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Variables influencing the success of subsistence farming: is business management a solution?

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Abstract

South Africa has a dualistic agricultural sector entailing commercial farming units along with subsistence maize farmers. Essentially the subsistence and small-scale farmer sector develops and improves production in an effort to increase rural development, create jobs and stimulate the rural economy.

The aim of this study was to investigate possible factors influencing the development of subsistence maize farmers as well as the ambition of these farmers to grow their practices into more commercial farming units. A quantitative, exploratory study was conducted among the target population of subsistence maize farmers in KwaZulu-Natal, Mpumalanga and Eastern Cape provinces. A questionnaire based on recent literature was compiled by the researchers and found valid and reliable. A convenience sample yielded 344 usable questionnaires.

The results exposed certain factors that influenced the ability of the subsistence maize farmers to develop, including poor access to resources such as land, finance and equipment, limited support from government and private agricultural companies, restricted access to off-take markets and insufficient financial and agronomic skills. It was also found that the farmers generally have the ambition and the will to expand their farming operations as well as the intent to produce maize on a more commercial level.

Key phrases

commercial farming; farmer development program; subsistence agriculture; subsistence maize farmers

1. INTRODUCTION

According to Section 27.1(b) of the Constitution of the Republic of South Africa (1996) all citizens of South Africa are entitled to have access to sufficient food. Therefore the Government of South Africa needs to do everything in its reasonable power to ensure that the citizens of South Africa are food secure (Kibirige & Obi 2015:269).

In addition, the Honourable Minister of Agriculture, Senzeni Zokwana highlights (Department of Agriculture, Forestry and Fisheries 2015:7) that the development and empowerment of small-scale producers in South Africa will contribute to the food security of the larger community by ensuring a higher and stable income of small-scale farming communities and by increasing the availability of locally produced food. Unfortunately these objectives have to be achieved amidst known challenges faced by small-scale and subsistence producers.

Furthermore, Kibirige and Obi (2015:269), state that following the first democratic elections in South-Africa in April 1994 government and parastatal research and extension services were given a mandate to transfer technology to farmers in the previous homeland areas. The goal of this knowledge and skills transfer was to help develop these farmers' commercial potential and to help them enter the national and international markets.

Up to now, except for a few exceptions, the above-mentioned goals have not been reached. Policies that were put in place have focussed more on the category of emerging/new era black farmers who can be considered already commercial (Xaba 2014:2). This group of farmers are in a position to access external resources and existing support. Up to now very little attention was given to the small-scale and subsistence farming sector. This includes support from government, parastatals and the private sector.

One of the predicaments seems to be that of land ownership. At the recent annual meeting of the African Farmers' Association of South Africa (AFASA) (Van Burick 2016:16), the secretary general of AFASA, Mr Aggrey Mahanjana said that land reform without ownership remains a very big challenge. Farmers receiving land without ownership remain vulnerable (Van Burick 2016:16). Mr Mahanjana added that new emerging farmers should receive support from government to develop into a more commercial level. Support programmes should be more focused on specific needs of developing farmers.

Although agriculture is a small contributor to the Gross Domestic Product (GDP) of South Africa, having contributed R66,7 billion (1.9%) to GDP in 2015 (Department of Agriculture, Forestry and Fisheries 2016a:3), it is very important for job creation and employment in rural areas. According to the Quarterly Labour Force Survey for Quarter 3 of 2015 (Statistics South Africa 2015a:1) agriculture has employed 897 000 people during the period July to September 2015. This figure is equal to 5.7% of the employable population of South-Africa. This is, however, a serious reduction from the 814 000 people or 10% of the employable population that was employed by the sector in 1996.

Although it is very important for resource-poor farmers, small-scale agriculture as a buffer against poverty is mostly overlooked by policy makers. Small-scale and subsistent farming is especially important for the alleviation of poverty among black women in rural areas, as more than 50% of the African population engaged in rural agriculture are women (Statistics South Africa 2015b:181). The women in these areas are also more likely to engage in agricultural activity as an additional source of food (Buyambo 2012:3).

Jacobs, Aliber, Hart and O'Donovan (2008:14) summarised numerous constraints and challenges that the agricultural sector development is facing, especially impacting small-scale/subsistence agriculture development in South-Africa:

- *Government support:* Lack of programmes and support.
- *Private sector support:* The private sector tends to focus on only the commercially viable portion of the sector.
- *Common constraints:* Negative household circumstances, motivation, land tenure security, lack of support services and challenges impacting the whole agriculture sector.
- *Inadequate rural infrastructure:* The under-investment in rural infrastructure such as roads, transportation and communication networks pose a serious challenge to small-scale subsistence farming.
- *Global factors:* Market access barriers, lack of domestic support and inadequate export subsidies have made it difficult for small-scale farmers as they are in particular affected by lower local prices for produce, caused by increased global supply.
- *Changes in the commercial sector:* A loss of employment opportunities and retrenchment of farm workers put more strain on the small-scale/subsistence farming sector.

