>0.127</td>
<td>0.189</td>
<td>0.735</td>
<td>0.171</td>
</tr>
<tr>
<td></td>
<td>0.111</td>
<td>-0.137</td>
<td>0.728</td>
<td>0.152</td>
</tr>
<tr>
<td>Industry networking</td>
<td>0.308</td>
<td>0.015</td>
<td>0.047</td>
<td>0.434</td>
</tr>
<tr>
<td></td>
<td>0.138</td>
<td>0.247</td>
<td>0.159</td>
<td>0.356</td>
</tr>
<tr>
<td></td>
<td>0.342</td>
<td>0.544</td>
<td>-0.056</td>
<td>0.040</td>
</tr>
<tr>
<td>Regulations and legislation</td>
<td>0.081</td>
<td>0.219</td>
<td>0.215</td>
<td>0.521</td>
</tr>
<tr>
<td></td>
<td>0.760</td>
<td>0.218</td>
<td>-0.031</td>
<td>0.052</td>
</tr>
<tr>
<td></td>
<td>0.698</td>
<td>0.040</td>
<td>0.067</td>
<td>0.315</td>
</tr>
<tr>
<td>Women empowerment programmes</td>
<td>0.709</td>
<td>0.144</td>
<td>0.075</td>
<td>0.048</td>
</tr>
<tr>
<td></td>
<td>0.755</td>
<td>0.164</td>
<td>0.111</td>
<td>-0.159</td>
</tr>
<tr>
<td></td>
<td>0.750</td>
<td>0.424</td>
<td>-0.137</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>0.672</td>
<td>0.274</td>
<td>0.134</td>
<td>0.235</td>
</tr>
</tbody>
</table>
Table 3.9. Factor analysis

<table>
<thead>
<tr>
<th>Factors</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant technical skills</td>
<td>0.76</td>
</tr>
<tr>
<td>Ability to secure finance</td>
<td>0.74</td>
</tr>
<tr>
<td>Women empowerment programme</td>
<td>0.71</td>
</tr>
<tr>
<td>Family support</td>
<td>0.58</td>
</tr>
<tr>
<td>Regulations and legislations</td>
<td>0.51</td>
</tr>
<tr>
<td>Industry networking</td>
<td>0.28</td>
</tr>
</tbody>
</table>
4. Discussion

This study identified five factors that contribute to the sustainability of women-owned engineering enterprises. A number of studies have been conducted and their findings are also discussed in this chapter which gives an indication on how these factors can support the women-owned enterprise. The findings show that family support plays a key role in the sustainability of these enterprises and that having relevant technical skill in the housing sector is critical as it enables these enterprises to grow, improve and be innovative in this sector. Other factors like industry networking and women empowerment programme seem to be assisting these entrepreneurs to form professional relationships with others in this industry and are able to learn business management skills that enable them to manage their enterprises.

4.1. Family support

The first one is family support, and this is due to women’s role in the family that of being child bearers and caregivers thus it is important for them to be in a flexible work environment that can afford them an opportunity to be able to balance their family and work life. Women who own their enterprise are able to work flexible hours so that they can have time to spend with their children (BIAC, 2015). A number of research indicate that most of households in South Africa are headed by women therefore it is critical that they function in a stable and supportive family set up in order to be sustainable(SBP, 2015).

From this study it emerged that owning an engineering enterprise does cater for work and family life balance which in turn result in the sustainability of these enterprises. Some family members have experience in managing enterprises thus they sometimes form part of the business either as personnel or business partners and they give support and to their women partner (Ferreira, 2007).
Verwy (2005) agrees that family including spouses, friends, parents, and partners are an informal source of business advice and personal network platforms which is critical to the success and sustainability of enterprises. Madzivhandila & Dlamini (2015) also agrees that women who are found in the engineering sector are seen to be having strong support from their family and are regarded as having high self-confidence, good communication skills and relevant education and training to be able to survive this industry for long duration.

Family support can also be in the form of finance as most of these entrepreneurs still struggle to secure finance to start their enterprise (Wiese and Lotriet, 2014). Therefore this factor indicates how important family is to women in this sector. For women to start and sustain an enterprise it is critical that the enterprise does not cause a conflict between the woman and her family and that without family support these enterprises will not be sustainable. This factor was ranked the highest which is an indication that women entrepreneurs value their family’s support highly.

### 4.2. Relevant technical skills

The second factor is relevant technical skills. When an enterprise is competent in different skills it enables them to be productive, competitive and sustainable (Naidoo, 2010). Owning an engineering enterprise require one to either have an engineering or construction skill or have the necessary resources to acquire and keep this skill which is specialized and currently scarce in the country. Irene (2017) argues that the sustainability of women-owned SMMEs is highly dependent on the capabilities and skills of the owner as compared to larger businesses thus it is also important that the owner does have technical skills herself and is able to invest in her technical development.
The benefits of an enterprise owner having the technical skills is that it makes it cost effective to deliver the projects as she handles most of the technical scope herself. There is currently high staff turnover of the technical specialist due to high demand of this skill in the country therefore if the owner of the enterprise has such skill it gives them an added advantage. SMMEs size and the fact that their management structure is inclusive of the owner makes the enterprise flexible and enables an immediate response to external change other than larger firms which still required more time to consult and to effect changes (ILO, 2016).

