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Opportunity exploitation amongst women entrepreneurs within the Engineering sector

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ABSTRACT

The study purpose was three-fold. First, it explored the challenges that hindered increased participation of women entrepreneurs in the Engineering sector. Second, it determined whether entrepreneurial opportunities were exploited by applying already acquired knowledge, skill and expertise through innovation. Thirdly, it probed if out of these opportunities women engineers independently created new firms.

Based on the the knowledge spillover theory of entrepreneurship, a qualitative research methodology was adopted, using convenience, quota and judgement sampling techniques. Data analysis was through means of content analysis. The findings were based on nine responses gathered through in-depth structured interviews.

Key findings affirm that entrepreneurial background and experience play a critical role in women engineers' ability to identify and exploit opportunities and that knowledge was spilled over from their incumbent organisations. There was, however, no evidence of commercialisation of a new idea by any of the firms that were started. Access to market, due to limited networks, remained the greatest challenge facing women entrepreneurs. Enterprise development including strategic partnerships were found to be prerequisites for institutional support and market growth.

The study delineates limitations, contributions to the field and further research to be done in the Engineering sector with a gender lens.

KEY WORDS

Women in Engineering. Knowledge spillover. Knowledge filter. Opportunity exploitation. Entrepreneurship

DECLARATION

I, Molebogeng Mogashoa, declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Molebogeng Mogashoa

Name

Signature

06 November 2017

Date

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CHAPTER 1: INTRODUCTION TO RESEARCH PROBLEM

1.1. Introduction

According to 2015 Global Entrepreneurship Monitor (GEM) research, statistics maintain that challenges in becoming entrepreneurial are far greater for women than men. The ratio of male to women participation in early-stage entrepreneurial activity in South Africa where the male Total Entrepreneurial Activity (TEA) rate is 11.6 compared to 7.0 for women is of great concern (Herrington, 2015) (See Annexure A). Entrepreneurial activity contributes to economic development in all countries around the world and is beneficial to both men and women, especially those in developing countries (Brush & Cooper, 2012). The research study undertook to understand the opportunity exploitation amongst women entrepreneurs within the Engineering sector in South Africa.

The qualitative research study was based on the knowledge spillover theory of entrepreneurship (KSTE), that states that knowledge can be spilled over through commercializing ideas that evolve from an incumbent organization by independently creating new firms (Acs, Audretsch & Lehmann, 2013). Applying knowledge spillover creates the entrepreneurial opportunity, which then drives entrepreneurial activity. This could result in more women playing a bigger role in generating innovative activity, fostering economic growth, increasing employment and therefore improving competitiveness in global markets (Acs & Sanders, 2013).

KSTE was used to determine whether women in the Engineering sector exploit the entrepreneurial opportunities by applying their already acquired knowledge, skill and expertise through innovation by independently creating new firms. Over and beyond the spilling over of knowledge, the study explored the challenges (phrased in the study as 'knowledge filters') that hindered increased participation of women entrepreneurs in the sector.

The data from the interviews substantiated the notion that the entrepreneur's background and experience play a critical role in their ability to identify and exploit entrepreneurial opportunities (Arentz, Sautet & Storr, 2013; Audretsch & Link, 2012). Evidence collected from women entrepreneurs that were interviewed affirms that knowledge was spilled over from their incumbent organisations. There was, however, no evidence that a totally new idea from the incumbent organisation was commercialised through starting of the new firm. The knowledge spillover was primarily through human capital and innovation of services and products offered. The findings

affirmed that the insights necessary for economic growth according to the endogenous growth theory are human capital (scarce skill), innovation (linked to independence and autonomy) and knowledge for entrepreneurship (Marvel, 2013). The state of the country's economy was what led the participants to spillover knowledge therefore creating entrepreneurial opportunity that resulted in entrepreneurial activity when they commercialised their human capital through creating new firms (Acs & Sanders, 2013).

The greatest opportunities facing women entrepreneurs were found to be collaboration with other companies and adapting to industry trends. Traits indicating a high internal locus of control were identified as the differentiating factor for exploiting the entrepreneurial opportunity by the women entrepreneurs.

The participants alluded to access to market due to limited networks as well as access to opportunities as the greatest challenges and threats facing women entrepreneurs. In expressing their views, participants highlighted that the industry in which they operate is somewhat monopolised or rather filled with male dominated oligopolies. Innovation through KSTE is one effective way to stimulate economic growth but is alone insufficient in developing economies and requires institutional support (Kuratko, Morris & Schindehutte, 2015). Hence the finding that constitutes market growth of the ventures to enterprise development partnerships. The knowledge filters impede the absorptive capacity in knowledge spillover and can be suppressed by inclusive policies and successful implementation thereof.

An in-depth study on knowledge filter can add to the body of knowledge if further explored by sampling women who continue choosing not to exploit the entrepreneurial opportunities within the Engineering sector. Extension of institutional support to research and development entities can potentially assist upcoming entrepreneurs in commercialising ideas to the market within the Engineering sector, and thus enhance exploitation of opportunities.

The main contribution of the paper is to provide deeper understanding of woman entrepreneurship in relation to exploiting the opportunities, efficiency of support structures and foreseen challenges within the Engineering sector. In addition, to the best of our knowledge it is the first evaluation of KSTE conducted for a developing economy focusing purely on women entrepreneurship. It is hoped that interrogating the drivers and barriers to the success of women entrepreneurs in Engineering sector or any male dominated industry will yield practical solutions that increase the rate of women entrepreneurial activity. The end goal is solutions for a more inclusive economy, reduced inequality and improved economic growth.

1.2. Background to the problem

High inequality, unemployment rates and poverty are some of the challenges facing the majority population of South Africa with women at the lowest base of the formal economic hierarchy (Madzivhandila, 2015). South Africa's GINI-coefficient is ranked one of the highest at 0.69 (WEF, 2016) and women's economic inactivity high at 41% compared to 28% for men, with primary involvement in micro size businesses within the informal sector for survival purposes (Department of Women, 2015).

The GEM highlighted the difference between an opportunity driven entrepreneur (those who are pulled into entrepreneurship because they identify an opportunity in the market and pursue it) and a necessity driven entrepreneur (those who are pushed into entrepreneurship because there are no other means of generating income) (Herrington, 2015). Women have traditionally been necessity driven entrepreneurs due to lack of opportunities, education and skills (Small enterprise development agency, n.d.). The growth in numbers for women entrepreneurs within the formal sector is however very slow even though more and more women acquire education, skills and access to opportunities (See Annexure C). GEM report indicated that opportunity-driven entrepreneurial activities are economically more sustainable fostering economic growth compared to necessity-driven entrepreneurial activities (Herrington, 2015).

Low entrepreneurial activity in the formal sector is still prevalent amongst women (Herrington, 2015) amidst the effort to ease the environment of doing business. The South African government is fortunately driving a number of initiatives that aim to narrow the high inequality and gender gap through policy changes, institutional support and availability of funds especially for the previously disadvantaged; with women and youth considered high priority (Small enterprise development agency, n.d.). This is being done through different government vehicles i.e. Department of Trade and Industry (the dti), National Empowerment Fund (NEF), Industrial Development Corporation (IDC), Small Enterprise Finance Agency (SEFA) and National Youth Development agency (NYDA).

Women have traditionally been associated with lower levels of human capital with regards to education and skill training. Education can act as enabler in building successful businesses, as it can be a crucial source of knowledge, enhance problem-solving ability, improve skills and discipline, as well as self-confidence (Robson, Akuetteh, Westhead, & Wright, 2012). Hence the study on women entrepreneurs within Engineering sector. Robson et al. (2012) suggests that

tertiary educated entrepreneurs may leverage their technical knowledge as well as their broader networks to address barriers to innovation.

Gender trends observed in university enrolment for the Science, Engineering and Technology (SET) indicate that gender disparities were inclined towards males at 0.83 index for the period between 2005 and 2013 (Africa, 2014). The trend however favours women in relation to graduation at 1.00 index (See Annexure B), implying that the fraction of women completing their qualification is higher compared to their gender counterparts. Disaggregating Engineering from the SET sector, statistics from the Engineering Council of South Africa (2014) revealed that 70% of the women who graduated with Engineering degrees left the sector after starting their careers because they felt isolated in their jobs. Just to put the statistics into context; Network Engineering placed 121 male engineers in employment positions, but only 20 women engineers during the same period (2014). The qualification attainment statistics are however not reflective of the TEA rate, which begs for a study to research the entrepreneurial opportunity exploitation of women within Engineering as the sector of interest.

South Africa's most worrying socio-economic problems remain the extremely high levels of income inequality and unemployment (Herrington, 2015). A weak job creating capacity has led to high unemployment rates in the country, worsening poverty and inequality (Small enterprise development agency, n.d.). South Africa's policy makers have had to introduce reforms aimed at fostering a more enabling business environment; an environment that supports the development of small and medium-sized enterprises that in turn contribute significantly to employment (Women, 2013). Small businesses have been shown to contribute substantially to job creation, economic growth and to a more equal income distribution in many developing economies (WEF, 2016).

A discouraging finding is the considerable widening of the gender gap in terms of entrepreneurial involvement. In 2014, eight women were engaged in early-stage entrepreneurship for every ten male entrepreneurs; in 2015 this has decreased significantly to only six women for every ten men engaged in early stage entrepreneurship (Herrington, 2015). Necessity-motivated entrepreneurship is up eighteen (18%) percent compared to 2014, evidence that South Africa's poor economic growth and chronically high unemployment over the past few years is starting to take its toll (Herrington, 2015). The weakest entrepreneurial conditions in South Africa are around the areas of government programmes and policies, school-level entrepreneurship education and training, research and development transfer, and cultural and social norms (WEF, 2016).

Given all above, the study on women entrepreneurs within the Engineering sector was necessary to understand ways to enhance women's entrepreneurial activity in the engineering sector, with economic growth in mind for the country through job creation.

1.3. Research purpose

The research was conducted to understand the opportunity exploitation amongst women entrepreneurs within the Engineering sector in South Africa. It undertook to understand the reasons that led the few women within the Engineering sector to respond to and take up entrepreneurial opportunities whilst the majority opt for careers within established organisations.

1.4. Research objectives

The following objectives were of interest to the study:

- i. To determine the unique traits of women who have started their own businesses within the Engineering sector and whether their background (i.e. education and experience) influenced their decision.
- ii. To determine if the effort to increase women entrepreneurial activity through policy changes has motivated women engineers to start new firms.
- iii. To identify factors that inhibit the majority of women from applying their acquired knowledge and skills in establishing new firms.

It was envisaged that a thorough exploration of the above objectives would result in three outcomes. Firstly, the deeper understanding of woman entrepreneurship particularly factors that contribute towards the exploitation of opportunities. Secondly, the effectiveness of support structures that aim to drive women participation in the Engineering sector. Thirdly, the challenges experienced by women within the Engineering sector. It is further hoped that interrogating the drivers and barriers to the success of women entrepreneurs in Engineering sector or any male dominated industry will yield practical solutions that increase the rate of women entrepreneurial activity. It is envisaged that the end goal is to offer solutions for a more inclusive economy, reduced inequality and improved economic growth.

1.5. Scope of the research

The available data on women entrepreneurs within the formal sector in particular comes from studies in developed economies. Research in the emerging economies and in South Africa specifically has tended to focus on the informal sector. Studies on the motivations and aspirations of South Africa's formal sector women entrepreneurs have been relatively limited.

Noting the alarming statistics that indicate that although there is a considerable number of women who graduate with Engineering qualifications, 70% of them exit the sector within the first few years of their careers. The statistics begs for a study to try and understand the opportunity exploitation of women within the Engineering sector. The scope will entail determining if a woman entrepreneur's decision to venture into the Engineering sector is in any way influenced by their educational background and industry experience with South Africa as the geopolitical area of interest.

South African economic policy places a high value on entrepreneurship. The government looks to entrepreneurship as a critical driver of growth and job creation. However, if efforts to encourage and support entrepreneurship are to succeed, the focus must shift away from informal sector survivalist enterprises, towards understanding success drivers in the formal sector. It **might be** these entrepreneurs whose efforts are likely to have the greatest all-round impact, in terms of wealth-creation, economic growth and innovation. If properly harnessed, their contribution could be truly transformative.

CHAPTER 2: THEORY AND LITERATURE REVIEW

According to Kirzner (1973), there is a relationship between an entrepreneur's prior knowledge and the kind of profit opportunities she identifies. This is further postulated by Arentz, Sautet and Storr (2013) who concur that an entrepreneur's prior knowledge and experience plays a role in directing their choice of field as well as the entrepreneurial opportunities to exploit. The study argues in alignment with Schumpeter (1934) who stated that entrepreneurs exploit the imperfections of competition to generate economic profits; and one way of exploiting the imperfections could be through spilling over of knowledge from incumbent organisations into a new firm (Acs et al., 2013). Hence, the dominant underpinning of the study on the KSTE theory. The literature took into consideration sub-elements of the theory in the context of the study, which are; entrepreneurial opportunity, knowledge filter and absorptive capacity as well as exploitation of opportunities.

2.1. Knowledge spillover theory of entrepreneurship (KSTE)

In their discussion of the knowledge spillover theory of entrepreneurship (KSTE) model Acs and Sanders (2013) stated that "the context in which decision making is derived can influence one's determination to become an entrepreneur" (p. 757). The afore-mentioned context is particularly prevalent within knowledge-rich contexts, where entrepreneurial opportunities can be generated from the ideas created (Acs & Sanders, 2012). The entrepreneur's role according to the theory is that of a conduit for the spillover of knowledge through commercialising the incumbent firm's ideas by independently creating new firms (Acs & Sanders, 2012). This research agrees that in so doing ensues innovative activity and enhances economic performance.

The KSTE is aligned with the endogenous growth theory which states that significant contributors for new technology development and production efficiency are knowledge, innovation and human capital to achieve economic growth (Schumpeter, 1935). The study leverages on the theory by questioning why women who are already within these environments (Engineering sector), and possess the mentioned skills fail to create new firms that will contribute to the economy and possibly help reverse current and unfavourable economic trends. Applying knowledge spillover creates the entrepreneurial opportunity, which in turn drives entrepreneurial activity. This could result in more women playing a bigger role in generating innovative activity, fostering economic

growth, increasing employment and therefore improving competitiveness in global markets (Acs & Sanders, 2013).

Previous studies on the motivations of entrepreneurs to take the entrepreneurship route, relied on theories focused on personal characteristics of individuals and the external environment; characteristics such as economic risk appetite, gender, social, cultural and psychological issues. The contemporary theories were taken into account as part of KSTE model with the added focus on economic growth (Qian & Acs, 2013). Audretsch (1995) argued that economic growth and technological progresses are largely induced by small businesses and entrepreneurial ventures and not only based on the efforts of large and incumbent firms, as proposed by policy influencers and the academic mainstream at that time (Ghio, Guerini, Lehmann, & Rossi-Lamastra, 2015). The approach was later adopted by most government institutes in terms of country's economic growth strategy.

The knowledge incubators are the big Engineering firms who have, through the firm's own resources and labour, developed new knowledge but opted not to commercialize it (Acs & Sanders, 2012). The entrepreneur then acts as an economic agent by spilling over the knowledge and converting it into economic knowledge; they commercialize the newly developed knowledge through founding a new firm and without bearing the full costs of developing new knowledge (Acs et al., 2012). It can also be argued in the study that the knowledge does not necessary have to be newly developed, it can be knowledge that is underutilized or knowledge that can be innovated from bigger to smaller scales (Acs & Sanders, 2013).

According to the KSTE, opportunities arise when firms do research and development (R&D) to maintain market competitiveness through efficiency improvements to their processes or products for the commercialised output (Acs & Sanders, 2013). It was further elaborated by Shu et al. (2015) that; pure upstream knowledge spillover is from incumbent firms' R&D to the intermediary processes of producing the goods, whilst downstream knowledge spillover is vice versa. The in-between processes are potentially where entrepreneurial activity lies as the intervening economic growth driver prospectively implemented through knowledge spillover (Shu, Liu, Gao, & Shanley, 2014).

Although KSTE literature emphasises R&D as the foundation of entrepreneurial opportunity, this study argues that R&D is not limited to inventions for the engineer to be entrepreneurial, but rather to application of skills and knowledge to invent, innovate but most importantly to commercialize

the ideas (Acs & Sanders, 2013). Audretsch and Belitski (2013) agreed with Acs and Sanders (2013) and further added that entrepreneurial talent for commercialization of ideas therefore is arguably what reaps financial rewards (Audretsch & Belitski, 2013). It can further be argued that commercialisation of ideas within the Engineering sector will prove to be challenging without prior knowledge of the subject due to the technical nature of the field.

KSTE theory could not be fully explored without understanding its effect on entrepreneurial opportunity.

2.1.1. Entrepreneurial opportunity

This research study wants to establish if women leverage the opportunities of knowledge spillovers within the incumbent organizations from which ideas generated can be commercialised through founding new firms (Acs et al, 2013). Martin and Wilson (2016) stated that an opportunity is “not tangible or measurable, rather it is the potential for something not yet operating, or the set of circumstances that enable entrepreneurial change to happen” (p. 262). Schumpeter (1934) further explains that entrepreneurial opportunities are derived from competitive imperfections that exist within markets. This was further argued by Acs and Sanders (2013) within the knowledge context that, differences in knowledge across individuals lead to differences in opportunity identification. Moreover elaborating in terms of KSTE is that, an individual can value an idea more than the incumbent firm or organization, they therefore perceive an opportunity while the incumbent organization does not (Acs & Sanders, 2013).

Although Ghio et al. (2015), agrees that knowledge spillovers provide the ability to generate an entrepreneurial opportunity, he however does not necessarily indicate that the entrepreneurs venture will be successful. The possible failure of the ventures could be as a result of what Alvarez and Barney (2014) alluded to regarding the need to take exogenous factors into consideration. These may include access to markets, acquiring the necessary resources and lack of support due to perceptions, social and cultural challenges (Alvarez & Barney, 2014)

Ghio et al. (2015) added that KSTE is less concerned with the intrinsic motivation of an entrepreneur, but more with the contextual variables of how (knowledge spillovers) and why (commercialise unexploited ideas for economic gains) entrepreneurship matters. This means that the entrepreneurs’ incentives of starting up a new venture remains unchanged with focus on the endogenously changing variables. Therefore, the KSTE theory focuses on individual entrepreneurs by integrating the context of what informs their decision-making (Lehmann, 2013).

It however does not mean that other context will not form part of the analysis i.e. society and state's role in fostering women entrepreneur's role as economic agents.

Entrepreneurial opportunity literature emanated from opportunity based theory (OBT) where, Kirzner (1973), stated that entrepreneurs exploit opportunities that change within whichever environment created, and not that entrepreneurs trigger change in the market system as put forward by Schumpeter (1934). A study conducted by Hunt (2016) indicated that the working environment is not favourable for women within the Engineering sector; and as a result many choose to leave their careers. Taking from the opportunity theory as per Kirzner (1973) then it can be argued that these mentioned women could have entrepreneurially exploited the opportunities within the particular unfavourable environment. With that said, there is no evidence post the aforementioned study to prove the paths chosen by the women in terms of economic activity post abandoning their Engineering careers.