- *The impact of HIV/AIDS*: HIV/AIDS infection has a serious effect on small-scale/subsistence farming, with families with infected members struggling to work the land effectively.

Considering all the above-mentioned challenges and constraints, it would take a deep and thorough understanding of the dynamics at work in the development of small-scale agriculture to truly determine if the challenges can be overcome. Role-players in the agricultural industry have to improve Business Management training to rural farmers in order to support the concept of farming as a business (Waife & Yona 2016:69).

2. PROBLEM STATEMENT

The productivity of subsistence agriculture is unsatisfactory and improving productivity is crucial to eradicate rural poverty (Department of Agriculture, Forestry and Fisheries 2016b:8, Le Roux *et al.* 2016:5). According to the above authors smallholder agriculture requires tenure security and improved access to reliable and effective farmer support services, finance and marketing.

Regarding the status of subsistence farmers, it seems as if the focus of most current projects is more towards the development of already commercial or semi-commercial developing farmers and that very limited and probably wrong support is provided to the biggest portion of “developing farmers” - subsistence farmers. Undoubtedly the development and support of subsistence farmers in South Africa are crucial, not only for food security, but also to sustain economic growth and create employment (Department of Agriculture, Forestry and Fisheries 2015:7; Xaba 2014:2).

Most small-scale subsistence farmers are situated on communal land in the former homelands, where they are seen as poor, mostly female and aged (Kisaka-Lwayo & Obi 2012:33). It is believed that these small-scale farmers’ poverty and complicated circumstances make it difficult for them to make use of available technology provided by state and parastatal research and extension services since 1994 (Makapela 2015:11-13). It is also believed that the motivation and reason for these farmers to be engaged in agriculture differ greatly from those of commercial producers (Murika & Kabegambire 2014:68). It is presumed that for these farmers agriculture provides nothing more than a safety net (Jacobs *et al.* 2008:4). Consequently, the research question is: What are the

major factors limiting subsistence maize farmers to develop their farming into more commercialised farming units? How can they be assisted in incorporating effective business management in order to address their numerous challenges?

2.1 The conceptual framework

The conceptual framework (Figure1) was compiled to guide the rest of the study illustrating the theoretical point of departure for this study. It was based on literature on this topic, amongst others by Kibirige and Obi (2015:269), Murika and Kabegambire (2014:80), Waife and Yona (2016:69) and Xaba (2014:109).