Some enterprises resort to forming joint ventures if they do not have the required technical skills which sometimes subject them to fronting (DHS, 2016). Njogu (2016) also agrees that it is critical for an enterprise to have relevant technical skill in-house because it enables the enterprise to provide innovative solutions to their client timeously thus attracting more business. The South African housing sector has had a number of issues with enterprises who deliver poor quality houses and this is due to unavailability of technical skills when these houses are delivered. Therefore for an enterprise to be sustainable they need to have such skill in-house, so as to deliver quality houses cost effectively thus attracting more projects (Irene, 2017).

There are also a number of sector-based professional bodies which are mandatory to the technical professionals and voluntary to the enterprise. Most clients in the engineering sector require that all technical professionals which are involved in the delivery of engineering projects be professionally registered with relevant professional bodies and institutes like Engineering Council of South Africa (ECSA), South African Council for the Project and Construction Management Professions (SACPCMP), The South African Council of the Quantity Surveying Profession (SACQSP) and others.
These professional registrations require that registered individuals attend a number of continuous professional development training in order for them to maintain and enhance their knowledge and skills as this will assist them in providing a professional service to their clients and the community (ECSA, 2016). The Department of Human Settlement has also made it compulsory for all enterprises who want to be involved in the delivery of houses to be registered with the NHBRC and CIDB either as builders or competent persons (DHS, 2011). If the enterprise does not have the required skills in-house it forces them to acquire this skill outside the enterprise and this is costly and it does not assist in the sustainability.

**Industry networking**

The third factor is industry networking. This can be associated with making connections and interacting with the right people within the industry and working together with them to obtain and deliver projects successfully. Networking is a skill that requires one to have confidence to meet people and make sure that she makes her mark and be remembered. It can be classified as both formal and informal. It is who you know that determines how long your enterprise survives in the built industry (NHBRC, 2017).

In the past, women have been seen to be not doing well with regards to developing and maintaining relevant business networks with one another or with other relevant stakeholders however that has changed. Women are now involved in a number of formal and informal network platforms and they interact with different stakeholders in the engineering and business sector in order to acquire knowledge, opportunities, resources and potential business partners (Ferreira, 2007).
Therefore it is important that women who are operating in this industry invest in selling themselves and their enterprises through business cards, attendance of relevant professional events, maximum use of social and business networks like LinkedIn and others (NHBRC, 2017). There is a number of stakeholder support networks which were formed in order to encourage interaction and mentoring of women. These institutions have seen an increase in the women’s ability to trust and work together and expand their access to political and industry bodies (ILO, 2007). South African Women in Construction (SAWIC), South African Association of Consulting engineers (SAACE), CESA, CESA and CIDB are some of the institutions.

Another networking platform for women in this sector is the Women Empowerment Programmes which are currently run by different government institutions together with academic institutions whereby women entrepreneurs interact during these training and share their skills and are being mentored beyond the classroom environment (Ferreira, 2007 and Irene, 2017). Industry networking is critical for women entrepreneurs because they operate in the male dominated sectors like engineering and construction sectors where they can form relationships with each other and expand their customer base and learn new best engineering practices from each other. There is also a need for programmes which can encourage women to enrol for technical education so that the technical skills gap is addressed.

**Women empowerment programmes**

The fourth factor is Women Empowerment Programmes (WEP). These are women based programmes which are providing relevant entrepreneurial training skills, create new network platforms and contacts that are critical to the success and sustainability of start-up and established women entrepreneur (Botha, Nieman & van Vuuren, 2007).
The WEP addresses the training needs of women and it consists of identifying business and market opportunities, entrepreneurial skills training, financial management, empowerment, relationship building and networking opportunities amongst women entrepreneur (Botha et.al., 2007). Some of these programmes are funded by government institutions but there are others that are privately funded and any women entrepreneurs can enrol.

The literature has found that WEP are effective in providing the required skills to women entrepreneurs who are starting up their businesses and to well establish enterprises to open more enterprises. According to Botha, et.al (2007) this can be seen through an increase in turnover, staff compliment, profit and productivity. Training and development of women entrepreneurs’ competencies like business management and entrepreneurial skills in South Africa forms one of the critical areas of focus for their business to succeed and be sustainable (Irene, 2017).

The sustainability of women-owned enterprises is directly linked to the owner’s capacity and skills, therefore WEP play that role very well. This finding show that even though these programmes have recently been implemented they are already being perceived to be adding value to these enterprise and in the long term they will improve the overall women empowerment and entrepreneurial skills in the country which is key to economic growth and employment creation.
4.3. Regulations and legislations

The current country’s regulations and legislations is the fifth supported factor. Women entrepreneurs indicate that one of the reasons they do not grow and be sustainable is due to red tape, bureaucratic rules, tax and current regulations stringent labour laws in the country (Ferreira, 2007 and Wiese & Lotriet, 2014). This means that there is still a need for more education and training to be done around the country’s regulation and legislation as some of the SMMEs are not conversant with them. All these requirements are not communicated clearly; they can be expensive and cause a burden administratively.