Entrepreneurial opportunity is categorised differently according to Alvarez and Barney (2014), where they alluded to three types of opportunities: self-employment, discovery and creation. All opportunities are competitive imperfections in markets where self-employment opportunities are probably the main driver according to Kirzner (1973). He further adds that these lead to necessity-driven entrepreneurship due to abject poverty situations. These are however not scalable and are rarely sources of employment for anyone except the founding entrepreneur (Alvarez & Barney, 2014). The opportunities required to drive economic growth are the discovery and creation driven opportunities. Discovery opportunities according to Alvarez and Barney (2014) exist independent of the entrepreneur whilst creation opportunities do not exist until the entrepreneur presents the opportunity. Shane (2003) further agreed with Alvarez and Barney (2014) that, discovery opportunities often arise from exogenous shocks (i.e. changes in technology, government policy, demographics, etc.) to a market.

Discovery opportunities are scalable and build on unique insights of entrepreneurs i.e. alertness and experience in a certain industry or market, as explained by Marvel (2013). These opportunities are of specific interest to the study as they can be sources of significant positive economic performance. The unique insights of entrepreneurs' necessary for economic growth according to the endogenous growth theory are human capital, innovation and knowledge (Marvel, 2013). Mostafa et al. (2011) affirmed that indeed discovery and creation opportunities equate economic growth in developing economies. However, Alvarez and Barney (2014) alluded to the high costs of success as it requires human capital, property rights and financial capital.

Endogenous growth theory contradicts the discovery opportunities statement in that it argues that endogenous and not exogenous factors result in economic growth. It can however be found that both factors are actively contributing as in the South African context; where endogenously, an increasing number of women acquire Engineering qualifications, and exogenously, the government policies are pro-women empowerment especially in terms of economic participation i.e. entrepreneurship (Africa, 2014). Evidence based on GEM report indicated that exogenous factors failed to translate in increased number of women exploiting the pro-women empowerment opportunities, specifically in the knowledge based sectors (Herrington, 2015).

According to Martin and Wilson (2016) discovery theory postulates that the secular chain of entrepreneurship originates with the opportunity; then through entrepreneurial action proceeds through the discovery and exploitation of opportunities and closes with a favourable outcome of an exploited opportunity. This however contrasts KSTE which states that prior knowledge is the alertness that leads to entrepreneurial opportunity, hence the need to explore prior knowledge and its role in KSTE.

2.1.2. Prior Knowledge

It is imperative to understand how opportunities come to be known in the first place (Arentz et al., 2013) before they can even be exploited through entrepreneurial activity. One of the ways is claimed to be through the relationship between prior knowledge and economic opportunities to be entrepreneurially discovered (Arentz et al., 2013). Prior knowledge is referred to by Shepherd and DeTienne (2005) as “an individual’s distinctive knowledge about a particular subject matter and may be the result of different things such as work experience, education or unintentional experiential learning” (p. 92).

Arentz et al. (2012) stated that the background of an entrepreneur in terms of experience and prior knowledge plays a critical role in his ability to identify and exploit entrepreneurial opportunities. Whilst Audretsch and Link (2012) agreed that the academic background and past industry experience play a significant role in the creation as well as the performance of new ventures. This is because having prior knowledge of the subject improves alertness to opportunities due to the familiarity and interest which subsequently leads the prospective entrepreneur into a certain directive of field (Arentz et al., 2013). This is further postulated by Kirzner (2005) who differentiates between information and knowledge by stating that “information

is an input in a process of learning that results in knowledge” (p. 76), which may lead to opportunity recognition through the process of alertness. What informs the level of alertness is however different per individual as knowledge is not symmetrically absorbed, whether gender plays a role in the level of alertness is however yet to be determined.

Entrepreneurial opportunities, thus, exist because individuals neither have perfect knowledge nor do they share the same knowledge according to Hayek (1945) and Kirzner (1973). Prior knowledge is therefore heterogeneous across individuals (Arentz et al., 2013), and linked to the entrepreneurs orientation towards some types of opportunities and not to others. Chances of successful entrepreneurial opportunity recognition increases through prior knowledge of; markets or industry, customer needs and challenges, and experience in serving those markets (Shane, 2000). Opportunities can easily be recognised if some relevant prior knowledge is acquired along with the cognitive abilities for understanding its relevance (Arentz et al., 2013).

According to Kirzner (1973), entrepreneurial discovery is the result of both a pull factor; which could be in monetary value (profit) or else and a push factor; which is the derivative of the content of their prior knowledge and experience (alertness), which may direct the entrepreneur’s gaze to a certain field (Arentz et al., 2013). The above theory is reflective of the theory of discovery opportunities in terms of alertness to ideas and applying the required human capital for commercialisation thereof. The stated narrative assumes that knowledge is dispersed, in that the knowledge people possess individually differs and that the interpretation of information is subjective as influenced by the idiosyncratic life experiences (Arentz et al., 2013).

Whilst the type, nature and source of knowledge can be broad; distinction for KSTE is formulated in relation to the study. Science (natural or social) is the primary field of study, with the theory focusing on knowledge-based entrepreneurship (Ghio et al., 2015). This study will focus on natural sciences i.e. scientific-technological knowledge. The source of knowledge can either be that of incumbent firms or research institutions, with particular interest to but not limited to incumbent firms. The nature of knowledge could either be codified (patents, citations, publications) or tacit knowledge (human capital) (Ghio et al., 2015), with the study focusing on human capital.

Knowledge is not exclusive and cannot be exhausted thus the positive ability to spillover (Arrow, 1962; Romer, 1982), in other words the one party’s perusal of knowledge neither forbids others from using the same bit of knowledge nor abolishes the value of the knowledge (Shu, Liu, Gao &

Shanley, 2014). Through knowledge spillovers, individuals and organizations other than the knowledge originator peruse the knowledge to their advantage whilst providing minimum to no compensation for it and it can happen at inter-organizational, regional, and even international level (Shu et al., 2014). Entrepreneurs can therefore spillover knowledge from their incumbent organisations at very little cost to adopt it into a new firm. Knowledge spillovers are however enhanced by high entrepreneurial absorptive capacity, which was mentioned to be fundamental for an entrepreneur in exploiting prior knowledge; by being innovative, open and alert to the environment (Qian & Acs, 2013).

2.1.3. Knowledge filter and entrepreneur's absorptive capacity

Arrow (1962) differentiated knowledge from traditional factors of production by classifying economically useful scientific-technological knowledge as either tacit and/or codified; and that it can be spilled over from incumbent organisations due to its strong propensity. Spillover of knowledge can however be inhibited by what is known as knowledge filters (Acs et al., 2013). It prevents automatic spilling over of knowledge for commercialisation, although can be alleviated or reduced by an entrepreneur's prior knowledge, experience and skills (Robson et al., 2012). Endogenous growth theory shifted focus towards education and technology for economic growth stimulation, which should be done through reducing the knowledge filters i.e. better regulatory laws and inclusive policies etc. (Acs et al., 2013). These contributors to knowledge filters are uncertainty, high cost of transaction and asymmetries inherent in knowledge according to Acs (2013). Knowledge filters are penetrated by either incumbent firms or new ventures; research indicates that knowledge is mainly transformed to economic knowledge by new ventures even though incumbent firms are better resourced (Audretsch & Link, 2012).

Knowledge spillover entrepreneurship is significant as it provides a conduit penetrating the knowledge filter and serves as a catalyst for the commercialization of knowledge and ideas created in one organizational context but generating innovative activity in the context of a new firm, which ultimately contributes to economic growth, employment creation, and global competitiveness. This therefore raises another area of interest; the knowledge filter thickness of women within the masculine Engineering sector compared to their male counterparts.

Qian and Acs (2013) defines entrepreneurial absorptive capacity as “the ability of an entrepreneur to understand new knowledge, recognize its value, and subsequently commercialize it by creating

a firm” (p. 185). The absorptive capacity of an entrepreneur is a means through which an entrepreneur’s human capital allows for profitable commercialization of knowledge through creation of a new venture (Qian & Acs, 2013). The stronger the absorptive capacity of an entrepreneur, the easier it is to identify and exploit an opportunity by recognizing its potential market value and responding by starting a new firm.

Entrepreneurial absorptive capacity has two dimensions and varies among potential entrepreneurs. Firstly there should be some prior knowledge (scientific/technical) as a form of background so as to understand the creation and to identify its market value; industry/market knowledge is the second dimension that can successfully enable the commercialisation thereof in creating a new firm (Lehmann, 2013). Absorptive capacity is therefore a fundamental trait for a prospective entrepreneur (i.e. women in Engineering) within an organisation (which may be playing the role of an inventor) to take the acquired knowledge using their scientific background and commercialise it provided there is distinct knowledge of the market to undertake entrepreneurial discovery and exploitation (Audretsch & Aldridge, 2008). Human capital is the lead determinant of entrepreneurial absorptive capacity which entails knowledge and skills of entrepreneurs to understand a new technology, acknowledge its market value, and commercialise it by creating a new firm. Entrepreneurial absorptive capacity addresses the individual’s propensity to and not the action of creating a new firm (Qian & Acs, 2013) which is attributed to the entrepreneur’s prior knowledge. The absorptive capacity is not only based on the scientific/technical skill but it is also reliant on the business skills (Ghio et al., 2015), which could also be adding to the knowledge filters.

New knowledge does not necessarily lead to entrepreneurship but it is the extent to which the market value of new knowledge is discovered and exploited depending on the capability of entrepreneurs to recognize such opportunities and to deploy resources to bring new inventions into the market as stated by the entrepreneurial absorptive capacity theory (Ghio et al., 2015). Entrepreneurial absorptive capacity theory suggests that strengthening human capital is important for regions to facilitate knowledge-based entrepreneurial activity (Qian & Acs, 2013), which is in alignment with the policies adopted in terms of women entrepreneurship and economic development in South Africa.

Some assumptions on prior knowledge are that women within the Engineering sector have some form of Engineering background, therefore encapsulating the scientific knowledge. Another assumption is that the background knowledge is acquired from universities or similar level of

educational institutions. Leyden and Link (2013) argued that if universities act to form part of collective entrepreneurship with the private sector through collaborative research and development (R&D) for incumbent firms and start-up entrepreneurs, there ought to be incentive for the increase in R&D costs through increase in business revenues (Patrick & Albert, 2013). Universities surely provide the platform for scientific knowledge in the Engineering field, however, there is still a role to play in providing entrepreneurial education within such technical expertise fields to enhance the absorptive capacities for entrepreneurship.

Based on the above literature, it undoubtedly can be seen that knowledge filter impedes entrepreneurs' alertness to opportunities and subsequently exploitation thereof. Institutional support is mentioned as one of the ways to increase absorptive capacity but found to fall short on the specific types of institutional support needed to enable exploitation of opportunities by the women in the sector.

2.1.4. Exploitation of opportunities

Alvarez and Barney (2014) argued that entrepreneurs who discover opportunities are different from others in their ability to either see or exploit opportunities (Marvel, 2013). Discovery theory states that opportunities are established by exogenous shocks to an industry or market (Martin & Wilson, 2016). If so, then individuals associated with an industry or market should be aware of any opportunities a change has created since these opportunities are observable (Marvel, 2013) and therefore exploit it. This however is not the case since some of the key components to exploitation of opportunity by individuals is their alertness as asserted by Kirzner (1973) and idiosyncratic knowledge (Shane, 2000). Entrepreneurs must entrust that they will gain more than they are giving up in order for them to exploit (Marvel, 2013). Research by de Jong (2013) suggested that the decision to exploit is related to the entrepreneurs' attitude in whether they find the opportunity attractive, subjective norms in terms of experiencing positive pressure from close social networks, and perceived behavioural control in relation to acquiring the resources needed for exploitation (Owners, 2013). These antecedents increase the likelihood that the person will intend to act and accordingly increase the chance of doing so.

Discovery and exploitation of an opportunity requires the entrepreneur to have prior knowledge and experience associated with an opportunity (Alvarez & Barney, 2014) as they are the sources of the bulk of discoveries because they demand minimal acquisition of new knowledge (Marvel,

2013) as a result of the entrepreneur's absorptive capacity (Qian & Acs, 2013). According to research on absorptive capacity, a lack of knowledge in a field may inhibit an individual from effectively obtaining succeeding knowledge, which may distinguish their capability to discover and exploit an opportunity (Marvel, 2013). Thus, prior knowledge is critical because it bounds the realm within which an individual acquires new knowledge. Marvel (2003) proposed that some types of knowledge may be of unequal value to individuals searching to discover opportunity hence most venture ideas come from past employment experience. An information conduit approach requires alertness to information within a peculiar and familiar domain, which is contradictory to Kirzner (1973) (Martin & Wilson, 2016). Idiosyncratic knowledge is important to opportunity discovery in addition to alertness as information about industries or markets cannot be entirely known by a single person as each person's amassment of knowledge and experience is idiosyncratic (Marvel, 2013).

The study previously explored the discovery of entrepreneurial opportunities, and less on the factors affecting the exploitation of those opportunities (Arentz et al., 2013). Even so, research on factors affecting opportunity exploitation have been focused on the behavioural interpretation of entrepreneurial attributes i.e. internal locus of control, masculinity, need for power and achievement, risk appetite (McClelland, 1961; Hofstede, 1980). Perhaps one of the causes for a creative individual's decision against commercializing an innovative idea, even when in possession of it (Audretsch & Belitski, 2013). Enacting the concept of a knowledge filter within the KSTE is paramount to control the effect of institutional barriers to the decision to venture into entrepreneurship (Stenholm, Acs, & Wuebker, 2010).

2.2. Entrepreneurship and Women

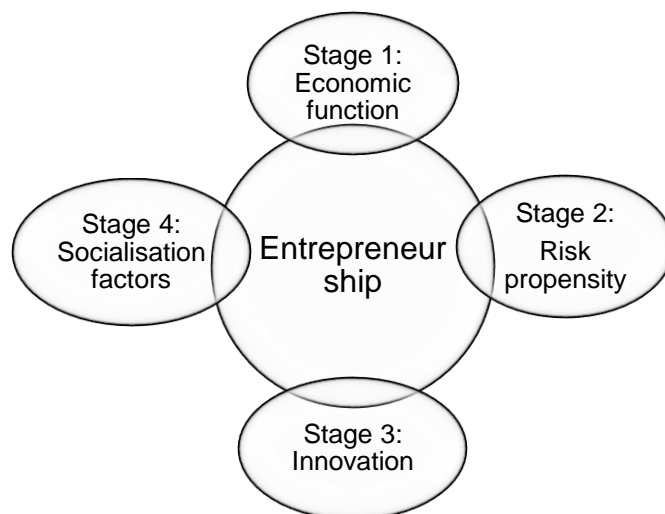
Entrepreneurship is a field of study which has attracted attention from business, academics and policymakers across multiple disciplines (Kuratko, Morris & Schindehutte, 2015). Classical economic theory developed by theorists like Adam Smith (1776), David Ricardo (1817) and Jean Baptiste Say (1803) defined the economic function of entrepreneurship as an enabler and driving force of all other factors of production of goods particularly land, labour and capital to make profit (Raimi, Oriented, View & Raimi, 2015). According to Raimi (2015), Say, a prominent French economist, invented the term 'entrepreneur' and defined it as "a creative and judgmental individual, a forecaster, an innovator, a project appraiser, and a risk taker" (p. 373).

Statistics point out that the rate of women who graduate within the Engineering field is more than that of men, yet more women abandon their careers during the first few years of employment (Hunt, 2016). Entrepreneurship continues to be viewed as a major contributor to economic development in all countries of different economic levels (Brush & Cooper, 2012) yet the GEM reports low entrepreneurial activity; particularly in the formal sector (Herrington, 2015). The world is increasingly interconnecting and economies face stiff competition for markets, resources and skills (Women, 2013). Consumers, in turn, are more demanding of originality therefore requiring innovation in an ever changing environment. GEM relays the keys to economic development for any country as the level of; innovation, job creation, international competitiveness and mix of industries (Herrington, 2015), to which Kuratko (2014) adds productivity and wealth generation.

Entrepreneurship as a discipline has evolved overtime (Kuratko et al., 2015) and the body of knowledge constitutes from different fields of study like economics, sociology, psychology, finance, marketing, journalism, management and anthropology (Raimi et al., 2015). A definition that partly resonates with the study describes entrepreneurship as opportunity identification and opportunity exploitation through resource allocation, combined with innovation, internal locus of control and risk appetite (Barringer & Ireland, 2008). Spilling over knowledge to start a new firm is an opportunity identified and exploited but the decision of the person who starts the firm compared to another who chooses not to is based on other factors.

According to Raimi (2015), entrepreneurship theory has evolved through four stages.

Table 1: The four stages of entrepreneurship (Raimi et al., 2015)



The four stages are discussed above to gather context and understanding of women entrepreneurship in addition to the prior discussion on opportunity exploitation using the knowledge spillover theory of entrepreneurship.

2.2.1. Women entrepreneurs and economic development

The emergence of a growing community of women entrepreneurs has been described as one of the most significant economic and social developments in the world (Brush & Cooper, 2012). Entrepreneurial activity is beneficial across all genders, men and women may however not engage in entrepreneurship to the same extent because of differential access to various forms of capital as well as socio-economic factors (Brush & Cooper, 2012).

Considerable difference between “replicative” entrepreneurs, those who produce or sell a good or service that is already available through other sources and who generally undertake starting the new business as a financial means of support, and those “innovative” entrepreneurs who engage in commercial activities based on a new product, service, or method of production or delivery. While the former clearly has benefits in terms of poverty alleviation and is a means for those with little capital, education, or experience to earn a living, it is clearly the latter group that is of interest to economic growth, and thus presents the greatest challenges from a research perspective (Baumol & Griffiths, 2012).

Women have typically been involved in low income informal service sector, running necessity type enterprises. The interest of this study however focuses on women’s opportunity exploitation within the formal sector which is more opportunity driven; research suggests that economic growth is primarily driven by opportunity entrepreneurial activity more than necessity driven activity. A positive trend has been an increase of women motivated by opportunity driven entrepreneurial activity within the South African context in the last couple of years (Report, 2016). Government has also placed great value in entrepreneurship as the driving force for the required economic growth. Schultz (1971) recommended education as means for attainment of economic growth and technological progress, which is applicable to the population being studied.

In furtherance of the debate, Thurik et al. (2008) argued that high unemployment rate precipitates high entrepreneurial activity in the forms of start-up ventures, a phenomenon called the refugee

effect. South African is experiencing one of the highest unemployment rates at 26.6% according to Statistics SA (2016) with the youth being the worst affected.

Women make up 49.6% of the world's population according to World Bank (2016), and in many parts of the world are at the lowest levels of economic activity (WEF, 2016). Most women who start businesses are doing so as a means of survival particularly in emerging economies like South Africa; where knowledge based entrepreneurship is of more essence to the shrinking economy that requires firms that create jobs. ECSA has found that women within Engineering abandon their careers within the first few years due to unfavourable working conditions. One of the key findings and conclusions from the 2012 GEM study of women entrepreneurs is that if women perceive that they have the capabilities or competencies for entrepreneurship, they are more likely to believe that entrepreneurial opportunities exist.

Entrepreneurship is often the suggested solution to economic growth (Rowley, 2013) and sectors such as Engineering offer solutions that ensure more women use their acquired knowledge and skill to develop the economy rather than abandon their careers. The marginalization of women within a majority of formal industries is not only a national issue that needs to be addressed, but rather a worrying international trend that needs immediate rectification (Women, 2013). Although it cannot be disputed that transformation within professional industries has been occurring over the years, not much is being done to develop and fully take advantage of the potential of women within formal industries (Vita, Mari, & Poggesi, 2014).

When more women join the labour force, and particularly become entrepreneurs, GDP rises dramatically in both developed and developing economies (Brush & Cooper, 2012). The impact of women entrepreneurs on the global economy cannot be underestimated. In South Africa, the percentage of firms with women ownership is 22.6% according to the World Bank (2016). Although women perform 66% of the world's work, and produce 50% of the food, they earn only 10% of the income and own 1% of the property in the world (WEF, 2016). To achieve economic empowerment, South Africa needs to recognise the value of women contributions within formal industries (Hughes & Jennings, 2012).