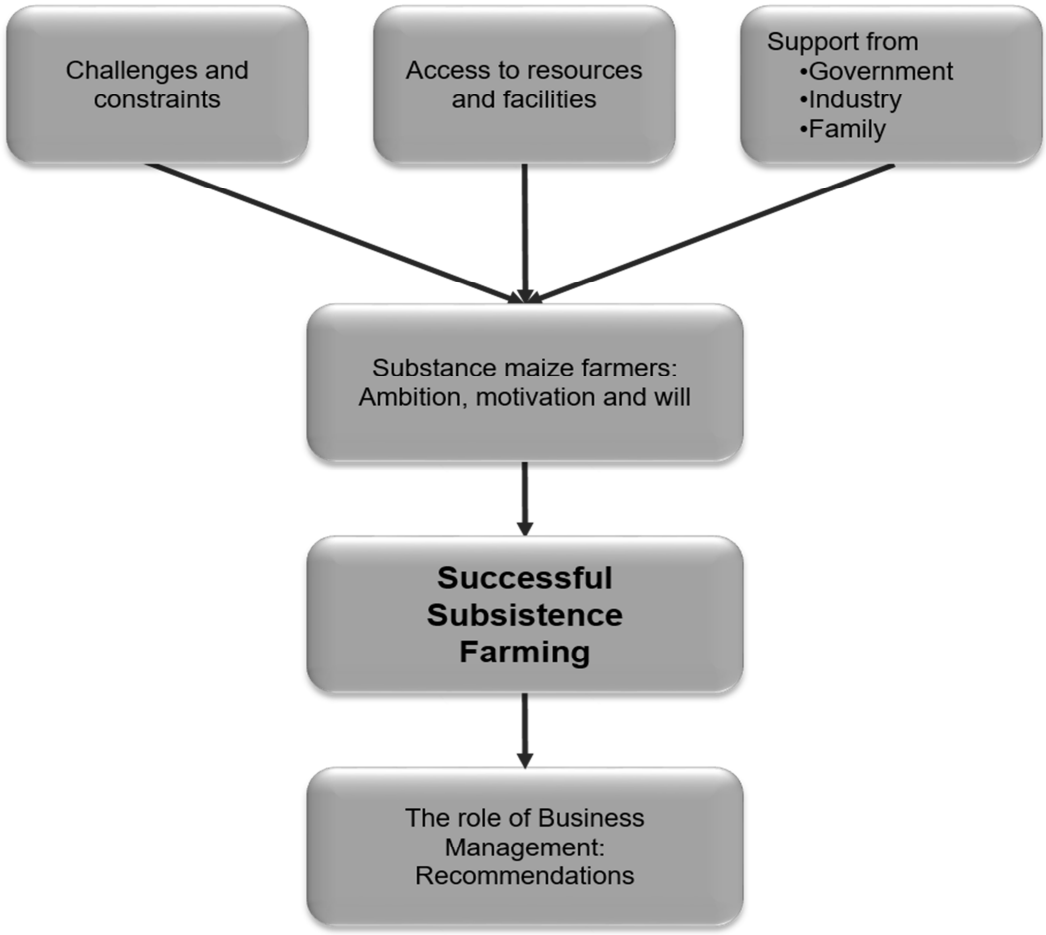

FIGURE 1: Conceptual framework: variables influencing successful subsistence farming

Source: Calculated from survey results

2.2 Research objectives

2.2.1 Primary objective

The primary objective of this study is to develop a deep understanding towards the ambition and mind-sets of subsistence maize farmers in South-Africa with regards to their development into more sustainable and commercialised farmers and the fundamental factors that influence this level of development.

2.2.2 Secondary objectives

The secondary or specific objectives are to:

- conceptualize the topic of subsistence maize agriculture production in South Africa through a literature study.
- determine from the subsistence maize farmers' perspective what the fundamental challenges and constraints are to develop their farming into more commercialised farming units.
- determine the level of access subsistence maize farmers has to resources and labour as well as infrastructure.
- determine the level of support from government, industries and family for the development of subsistence maize farmers.
- determine what the subsistence farmers' ambition and intention to commercialise are in order to develop more successful subsistence farming units.
- make recommendations regarding application of business management in order to enhance the success and sustainability of subsistence farming.

3. LITERATURE REVIEW

3.1 Subsistence farming in South Africa

According to the Crop Estimate Committee of the Department of Agriculture, Forestry and Fisheries (CEC 2004), a subsistence farmer is defined as a person who produces crops for own consumption. Because subsistence farmers are so dependent on efficient crop production for their food security it is essential that the entire area under production is utilised efficiently (Le Roux *et al.* 2016:5).

Subsistence farmers do not earn a large income from farming activities. The main reason for being engaged in crop and livestock farming is for own household consumption. Surplus production that can be sold is very limited. The subsistence farmers have limited access to markets due to technical, financial and managerial barriers (Grain SA 2015:10).

According to the latest Labour Force Survey (2016:63), almost 1.7 million people practised subsistence farming during the first quarter of 2016. The biggest number of subsistence farmers were situated in KwaZulu-Natal with 757 000 followed by 423 000 in the Eastern Cape and 149 000 in Mpumalanga.

The inhabitants of these rural areas of subsistence agriculture are typically women, children and aged people to whom the land is more a form of social security rather than using it for agricultural production (Aliber & Hart 2009:441; Fényes & Meyer 2003:26). Most of these farmers cannot even produce enough food to meet all their household needs. The crops they produce are mostly a supplement to an external form of income such as pensions and social grants. This might be an indication of the poor economic conditions prevailing in South Africa, where families under economic pressure fall back to farming as a source of income and fulfilment of household needs. Subsistence farming has the potential to improve food security among poor households in rural areas (Baiphethi & Jacobs 2009:459).

3.2 Factors influencing successful subsistence farming

For the purpose of this study the following factors were investigated:

3.2.1 Challenges and constraints faced by subsistence farmers in South Africa

Several authors (Kibirige & Obi 2015:275; Kibirige, Obi, Masuku & Singh 2016:191) have identified various challenges and problems faced in the subsistence agricultural sector in South Africa.

- Uncertain property rights: Land claims, possible land invasions and unfair land redistribution create considerable uncertainty among commercial farmers.
- Risk in crop production: The biggest region in South Africa receives limited rain, making crop production very risky or impossible.