This is in agreement with Jonas, Netshandama and Mudau (2014) that there more still need to be done to improve on the access of these women to relevant information, public procurement practical training and this is important to their sustainability. This finding gives an indication that a lot of work has been done to enable women owned SMMEs to thrive and this can be seen by a number of government projects which have been set aside only for women-owned enterprises and a number of women specific training programmes (WEP) aimed at improving women’s business skills and access to procurement information. Government institutions still need to look into separating requirements for small enterprises from the ones for large enterprises.

4.4. Ability to secure finance

Ability to access finance factor was perceived by respondents to be currently not fully supporting their enterprise’s sustainability. A number of government departments including DHS have formed a number of financial institutions which are aimed at improving SMMEs ability to access fund.
However findings from this study indicate that these efforts have not had any positive impact on the women-owned enterprises as yet. These findings are in agreement with a number of studies which indicates that most women-owned enterprises are still not able to access finance due to a number of constraints including lack of security as most of women do not own properties which can be used as a collateral, lack of negotiating skills and others (Madzivhandila & Dlamini, 2015). Inadequate access to finance and working capital caused by absence of tangible security and credit result in other enterprises not being able to grow (Chinomona, & Maziriri 2015).

This is in agreement with BIAC( 2015) findings that women-owned enterprises still experience poor access to finance which is due to how private equity, venture capital and financial institution works. Women still need to strengthen their networks with commercial banks and acquaint themselves with the current institutions like NEF, Isivande and others that have been formed to assist women improve their access to finance for their enterprises. This gives an indication that women entrepreneurs are still struggling to access finance, and this is not due to shortage of institutions but the structure of the existing of both private and public financial institutions.

This means that when it comes to accessing finance women still need to be trained on financial investment and the institutions need to identify the needs of women entrepreneurs and accommodate them when designing the requirements for funding in their institutions. There is more work that still needs to be done by commercial banks and government institutions and the owners of these enterprises in order to identify the areas of their short comings and to educate each other on how to improve on the challenge of accessing finance because small enterprises need finance to be sustainable.
5. Implications and recommendation of the study

This study recommends that both public and private funders and other stakeholders who want to see women-owned engineering enterprise growing and sustainable should give support which is earmarked to improve their family support, relevant technical skills, networking and women empowerment.

There is a need to conduct continuous monitoring of the progress made by these support programmes and policies so as to see if it is impacting on the growth and sustainability of these enterprises positively. The engagements should include one-on-one interviews with the women who own these enterprises on continuous basis. This will enable them to make any adjustment to be made timeously.

It also recommended that the current access to finance and knowledge about the industry’s regulations and legislations be reviewed so that it identifies and close all the gaps that are not supportive to the engineering enterprise which are women-owned.

The respondents for this study were chosen based on their duration in the engineering sector which was an indication that their enterprises are sustainable; it is thus recommended that other women who aspire to start their enterprise in this sector look into the factors that have been discussed in this study. They also need to take precautionary measures when dealing with issues around finance and regulations and legislations.

The implications of the study are that, the findings of this study will be beneficial to the housing sector decision and policy makers to know where to give the relevant support in order to sustain the engineering enterprises in the housing sector.
It will add value to the engineering sector and gives information on which factors are impacting on the sustainability of women-owned engineering enterprises. Housing sector stakeholders including the owners of the enterprises who are struggling to grow and sustain their business in this sector will learn from the views of the respondents.

5.1. Recommendations for future studies

This study recommends that similar study be carried out using a larger sample, this could enable the results to be generalised by employing a qualitative phase as an input to the quantitative phase of the study. It is also recommended that another study be conducted aimed at comparing the factors that have been identified in this study with the factors that affect the male owned enterprises in the same sector. Another future study is proposed to look into how sustainable women-owned enterprises have created employment opportunities for other women and the youth. A similar study can also be conducted in the agricultural and mining sectors.

6. Conclusion

Literature reviews highlighted the need for women to be entrepreneurs and to start and grow their businesses in the engineering sector. It also highlighted the importance of SMMEs in growing the economy, eradication of poverty and delivery of houses in a sustainable manner. The findings of this study highlighted the factors that support women-owned enterprises to grow and to be sustainable and how each of the identified factors contributes to sustainability based on the previous studies that have been conducted on the sector.
Respondents concur that supportive work is already in place in terms women’s ability to secure finance and the supportive country’s regulations and legislations to suit women entrepreneurs. Therefore because of the roles of women in the society and the expected role that they play in their families and in their business it is important for them to start their own enterprises. This is seen to be providing the flexibility that they require to apply their minds and skills and still be able to take care for their families. It was also noted that women entrepreneurs prefer to network with each other through training and mentoring and this is seen to be improving their skills while growing their businesses.

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7.1. Competing interests

The author for this research declares that they have no financial or personal relationship(s) that may have inappropriately influenced her in writing this article.
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