Potential advantages to formal sector participation for women include reduced vulnerability to corruption, access to formal credit institutions, and greater access to foreign markets (Klapper & Parker, 2010). Still yet with women's capabilities and potential, gender stereotyping continues to

cripple women entrepreneurship participation. Some industries such as Engineering where participation has traditionally been male-dominated are inclined to disregard the reality of the value backing increased women participation (Adom, 2015). The limitation to financial resources is another contributing factor to the delayed development of women in enterprise. There seems to be an existing discrimination when it comes to women seeking finance from traditional institutions (Chant, Sweetman, Chant, & Sweetman, 2017).

Previous studies showed evidence that the advantages of growing women-owned businesses and integrating women into economies can contribute to an increase in the GDP, yield a broad range of economic gains; including job creation, increased profits, productivity gains, better corporate leadership, more efficient utilisation of resources and talent, and poverty reduction.

2.2.2. Risk propensity

The underlying logic behind the assertion that entrepreneurs tend to have a high risk propensity is that they often have to make decisions in dynamic environments bearing risks and uncertainties avoided by others (Bönte & Procher, 2016). Risk taking theory views entrepreneurship as a frame of mind that stimulates individuals to take calculated risk for which they stand to enjoy a stream of benefits or losses (Raimi et al., 2015). For the KSTE the risk involves letting go of financial security at the incumbent's organisation as an employee to form a new firm with numerous uncertainties. Studies however indicate that men have a higher risk appetite as compared to women (Adom, 2015), which could be influenced by the socio-cultural influences that have limited women's potential and ability (Hughes & Jennings, 2012).

Rauch and Frese (2012) stated that the predictive power of personality can be enhanced if situational parameters are taken into account (Bönte & Procher, 2016), where it is foreseen that risk-taking propensities aligned with requirements of starting one's own firm allows for ease of venturing into entrepreneurship. Risk-taking decision is related to one's professional career likely to matter more as in the case of venturing into entrepreneurship than a general tendency to bear risks (Bönte & Procher, 2016).

Starting one's own new firm requires high investments in terms of time and financial resources and puts future income at risk which may be too risky for individuals with low risk propensity (Rauch, 1993). Another argument is that women in developing economies like South Africa have

far greater financial responsibilities and are therefore limited in their risk propensity towards entrepreneurship (Rowley, 2013). However, the inspiration to venture into entrepreneurship is a commitment to undertake risks for the purpose of earning economic benefit (Raimi et al., 2015). Risk is inherent in entrepreneurship, but again as entrepreneurs become successful in their undertaken ventures, their risk appetite increases in their decision-making process. This begs the question on the willingness of women to make the commitment and investment to achieve the sought growth in women economic contribution. Research studies argue that women tend to shy away from risk and thus contributes to the smaller size and slower growth of women-owned firms. The 2012 GEM survey found that, in every region surveyed, women reported being more afraid of failure on average than their male counterparts, and show more reluctance to scale their businesses or to enter new and less tested markets.

Sociological theories prove that desire to become an entrepreneur is greatly influenced by an individual's socio-economic, cultural and environmental conditions (Wennberg, Pathak & Autio, 2013). Prevalent economic conditions and social cultures are forces driving entrepreneurship in the society because these forces configure or shape attitudes and beliefs of people, which in turn influence their entrepreneurial views, behaviour and perception (Kuratko et al., 2015). Influences are based on society's statue and value to entrepreneurship as a lucrative career. Countries like South Korea, Silicon Valley are a prime example of society's behaviour driving the level of entrepreneurship. Key environmental factors that make business sustainability in the society include "political system, government legislation, customers, employees and competition", therefore risks and challenges are affected by both micro and macro factors (Ladge, 2016).

Entrepreneurs have been identified in the literature as having diverse characteristics, which empower them to make a difference in their society. Quaye and Acheampong (2013) described an entrepreneur as someone who possesses these three key characteristics: "innovativeness," "proactiveness" and "risk-taking."

2.2.3. Innovativeness

Schultz (1971) ascribed the creative capacity of entrepreneurs to human capital development which enhances innovativeness to grasp environmental opportunities. He argued that entrepreneurial activity increases with investment in people as human capital (Marvel, 2013) and therefore impacts positively on economic growth and development. This is evidently seen when

studying the encouraging level of economic growth and development around the Four Asian Tigers i.e. Hong Kong, South Korea, Singapore, and Taiwan. These countries are highly associated with human capital development and technical education/training (Raimi et al., 2015). Statistics for women in South Africa show that more women graduate from universities as compared to their male counterparts even for degrees that are traditionally considered masculine i.e. Engineering (Singh & Chauhan, 2016). This is however not reflected in the SME growth index research that was conducted in terms of women business ownership within those industries (Women, 2013).

Theorists suggest that education and the ability to identify and exploit an opportunity induces entrepreneurship, this however seems to not translate to women's entrepreneurial activity. Some countries introduced entrepreneurial education (EE) as part of the solution to their economic problem. Zimbabwe and Nigeria are exemplary. In Zimbabwe, EE is offered at all tertiary institutions following rising unemployment in the country. The essence of its adoption by policy maker in the Ministry of Education was to enhance graduates' creativity and innovativeness. EE emerged in Nigeria in the 1980s purposely to make the citizens self-reliant, self-employed and job creators rather than looking for white collar jobs. EE was therefore a response to unemployment and poverty incidences which were surging and beyond the control of the government (Raimi et al., 2015).

Reality has shown that improvement of skills of human capital is not always commensurate with economic opportunities and increased entrepreneurial activity through the low entrepreneurial activity (Herrington, 2015). This is primarily as a result of knowledge filters. Prior knowledge, entrepreneurial intentions, and alertness have been attributed to entrepreneurial action (Kirzner, 1973), not disregarding the economic and socio-cultural factors and their influence as knowledge filters (Owners, 2013). An institutional environment filled with new opportunities created by knowledge spillovers and access to needed resources is important for high impact entrepreneurship (Stenholm, Acs & Wuebker, 2013). The current South African policies and initiatives intended to make the environment conducive for women entrepreneurs do not seem to yield the anticipated results according to the entrepreneurial activity trend for women in formal sectors, perhaps indicating thicker knowledge filters for women.

The knowledge production function asserts that technological research and development is a rise of innovations, new knowledge (Klarl, 2013) and new firm growth (Acs & Sanders, 2012),

however, withstanding the institutional influence (Lehmann, 2013). It is recognised that innovation through KSTE alone is insufficient specifically in developing economies and requires institutional support to account for the knowledge filter thickness. It considers regulatory barriers to entrepreneurship, bureaucratic constraints, taxes, social acceptance, entrepreneurial opportunities and culture as some of the factors contributing to the thickness of individual's knowledge filter. Knowledge filter is responsible for innovative individual's decisions to shy away from creating their own firms, even when in possession of brilliant innovative ideas (Qian & Acs, 2013).

The process of new knowledge commercialization through knowledge spillover becomes a key determinant of innovation and growth in industries and regions (Acs & Sanders, 2013), hence often the advocacy of firm clusters in a region (Audretsch & Belitski, 2013). Creative cities experience higher innovation and start-up rates of new high impact businesses and are often considered centres of global competitiveness (Robson et al., 2012). Recent research suggests that it is both human capital and creativity embodied in educated or skilled individuals as well as a conducive environment that triggers entrepreneurial opportunities and regional growth (Audretsch & Belitski, 2013). It is generally the stereotypes intertwined with the masculinity associated with the industry, which impede commercialisation of innovative ideas by women.

2.2.4. Socialisation factors

Two approaches to entrepreneurship summarise certain behavioural tendencies of the entrepreneur in the face of social and economic circumstances. The "creative destruction" of the Schumpeterian school sees the entrepreneur taking steps to distort social equilibrium (proactivity), developing new and better things to replace old ones (innovation) and facing the risk of failure (risk-taking). In the Kirznerian School's alertness to opportunities and market possibilities, the entrepreneur actively seeks for market information (proactivity), closes any imbalances (innovation) and still run the risk of failure (risk-taking) due to possibilities of inaccurate market information (McClelland, 1961; Kirzner, 1973; Schumpeter, 1935; Quaye & Acheampong, 2013). These elements formed some of the major sources for KSTE. Innovation, entrepreneurial opportunity and risk taking have already been discussed in relation to women entrepreneurs as gender is mutually intertwined with human capital, social capital, industry context, technology, and venture ideas (Ljunggren, 2017).

The historic literature on women leaving science and Engineering has accentuated the challenges of balancing long work hours and family in the sector. Even more so the isolation of being a minority in the workplace, related lack of mentoring and networks; the risk-taking environment; the hostile macho culture that is engrained in discrimination (Hunt, 2016). Simpeh (2011) argued that it is practically onerous to do a collection of inborn traits or qualities of an entrepreneur. Optimism, opportunity driven, competitiveness, willingness to make a difference, creativity and innovation, business management skill, enthusiasm for continuous improvement, commitment, perseverance and desire to win; were some of the common traits observed in accomplished entrepreneurs. The resilience to succeed may be as a result of the locus of control theory. It presumes that people's success or failure in entrepreneurial activities depends on personal abilities (internal locus of control) and degree of external support received from others (external locus of control) (Arentz et al., 2013). It is imperative to have both but a higher internal locus of control is probably more required to succeed as women entrepreneurs within such a masculine sector. Individuals with high internal locus of control believe they could influence the course of events in life to their own advantage, while those with external locus of control believe that life events are controlled by external forces like luck, chance, fate, which are outside human control (Kuratko et al., 2015; Simpeh, 2011). Some of the external forces are the socio-cultural perceptions that affect the decision to venture into entrepreneurship. Entrepreneurial intention and action is likely to occur if entrepreneurial activity is perceived in a community or culture as desirable and viable (Eckhardt, 2015).

The role that women entrepreneurship plays is more than just an economic, but carries a social perspective in that it allows an individual to explore the emancipatory power of owning a firm (Vita, Mari & Poggesi, 2014). The degree to which the social structural dimensions, cultures and values affect women entrepreneurs in developing economies is influenced by the unavailability of training in basic business skills and difficulties in access to networks and business support systems, the social segregation and the lack of societal legitimation to act as an entrepreneur, all seem to be the issues that most influence women's participation in entrepreneurship and their outcomes in developing countries (Adom, 2015). The characteristics of women entrepreneurs in developing countries (smaller, less innovative, less competitive, and therefore less prone to growth and exports) indeed seem to be the direct result of the socialization processes that legitimize, or discriminate certain types of enterprise for women and thus hinder the available opportunities for women to explore entrepreneurially (Mostafa et al., 2011).

2.3. Conclusion

The KSTE recognizes new knowledge that hasn't been exploited /underexploited by an incumbent firm as a source of entrepreneurial opportunities for prospective entrepreneurs (Arentz et al., 2013). It, however, also brings to attention the importance of human capital as a major source of entrepreneurial absorptive capacity which acts as a catalyst for commercialization of knowledge through starting new firms (Qian & Acs, 2013), positively contributing to economic growth of the country.

Although KSTE claims to integrate the contemporary theories added by the focus on economic growth, the emphasis was greatly on endogenous factors i.e. innovation, human capital and knowledge (Acs & Sanders, 2013), which in itself is a challenge for developing countries where social factors weigh heavily on a woman's decision to venture into entrepreneurship. It is clear from the literature reviewed that KSTE alone in developing economies is insufficient and requires to be supplemented by institutional support. The literature however fails to be specific in terms of the type of institutional support required specific to the sectors rich within the SET contextual environment.

The research questions sought to literature to answer two peculiar themes, firstly entrepreneurial opportunity and subsequent exploitation thereof, secondly factors that impede opportunity exploitation in the context of knowledge spillovers in engineering sector, within the context of South Africa as a developing economy. Insights from the KSTE theory shed great light on the subject but found that it was rather suited to developed economies.

CHAPTER 3: RESEARCH QUESTIONS

The research objectives were translated into four research questions which were based on the theory discussed to direct the research study.

3.1. Research Questions

Research Question 1: Do women entrepreneurs within the Engineering sector spillover knowledge from their incumbent firms when starting new firms?

Purpose of question: The question aims to determine whether women use their experience and prior knowledge to start new firms or whether there are other inputs that go into starting a new Engineering firm.

Research Question 2: What were the opportunities that informed the woman entrepreneur's decision to establish a new firm within the Engineering sector?

Purpose of question: The question aimed to establish the type of opportunities that were identified by and motivated women within the Engineering sector to start entrepreneurial businesses. Is there a noticeable trend of women entrepreneurs in the Engineering sector who have established new businesses that are related in nature to the larger incumbent organizations? Also, are women entrepreneurs in the Engineering sector driven to establish own businesses because of opportunities created by government policies.

Research Question 3: What are the challenges faced by women entrepreneurs who desire to start their own Engineering firms?

Purpose of the question: The question was asked to determine if challenges phrased in the study as knowledge filters were higher for women and therefore inhibiting their absorptive capacity in spilling over knowledge or if there could be other reasons for the low entrepreneurial activity amongst women within the Engineering sector.

Research Question 4: Is there sufficient support structures for women entrepreneurs entering the Engineering sector to ensure success thereof?

Purpose of the question: The question tried to determine if the structures and systems offered by government are sufficient to ensure ultimate start-up success, particularly for women within a

male dominated industry, and if the private sector is playing any role in terms of supporting women entrepreneurs.

3.2. Interview and Research Questions Mapping

A summary of the research questions and secondary questions is given below:

Table 2: **Research Questions and interview questions mapping**

Research Questions	Secondary Questions
Research Question 1: Do women entrepreneurs within the Engineering sector spillover knowledge from their incumbent firms when starting new firms?	<ul style="list-style-type: none"> ▪ Did your background in any way influence your choice of industry and business offering? ▪ What in your previous jobs prompted you to make the switch to entrepreneurship? ▪ What is similar in your business offerings to your incumbent organization? ▪ In which ways has innovation being derived from the ideas and/or knowledge of your incumbent organizations into your new firms? ▪ What was the cost of developing the idea and what has been the ROI of the adopted idea?
Research Question 2: What were the opportunities that informed (the woman entrepreneur's) decision to establish a new firm within the Engineering sector?	<ul style="list-style-type: none"> ▪ What inspired your decision to venture into entrepreneurship? ▪ What was the major opportunity you identified and exploited to lead you into entrepreneurship? ▪ What are the biggest opportunities available to women entrepreneurs in the sector? ▪ What have been the greatest successes available to women entrepreneurs? ▪ Would you say education and experience within your industry was enough foundation to start off your firm and why? ▪ What are the personal traits you think you embody that made transitioning into entrepreneurship lighter?
Research Question 3: What are the challenges faced by women entrepreneurs who desire to start their own Engineering firms?	<ul style="list-style-type: none"> ▪ What were the biggest challenges you faced and how did you overcome them? ▪ What are the biggest threats facing women entrepreneurs?
Research Question 4: Is there sufficient support structures for	<ul style="list-style-type: none"> ▪ How did you fund the business?

women entrepreneurs entering the market within the Engineering sector to ensure success thereof?

- Did you require any other support excluding financial; if so, what was it and was it sufficient?

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Introduction

This chapter discusses the selected research methodology used in this study. The literature reviewed and presented in Chapter two informed the basis of the design of the methodology as well as the interview guideline used during the in-depth interviews. A qualitative and exploratory approach was adopted; therefore, the research method, design, data sampling and analysis were in line with the selected approach.

4.2. Research methodology and design

The research followed the interpretivist approach which Saunders and Lewis (2012) explained as a research philosophy that advocates the necessity to understand differences between humans in their roles as social actors. This philosophy was chosen because the research aimed to understand the factors influencing the decision of women within the Engineering sector to use acquired knowledge and experience to get into entrepreneurship. It aimed to understand the extent to which women exploit the opportunities in the Engineering sector and the challenges equally facing women entrepreneurs within the sector.

The purpose of this study was to discover new insights into an area of study where little research has been conducted, which is women entrepreneurship in the Engineering sector. Exploratory research was the chosen design as it is conducted to refine ambiguous cases and/or to discover potential business opportunities (Zikmund, Babin, Carr, & Griffin, 2010). Saunders and Lewis (2012) in agreement with Zikmund, Babin, Carr and Griffin (2013) stipulate that qualitative and exploratory type of study is best suited for cases where speculative answers must be provided to initial questions; it is also for cases in which new insights are sought. The research approach was primarily inductive and allowed for the researcher to meaningfully explore the subject around the topic by focusing on meanings, ideas and views through constructs highly valued by the women entrepreneurs.

The research design is a qualitative one, and entailed an academic literature review of books and peer reviewed articles from highly credible sources, supplemented by data collection. The qualitative design aim was to explore the “why” and “how” related to the topic with the mission of deriving more onto the literature. Data was collected through in-depth, semi-structured interviews

with women entrepreneurs in the Engineering sector as the aim was to gain new insights from the research study. The nature of all data generated from these sources was in text, data collected was recorded and transcribed. The data was collected over a short period of time due to time constraints measures; therefore, rendering it a cross-sectional study (Saunders & Lewis, 2012; Zikmund et al., 2013).

The data collection technique entailed a small sample to enable an in-depth investigation (Saunders, Lewis, & Thornhill, 2009). Questions were posed in ways that aligned the variables to ensure that the research questions were answered using a structured discussion guide to ask the questions (See Annexure D for draft questionnaire). Open ended questions were asked to facilitate flow and ease of collecting in-depth information from participants (Creswel, 2008).

4.3. Population

The population universe that was deemed to be relevant for this study was women entrepreneurs who owned firms within the Engineering sector in South Africa, including but not limited to manufacturing, infrastructure development, designing and mining.

4.4. Sampling method and size

Non-probability purposive sampling was used in the study. The method involves deliberate selection of particular units of the population for constituting a sample which represents the universe/population (Kothari, 2004). Women entrepreneurs were sampled through attendance of different Engineering related entrepreneurship workshops. The sampling was relatively homogenous as the research study was trying to understand a subgroup of in depth.

The sampling frame was all the registered businesses within the Engineering sector at the entrepreneurship workshops, with the “Engineering sector” defined as businesses where science is applied to process and/or where scientific ideas are industrialized into economically viable firms. Sampling was then narrowed to women owned Engineering firms and/or women hold executive directorship positions within the Engineering businesses. Defining women entrepreneurship according to McClelland (2005), a woman owned business is defined as a business that is at least 51% owned by one or more women or in the case of any publicly-owned business, at least 51%

of the stock of which is owned by one or more women and the management and daily business operations of which are controlled by more women.

Size of business was measured according to the number of people the firm employed as according to Small Enterprise Development Agency outline. The intended business category was from small to medium. This however proved to be a challenge as most of the business were younger than three years and deploying the lean employment strategy in order to remain competitive.