- Restrictive labour policies: Although most labour laws have some benefits, they create high transaction and wage cost for the employer. The steep increase in the minimum wage in 2013 saw a decline of 60 000 jobs in 2014 (BFAP 2016:5).
- The impact of HIV/AIDS: Agriculture and the economy are affected negatively by HIV/AIDS destroying social capital, weakening institutions and exacerbating the problem of poverty.
- Low productivity in smallholder agriculture*:* The small-scale agriculture sector in South-Africa is regarded as being low in productivity. This is also evident in the maize production segment.
- Under-investment in rural economy*:* Investment in rural areas in terms of physical and institutional infrastructure is considered inadequate.
- Along with poor access to agricultural assets, poor health services and education limit productivity of agriculture further (Baiphethi & Jacobs 2009:471). People infected with HIV/AIDS have a serious effect on small-scale/subsistence farming, with families with infected members struggling to work the land effectively (Jacobs *et al.* 2008:14).
- Most of the people engaged in subsistence farming in the rural parts of South Africa are women, aged individuals and children (Aliber & Hart 2009:441; Fényes & Meyer 2003: 26). A study by Mbanza and Thanaga-Chitja (2014:251) revealed that the high age of farmers is detrimental to the productivity and success of them to ensure household food security.

3.2.2 Access to resources and facilities

The only input purchased mainly when needed is seed. Only 6% of households purchase fertiliser and 2% of household purchase additional agrochemicals (Aliber & Hart 2009:447). Due to the extremely low levels of income, households are unable to engage in high cost input agricultural practices. Furthermore, most households are food-insecure and additional income is spent on food instead of buying expensive agricultural input products. Therefore, subsistence farming households concentrate on low input agricultural practices and products that are appropriate for their areas.

One of the biggest drivers in the employment creation initiative will be the accelerated productivity of small-scale farmers, who make use of labour absorptive production practices (Department of Agriculture, Forestry & Fisheries 2015:15). Research has shown that the

absence of sufficient labour during critical seasonal operation such as planting, weeding and harvesting, is a crippling impediment to increase crop yields and expand production. Gouse *et al*. (2016:9) found that in the former homelands of KwaZulu-Natal land was abundant but labour was in short supply. The main reasons for the short supply of labour were the migration of people from the rural areas to the urban areas and the high incidence of HIV/AIDS. The limited supply of labour is leading to under production of available agricultural land in rural parts (Gouse, Sengupta, Zambrano & Zepeda 2016:11).

Because of cultural laws it is especially difficult for woman-headed households to access labour. Evidence indicates that women farmers in woman-headed households in the former homeland areas in KwaZulu-Natal and the Eastern Cape have unequal access to labour and land compared to male farmers (Hull 2014:455). In male-headed households, women farmers depend of their status in the household to gain access to family labour (Hull 2014:455).

Concerning land, subsistence farmers generally have access to small land areas. If these farmers in rural areas can be assisted to make better use of the land they have available, irrespective the size of the land, it can have a positive impact on the rural economy and developments leading to poverty alleviation and employment opportunities (Grain SA 2015:4).

Regarding facilities, a study by Mbanza and Thanaga-Chitja (2014:251) in Rwanda, where 150 members of subsistence farming cooperatives were surveyed, revealed that availability of agricultural equipment and access to agricultural inputs enhanced the productivity and success of the farmers in ensuring household food security.

3.2.3 Support

The Government of South Africa already started with small scale farming support programmes in the mid nineteen-nineties. Some of these programs included homeland consolidation, trust land purchases (1970's), deregulation which increased informal marketing of farm products (1968) and land reform processes (Department of Agriculture, Forestry and Fisheries 2011:1). According to Cousins (2011:2) it is argued that land reform in South Africa should be focussed on the "rural poor" and "smallholders" instead of the "emerging commercial farmer.

Efforts to improve the productivity of smallholder farmers are central to development strategies of African governments and international development agencies (Larson *et al.* 2013:355). Level of education as well as training and skills of farmers, level of government assistance and provision of extension services influence the productivity of farmers and their ability to ensure household food security (Mbanza & Thanaga-Chitja 2014:251).

Further important developments and improvements that can help increase subsistence productivity is an increased investment in research, extension services, financial and credit services and training and skills transfer (Baiphethi & Jacobs 2009:477).

The Agricultural Policy Action Plan (APAP) was approved by Cabinet in March 2015 (Department of Agriculture, Forestry and Fisheries 2015:7). The APAP aims to bring more smallholder farmers into the mainstream food supply value chain.

Various government support programmes such as the *Fetsa Tlala* programme and *Rekgaba ka Diratswana* programme in the Free State province have been launched with the aim of improving production and job creation (Department of Agriculture, Forestry and Fisheries 2015:7). Yet Kruger (2016) states that it is very complex to provide support to subsistence farmers and that the support subsistence farmers receive is ineffective and does not consider the local context and needs of the farmers. He is also of the opinion that there is a lack of programmes and support that is targeted at the resource-poor subsistence farming sector.