Table 3: **Defining size of business**

Size of business	No. of employees
Micro enterprise	0 – 25
Small enterprise	25 – 50
Medium enterprise	51 – 200

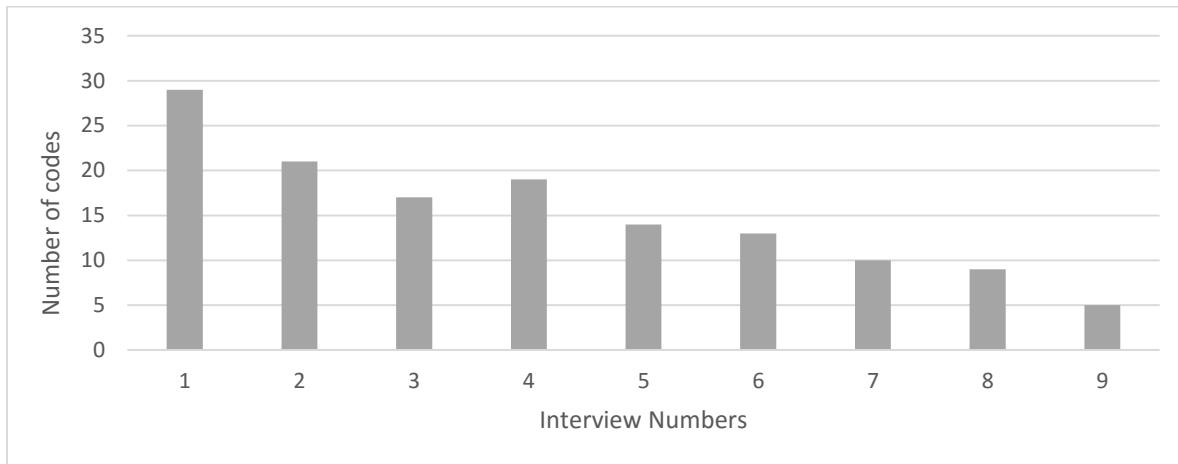
Total sample size per unit of analysis was nine interviews. Sample was a fairly good representative of the population being studied and the industries ranged from building and civil Engineering, mining and geo-techniques, GIS and environmental services, manufacturing and Engineering services. More details on sample description are provided below.

Table 4: **Sample description**

Initial	Position	Industry
UN	Managing Director, Project Manager, Head of Engineering	Built Environment
TM	Chief Executive Officer	Civil Engineering
SN	Director: Surface Mining and Civils Geo-techniques	Mining Geo-techniques
NM	Managing Director	Manufacturing
LT	Director	Building and Civil Engineering
LS	Managing Director	Engineering Maintenance Services
LL	Chief Executive Officer	Engineering Consulting services
AS	Managing Director	GIS & Environmental Services
AA	Director	Mining Geo-techniques

Sample was adequate following saturation analysis for new insights during data collection. Figure **Error! Reference source not found.** below illustrates the data saturation analysis graph based on the data analysis following the interview process.

Figure 1: **Saturation analysis graph**



4.5. Unit of analysis

The unit of analysis for a study indicates what or who should provide the data and at what level of aggregation (Zikmund et al, 2013). The data was collected about individuals (women entrepreneurs), sector (Engineering), and businesses (start-ups to small medium enterprises).

The participants' views, thoughts and perceptions around opportunity exploitation and challenges contributing to the low entrepreneurial activity by women in the sector were determined to be the units of analysis for the study.

4.6. Measurement instrument

Interviews were conducted with individual women entrepreneurs using an interview guide as the measuring instrument (See Annexure D). The questions included in the interview guide were derived and mapped against the research questions as per Chapter Three in consistent with literature review as illustrated by Table 1.

To ensure that there was consistency and to avoid the subjective error, the majority of the interviews were conducted in the premises of the participant.

4.7. Data gathering process

An interview guideline was developed through the use of a consistency matrix and in line with the objectives of the research as indicated in Chapter One. Data collection was conducted through semi-structured face-to-face interviews. The interviews were recorded and the audio recordings were later transcribed verbatim. The locations where the interviews were conducted were the interviewees' offices. Although there were structured questions, flexibility was practised in getting as much relevant information as possible by applying probes and making follow up questions. A checklist was formulated to ensure that all required is covered.

Individuals were studied which required acquiring permission from the women entrepreneurs as well as approval from the Institutional review board (Gordon Institute of Business Science (GIBS) Research Committee). Please see Appendix 5 for an example of the consent letter used. The questions posed were open-ended which allowed the participants to share their views relatively unconstrained. The interview approach was of one-on-one interviews, with intensive preparation by the researcher on how to conduct the interview. All attention was given to ensure that data collection is done so ethically, with sensitivity to individuals, populations being studied, and research sites.

4.8. Analysis approach

The data from the audio recordings were transcribed into text data. The services of a professional transcriber were employed to transcribe the recordings. Analysing the data commenced post the fourth subscription and did not await completion of all interviews. The data collected was analysed using thematic content analysis through careful studying of recurring themes and patterns, which were developed through categorising and grouping of the constructs to enable answering of the research questions. The actual words used by the participants were used in text, despite some of the excerpts being grammatically incorrect. Analysis of the data was executed using Microsoft Excel programme. The process of data analysis was used to answer the research questions.

Qualitative data analysis was employed to analyse the data transcribed from the interviews conducted. The analysis process involved coding or grouping of collected information with the aim of analysing the information to identify differences, common themes and perceptions and trend (Zikmund et al., 2010). Transcribed responses were systematically analysed using a replicable credible method (Creswell, 2012) . All the audio recordings were listened to at least once by the researcher even though the actual transcribing was outsourced. Understanding of the data was attempted right through the interviewing process to identify any common themes and insights; however, the majority of the analysis was done post the interview process. The researcher’s intention in initially attempting the content analysis was to test any emerging themes as well as to enrich the interview process. Thematic content analysis was employed by grouping the data on a question-by-question basis through qualitative methods (Braun & Clarke, 2006; Zikmund et al., 2013; Saunders et al., 2009). Analysis was done through coding the data and using the codes to develop meaningful categories; the coded meaningful data i.e. findings was then represented through visuals; making an interpretation of the meaning of the results by deciding on the unit of data that is appropriate for the analysis (Saunders et al., 2009). Braun & Clarke, 2006 suggested the following steps in the thematic analysis of data:

Table 5: Phases of Thematic Analysis (Source: Braun & Clarke, 2006)

Steps	Process Description
1	Study the data collected to accustom self, paying specific attention to patterns and themes that emerge
2	Find the initial codes and document the obvious patterns
3	Combine the codes into major themes that precisely describe the data
4	Relate the created themes to the data
5	Describe the theme and give details of the significance of each theme
6	Determine the key themes that are important for the discussion of the results

It took approximately four hours to analyse each transcribed interview in full, through the use of a systematic process as defined by Braun and Clarke (2006), this then translated to 36 hours in total to complete the analysis. This process entailed listening to the audio recordings from the interviews, the review of transcripts and a review of the observation notes that were taken during the interview process. The codes were comparably generated and assigned to the features of the data collected (Braun & Clarke, 2006; Zikmund et al., 2013). The themes were established

through identification of important constructs, opinions or thoughts, which were associated to the research questions (Saunders & Lewis, 2012; Braun & Clarke, 2006). The research adopted an iterative method, ensuring that the codes and identification of themes were generated twice before continuing with the review of the identified themes (Braun & Clarke, 2006). The data that emerged was captured into a Microsoft Excel spreadsheet created by the researcher. Analysis was then performed for each question, which was followed by a frequency analysis. Each notion, view, or idea from the data was recorded and the number of times it recurred was captured. These captured concepts were then ranked according to the number of times they were mentioned. Finally, insights from each interview were interrelated and analysed in the context of the research questions in Chapter three (Saunders & Lewis, 2012; Braun & Clarke, 2006).

4.9. Data validity and reliability

Reliability and validity evaluate the measurement tool used (Saunders & Lewis, 2012). Zikmund et al. (2013) refer to reliability in the context of consistency and validity as representing the accuracy with which the measurement assesses the postulates needs to be reliable and accurate (Zikmund et al., 2013). Qualitative research is considered subjective by nature and can be affected by interviewer bias, interpreter bias and response bias (Saunders & Lewis, 2012; Zikmund et al., 2013). Creating and adhering to systematic analysis or a coding scheme was done to increase validity of the study (Shannon, 2005)

All interviews followed the interview guide where same questions were asked to all interviewees for consistency and research bias avoidance (Zikmund et al., 2010). The researcher abstained from adding comments or opinions and adhered to just asking the questions and facilitating the interview where there was a need to ensure the answers are relevant to the questions without leading the participants. The researcher made a concerted effort to focus on views and perceptions of participants taking into account the influence of researcher biases as qualitative research is understood to be naturally subjective and prone to different biases (Saunders & Lewis, 2012; Zikmund et al., 2013).

4.10. Limitations

- The study is concluded based on a small sample size with very similar demographics in terms of ethnic group and majority of the businesses being in nascent stages. The initial intention was to find businesses that were employing more than twenty-five individuals which however proved to be challenging.
- The sample comprised of women entrepreneurs only. A broadened view from policy makers and women in the Engineering sector as employees could have widened the shared perspectives.
- Qualitative research is subjective and the researcher is at risk of being affected by a number of biases. One of the biases rises from the fact that the researcher is not a trained interviewer and could affect the collection of data.
- All participants were based in Johannesburg, Gauteng, South Africa, which could possibly contain an element of a geographical bias.

4.11. Conclusion

This chapter outlined the research design and methodology in fulfilling the research objectives of the study as introduced in Chapter one. The research and design approach were dissected through defending the chosen research method of qualitative study. Moreover; support from academic literature, applied relevance to the study and the chosen research instruments for data collection were presented to enable answering of the research questions.

CHAPTER 5: RESEARCH RESULTS

A majority of the participants agreed that their background influenced their choice of industry and business offerings. Knowledge spillover occurred through innovative solutions in their current business based on the knowledge gained from their previous organisation and at very little cost. There was no evidence found that the adoption of the idea into the new firm was as a result of completely new knowledge developed but chosen not to be exploited by the incumbent firm. The second most exploited opportunity was the transformational policies equally shared with market growth possibilities. The participants alluded to access to market due to limited networks as well as access to opportunities as the greatest challenge and threat facing women entrepreneurs. Enterprise development and strategic partnerships were mentioned to have contributed to ease of doing business for market growth attainment.

5.1. Background information

As highlighted in the methodology chapter, non-probability purposive sampling was applied to select the nine participants. The qualifying criteria for participation was business ownership and current involvement within the Engineering sector. All participants were women and had more than one year of experience in entrepreneurship.

Education background

It was important to get an understanding of whether the women entrepreneurs' education background influenced their choice of entrepreneurial sector. Most participants possessed an Engineering education background.

Table 6: Education Background Profile of Participants

Rank	Constructs	Frequency
1	Engineering Education Background	6
2	Science Education Background	2
3	Accounting Education Background	1

Previous work experience

An overview of work experience of the participants is illustrated on the table below. Majority of the participants had work experience that fell within the range of 5 to 10 years.

Table 7: **Employment experience of participants**

Rank	Constructs	Frequency
1	Employment Experience of between 5-10 years	7
2	Employment Experience of between 0-5 years	1
3	Employment Experience of between 10-15 years	1

Entrepreneurial experience

Most of the participants had more than five years' experience as entrepreneurs as shown below.

Table 8: **Number of years as an entrepreneur**

Rank	Constructs	Frequency
1	Number of years as Entrepreneur between 5-10 years	4
2	Number of years as Entrepreneur between 0-3 years	2
3	Number of years as Entrepreneur between 3-5 years	2
4	Number of years as Entrepreneur more than 10 years	1

Size of business

The size of business was determined by number of people employed by the firms as stipulated in Chapter Four. It can be inferred from this result that most women entrepreneur businesses are still categorised as small to medium enterprises with only one participant's business falling within the large scale business category.

Table 9: **The number of employees employed by the businesses**

Rank	Constructs	Frequency
1	Between 0 and 5 employees	5
2	Between 6 and 10 employees	2
3	Between 10 and 15 employees	1
3	300 and Above	1

Business ownership

This interview question required participants to describe the ownership profile of their businesses and the determining factors that contributed to the split. Half of the participants described their ownership profile as a partnership whilst a quarter of the participants were sole owners. The remainder changed from partnership to sole owner and vice versa.

Table 10: **Split of ownership**

Rank	Constructs	Frequency
1	Partnership	4
2	Sole Owner	2
3	Sole Owner initially and changed to Partnership	1
4	Partnership initially and changed to Sole Owner	1

Table 11: **Ownership Split profile**

Rank	Constructs	Frequency
1	Shareholding Split is 50/50	3
1	Shareholding Split is based on Friendship	3
2	Shareholding Split is 80/20	2
2	Shareholding is based on Founding Partner	2

5.2. Results for Research Question 1

Do women entrepreneurs within the Engineering sector spillover knowledge from their incumbent firms when starting new firms?

Secondary Question 1.1: Considering whether the background of the entrepreneurs influenced their choice of industry and the business offerings.

The Eight of the nine participants agreed that their background influenced their decisions to select the industry they are currently operating in and only one participant disagreed.

Table 12: Influence of entrepreneur’s background on choice of industry

Rank	Constructs	Frequency
1	Yes	8
2	No	1

A majority of the participants agreed that their background influenced their choice of industry and business offerings, with some of the participants expressing that;

- *“So what I studied and my work experience actually played a big role in terms of me deciding which industry I want to do business in”.*
- *“That’s first hand, when I started the business, I wanted to explore everything, including my skill set. So I wanted to be part of, especially in the infrastructure growth sector, construction, automation, in the built environment, I wanted to be part of a lot of things and also innovation”.*

Only one participant conveyed that her background did not influence her decision to enter into the industry, probably because she had qualified as an accountant and then decided that she would pursue a business in Engineering, justifying her reasons as being linked to what she perceives as her responsibility to society. The participant said that:

- *“I’m an accountant, but I thought I need to go down to the grass roots where I can be able to empower the youth and the platform in the CA field was not there for me because when we recruit, we recruit people with junior degrees and those people do not struggle”.*

Secondary Question 1.2: Assessing the factors from the previous jobs of participants that prompted them to switch to entrepreneurship

The interview question encouraged participants to reflect back on their experiences and to recall events in their previous jobs that prompted them to leave their jobs and switch to entrepreneurship. Many of the participants were of the opinion that self-actualisation in terms of their expertise and capabilities encouraged them to switch to entrepreneurship.

Table 13: Factors from the previous jobs that prompted participants to switch to entrepreneurship

Rank	Constructs	Frequency
1	Realisation of Capabilities and Expertise	7
2	Prejudice against Gender and Race	6
3	Misalignment between personal preferences and corporate requirements	4
3	Routine Work	4
4	Lack of Appreciation for Value	3
4	Poor Working Conditions	3

The highest-ranking concept based on frequency count was related to the fact that many of the participants had a realisation of the value of their capabilities and expertise. The participants referred to significant moments when they realised their value, expressing that;

- *“You know; at some point you realise your value. Honestly. Let me bookmark that one. You know mines are very male dominated, very racist and very undermining to a point where you even start thinking maybe I am stupid, maybe I can't really do anything, let me just work at twenty percent of my capability because if I take it to eighty percent, I will scare these people, you see”.*
- *“I was like, okay, I'm one of the specialists in South Africa and there were few then, but now we've got more of people who are specialising in the discipline, so I felt like there's a gap in the market”.*
- *“Being unable to have your view exploited. Having to subordinate to seniors who do not carry a vision, and being involved in specifics in the work”*

Some of the participants stated that “prejudice against gender and race” was the main reason that prompted them to leave their previous organisation. One of the participants, recalling a period in her life in the corporate organisation, where she was judged for being away for maternity leave, sharing that,

- *“I don't know; it comes back to environment. Once, you go on maternity leave, as a lady, and then already you're seen as you're taking time off. So, I think reflecting the environment that corporate actually offers, they may say, yes, we are for women; but then are the policies even*

aligned to that? And are even the people? The leadership? Do they even embody the policies that they have on paper?

Misalignment between personal preferences and corporate requirements was also one of the significant constructs that was highlighted by participants. One participant explained in detail how hard the working environment was in her previous organisation, and said that:

- *“Where I was, my last company, in the rail industry, the environment was so bad that a number of ladies, I think they actually had miscarriages, a minimum of three that we know of did because of the condition, work condition. So it does get, it really, really does get bad, it really, really does get bad”.*
- *“The driving, but you know what, I thought at that time that the driving will be something that will be... It will go away, but now it’s more”.* Further adding how she always felt out of place in the corporate environment, the participant said that *“also the environment, actually, I didn’t feel being part of the environment, I didn’t feel like I fit in. You had to fight consistently. Then I got tired of it”.*

Secondary Question 1.3: Understanding the similar offerings in current business to incumbent organization.

This interview question sought to understand whether there were similarities between the incumbent organisation and the entrepreneurial business with regards to products / services / models.

Table 14: **Similar offerings in current business to incumbent organisation**

Rank	Constructs	Frequency
1	Exactly the same service offerings	6
2	Similar Technical Expertise	3
2	Similar Values in terms of Career Development	3
2	Nothing Similar	3

Majority of the participants said they offer exactly the same service offerings with some of the participants stating that,

- *“It’s quite similar because of what we used to do in my previous work”;* moreover, expressing, *“We do new buildings, we do rooftop structures, we do refurbishment of your fencing, which is very similar to what we used to do”.*

- “Yes, I would say somehow because now we have increased our scope of work. Initially, I was only doing supplies but now I offer services. So, on services there's repairs, calibrations, so it's more or less similar”.

Similarly, two other participants also mentioned how much they learned from their incumbent company which only made sense to offer the same services in their current business, stating that,

- “I learned a lot, technically, one of the best places I could have been for technical growth was there, but for career development and self-actualisation in my career”.
- “So, I would say those two companies really helped me, and Company B, yes, they do have a department that actually provides the same services that we are offering”.

It was surprising to find that there was one participant who conveyed that her current business did not offer any service offerings that were similar to her previous organisation, and said that,

- “No. Completely different, completely different. Remember, I said I was more, again, on the supply chain side of things but now it's a lot different, it's very, very different”.

Secondary Question 1.4: Assessing the extent to which innovation in current business is based on ideas/knowledge from tenure in former employer.

“Innovative solutions” was the most significant theme with a frequency count of six; followed by “product and services enhancements”.

Table 15: The manner in which innovation of prior knowledge has been adopted in the new business

Rank	Constructs	Frequency
1	Innovative Solutions	6
2	Product and Service Enhancements	5
3	Structuring Divisions by Service Offering	2
3	Process and System Development and Modification	2
3	Cost Effective Solution	2
3	Green Solutions	2
3	Attraction and Retention of Talent	2

Many participants agreed they had implemented innovative solutions in their current business based on the knowledge gained from their previous organisations, with participants explaining the use of technology and innovative systematic solutions, detailing that,

- *“Number one, in terms of construction, what we are doing, we’re not doing the service offering that we bring to customers, so we’re using their technology in terms of innovating our construction processes”.*
- *“Finally, the amount of opportunity that you can generate from just being innovative. So, it’s a seriously developmental environment innovation, because you get to put systems in place, you get to have to research it, you get to learn about it, you get to handle the administration of it, and you get to modify the actual software or the level of innovation that you currently have”.*

Some of the participants made reference to innovative ideas being linked to product and service enhancements, with one of the participants explaining how one of her employees is responsible for product enhancement and how these enhancements have resulted into the registration of patents, proudly stating,

- *“Because this guy would do some inventions, enhancing the product. As it is, we’ve got patents that we registered last year which DTI came to the party”.*

Another participant referred to the importance of structuring service offerings by divisions, explaining how structuring enhances efficiency in an organisation, which is a lesson she gathered from her previous organisation stating that,

One of the most interesting concepts highlighted by one participant was that innovation was perceived to be linked to the attraction of talent and not necessarily technology, explaining thus,

- *“With us innovation from a perspective, yes, human resources, like not really technology, we’re not there yet but the kind of people you’re going to use to run the business, so we wanted a younger group of people and a more African group of people”.*

Secondary Question 1.5: Determining the cost of developing the idea and the Return in Investment (ROI) of the adopted idea

This question sought to establish from the participants the cost of commercializing an idea and the return on investment of that idea.