Non-Government support has existed since its establishment in 1999, as Grain South Africa has been involved in the development of subsistent farmers since then. The Grain SA farmer development programme has received funding over the years from numerous grain trusts, government departments and private companies.

Over the past years Grain SA was able to establish a network of ten regional offices in strategic locations from where the training and development programmes are driven (Grain SA 2015:4). The mission of the Grain SA program states the following: “To develop capacitated grain farmers and to contribute to household national food security through the optimal use of the land available to each farmer” (Grain SA 2015:4).

Family support is very important among subsistence farmers. Because of high levels of unemployment and poverty young adults remain in their parental homes for extensive periods of time. However, these young adults’ productive labour is often not utilized

sufficiently in family farming operations. Young unmarried adults have limited responsibilities to provide labour and income towards the family homestead which reduces the overall viability of small scale family faring operations (Hull 2014:451).

A different form of labour assistance is also encountered. The contribution of females cannot be overlooked, as it was found that the formation of "working groups" by female farmers made accessing labour easier, leading to an increase of productivity (Gouse *et al*. 2016:11).

3.2.4 Ambition and intention to commercialise

The ambition and motivation of subsistence farmers to develop into bigger and more commercialised farming units will to a large extent determine their contribution to agricultural development in South Africa. It is therefore crucial to determine what the most critical factors are, preventing them from developing into bigger and more commercial farming units, and what they regard as enhancing factors to promote successful subsistence farming.

If this information is available, it is believed that these farmers can, by applying effective business management principles, overcome some of the barriers they face and master the challenges in their unique set-up (BFAP 2016:8).

4. RESEARCH METHODOLOGY

4.1 Research design and approach

During this study a comprehensive and in-depth review of literature was conducted to fully understand and conceptualise the concept of subsistence agriculture and maize farming in South Africa. From the literature study a relevant conceptual framework that portrays variables that may play a role in successful subsistence farming was compiled (Figure. 1).

The study followed a quantitative, descriptive, non-experimental, cross-sectional field survey design and was exploratory in nature. The quantitative research method was chosen because of the fact that it is an economical and practical way of assessing opinions of big groups of respondents by ways of a structured, self-administered questionnaire (Delport & Roestenburg 2011:188-189).

4.2 Research instrument

After the in-depth literature study and consultation with the Grain South Africa development programme manager a structured questionnaire was developed as a new measuring tool, since no previous studies could be found making use of a similar measuring tool. The questionnaire includes 38 questions testing the respondents' opinions towards certain pre-identified factors that may enhance the development of more commercialised farming units. The first section of the questionnaire required respondents to reveal demographic information such as gender and age. Close-ended questions were also used to determine the main reason for farming, the respondents' main source of income and their expenditure on seed, fertilizer, agro-chemicals and lime.

The second part of the questionnaire consisted of close-ended statements in the form of a four-point Likert scale, where 1=totally disagree and 4=totally agree. These statements investigated four factors which may influence the success of subsistence farming, as identified through the literature study and consultation with Grain SA representatives. These factors embraced challenges and constraints encountered by subsistence farmers, access to resources and facilities, support received from government, industry and family and lastly the ambition, motivation and will of these farmers to expand their farming and develop into more commercialised farmers.

4.3 Target population and sample

The target population for this study included subsistence maize farmers predominantly situated in the former homelands of the KwaZulu-Natal and Eastern Cape provinces of South-Africa. The population in question was typically farmers that had access to a small portion of land (<10ha), were resource poor and engaged in maize production to supply their household subsistence needs fully or partially.

The target population was farmers that participated in the Grain South Africa farmer development programme. In this network small-scale and subsistence maize farmers are structured into study groups. Each study group has a mentor from Grain SA, who supports these farmers in terms of technical advice and best practices, support and training. To study the population in question the study-group-and-mentor network of Grain South Africa's farmer development programme was used. Respondents, representative of the target

population were selected according to their availability, therefore a convenience, non-probability sample was used.

4.4 Gathering of data

The Grain SA study groups were utilised to obtain as many as possible respondents by making use of study group meetings, with the mentors acting as interviewers who handed out the questionnaires and assisted farmers in their study groups to complete these. Mentors and coordinators of Grain South Africa are able to speak the major local language in the research areas and were able to assist the farmers in their home language. They were also able to explain the concepts in the questionnaire. This reduced the possibility of misunderstanding by the respondents and the possible research error. A total of 344 completed questionnaires were retained for the data analysis.

4.5 Statistical analysis

The completed questionnaires were firstly screened for completeness and quality. The North-West University's Statistical Consultation Services captured the data and performed the statistical analysis using SAS (SAS Institute Inc. 2016). Descriptive statistics was conducted to summarise and describe the results (Levine, Stephan & Szabat 2014:36), including frequencies, means/averages, variance and standard deviation.

The psychometric properties of the measuring instrument were inspected by investigating validity by means of exploratory and confirmatory factor analysis, and reliability by computing Cronbach alpha coefficients.

Exploratory factor analysis was conducted to identify and group statements into constructs. These constructs were validated by confirmatory factor analysis and Kaiser's measure of sample adequacy (MSA) was calculated to determine if the factor analysis was appropriate.

4.6 Ethical considerations

According to Welman, Kruger and Mitchell (2005:181) some of the ethical issues that should be considered include:

- Participants' personal and identity rights should be protected
- Research should be done according to the researchers' competency

- A deep and thorough literature study needs to be conducted to ensure that an already existing study is not repeated or copied
- Plagiarism must be avoided
- Results of the study must not be falsified or misrepresented.

The research conformed to all academic research etiquette and ethics as described by literature and the Ethics Committee of the North-West University. All the literature used and studied were referenced according the Harvard guidelines. The actual results of the study were analysed and presented without distorting any information; no deliberate or intentional misrepresentation of the results took place. The informed consent of all respondents as well as Grain South Africa was obtained before the research was conducted. The identity of the respondents was protected and won't be revealed during or after the study and all rights to privacy were protected. The data collected will be treated in confidence and won't be shared in a way that will bring harm to any of the respondents.

5. RESULTS AND DISCUSSION

The psychometric properties of the measuring instrument will be discussed first, followed by the results of the empirical study.

5.1 Psychometric properties of the measuring instrument

Construct and content validity as well as reliability were investigated.

5.1.1 Construct validity

Van Zyl and Pellissier (2017:150) state that construct validity explains how well items within a measuring instrument measure the construct that the measuring instrument was intended to measure. An exploratory factor analysis (EFA) was conducted first in order to group the items in the questionnaire into factors. This EFA yielded 11 factors containing two to six items each (a total of 34 items). The remaining four single items were discarded due to their weak content validity.

The EFA was followed by a confirmatory factor analysis (CFA).

The Kaiser's measure of sample adequacy (MSA) was calculated to determine if the factor analysis was appropriate. An overall MSA value of 0.73 was obtained. According to Hair,

Anderson, Tatham and Black (1998) a MSA of 0.73 would be considered middling to meritoriously adequate. According to Field (2009:647) a MSA value below 0.5 would be considered unacceptable. It can therefore be concluded that performing the CFA was appropriate.

The eigenvalues of the correlation matrix associated with each construct was also calculated. This value represents the amount of variance that can be explained by the linear component (Field 2009:660). The 11 factors that were retained yielded a cumulative eigenvalue of 69.22%, therefore 69.22% of variation in the data set could be explained by the 11 factors that were retained.

Communality is the estimate of variance that is present for each variable as a component of the retained factors (Field 2009:637). A variable with a high communality has a high contribution to a retained component whereas a variable with a low communality does not contribute much to a retained component.

According to the communalities that were calculated the item with the lowest contribution to a construct was Question 15 (0.396) in the construct *Access to resources and labour*. The question with the highest contribution to a construct was Question 4 (0.864) in the construct *Access to inputs and non-government support***.** The range of communalities can be considered high enough and the 11 retained constructs can be considered construct valid.

5.1.2 Content validity

According to Van Zyl and Pellissier (2017:150) content validity is obtained when the content of the items adequately represents the comprehensive field of a given construct. The researchers made use of experts in the field of subsistence farming, in this case five mentors of the Grain South Africa farmer development programme, to review the item pool and confirm if it covered all potential dimensions within the boundaries of each specific construct.

5.1.3 Reliability

Cronbach's alpha coefficient was calculated as a measure of reliability and internal consistency. It is an indication whether items and subsets of items within the measuring instrument are correlated (Field 2009:675).

The Cronbach's alpha reliability coefficient may range between 0 and 1, with the value closer to 1 indicating a greater internal consistency of the items in the construct. According to Field (2009:675) a Cronbach's alpha value greater than 0.8 can be considered acceptable for cognitive testing. When testing ability a Cronbach's alpha value greater than 0.7 can be considered acceptable, whereas when testing psychological constructs Cronbach's alpha values lower than 0.7 can still be considered realistically acceptable due to the fact that the constructs that are measured can be considered diverse. The fewer items included in a construct it would be expected that the value of the Cronbach's alpha would be lower (Tavakol & Dennik 2011:53).