Table 16: **Determining the cost of developing the idea and the ROI of the adopted idea**

Rank	Constructs	Frequency
1	No Costs Involved	3
2	Costs between R50 000 - R1 000 000	2
2	Costs are project-based and cannot be quantified	2
3	Costs between R5 000 - R50 000	1
3	Costs above R1 000 000	1

A theme that emerged strongly was that there were no costs associated with starting a new business idea. One of the reasons for this, was attributed to the fact that most of the participants were involved in consulting service offerings, which did not require any capital. The participants explained how they started their businesses with no finance, stating that,

- *“The cost really was the time and the travelling costs. We didn’t put money on the table for the idea but it took more than a year to convince some clients to, it took us more than a year. That was the cost of it that you worked for a year, basically, without earning any income”.*

Further responding to the question of ROI the participant said:

- *“yes, there was a return on investment because when the client eventually agreed they gives us quite a big project which was about 600 million to do on turnkey”.*

Another participant mentioned how she started her idea with a small amount of money, stating that,

- *“You’ll never believe, it was not more than R5,000, it was not much, it really wasn’t much. I don’t know how much Siya gave me, but I don’t even think we scratched R10,000”.*

There was, however, one participant that spent quite a substantial amount of money to her business idea, justifying the expenditure as,

- *“So far, as I’m saying, I’ve spent in excess of five million. Because the equipment, I bought it from my pocket from the beginning. I only got funding now, recently from IDC and I can assure you if I was not sitting on that board, I don’t think I would have got it”.*

5.3. Results for Research Question 2

What were the opportunities that informed the woman entrepreneur’s decision to start a firm within the Engineering sector?

Secondary Question 2.1: Factors that inspired the women to venture into entrepreneurship

The participants made some interesting revelations on factors that influenced their decision to endeavour into entrepreneurship.

Table 17: Understanding the factors that inspired women entrepreneurs to venture into entrepreneurship

Rank	Constructs	Frequency
1	Responsibility to society	10
2	Independence and autonomy	9
3	Accomplishment of personal goals	7
4	Opportunity linked to scarce skills	5
4	Dissatisfaction with corporate environment	5
5	Opportunity linked to transformation	3
5	Unconventional thinker	3
5	Legacy	3
6	Financial Success	1

Most of the participants took their time to reflect on the question posed whilst also reflecting on the context of the study and the question. Many participants were excited about this question as it brought back memories of an interesting time in their lives where they started the journey of entrepreneurship. Many of the participants gave two or more inspiring factors that convinced them to establish their own business.

Societal responsibility is identified as the most inspiring factor that led participants to venture into entrepreneurship. A number of participants debated between “responsibility to society” and “independence and autonomy” as one of the most prominent factors.

“I believe that we are in an industry that’s very male dominated in entrepreneurship and I believe that if we come out as Engineering women it’s your responsibility to open the door for other people so that other women who come behind you, other young girls are like, it’s possible, I don’t have to be employed all the time and it’s possible for me to become an entrepreneur”. Further emphasising that, “so it’s also to break a certain stigma, it’s your responsibility to raise the flag”.

A number of participants were adamant that independence and autonomy was quite an important driver for going into entrepreneurship. Below are comments from some of the participants:

“It was that and much more because I ultimately always wanted to be on my own, primarily because I knew at the back of my mind that any organisation that I would be a part of in South Africa or the world, would never allow me to pursue the vision that I would like to drive... So, I had a vision from a very young age that I wanted to direct others in terms of the Engineering fraternity”.

Further emphasising how being employed by a company would have limited her,

- *“Besides that, also pursuing opportunity when you are employed by someone else is really how much of the exploitation can you do? You do according to mandate, so I don’t have a mandate, I do everything. That gives me more leverage”*

“Accomplishment of personal goals” was the third highest ranked construct, with participants highlighting what that meant to them:

- *“and to say I’m counted amongst the women who took the risk, went out there and proved that it works because, as you said, in our industry it’s very difficult for women to be taken seriously”. Further highlighting, “So I think that was my biggest motivation, I wanted to be counted amongst the few women who have gone out there and have proven themselves in the industry, beyond being employed.”.*

Some participants identified “opportunity linked to scarce skills and dissatisfaction with corporate environment” as the fourth most common theme with a frequency count of 5. They shared the following:

“... I think the longest I stayed in a company was about three years, which was SRK, from 2013 to 2016”. Further adding that, “... I feel like there’s more that I should be doing, my involvement in everything should be more, I should be able to be making influential and life changing decisions for other people because what I realised when I left Eskom is that was a very good paying job, it was overly paid for someone coming out of varsity but there was no technical growth and they never had a plan for me, because I know that you’re supposed to structure you own plan but you’re also supposed to have guidance”.

Secondary Question 2.2: Understanding the major opportunities identified and exploited that led into entrepreneurship.

Table 18: **Major opportunities identified and exploited that led entrepreneurship**

Rank	Constructs	Frequency
1	Scarce Skills and Experience	8
2	Black Economic Empowerment Regulations	4
2	Market Growth Potential	4
4	Networks in the Industry	2

Most participants expressed the fact that the main opportunity was related to “scarce skills and experience”. They stated that:

“Not really major opportunities but accessing opportunity. There was never the one big thing. For example, when you’re a dual special practitioner you are so diverse in skills, you are on road, off road”. Further providing a profile about her background, unpacking that, “I’m a data specialist, I’m a project manager, I’m a land surveyor, I’m a systems engineer because I formulate strategies for clients who want to understand the big picture”.

- Another participant further reiterated that, *“like I said, geotechnical Engineering is quite a scarce skill”*.

The second highest-ranked opportunity by frequency count related to “Black Economic Empowerment Regulations”. One of the participants explained how her company was approached for access to BEE rating, however the potential ended up requiring her company without the joint venture explaining that:

“so we heard that there’s a mine where they had stopped them from exporting a product because they did not have a good BEE rating, so then we knew, okay, so if we go there, and we have the experience and we have the required rating, so we went there but someone put us in as the joint venture and then, they rejected the venture and they came back to us and said they wanted our company alone”.

This notion was further emphasised by another participant who expressed that:

- *“This was the thought of, you know, we’re black women and we’re technically sound, we’re good at what we do, so it shouldn’t be that difficult to get work”*.

Another significant construct mentioned was related to the “high demand in the market for the offerings”, with one of the participants articulating how the idea of her business came to her mind, detailing that:

“Yes, because I saw this industry is very big, the market is huge. My interest from this was when I was sitting at Optimum Coal, I used to sit on that board, and when we visit the plants, we’ll see how long the conveyer belt is, and then I said, goodness, all mining houses, manufacturing, they use a conveyor belt and then when we sit down with the CEO, he would be watching his laptop, on a daily basis so many rollers break, so they change them every day”. Further expressing, *“So I said, no, this is a big market. He says, yes, of course. That’s when the idea came”*.

Secondary Question 2.3: Exploring the biggest opportunities faced by women entrepreneurs

Table 19: The biggest opportunities faced by women entrepreneurs

Rank	Constructs	Frequency
1	Collaboration with other companies in the industry	2
1	Adapting to industry trends	2
2	Increased demand for services due to lower prices	1
2	Increasing global footprint	1
2	Increasing continental footprint	1

Participants pointed out that “collaboration with other companies in the industry” led to big opportunities and therefore contributed to their success. One of the participants highlighted that,

- *“So we have collaboration of smaller companies. I feel sometimes that as Black businesses, it’s that whole one man show thing and not wanting to work or share the pie, and I feel like the pie is for everyone, it is big enough for everyone”.*

While another supported this view by stating that

- *“The opportunities are, I always look for partnerships, either you’re my competitors, small or big, because I realised that you cannot be able to offer everything”.*

“Adapting to industry trends” also ranked high as an opportunity for women entrepreneurs with one participant pointing out that,

- *“The opportunity for our company, we’ve got the skills to become continental, and the way our people think and all of us think, we’ve got the skills and I think the ability to ... opportunity is, how can I put it, we’ve got people ...we’ve got a next generation, like Generation Y type of approach to a lot of things and thinking”.*

Secondary Question 2.4: Understanding the greatest successes of women entrepreneurs

The successes highlighted by the participants were significantly different, however there were some common themes that emerged and these are presented below.

Table 20: **The greatest successes for women entrepreneurs**

Rank	Constructs	Frequency
1	Gaining access to work/project opportunities	3
1	Gaining access to enterprise development programmes	3
2	Gaining access to solid partnerships	2
3	No successes yet	1
3	Obtaining recognition as one of top 10 suppliers	1
3	Personal growth, development and the development of others	1
3	Accessing financial support	1
3	Achieving financial growth	1

Most participants had a success story to share except for one who pointed out that they had had no successes yet in their business venture. What was interesting to note is that while this participant had not had any successes yet, she remained optimistic about the future of her business.

Most participants highlighted “gaining access to work opportunities” as being their biggest success, with one participant sharing her experience about the first project undertaken by her firm after a long wait. She shared:

“I think our first project was our great success because we had ... no project for a year, and when it finally came through after a long wait, a long period of going back to the client and saying, so when are you making a decision, blah-blah-blah and he finally made a decision on this project. I think it was a highlight for us at the time, even though the value was not as big, but it was not about the value, it was about the fact that someone can take us seriously, oh wow, we actually do have a service to sell”.

“Gaining access to Enterprise Development Programmes” had the same ranking as the “access to work opportunities success”. While the two are similar in nature, it was important to separate them in analysing the results of the study. Participants relayed their stories as follows:

- *“I would say, having to be selected on the top ten of [the organisation] bottling suppliers out of 7,000 companies, I came out of top ten and I am currently in their incubation programme. We were battling but now it’s getting there, we’ve now been given the first nice order in Africa”.*

“I think when we went into that partnership, it also gave us a sense of assurance and confidence that, you know what, there’s hope out there, maybe we’ve been tapping in the wrong hole, knocking on the wrong doors, but once you meet the right partner, they will definitely do their best to support you and I think that’s what they’ve done, they’ve supported us when we’ve gone to them and said, look, we have a QF that we need to pay, we don’t have money, please pay them, they pay them”.

“well, the greatest successes really, I think for me the merger with [the organisation] is the greatest success because then I was able to move from a company that was employing about thirty-five people, turning over, over 25 million to a company that employs 300 people and turns over, over 300 million. So as much as I was not the only sole shareholder as per my previous company, I was part of a bigger organisation and we could compete with the big companies, international companies, because we’ve got capacity. So that, for me, was a success”.

Secondary Question 2.5: Assessing if education and experience within the industry was enough foundation for women entrepreneurs to start off their firms

Table 21: **The value of education and experience in starting up a firm**

Rank	Constructs	Frequency
1	Yes - Educational background is required but other skills need to be acquired	3
2	Yes - My accounting background was enough to give me good financial discipline	1
2	Yes	1
2	Yes - Waited to gain experience before starting a business	1
2	Yes - Education and experience gives you the confidence required	1
2	Yes - Education enables one to think and solve complex problems	1
2	Yes - My specific degree taught me how to run a business	1

The top ranking construct based on frequency count was the observation that “educational background was a good foundation” but it has other benefits over and above teaching one core business skills. Participants shared the following views:

- *“yes, I think definitely, it’s a good foundation, definitely”*. The participant further highlighted the additional benefits brought about by education saying *“so if you’ve got the education it means you are able to think and solve complex problems”*.
- *“yes because you need the educational background and the training but you can’t conquer it all. It gives you a base”*
- *“so it’s what gives me the confidence to walk in those big boardrooms to present my case and walk out feeling good because I feel, you know what, I gave you who I am, what I know, and that you can’t take away from me”*.

Further echoing similar views was another participant who spoke about the benefits of having to gain sufficient experience before running her business, she said

- *“the idea was we decided to actually start a company in 2004, that’s when we registered our company, but then we felt like we are not ready in terms of the skills, so let’s work more years to actually gain the skills so that we can provide good service to the clients So we waited, how many years, four years to actually do the service or to actually start the business but the idea was born in 2004”*.

Secondary Question 2.6: Understanding the personal traits that has made the entrepreneurship transitioning process to be easier.

The interview question prompted the respondents to think deeply, consider and reflect on their most prominent traits that have made the transition into entrepreneur to be less challenging. The question was specifically phrased in a positive and open manner that allowed the participants to dig deep into their personality and character and attempt to accurately describe the personal traits that matter in the context of this question. Noticeably, most of the participants paused for a while before answering this question.

Table 22: The personal traits that has made the entrepreneur transitioning process easier

Rank	Constructs	Frequency
1	Highly Self-Motivated	9
2	Tenacity	8
3	Good Business Skills	5
4	Self-Confident	4
4	Self-Awareness	4
4	Eagerness to Learn	4
4	Strong Leadership Qualities	4
5	Risk Tolerance	3
5	Hard-Working	3
5	Focused	3

The participants had differing traits which was understandable. A significant emphasis was placed on “self-motivation”, with the participants relaying the following:

- *“I think because I’m one person who is prepared to take risks, that’s what drove me to start this. If you look at my accounting background, I’m sure I briefly touched on it, I finished my schooling at primary, I’m where I am through my own self development.”*

Another participant supported this further by referring to her father as a major influencer in her life that somehow influenced her to be self-motivated, exclaiming that,

- *“and I think it’s just a personality that I have, strong willed, I know what I want, I’m determined, committed, I’m a go getter by nature, and I think it was something that was embodied in me at a very young age because of my background and the relationship I have with my father, it was very strong”*

The concept of “tenacity” emerged as a significant personal trait that has contributed to the easy transitioning into entrepreneurship.

- *“So having that leadership and the tenacity, sometimes you need to be able to pester people. That’s what I’ve learned. Just being tenacious and following up with people. So that’s helped in the past year. That’s helped a lot”.*

“Entrepreneurship is not easy, it’s a lonely road. I think having a vision for oneself and being able to manage oneself and not necessarily be swayed by the environment or what happens around you”. In explaining her self-determination mentioning that, “When I go into a negotiation with a client, it’s more on the commercial side and because of all that experience that I had picked up, it makes it a lot easier. It’s not even about being a woman or not, more than anything. I think that also helped”.

Specific emphasis was placed on the importance of possessing “good business skills” with one of the participants declaring that,

“Yes, because of the passion that I had for data management and actually giving people information to be able to make decisions, that’s what I studied, I used the technology, geographical information systems, to actually come up with information that would help decision makers. So what I studied and my work experience actually played a big role in terms of me deciding which industry I want to do business in”.

- Another participant also made reference to her “professionalism” underlining that, *“I would say I’m a risk taker and I’m professional and a go getter and a perfectionist”.*

5.4. Results for Research Question 3

What are the challenges faced by women entrepreneurs who want to start their own Engineering firms?

The aim of the question was to determine if knowledge filters were thicker for women and therefore inhibiting their absorptive capacity in spilling over knowledge. Furthermore, the question sought to ascertain if there could possibly be other reasons for the low entrepreneurial activity amongst women in the Engineering sector.

Secondary Question 3.1: Understanding the biggest challenges faced by the women entrepreneurs and how they overcame those challenges.

Table 23: **Challenges faced by women entrepreneurs**

Rank	Constructs	Frequency
1	Access to market due to networks	5
1	Lack of access to opportunities	5
3	Lack of sustainable cash flow	4
4	High capital investment required	3
4	Difficulties in penetrating the market	3

Many participants cited “access to market as a result of limited networks” as a significant challenge in growing their businesses. In expressing their views, participants highlighted that the industry in which they operate is somewhat monopolised, further explaining that it was difficult to obtain work opportunities if one had not broken into the networks of decision makers. They commented as follows:

- *“actually marketing the business, because I remember one time we were requested to submit a proposal and our proposal was the best out of all the people who had submitted. We were told, I'm not saying that because ... but when we were called in, the comment that we got was, we do not know you, so we cannot use your company because we don't know whether you do have the capacity to actually deliver on the project.”*
- *“I think we've learned that you need to be out there, you need to be known and seen, so marketing and networking”.*

Participants also explained that another challenge they faced is the lack of opportunities to offer their services to potential clients because of a lack of access, saying that:

- *“the biggest challenge was just getting an opportunity to quote, not even to supply, to quote. I was never given opportunity. I had to go via the head office, write a letter, have meetings, until it was sent on tender, but all of those years, it was something that was done by this particular supplier for years and years. I was already supplying [the organisation] but I wanted to grow, and the growth was through [the organisation], and the exposure, because [the organisation] is dealing with everyone”,*

- *“..getting work, it’s literally very difficult because you don’t get opportunities by tendering”.*

Another construct that ranked high as a challenge for women entrepreneurs was the “lack of sustainable cash flow” to run their businesses. One participant explained:

- *“I think just every day is a challenge. Just knowing that you’ve got people under your belt who you need to pay and you know you don’t have a client or a project is coming to an end, I think for me those are the major problems, whether ... I don’t know who says what, but I think sustainability in terms of cash flow”,*
- *“If I can try and put it altogether I would say it has been cash flow, yes, and also it has been penetrating our market because we did not have a track record to say this one has done fifty projects, I’ve got this amount of ...so we had to find avenues to penetrate so we can get the work”.*

On the subject of high capital investment required, participants expressed their frustration at the inability to take on assignments due to lack of financial resources.

- *‘We didn’t have money to start working and no-one wanted to give us bridging finance. That was the biggest challenge, that you’ve got work but you’re not able to implement the work because you don’t have money to start”,* said one participant.

Secondary Question 3.2: Exploring the biggest threats faced by women entrepreneurs

Table 24: **The biggest threats faced by women entrepreneurs**

Rank	Constructs	Frequency
1	Access to market and opportunities	3
1	The emergence of new or stronger competitors	3
2	Rapid business expansion beyond financial capability	2
2	Adapting to changing market environment	2
2	Changes in politics, policy and regulations	2

In answering this interview question, participants highlighted the two most challenging threats they faced as “access to market and opportunities” as well as “the emergence of newer or stronger competitors”.

Explaining the threats faced by her business the participants stated:

- *“Threat is lack of access to market, that’s a big, big threat”.*
- *“I think my biggest threat would be not being adaptable to the changing environment and economy and finding opportunities”.*
- *“I think the biggest threat is one that our government is basically slowing down the rate of infrastructure development through political instability, so that then affects the amount of investment that comes into the country. So that will reduce the number of opportunities and therefore reduce the number of projects we could get”.*

The second threat that had the same ranking as lack of access was the emergence of newer and stronger competitors, to which participants explained that while they were confident in their capabilities, the emergence of newer or stronger competitors stifled their growth as small businesses. In expressing their views, one participant said:

- *“I would go to a client with this confidence, that I will offer you service, I will compete with [bigger organisation], but I can't do that anymore.*
- *“potential threat, I would say competitors. Now we’re finding more companies coming up and we find that we do the same kind of work and part of that”.*
- *“the costing is an issue because now all of us are coming up as small businesses; you've got the bigger guys, so they lower their cost so that they get the work. We cannot lower our costs to the level that they have”.*

Other threats that were highlighted by participants were rapid business expansion beyond financial capability, adapting to changing market environment and changes in politics, policy and regulations. Here are some of their views,

- *“our biggest threat is the fact that if we expand too quickly beyond our financial capability. You expand not knowing whether your client will fulfil their payment terms and commitments, you just go by faith, and we’re like, oh no, they'll pay.*
- *“The other threat is that the world is changing and if we continue doing business the way we've been doing it for the past thirty years, we are going to miss out on the biggest opportunity”.*

5.5. Results for Research Question 4

Are there sufficient support structures for women entrepreneurs entering the market within the Engineering sector to ensure success thereof?

The question determined if the structures and systems offered by government are sufficient to ensure ultimate start-up success, particularly for women within a male dominated industry, and if the private sector is playing any role in terms of supporting women entrepreneurs.

Secondary Question 4.1: Exploring the different funding options used by women entrepreneurs to start up their firms

Table 25: The different funding options explored by women entrepreneurs

Rank	Constructs	Frequency
1	Personal Funding	5
2	No Funding required	2
3	Family Support	1
3	Obtained Funding from Enterprise Development Programme	1

Most participants indicated that they used personal funding approaches to fund their businesses. Two of the participants explained that they used funds from their pension funds as start-up capital for their businesses. One participant said,

“I used my pension money and it was about R70,000, so it managed to push me through the first two years, then after that I started getting returns, I was getting a salary, even though it was R2,000, it was a lot, from zero to R2,000. So over the years, now the company has grown, I'm now sitting, my financials are due now, but I'm thinking that I'm now sitting on about 10 million” and another echoing the same views added *“I used my own pension money. So no funding from any banks. Banks are useless when it comes to business, useless.*

Other participants explained how they had used their personal reserves to fund their businesses with one of the participants voicing her frustration with the lack of support from development finance institutions. One participant further expressed her frustration with banks by saying,

- *“They just want you to be a consumer, then they will say, we’ll fund you a car. But say I want to start a business, they’re not interested”.*

The second highest ranking construct was “no funding required”. The case of these participants was slightly different in that they had consulting businesses which did not necessarily require funding because it was based purely on intellectual property. One of the participants relayed that,

- *“The thing with consulting is that a lot of it is intellectual property, I don’t need start-up capital to start going and working in certain places, so we literally had a business plan but we didn’t need the funding”.*

Family Support and funding obtained from Enterprise Development Programme also emerged as funding options that were explored by women entrepreneurs. The only participant who had managed to get start-up funding from an enterprise development partner from the onset explained how her firm got funding by saying:

- *“we got a monthly grant from our ED partner, so what they offered us in the first year, they said, look, we’re going to take you on but we know you’ve got this great background and all, but for us to satisfy ourselves that when we send you out and give you projects you can deliver”.*

Secondary Question 4.2: Understanding whether or not additional support, excluding financial, was accessible to the women entrepreneur

The interview question delved deeper into understanding what type of support was required by women entrepreneurs and whether or not that support was accessible to women entrepreneurs. All but one participant indicated that they required additional support.

Table 26: Additional support required by women entrepreneurs

Rank	Constructs	Frequency
1	Yes - Mentorship	5
2	Yes - Enterprise development support	3
3	Yes - Operational business support	2
3	Yes - Access to industry experts	2
4	Yes - Financial Management training	1
4	Yes - Support of family and friends	1
4	No additional support required	1

In analysing the top three constructs, most participants indicated that they required mentorship in order to grow and succeed in their businesses. One participant opened up and explained that:

“I was lucky in the sense that there is this man I met a couple of years ago, [the mentor] and he has a small civil geotechnical consulting company and without his knowledge or consent, I just made him my mentor, whether he liked it or not. The support that I got from [the mentor], someone to sit you down and okay, this is how you should have a project list and this is how you should structure your proposals and administrative wise, try to get things in order, it’s the simple things, like when we got a VAT number, [the mentor] was like, as soon as you get paid, you take that VAT and put it aside because it’s not your money, do not use it, things like that”.

The second highest ranking construct was the need for Enterprise Development support that was required by women entrepreneurs. Participants expressed that they had required enterprise development support and were fortunate enough to get access to such programmes. In articulating the benefits, they received from this support, participants shared that,

- *“I would say that their programme, even though we had the background, was still helpful in the sense that their industry was different, was unique”.*
- *“there were a lot of things that we were not aware of and a lot of legislation that we were not aware of because they’re saying to you now, we just focus on building and goals, and actually they introduced an element where it broadened our scope, if I can put it that way”.*

Participants also highlighted the importance of gaining access to operational business support and access to industry experts as being of key significance. On the need for operational business support one participants stated,

“they also had the training on how to do your finances and all that, but one thing that they had which was different from [the organisation] was they provided us with office space that had everything that you need”, further highlighting “they would interview and find out what out what are your business needs and then they would provide support based on your business needs. So the tools to actually do ... the software that we used to actually provide the service to our clients, they supported us on that”.

- The benefit obtained from industry experts was highlighted by one participant who said “*well, now and again I had people who I could call and find advice in terms of anything, depending on what the challenge was that I encountered*”

Additional Question 1: Exploring the reasons why there is low participation of women in the industry

Although the following two questions didn't form part of the Research Questions, the researcher was interested in the participants' insights as part of the additional comments sections.

Table 27: **Reasons for low participation of women in the industry**

Rank	Constructs	Frequency
1	Gender and societal stereotypes	4
2	Lack of knowledge and exposure to profession	3
2	Perception that it is a tough environment	3
3	Irregularities and corrupt practices in the industry	2
3	Male dominated environment	2
3	Fear of financial insecurity	2
4	Lack of confidence	1

Evidently, participants believed there were several reasons why there is low participation of women in the industry with the majority of them highlighting gender and stereotypes as being the highest-ranking reason as one participant explained:

“Stereotype. Anything coming from a black woman is always questionable, perception is of inferior quality”. Another participant expressed a similar viewpoint explaining that “I think, one, maybe it comes from every stage that maths is not for women, it’s for men, because in Engineering it’s all about maths. Also, Engineering was not seen as an attractive field because it’s not glamorous. Also, it’s hard work from day one, from varsity. And also it’s a bit intimidating today; I’ll be surrounded by all these old white men telling me what to do and being treated badly”.

Lack of knowledge also emerged as a dominant theme in the analysis with one participant sharing that she nearly did not get into the field because her father did not understand what the career was about and whether or not it was suited to women. As she put it,

- *“luckily one of my uncles has a chrome mine so he knew geology and stuff like that, so he was like no, let the girl do what she wants to do, she will be fine. My dad, I remember when I went to Malawi, he was so panicked, he was, oh my daughter is going to die, what is she going to Malawi for, what does she think”.*

Another participant supported this view by saying:

- *“I think women have fear of getting involved in industries that are male dominated because you always have to do more than your counterparts”.* This view also supports the reason identified by participants that there is a perception that the Engineering field is a tough industry to operate in for women.

Additional Question 2: Unpacking the advice that would be offered to a woman wanting to start a venture in a similar industry

Table 28: Participants advise to women aspiring to venture into entrepreneurship in the Engineering sector

Rank	Constructs	Frequency
1	Be resilient and assertive	3
1	Let passion be your driver	3
1	Take the risk and stay focused	3
2	Be open to collaboration with other industry experts	2
3	Be open to mentorship	1
3	No advice	1
3	Acquire enough industry knowledge / expertise to operate with confidence	1
3	Understand industry regulation	1

Mixed views were expressed by the participants in relation to the advice they would offer to upcoming business owners with resilience and assertiveness; passion, and taking risks appearing as the highest-ranking pieces of advice. Participants advised:

- *“I would give her advice to be brave, to be assertive, to be loyal, to be professional, and stand their ground”,* while another participant said *“You must be willing to fight for your voice to be heard because people will just ignore you and run over you if you don’t stand up for yourself”.*

- *“they must not come into the industry for the money”,*
- *“Advice I would give that, one, be passionate about it, without passion you can't make it”.*
- *“It's not easy every day but you just pick yourself up and you go and you say, you know what, it's one of those...you move on”.*

5.6. Conclusion to Analysis of Results

The results from the interview questions were presented in this chapter. Through content analysis, common themes that emerged were grouped to develop a ranking order of importance for each of the questions. The constructs that emerged from the interviewing process and through analysis of data were tested against existing literature on the topic of opportunity exploitation amongst women entrepreneurs within the Engineering sector.

CHAPTER 6: DISCUSSION OF RESEARCH RESULTS

6.1. Introduction

The insights from the research findings are discussed in detail in this chapter. The context of the study in relation to the research questions and the theory presented in Chapter Two are further discussed. The constructs are juxtaposed and contrasted to the literature in light of answering the research questions in order to contribute to an improved understanding of opportunity exploitation amongst women entrepreneurs in the Engineering sector and offer new insights that are currently unexplored in the reviewed literature.

6.2. Discussion of Results for Research Question 1

Do women entrepreneurs within the Engineering sector spillover knowledge from their incumbent firms when starting new firms?

Secondary Question 1.1: Determining whether the background of the entrepreneurs influenced their choice of industry and the business offerings.

The data from the interviews substantiated the notion that the entrepreneur's background and experience play a critical role in their ability to identify and exploit entrepreneurial opportunities (Arentz et al., 2013; Audretsch & Link, 2012). Eight out of nine participants agreed that their background influenced their choice of industry and business offerings. The only participant whose background and experience didn't influence her choice of industry was due to her drive to make a difference in the economy through skills development of young South Africans. She did this by leveraging industrialization which was policy focus at time of venture. It again attests to the discovery theory of opportunities, which states that opportunities often arise from exogenous shocks (i.e. changes in technology, government policy, demographics, etc.) to a market (Alvarez & Barney, 2014).

Secondary Question 1.2: Assessing the factors from the previous jobs of participants that prompted them to switch to entrepreneurship.

The findings confirmed the literature in that many of the participants with a frequency count of seven mentioned that realisation of capabilities and expertise was their motivation for venturing

into entrepreneurship. KSTE is concerned with the contextual variables of how (knowledge spillovers) and why (commercialise unexploited ideas for economic gains) entrepreneurship matter in economic growth (Ghio et al., 2015). The 'how' is definitely proven as the entrepreneurs used their prior knowledge and experience i.e. 'capabilities and expertise' and spilled over to new firms, the 'why' part is yet to be answered. It is however befitting since the study is exploratory and seeks to explore the reasons that prompted the entrepreneurs to venture into entrepreneurship.

Findings were analysed with basis of the KSTE in mind to determine if there were opportunities identified within their incumbent organisation and explored through creating new firms. It however did not come out directly through the themes although the capabilities and expertise were linked to their prior knowledge and experience. The participants related that their capabilities and expertise were underutilised and therefore explored the opportunities of realising their full potential through starting their own firms. Another participant related that she identified the gap in the market in terms of their skills and expertise and explored that through their new firm.

The second construct was that of gender and race based prejudice with just one less frequency count compared to the strongest construct. This then, it can be assumed, made working conditions unfavourable for the women, which motivated them to embark on the entrepreneurship journey. Research indicates that the working environment is not favourable for women within the Engineering sector as a result many choose to leave their careers (Hunt, 2016). Opportunity theory (Kirzner, 1973) however argues that numerous opportunities can be exploited by women entrepreneurially within the particular unfavourable environment (Drucker, 1985). According to Kirzner (1973), entrepreneurial discovery is the result of both a pull factor; which could be in economic value or self-actualisation and a push factor; which could be the unfavourable working conditions leading to entrepreneurial alertness, which may direct the entrepreneur's gaze to a certain field (Arentz et al., 2013). Prejudice against women in the sector is certainly rife with statistics showing that 70% of women who graduated leave their Engineering careers after the first few years. The historic literature on women leaving science and Engineering has accentuated the challenges of work-life balance in the sector. This is evident in one of the participant's response to the discrimination she experienced when maternity leave had to be taken due to pregnancy. Even more so the isolation of being a minority in the workplace, related lack of mentoring and networks; the risk-taking environment; the hostile macho culture that is engrained in discrimination (Hunt, 2016).

The third and fourth construct shared an equal amount of frequency counts. Misalignment between personal preferences and corporate requirements; and routine work were the constructs respectively. The third construct again relates to the indirect prejudice around gender. Due to the masculine nature related to the Engineering industry, most women felt that their jobs were not catering for their personal lives. One participant relayed how women had to experience miscarriages in one of the companies she worked for in the rail industry due to lack of adaptation of tasks to suit the women's health state. Another woman said it was due to the requirements of her job that entailed a lot of driving. The misalignment goes back to the hostile macho-culture in the industry that makes balancing work and family life difficult. Routine work was too a strong construct that emerged. Routine work, it may be argued, embodies lack of creativity and the ability for an individual to wholly apply themselves and their skills. Recent research suggests that it is both human capital and creativity embodied in educated or skilled individuals as well as a conducive environment that triggers entrepreneurial opportunities and economic growth (Audretsch & Belitski, 2013). The other six constructs (namely; poor working conditions, lack of growth, insufficient leadership, lack of transformation, lack of appreciation, desire to contribute to community) that emerged can be grouped into unfavourable working conditions, lack of growth and empowerment, and desire to contribute to the growth of the economy.

Secondary Question 1.3: Understanding the similar offerings in current business to incumbent organization

Majority of the participants were offering the exact similar business offerings as their incumbent organisation. Presentation of the results shows that even for those that do not offer the exact same offerings, admit to offering similar technical expertise or similar offering with increased scope. Previously acquired knowledge was spilled over through creation of new firms, which is particularly prevalent within knowledge rich contexts where entrepreneurial opportunities can be generated from the ideas created within their incumbent organizations (Acs & Sanders, 2012). Looking at the KSTE as presented in Chapter Two, it states that "the context in which decision making is derived can influence one's determination to become an entrepreneur" (Acs & Sanders, 2013). The context has partly been covered in the previous two secondary questions; where an understanding behind venturing into entrepreneurship was determined in relation to spilling over of knowledge and identifying motivation from previous roles that prompted the entrepreneurship venture. The findings were however short in the critical part of KSTE as it focuses on new ideas or knowledge created. To discover more on this part of the theory, a question was asked in relation to the process of spilling over knowledge in terms of innovation.

Secondary Question 1.4: Assessing the extent to which innovation in current business is based on ideas/knowledge from tenure in former employer.

Evidently, the majority of participants agreed they had implemented innovative solutions in their current business in implementing the ideas and/or knowledge gained from their incumbent organisation. Findings showcased the most significant construct with frequency count of six as innovative solutions, followed by product and service enhancements. One of the participants emphasised just how crucial innovation is in terms of entrepreneurial opportunity and further emphasised how it continues even post commercialisation of idea in terms of systems, administration and continuously improving products and processes. According to KSTE the entrepreneur's role is that of a conduit for the spillover of knowledge through commercialising the incumbent firm's ideas innovatively by independently creating new firms (Acs & Sanders, 2012), and in so doing enhances economic performance.

The incumbent organisations play the role of knowledge incubators who have, through the firm's own resources and labour, developed new knowledge and opted not to commercialize it due to whatever reasons that made business sense to the organisations. The non-commercialisation of ideas from incumbent organisations did not come out so clearly in the findings. Product and service enhancements were the differentiating factor innovated by the entrepreneurs with their new firms based on prior knowledge and experience of the products and services from their incumbent organisation. These even resulted in new patents being developed for one of the participants. Entrepreneurial absorptive capacity is fundamental for an entrepreneur in exploiting the knowledge; by being innovative, open and alert to the environment (Qian & Acs, 2013). The evidence from the participants in merely creating their women firms attests to a high absorptive capacity and based on the data collected innovation had to be applied at more than just the scientific/technical requirements but also on the business skills (Ghio et al., 2015). This is evident in the response of one of the participants who highlights that innovation was linked to the talent attracted to their business.

Secondary Question 1.5: Determining the cost of developing the idea and the ROI of the adopted idea.

KSTE sees the entrepreneur as an economic agent who spills over knowledge converts it into economic knowledge by commercializing it through founding a new firm without bearing the full costs of the newly developed knowledge (Acs et al., 2012). As highlighted in and Chapter Two, the focus of the study is on tacit knowledge i.e. human capital; it, however, was interesting to

discover that there were indeed minimal costs for the creation of their new firms notwithstanding their satisfying returns on the minimal input costs. Knowledge is not exclusive and cannot be exhausted thus the positive ability to spillover (Romer, 1982), hence the easiness for entrepreneurs to spillover knowledge from their incumbent organisations at very little cost to adopt it into a new firm. Through knowledge spillovers, individuals and organizations other than the knowledge originator peruse the knowledge to their advantage whilst providing minimum to no compensation for it (Shu et al., 2014). What was even more interesting was the fact that the one participant who spent the most significant amount was the one who did not spillover knowledge as she was from an accounting background.

Conclusion to Results for Research Question 1

Data collected affirmed that academic background and past industry experience (Audretsch & Link, 2012) plays a significant role in the creation as well as the performance of new ventures (Ghio et al., 2015). Having prior knowledge of the subject improves alertness to opportunities due to the familiarity and interest which subsequently leads the prospective entrepreneur into a certain directive of field (Arentz et al., 2013). It was also found that there was very little cost to spillover the idea by adopting it into the new firm. Although innovation was highlighted as the enhancer for entrepreneurial opportunities, there was no evidence found that the adoption of the idea into the new firm was as a result of completely new knowledge developed but chosen not to be exploited by the incumbent firm.

Evidence collected from the women entrepreneurs affirms that knowledge was spilled over from their incumbent organisations. There was however no evidence that a totally new idea from the incumbent organisation was commercialised through starting of the new firm. The knowledge spillover was primarily through human capital and innovation of services and products offered.

6.3. Discussion Results for Research Question 2

What were the opportunities that informed the woman entrepreneur's decision to start a firm within the Engineering sector?

The findings were discussed linking back to literature relating discovery opportunity theory to prior knowledge within the context of spilling over the knowledge by venturing into entrepreneurship.

An additional element of interest on opportunity exploitation was the current policy drive to increase entrepreneurial activity amongst women.

Secondary Question 2.1: Factors that inspired the women to venture into entrepreneurship.

Findings evidently illustrate that the constructs identified by the participants where “responsibility to society” was the construct with the highest frequency count. The participants all mentioned the responsibilities to the youth as well as the state of the country’s economy as a motivation factor. Two participants highlighted that venturing into entrepreneurship in the Engineering sector amidst its male dominance was to inspire future female generations to aspire for greatness. “Independence and autonomy” which is closely related to “accomplishment of personal goals” is the construct with the second highest frequency count. “Opportunity linked to skill” is surprisingly only fourth on the rankings followed by “dissatisfaction with corporate environment”. Opportunity linked to transformation is surprisingly also on the lower end of the ranks, however consistently ranked similar for major opportunities identified and exploited. The constructs with the highest frequency counts are all endogenous whilst the ones that were lower on the ranks are more exogenous factors. The findings affirm that the insights necessary for economic growth according to the endogenous growth theory are human capital (scarce skill), innovation (linked to independence and autonomy) and knowledge (Marvel, 2013) for entrepreneurship.

Discovery theory puts forward that the chain of entrepreneurship originates with the opportunity; then through entrepreneurial action proceeds to discovery and exploitation of opportunities and closes with a favourable outcome of an exploited opportunity (Martin & Wilson, 2016). The opportunity for these entrepreneurs was the ailing economy and high youth unemployment rate. The discovery and exploitation of the opportunity was through utilising the participants’ scarce skills and expertise, which was the construct with the most frequency counts. The opportunities associated with knowledge based entrepreneurship are noticeably scalable and build on unique insights of entrepreneurs i.e. alertness and experience in certain industry or market; that can be sources of significant economic profit (Eckhardt, 2015).

Secondary Question 2.2: Understanding the major opportunities identified and exploited that led into entrepreneurship.