Most of the constructs had Cronbach Alpha values greater than 0.7. Considering the level of education and literacy of the target population and respondents, the Cronbach alpha values indicates an acceptable level of internal consistency for the questionnaire used. Only two constructs had a Cronbach's alpha value of less than 0.7: Access to infrastructure and Commercial intention. Both these constructs had Cronbach Alpha values equal to or greater than 0.5 and because the attitudes and perspectives are measured and not the ability of the respondents both these constructs were used and analysed.

5.2 Empirical results

The results are presented in accordance with the objectives. The primary objective of this study was to develop a deep understanding towards the ambition and mind-sets of subsistence maize farmers in South-Africa with regards to their development into more sustainable and commercialised farmers and the fundamental factors that determine their development.

The first secondary objective was to conceptualize the topic of subsistence maize agriculture production in South Africa through a literature study. This objective was fulfilled by the literature overview (see par 1.4).

The second secondary objective was to determine from the subsistence maize farmer's perspective what the fundamental challenges and constraints are to develop their farming into more commercialised farming units. For the purpose of this study age and health were considered important factors regarding challenges and constraints faced by subsistence farmers

More than half (160 of the 274 respondents who reported their age group) can be considered elderly or middle aged (Table 1). Age and health could be a limiting factor for these farmers as suggested by the literature (Baiphethi & Jacobs 2009:471; Jacobs *et al.* 2008:14; Mbanza & Thanaga-Chitja 2014:251). A comparative analysis between the different age groups might give more insight.

TABLE 1: Different age groups (N = 274)

Age group	n
15 - 34	28
35 - 44	45
45 - 54	82
55 – 64	78
65 +	41

Source: Calculated from survey results

The respondents were also asked to give their opinion of age and health as a combined factor of constraints (Table 2).

TABLE 2: Age and health as a combined factor regarding challenges and constraints

Construct	N	Mean	SD
Age and health	344	2.24	0.93

Source: Calculated from survey results

The respondents were slightly positive (mean = 2.24) that their age and health was not a serious constraint. What needs to be considered is the fact that there is some variation in the

responses of the respondents with the standard deviation being 0.93, which is the highest compared to all the other constructs. The respondents were asked to indicate if they have the necessary financial and agronomic skills to develop and expand their farming operations (Table 3).

TABLE 3: Skills as a constraint

Construct	n	Mean	SD
Skills	344	2.14	0.78

Source: Calculated from survey results

The results ($\bar{x}$=2.14, S = 0.78) suggest that the respondents feel that they have only moderate skills to manage their operations. This would suggest that more skills transfer would be needed by these farmers to help them develop into more commercial farming units. Therefore deficient skills and limited support to acquire these can be considered a constraint in the success of these farmers. According to the literature training in skills can have a positive effect on the productivity and development of subsistence farmers (Baiphethi & Jacobs 2009:477; Mbanza & Thanaga-Chitja 2014:251).

The third secondary objective was to determine the level of access subsistence maize farmers have to resources and labour as well as infrastructure. The respondents were asked to give an overall opinion regarding their access to resources such as implements (tractors, planters, sprayers etc.), land, money and labourers (Table 4). They were also asked what access they have to infrastructure such as grain storage facilities, roads, transport and water as well as good cellular connectivity (Table 4).

TABLE 4: Access to resources and labour

Construct	N	Mean	SD
Access to resources and labour	344	2.19	0.64

Source: Calculated from survey results

The responses of the sample population upon all questions relating to access to resources such as land, equipment and finance as well as the likelihood of employing extra people in their farming operation were grouped together. The results (Table 4) indicate that the respondents have limited access ($\bar{x}$=2.19, SD = 0.64) to resources and labour in their farming operation. It is clear that management of resources and labour need to be attended to.

TABLE 5: Access to infrastructure

Construct	N	Mean	SD
Access to infrastructure	344	2.49	0.52

Source: Calculated from survey results

The results (Table 5) indicate a slightly positive opinion regarding the respondents' access to infrastructure ($\bar{x}$=2.49, SD = 0.52). However, there is still more room for improvement in this aspect. According to the literature (Baiphethi & Jacobs 2009:471; Jacobs *et al.* 2008:14) poor infrastructure has a negative effect on the productivity of rural subsistence farming.

The fourth secondary objective was to determine the level of support from government, industry, family and community for the development of subsistence maize farmers. The results are depicted in Table 6 – 8.

The respondents were asked to which extent they perceived government support satisfactory in terms of provision of land, loans and subsidies.