Opportunities required to drive economic growth were mentioned to be discovery and creation driven opportunities (Alvarez & Barney, 2014) as discussed in Chapter Two. Discovery opportunities “exist independent of entrepreneur but can only be discovered by a few whilst creation opportunities do not exist until the entrepreneur enacts the opportunity” (Alvarez &

Barney, 2014). Most participants expressed the fact that the main opportunity was related to scarce skills and experience i.e. human capital. Human capital is an enabler in the discovery of opportunities according to Audretsch and Link (2012). Kirzner (1973) stated that there is a relationship between prior knowledge and the economic opportunities to be entrepreneurially discovered (Arentz et al., 2013). Having prior knowledge of the subject improves alertness to opportunities (Arentz et al., 2013), which is attested to by the data collected. Arentz et al. (2012) posits that the background of an entrepreneur in terms of experience and prior knowledge plays a critical role in his ability to identify and exploit entrepreneurial opportunities.

“Black economic empowerment regulation” and “market growth potential” were the constructs with the second highest frequency counts. Both factors are exogenous, aligning with the discovery theory which states that opportunities are established by exogenous shocks to an industry or market (Martin & Wilson, 2016); and therefore insinuates that entrepreneurial opportunity originates independent of the entrepreneur. This notion can certainly not be ignored as evidence indicates it as the second exploited opportunity by the participants. Endogenous growth theory however contradicts the discovery opportunities statement in that it argues that endogenous and not exogenous factors result in economic growth. The argument has too been proven by the fact that the participants presented their expertise (human capital, knowledge and innovation) as the major opportunity exploited and not the policy or market growth potential. The endogenous and not the exogenous factors seem to bear more weight on opportunity exploitation by women entrepreneurs in Engineering, aligning with KSTE.

Secondary Question 2.3: Exploring the biggest opportunities faced by women entrepreneurs.

“Collaboration with other companies” and “adapting to industry trends” were the most frequently occurring themes. The participants interrelated the market growth potential constructs from the previous question to the opportunity in collaborating with other companies. There was certainly confidence from the participants in viewing competition as an opportunity for collaboration, as the market is big enough for everyone to participate, as alleged by one participant. Shane (2000) attests to the notion that chances of successful entrepreneurial opportunity recognition increases through prior knowledge of; markets or industry, customer needs and challenges, as well as experience in serving those markets. Prior knowledge is again heterogeneous across individuals (Arentz et al., 2013) and therefore can yield greater results if different individuals collaborate; particularly if business has to scale up and make real significant difference to the country’s economic growth.

Secondary question 2.4: Understanding the greatest successes of women entrepreneurs.

Although the successes highlighted by the participants were significantly different, “gaining access to market” and “enterprise development programmes” had the highest frequency counts. This was closely followed by “access to solid partnerships”. These constructs are all closely related and quite similar in how they offer access to market opportunities that would have proven to be challenging at the different stages of their businesses.

The resilience to succeed may be as a result of the locus of control theory. It presumes that people’s success or failure in entrepreneurial activities depends on personal abilities (internal locus of control) and degree of external support received from others (external locus of control) (Arentz et al., 2013). This clearly resonates with the participants’ experience as evidently seen from the data collected. The data indicates that high internal locus of control is essential in starting up a firm whilst external locus of control is necessary for market penetration.

There was an interesting contrast with the other constructs in that entrepreneurs either mentioned that there were no successes as yet or there has been great success like being recognised as one of the top 10 suppliers by a leading global company.

Secondary Question 2.5: Assessing if education and experience within the industry was enough foundation for women entrepreneurs to start off their firms.

The participants all shared the view that “education and industry experience was enough foundation” to start off their businesses and that it played a role towards providing a foundation for the effective running of a business. It was interesting to observe that even the participant with no Engineering background agreed with this view, although relating in terms of her accounting background. A third of the participants with an Engineering background, however, highlighted the importance of acquiring additional skills relating to business management.

Prior knowledge is referred to by Shepherd and DeTienne (2005) as “an individual’s distinctive knowledge about a particular subject matter and may be the result of different things such as work experience, education or unintentional experiential learning”. Opportunities can easily be recognised if some relevant prior knowledge is acquired (Arentz et al., 2013), which heightens alertness to ideas. The human capital i.e. prior knowledge is again applied for commercialisation of idea and ensuring success thereof. The strong theme from the participants was that the technical education needs to be supplemented by other skills to properly manage the business. Theory further substantiate that absorptive capacity in KSTE is not only based on the

scientific/technical skills but it is also reliant on the business management skills (Ghio et al., 2015) in order to minimize the knowledge filter that can inhibit commercialisation of ideas. The participants mentioned that they gained the additional skills from employment experience gained from working in the industry prior to running their own firms. One participant, however, mentioned that running your own business requires different skills to running a business as an employee and hence the placed value to enterprise development programmes and strategic partnerships.

Secondary Question 2.6: Understanding the personal traits that has made the entrepreneurship transitioning process to be easier.

The top ranked constructs indicate “self-motivation” and “tenacity” as the recommended traits. The findings resonate with the theory that high internal locus of control is substantial in becoming a successful entrepreneur. The participants mentioned how lonely the entrepreneurship journey gets and how one needs to keep themselves motivated at all times. Perseverance, determination and persistence were the themes grouped under tenacity which were evident of high internal locus of control. Individuals with a high locus of control believe that they can influence the course of events in life to their own advantage (Kuratko et al., 2015). What was profound was the sense of confidence in their abilities to succeed, even so for the participant who invested more than R5 million into the business and has yet to experience the returns. Needless to say, “self-confidence” and “self-awareness” featured in the top five rankings according to frequency count. Simpeh (2011) argues that “it is practically difficult to do a collection of inborn traits or qualities, but common traits observed in accomplished entrepreneurs include optimism, mental energy, opportunity driven, creativity and innovation, management skills and business know-how, emotionally resilient, hardworking, integrity, visionary leadership, commitment, perseverance, competitiveness, desire to excel/win, zeal for continuous improvement, transformational tendency, willingness to make a difference, lifelong learners, learner”. All the traits listed above were mentioned by the participants in some way or the other in the data collected. “Good business skills” ranked third amongst the construct. This linked well with the previous secondary question’s data and alluded to the fact that technical background is a great foundation to start a firm, but the success and growth thereof requires additional skills i.e. business skills.

Resource allocation was only discussed in view of KSTE which involves human capital in the form of prior knowledge. Traits considered to be the stems of internal locus of control were highly rated by the participants affirming the postulated statement by McClelland (1961).

Risk propensity was surprisingly ranked relatively low even though literature emphasises it as one of the major motivations for venturing into entrepreneurship. The literature asserts that entrepreneurs tend to have a high risk propensity as the nature of entrepreneurship is dynamic and uncertain (Bönte & Procher, 2016). Venturing into entrepreneurship in itself is a risk undertaken with the belief that the spilled over idea being commercialised will yield positive economic returns, not forgetting that the entrepreneur exits a certain secure environment in the incumbent organization and ventures into the unknown. It is therefore intriguing that the participants found this trait not as important, this will be interesting to research further.

Conclusion of Results for Research Question 2

The top factors that led the women into entrepreneurship were the “ailing economy” and “responsibility towards the youth”; followed by independence and autonomy then opportunity linked to scarce skills. The findings certainly affirm that the insights necessary for economic growth according to the endogenous growth theory are human capital (scarce skill), innovation (linked to independence and autonomy) and knowledge for entrepreneurship (Marvel, 2013).

On major opportunities that were exploited by the women entrepreneurs, it was found that “prior knowledge in terms of education and experience” was the opportunity with the most frequency counts. The prior knowledge was relayed in the form of scarce skills by the participants. The second most exploited opportunity was the “transformational policies to bridge the gender inequality gap through increasing entrepreneurial activity for women”. The second ranking was equally shared with “market growth possibilities”, the participants here explained how this afforded them the opportunity to exploit strategic partnerships often through enterprise development. The country’s economy was what led the participants to spillover knowledge, therefore creating entrepreneurial opportunity that resulted in entrepreneurial activity when they commercialised their human capital through creating new firms (Acs & Sanders, 2013).

The entrepreneurial opportunity that led to founding a new firm was established from the participants but the study needed to explore more on the opportunities they exploited to grow and scale up their firms. The greatest opportunities facing women entrepreneurs were found to be “collaboration with other companies” and “adapting to industry trends”. Collaboration with other companies correlated with the entrepreneurs’ greatest successes as it gained them access to market or opportunities that would have otherwise been out of reach. This came in the form of enterprise development and/or strategic partnerships.

Prior knowledge was identified by the participants as the seed to entrepreneurial opportunity, the study however still lagged in determining what makes the one woman entrepreneur exploit the opportunity whilst another with similar prior knowledge chooses not to. Self-motivation and tenacity were the personal traits that the participants highly ranked for the entrepreneurial journey. Traits that indicated a high internal locus of control were highly ranked by the entrepreneurs.

6.4. Discussion of Results for Research Question 3

What are the challenges faced by women entrepreneurs who want to start their own Engineering firms?

In as much as human capital encapsulated by the women entrepreneurs was found to have enabled their entrepreneurial journey in terms of spilling over acquired knowledge, the low entrepreneurial activity perhaps insinuates other challenges that thicken the knowledge filter. The research question undertakes to further understand these knowledge filters through phrasing the questions using the word challenges.

Secondary Question 3.1: Understanding the biggest challenges faced by the women entrepreneurs and how they overcame those challenges.

“Access to market due to networks” was one of the constructs as well as “lack of access to opportunities”. A study conducted on challenges leading to women in SET abandoning their careers in the industry highlighted “lack of mentoring and networks” as some of the challenges faced by women in the sector (Hunt, 2016). In expressing their views, participants highlighted that the industry in which they operate is somewhat monopolised or rather filled with male dominated oligopolies (market is shared by a small number of product/service providers). They further explained how that made it difficult to obtain work opportunities unless one breaks into the networks of decision makers.

Issues that most influence women’s participation in entrepreneurship and their outcomes in developing countries are social structural dimensions, cultures and values influenced by the unavailability of training in basic business skills and difficulties in access to networks and business support systems (Adom, 2015). In terms of access to opportunities, participants explained that the challenge they faced was with regards to getting opportunities to offer their services to potential clients solely due to lack of access to market as a result of the oligopolistic nature of the

industry. One of the participants highlighted how she struggled for a year to secure a project and when she finally did, struggled to acquire resources required to commence the project.

Endogenous growth theory where KSTE stems from focused on education and technology for economic growth stimulation, reducing the knowledge filters is however pertinent if it is to be optimized. One way of doing that is through better regulatory laws and inclusive policies (Acs & Sanders, 2013). The role of policy makers in entrepreneurship is then reflected through the value entrepreneurs place on enterprise development programs as well as strategic partnerships. Participants who have been involved in these programs are quite appreciative of the difference it has made in affording them opportunities they would otherwise have not been able to get. One of the businesses went from just 25 employees to over 300 due to the strategic partnership that rose from an enterprise development program.

“Lack of sustainable cash flow” closely follows in terms of highest frequency count. The participants listed that as one of their biggest challenge. One of the participants however was quick to highlight how having a big brother in terms of enterprise development has alleviated the constant pressure they carried in terms of operational expenses at the end of each month whilst awaiting receipt of payment of invoices. It is recognised that innovation through KSTE alone is insufficient specifically in developing economies and requires institutional support to account for the knowledge filter thickness. Interesting view to develop in your recommendations or future research.

Closely related to the top two constructs discussed above were “high capital investment required” as well as “difficulties in penetrating the market”. On the subject of high capital investment required, participants expressed their frustration at the inability to take on assignments due to lack of financial resources. One of the participants mentioned how difficult it is to acquire funding from government although the institutions continuously claim the availability of funding for women entrepreneurs. This obviously adds to the knowledge filters as it acts as a hurdle in commercialising the knowledge at the required time. Entrepreneurial absorptive capacity is fundamental for an entrepreneur in exploiting the knowledge; by being innovative, open and alert to the environment (Qian & Acs, 2013). It considers regulatory barriers to entrepreneurship, bureaucratic constraints, transactional costs, taxes, corruption, social acceptance, entrepreneurial opportunities and culture as some of the factors contributing to the thickness of an individual’s knowledge filter and hence the low entrepreneurial activity.

Enacting the concept of a knowledge filter within the KSTE is paramount to control the effect of institutional barriers to the decision to venture into entrepreneurship (Stenholm et al., 2010). The knowledge filters arguably equally face men and women, but statistics seem to indicate a deeper effect on women than on men when measuring it against entrepreneurial activity. An in depth study on the gender effect for knowledge filters in KSTE will shed more light but the individual's socio-economic, cultural and environmental conditions (Wennberg et al., 2013) influence certainly cannot be waived. Prevalent economic conditions and social cultures are forces driving entrepreneurship in the society because these forces configure or shape attitudes and beliefs of people, which in turn influence their entrepreneurial views, behaviour and perception (Kuratko et al., 2015). Based on the above theory and looking at the masculine nature of the Engineering sector, perhaps these influences thickens the knowledge filter for women in comparison to their male counterparts.

Secondary Question 3.2: Exploring the biggest threats faced by women entrepreneurs.

The previous interview findings identified knowledge filters that made spilling over of knowledge through creation of new firms a challenge for potential women entrepreneurs in the Engineering sector. The follow up question is similar yet tackles the challenges facing the entrepreneurs in scaling up and growing their firms.

“Access to market and opportunities” yet again topped the ranks as the construct with the highest frequency count, this time equally sharing ranking with “emergence of newer or stronger competitors” as the biggest threat. Access to market has greatly been discussed and the threat of monopolies and oligopolies controlling the market is yet highlighted by the participants. The concern is around the economies of scale that these companies can offer particularly when it comes to pricing, therefore rendering the smaller businesses uncompetitive when bidding for opportunities.

The lack of opportunities as a threat was combined with the ever dynamic environment as well as political instability experienced in recent years. One of the participants highlighted that the political instability is driving investments out of the country, slowing down infrastructure development and therefore opportunities for business. Conducive environmental factors that make business sustainability in the society include “political system, government legislation, customers, employees and competition” (Ladge, 2016). Upcoming competition is mentioned as a threat, with a concern on the lack of differentiation in terms of value proposition. One participant mentioned that the threat when it comes to competition is that they all offer very similar services. This

however can be seen as opportunity to adapt to the changing environment and therefore position the business for first mover advantages.

Rapid business expansion beyond financial capability was interestingly mentioned as a threat. This is again linked to funding requirements. Most of the participants initially mentioned that funding was not required when spilling over knowledge in creating their firms. It is however now seen as a potential threat for business expansion. The participant's concern is however not around the positives surrounding acquisition of more business, it is rather around the payment terms of big businesses that often disfavour growing business that are not yet financially liquid. The limitation to financial resources is historically researched as a contributing factor to the delayed development of women in enterprise (Chant et al., 2017).

Conclusion of Results for Research Question 3

The participants alluded to access to market due to limited networks as well as access to opportunities as the greatest challenges and threats facing women entrepreneurs. A big obstacle highlighted by participants in accessing the market is the limited competition created by oligopolies in the industry. The oligopolies achieve this through economies of scale, experience and closed network of industry influencers who are usually male. The third challenge had to do with finances where it involves cash flow for the daily operational costs especially when just starting up a project as well as capital investment requirements. Enterprise development was the big brother who assisted in one of the participant's case. One of the participants had to put up a significant shareholding percentage of her company as surety to get funding assistance from a stranger who was formally not even an investor. Innovation through KSTE is one great way to stimulate economic growth but it alone is insufficient in developing economies and requires institutional support. The knowledge filters mentioned above can all be suppressed by inclusive policies and monitored implementation of the regulations. Although the policies have been put in place and institutions set up to ensure implementation thereof, the participants were disheartened at the lack of support received from these institutions.

The other threat mentioned by the participants was the industry trends and rate of upcoming competition. A challenge with upcoming competition was the lack of differentiation leading to saturation in terms of services offerings, a sign of lack of innovation. Industry trends serve as an opportunity for the entrepreneurs to diversify and innovate an improved value proposition for their clients. Rapid business expansion posed a threat for the participants and it correlates to the

challenges with cash-flow earlier discussed as well as the importance of enterprise development and strategic partnerships as regulatory means to thin the knowledge filter.

6.5. Discussion Results for Research Question 4

Are there sufficient support structures for women entrepreneurs entering the market within the Engineering sector to ensure success thereof?

Government seems to be increasing effort in encouraging women participation in the country's economic development through small and medium enterprise development. Evidence from previous analysis on section 6.4 accentuated institutional barriers as the major contributor of knowledge filter.

Secondary Question 4.1: Exploring the different funding options used by women entrepreneurs to start up their firms.

The cost of developing the idea was established in section 6.2.5 from the participants which was found to be minimal. The various options that women entrepreneurs used to fund their businesses were highlighted in Section 5.5 and it is quite intriguing to observe that none of them used government funding. More than half of the participants used their own funds, one of the participants strongly voiced her opinion on how banks are just useless when it comes to funding businesses. The participant went further to say that the banks are not assisting the economy as they easily embrace consumption rather than investment funding. One participant emphasised the lack of support from development finance houses which contradicts the sentiments of Small Enterprise Development Agency (SEDA). SEDA explains that it thrives to narrow the high inequality and gender gap through policy changes, institutional support and availability of funds especially for the previously disadvantaged; with women and youth topping the list.

It all seems to be that the women's human capital capabilities and potential, continue to be crippled by gender stereotyping with regards to entrepreneurial participation in the sector. Formal sector entrepreneurial participation in its nature has the advantage of some form of confidence in accessing funding from formal credit institutions as well as access to foreign markets (Klapper & Parker, 2010). The limitation to financial resources slows down the participation of women in knowledge based industries essential for economic growth and the women participants gather a certain discrimination when it comes to seeking finance from traditional institutions (Chant et al., 2017).

Only one of the participants seem to have a positive story to tell regarding funding. The participant acquired funding from an enterprise development partnership she was involved in, the participant praised the partnership and went as far as mentioning how their success was important to their ED partner. This demonstrates the importance of external support such as enabling policies and conducive regulatory environment for small and medium business to thrive and make a positive impact to the economy.

Secondary Question 4.2 Understanding whether or not additional support, excluding financial, was accessible to the women entrepreneur.

Most participants indicated that they required some form of mentorship in order to grow and succeed in their businesses. Lack of mentoring is said to be one of the main reasons behind women exiting the science and Engineering sector within the first few years of their careers (Hunt, 2016). It was interesting that one of the participants who highly ranks mentorship mentioned that she still has not managed to obtain a mentor although there has been an older white male who has been coaching her where necessary. All participants who have undertaken an enterprise development partnership talked about the positive impact it made to their businesses in terms of allowing access to opportunities, operational business support and diversification of services that would have otherwise not been possible.

Although prior knowledge was imperative in establishing the firms, knowledge is however heterogeneous in individuals, and serving the market effectively often requires broader and deeper knowledge base. The participants also highlighted this when mentioning the support of having access to industry experts where their own knowledge fell short. Knowledge spillovers provide the ability to generate an entrepreneurial opportunity, it however does not necessarily indicate that the entrepreneur's venture will be successful (Ghio et al., 2015). There are still exogenous factors to take into consideration. These may include access to markets, acquiring the necessary resources and lack of support dues to perceptions, social and cultural challenges (Alvarez & Barney, 2014).

Conclusion of Results for Research Question 4

The majority of participants used their own funds to start up their businesses, with a number of them saying it was funds from their savings and pension funds post exiting their incumbent organisations as well as support from family. The despondency in the participants' responses when it came to support from the government and the finance institutions was however

pessimistic. The one consistent positive is the opportunities gained through enterprise development partnerships.

Mentorship was the support most valued by the participants in exception to funding. This is understandable taking into account the challenges highlighted with access to market. The mentorship also came in the form of enterprise development as gathered from the data. Enterprise development seems to be the bridge that interconnects access to market, funding, and mentorship support judging from the data collected.

Additional Comments on women's entrepreneurial activity

The four research question were used to gather data relating to opportunity exploitation with regards to knowledge spillover theory of entrepreneurship for women entrepreneurs. The questions were phrased to address the different aspects of the KSTE namely; prior knowledge, entrepreneurial opportunity, exploitation of opportunity, knowledge filters and cost of spilling.

The next section focuses on the women's role in the economy in terms of entrepreneurship. Research states that when economic activity of women increases, GDP growth rises dramatically in both developed and developing economies (Brush & Cooper, 2012). Section 5.2.4 already touched base in terms of the women entrepreneurs and their contribution to employment. Although most of the businesses are still relatively micro, there seem to be great inspirations and drive for growth. The small sizes of the businesses are duly as a result of minimising overhead costs and employing on project basis for the majority of the entrepreneurs.

Exploring the reasons why there is low participation of women in the industry

Participants highlighted gender and stereotypes as being the major reason for low participation of women in the industry, with one participant explaining how they believed black women were not taken seriously in the industry. One participant relayed her heart breaking story of how her products are discriminated purely on the basis of being manufactured by a woman.

The degree to which the social structural dimensions, cultures and values affect women entrepreneurs in developing economies is influenced by the social segregation and the lack of societal legitimation to act as an entrepreneur (Adom, 2015). One of the participants takes it back to school years where Maths is seen as a tough 'boy' subject, which then affects the choice of industry as Maths is a fundamental subject in the Engineering field. The chosen types of enterprises women end up owning (Mostafa et al., 2011) indeed seem to be the direct result of the socialization processes that legitimize, or discriminate certain types of enterprise for women.

Social cultures are forces driving entrepreneurship in the society because these forces configure or shape attitudes and beliefs of people (Kuratko et al., 2015). This is evidently seen when one of the participant's relays that she almost did not get into the field because her father did not understand what the career was about and whether or not it was suited to women. This view also supports the reason identified by participants that there is a perception that the Engineering field is a tough industry to operate in for women.

Unpacking the advice that would be offered to a woman wanting to start a venture in a similar industry

Mixed views were expressed by the participants in relation to the advice they would offer to upcoming business owners with "resilience and assertiveness"; "passion", and "taking risks" appearing as the highest ranking themes.

It is quite surprising to see risk appetite climbing up the ranks as a crucial trait required to succeed as an entrepreneur in this industry, which was not previously the case with the participants when asked about the personal traits they embodied for entrepreneurship in the sector. Risk has always been associated with entrepreneurship from the birth of entrepreneurship. What is consistent though is the high regard for traits attributed to high internal locus of control. Risk taking theory views entrepreneurship as a frame of mind that stimulates individuals to take calculated risk for which they stand to enjoy a stream of benefits or losses (Raimi et al., 2015). Studies, however, indicate that men have a higher risk appetite as compared to women (Adom, 2015), which could be attributed to the socio-cultural influences that have limited women's potential and ability (Hughes & Jennings, 2012). Strategic partnerships with an element of mentorship similarly also featured as a strong trait for success.

6.6. Conclusion

The research objectives have certainly been met in relation to the theory advanced for opportunity exploitation amongst women entrepreneurs. The insights derived from the findings indicated that the majority of the women entrepreneurs interviewed exploited the identified opportunities by spilling over knowledge from their incumbent firms to create their own firms. The study highlighted the importance of both endogenous and exogenous influence on determining the success of the women's entrepreneurial ventures.

7. CONCLUSION AND RECOMMENDATIONS

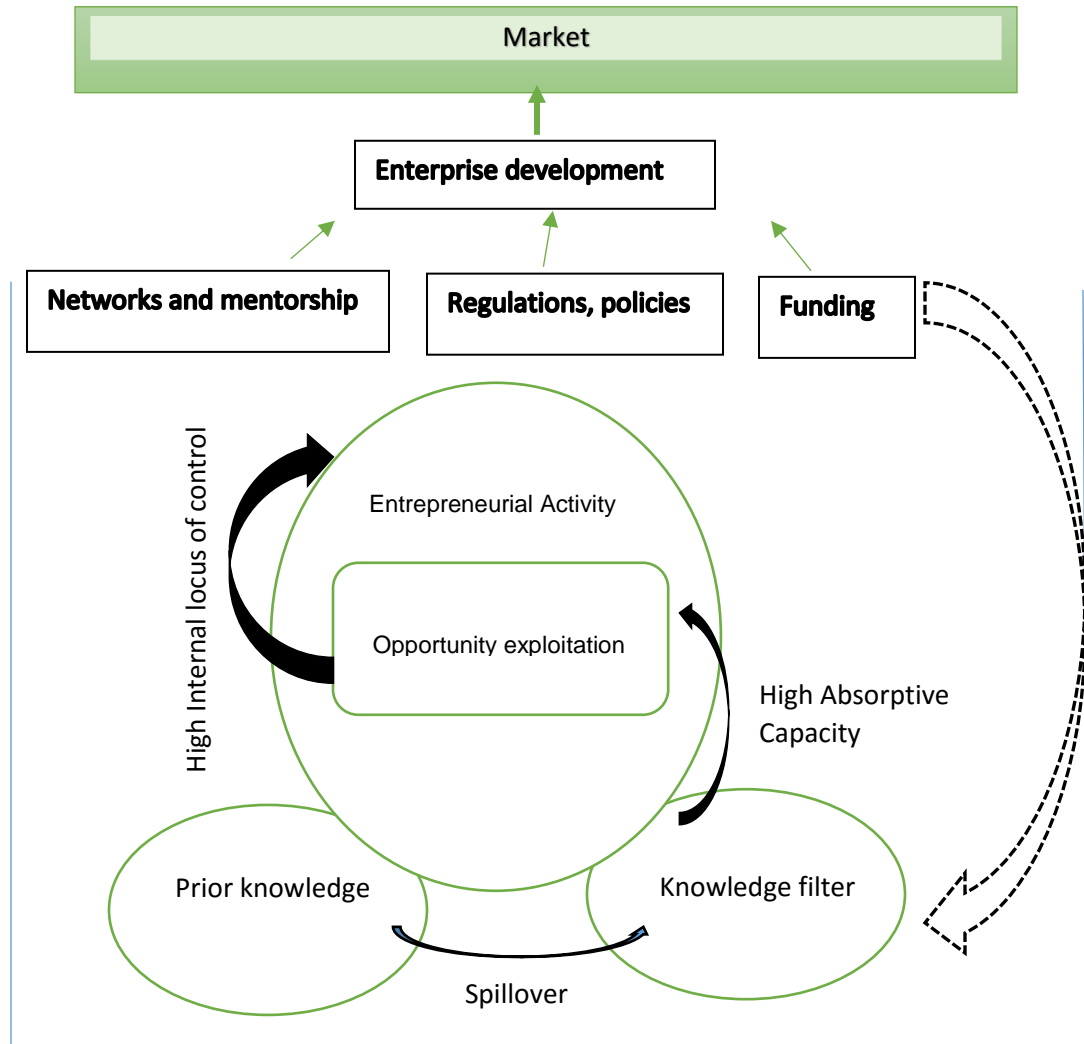
7.1. Introduction

Insights into opportunity exploitation amongst women entrepreneurs in the Engineering were gathered through data collection (Chapter Five) and analysis (Chapter Six). Based on the findings, analysis and literature; a framework was conceptualised. The framework comprehensively links literature discussed in Chapter Two with insights from the findings. Based on the findings and the developed framework, recommendations for women entrepreneurs and incumbent organisations in the Engineering sector are presented and future research delineated.

7.2. Opportunity exploitation framework: major findings

A conceptual framework is developed. The framework is illustrated by Figure **Error! Reference source not found.2** on the next page. It was informed by the insights based on findings, and aligned with theory as per literature review. Key findings attest that academic background and past industry experience play a significant role in the creation as well as the performance of new ventures as evidently indicated by the participants. Therefore, prior knowledge was found to be the seed of alertness required for identifying an entrepreneurial opportunity, which when spilled over directs the prospective entrepreneur's decision on choice of industry to venture the new firm. One of the fundamental principles of knowledge spillover theory of entrepreneurship is that the knowledge can be spilled over from the incumbent firms at very little cost to commercialise it when founding the new firm. This resonated with the study amongst the women entrepreneurs. Innovation essentially enabled the opportunity discovery for the new entrepreneurs. However, no evidence was found that suggested that the adoption of the knowledge into the new firm involved development of a single new idea from the incumbent firm; the spillover was primarily human capital based and through innovation of services and products offered. It can therefore be deduced that knowledge spillover primarily involves human capital, innovation and knowledge as per the endogenous growth model to achieve economic growth.

Figure 2: **Opportunity exploitation of women entrepreneurs' framework in Engineering sector**



Chapter One briefly discussed the role of government policy in driving entrepreneurship as an essential vehicle required for economic growth. The country's economy was found to be the element that led the entrepreneurs to spillover knowledge through alertness to entrepreneurial opportunity, which resulted in entrepreneurial activity. Whilst still on policies, the second most exploited opportunity was the transformational policies aimed at bridging the gender and income inequality gap through increasing entrepreneurial activity for women. Market growth potential was equally ranked as one of the top exploited opportunities as they enabled strategic partnerships often emanating from enterprise development partnerships. Enterprise development is one of the policy reforms to enforce transformation and include the previously disadvantaged.

High absorptive capacity enhances spillover of knowledge for potential entrepreneurs through high alertness to new knowledge and its value; and commercialisation thereof. Knowledge filter however easily impedes its effectiveness. The knowledge filters that were frequently mentioned in this study were access to market due to lack of influential networks and funding. Inclusive policies accompanied by support from the business ecosystem and regulatory monitoring bodies can however suppress the effect of the knowledge filters. As much as transformational government policies were one of the opportunities exploited, the policies didn't seem to add as much value in ensuring the success and growth of these women within the industry.

Traits that indicated a high internal locus of control were identified as the differentiating factor for exploiting the entrepreneurial opportunity by the women entrepreneurs. It is what differentiates two potential entrepreneurs who embody similar human capital qualities and/or attributes. Self-motivation and tenacity were the two personal traits that were highly ranked in this regard.

Mentorship was the support most valued by the participants in addition to funding. This is understandable taking into account the challenges highlighted with access to market. Mentorship, for most participants, was acquired in the form of enterprise development. Enterprise development seems to be the bridge that interconnects access to market, funding, and mentorship support.

7.3. Implications and Recommendations

This study extends opportunity exploitation research amongst entrepreneurs in the Engineering sector in South Africa beyond gender standardisation by focusing on women. Sufficient body of knowledge is available in terms of women entrepreneurship, it is found lacking when it comes to women's entrepreneurial activity in SET sectors. As such, it offers an important inclusion into the field of academic entrepreneurship for women entrepreneurs in the knowledge sector.

Both the private and public sector have an important role to play in fostering a culture and climate for entrepreneurship, by providing support for women entrepreneurs through inclusive formulation and reception of government policies and institutions, introducing entrepreneurship education in Engineering undergraduate degrees, research and development institution to afford commercialisation of ideas for potential entrepreneurs, leadership to make consented effort in challenging the cultural and social norms around women in the industry. Leaders of institutions should ensure that the institutions they lead reprioritize the support they give women

entrepreneurs and, in turn, reduce knowledge filters and therefore increase exploitation of entrepreneurial opportunities. The business ecosystem needs to devise differentiated support initiatives and incentives for high impact entrepreneurship and for women to improve entrepreneurial activity. The one-size-fits-all approach needs to be revisited if optimal results are to be attained in the quest to lower economic growth and reduce the high unemployment rate particularly affecting the youth.

7.4. Limitations of Research Study

The following were found to be the limitations of the research study:

- The research sample represents a small fraction of the total research population in South Africa and cannot be generalised for all women entrepreneurs in the Engineering sector within South Africa.
- A limitation of the knowledge spillover theory of entrepreneurship is that it exclusively focuses on scientific or inventor entrepreneurs. This is applicable to our study. But makes it difficult to replicate to other fields.
- The focus of this study was not on knowledge spillover of a particular singular idea from incumbent organizations but more on human capital in terms of innovation, skill and knowledge; that can be spilled over through creation of new firms.

7.5. Conclusion

The following conclusions can be derived on whether the research objectives have been met.

Prior knowledge was found to be the seed of alertness required for identifying an entrepreneurial opportunity, which when spilled over directs the prospective entrepreneur's decision on choice of industry to venture the new firm. Cost of spillover was minimal to commercialise when founding the new firm. Although innovation essentially enabled the opportunity discovery for the new entrepreneurs, no evidence was found that the adoption of the knowledge into the new firm involved development of a single new idea from the incumbent firm.

High internal locus of control traits namely; self-motivation and tenacity were identified as the differentiating traits for exploiting the entrepreneurial opportunity by the women entrepreneurs. High absorptive capacity enhances spillover of knowledge for potential entrepreneurs though easily impeded by knowledge filters. Access to markets due to lack of influential networks and

funding were among the knowledge filters listed as highly affecting women entrepreneurs. Inclusive policies, genuine support from business, regulatory monitoring bodies can however suppress the effect of the knowledge filters. Market growth for the women entrepreneurs often required making strategic partnerships which often emanate from enterprise development partnerships. Enterprise development was found to be highly valued by the women entrepreneurs and seems to be the bridge that interconnects access to market, funding, and mentorship support.

7.6. Recommendation for future research

There is little empirical evidence on opportunity exploitation of women entrepreneurs in the Engineering sector. The study can be extended to SET industries as well. The following can add to that body of knowledge to enhance opportunity exploitation:

- A study on knowledge filters to be further explored by sampling women who continue choosing not to exploit the entrepreneurial opportunities within the Engineering sector. This study could further explore ways in which the absorptive capacity can be improved.
- Research into how to commercialise new developed ideas and/or knowledge from incumbent firms would be beneficial as a mechanism to increase the number of new ventures. Also, as a way to provide support to prospective entrepreneurs in the sector, this new study could look at how to minimise knowledge filters for entrepreneurs in general.
- A study on ways government policies, regulations and institutions can be tailored to different types of entrepreneurial activities in the technical knowledge based sector.
- Inclusion of entrepreneurial education in the Engineering undergraduate studies; the effect of compulsory entrepreneurial education on entrepreneurial activity of women in the SET factor. Such a study would also contribute ways of increasing the absorptive capacity of potential women entrepreneurs.
- The literature asserts that entrepreneurs tend to have a high risk propensity as the nature of entrepreneurship is dynamic and uncertain (Bönte & Procher, 2016). Venturing into entrepreneurship in itself is a risk undertaken with the belief that the spilled over idea being commercialised will yield positive economic returns. This does not precludes that the entrepreneur exits a certain secure environment in the incumbent organization and ventures into the unknown. It is therefore intriguing that the participants found this trait not as important, this will be interesting to research further.

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9. APPENDIX

Annexure A.

	2001	2005	2009	2013	2014	2015	Africa (average)	Efficiency-driven economies (average)
Male TEA rate	7.3*	5.9	7.2	12.3	7.7	11.6	22.7	17.0
Female TEA rate	5.8	4.5	4.7	9.0	6.3	7.0	17.0	13.0
Ratio female to male	0.79	0.76	0.65	0.73	0.8	0.6	0.75	0.76

*Read as 7.3% of the adult male population in 2001 were engaged in TEA activity

Table 29: Total Entrepreneur activity (TEA) rates by gender in South Africa, 2001-2015 from the GEM research (Herrington & Kew, 2015)

Annexure B.

Area of specialisation	Gender parity ratio
	2013
SET	0,83
Business and Commerce	1,28
Education	3,00
Other Humanities	1,77
Total	1,40

Table 30: University graduate by sex, area of specialization and qualification type (Africa, 2014)

Major field of study	Gender parity ratio
	2013
SET	1,00
Business and Commerce	1,32
Education	3,00
Other Humanities	1,97

Table 31: University graduate by sex, area of specialization and qualification type (Africa, 2014)

Annexure C.

	2001	2005	2009	2013	2014	2015	Africa (average)
Male opportunity	53.4*	57.6	63.9	71.5	71.4	68.0	71.8
Male necessity	30.0	32.2	31.9	26.8	28.6	30.2	25.8
Female opportunity	46.5	46.7	63.8	64.4	71.4	62.2	61.6
Female necessity	44.8	40.0	34.0	34.4	27.0	37.8	36.8

*Read as 53.4% of male early-stage entrepreneurs in 2001 were opportunity-motivated

Table 32: Entrepreneurial motivation by gender in South Africa, 2001 to 2015 (as % of TEA) (Herrington, 2015)

Annexure D.

(i) INTERVIEW DISCUSSION GUIDE

Date: _____

Time: _____

Venue: _____

Name of organisation: _____

Industry: _____

Age of business: _____

1. Introduction

- Welcome the participant by introducing myself and my role
- Give brief background and purpose of study
- Confirm consent for participation, explain method of data capture and analysis
- Assure participant of confidentiality and anonymity
- Inform participant of planned interview duration time
- Provide the benefits of study to respondent

2. The woman entrepreneur

- Background information relating to education and work experience
- What inspired your decision to venture into entrepreneurship?
- Are you the sole owner or do you have partners?
- If not sole owner then, how is the shareholding split and what were the determining factors?
- Did your background in any way influence your choice of industry and business offering?
- What are the personal traits you think you embody that made transitioning into entrepreneurship lighter?
- What does being a women entrepreneur with the Engineering sector mean to you?

3. How did the business develop?

- What in your previous jobs prompted you to make the switch to entrepreneurship?
- What is similar in your business offerings to your incumbent organization?

- In which ways has innovation being derived from the ideas and/or knowledge of your incumbent organizations into your new firms?
- What was the cost of developing the idea and what has been the ROI of the adopted idea?
- What was the major opportunity you identified and exploited to lead you into entrepreneurship?
- What were the biggest challenges you faced and how did you overcome them?
- What have been the greatest successes?
- Would you say education and experience within your industry was enough foundation to start off your firm and why?
- How did you fund the business?
- Did you require any other support excluding financial, if so was it sufficient?

4. Additional Questions/Comments

- Why do you think there is such low participation of women in the industry?
- What advise/assistance would you give a woman wanting to open a venture in the industry?

Would you say that the questions fully covered the scope of the study? If not, any additional comment?

Appendix E

(ii) Informed Consent Letter

Dear Sir/Madam,

My name is Molebogeng Mogashoa. I am currently registered for a Masters in Business Administration with the University of Pretoria, Gordon Institute of Business School (GIBS). I am conducting research on the opportunity exploitation of women entrepreneur within the Engineering sector.

I would like to interview you as an expert on the subject matter. The interview is scheduled to last approximately an hour. This will help gain insights on improving the woman in the sector current economic status.

Your participation is voluntary and confidentiality is guaranteed. You can withdraw at any time without any penalty. All data will be kept confidential. You can contact my supervisor or myself should you have any questions or queries. Our details are provided below.

Researcher: Molebogeng Mogashoa

Research Supervisor: Prof Lulama Makhubela

Email: 13413687@mygibs.co.za

Email: lulama.makhubela@gmail.com

Phone: 076 190 2469

Phone: 082 728 2951

Signature of researcher: _____

Date: _____

Participant name: _____

Signature of participant: _____

Date: _____

Appendix F

Gordon Institute of Business Science

University
of Pretoria

13 July 2017

Molebogeng Mogashoa

Dear Molebogeng,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