TABLE 6: Government support

Construct	N	Mean	SD
Government support	344	2.31	0.59

Source: Calculated from survey results

According to Table 6 most farmers ($\bar{x}$=2.31, S = 0.59) indicated that they are not getting enough support from the government. The government and ruling party in South Africa still support and encourage land redistribution and restoration, although these programmes have been characterised by little success, poor performance and low levels of productivity (Cousins 2011:3). Unfortunately agricultural activity in sub-Saharan Africa is often characterised by small farm sizes, poor-quality land and negligible irrigation infrastructure.

The respondents were asked to which extent they experienced support from industry in terms of crop protection chemicals, hybrid maize seed and fertilizer as well as from mentors and agronomists. The results are depicted in Table 7.

TABLE 7: Industry support

Construct	N	Mean	SD
Industry support	344	3.00	0.59

Source: Calculated from survey results

The results in Table 7 indicate that subsistence farmers have fair support from industry ($\bar{x}$=3.00, SD = 0.59). The results therefore, suggest that access to industry support cannot necessarily be seen as a limiting factor in the development of these farmers.

These findings are in contrast to those suggesting that subsistence and small-scale farmers in South-Africa and Africa have limited access to support from industry (Baiphethi & Jacobs 2009:471; Gouse *et al*. 2016:11; Jacobs *et al.* 2008:9; James 2015:12). It could turn out that these respondents might have better access to industry support because of their involvement in organised agriculture and the Grain SA development program.

When investigating the last aspect in this construct, family support was explored in terms of help from family and other community members. These results are portrayed in Table 8.

TABLE 8: Family and community support

Construct	N	Mean	SD
Family and community support	344	2.59	0.61

Source: Calculated from survey results

According to the results in Table 8 ($\bar{x}$=2.59, S = 0.61) the respondents positively agreed that their family and community members are involved in their farming operations to some extent. These findings correspond with those in the literature, suggesting that the labour capacity of young adults are not fully utilised in family farming operations (Hull 2014:451). In a study by Gouse *et al*. (2016:11) it was found that the formation of community "working groups" among community members, had improved labour access and increased productivity of subsistence farmers.

The fifth secondary objective was to determine what the subsistence farmers' ambition and intention to commercialise are in order to develop more successful subsistence farming units.

Ambition was investigated in terms of striving towards better financial support, land ownership, access to labour, expansion of farming operations and agronomic support. The results are depicted in Table 9.

TABLE 9: Ambition towards commercialisation

Construct	N	Mean	SD
Ambition to commercialise	344	3.18	0.45

Source: Calculated from survey results

The results in Table 9 ($\bar{x}$=3.18, SD = 0.45) depict that the majority of the respondents indicated that they would like to expand their farming operations if they had access to specific resources such as their own land, finance and agronomic support. The responses to

this construct are a positive indication that the respondents have the ambition to develop and expand their farming operations.

The respondents' intention to commercialise their farming units was explored in terms of their needs for family involvement, enlargement of maize production and increasing of income to become the main source of revenue.

TABLE 10: Intention to commercialise

Construct	N	Mean	SD
Intention to commercialise	344	3.31	0.44

Source: Calculated from survey results

The results in Table 10 ($\bar{x}$=3.31, SD = 0.44) strongly indicate that the respondents have a sturdy intention to become more commercialised maize producers.

The sixth secondary objective was to make recommendations (par 1.7.) regarding the application of Business Management in order to enhance the success and sustainability of subsistence farming.

6. CONCLUSIONS

Subsistence farming in South Africa is a way of providing a livelihood for many South African citizens and it is very important for job creation and employment in rural areas.

If it is true that most subsistence farmers are not in the position or do not have the ambition to develop bigger, more commercialised farming units, the whole approach of agricultural development in South Africa might be wrong.

Therefore it is critical to determine first hand from subsistence farmers themselves, what their ambitions are and what the most critical factors are, preventing them to develop bigger and more commercial farming units. With this information available and despite the many barriers these farmers face, it is believed that they can conquer some of the challenges by empowering them to apply sound business management.

Factors investigated in this study were challenges and constraints these farmers face, level of access to resources and labour as well as infrastructure, level of support of government, industries and family and lastly their ambition and intention to commercialise. Based on the findings various recommendations could be made towards the success and sustainability of subsistence farming.

7. RECOMMENDATIONS

The recommendations will be presented in accordance with the objectives and the findings, with the centre of attention on Business Management implications.

Regarding the first objective concerning the literature study the researcher focused on recommendations with reference to marketing implications pointed out in findings of studies on the topic of subsistence maize agriculture production in South Africa.

The second objective centred around challenges and constraints which subsistence maize farmers have to deal with in order to establish more commercialised farming units.

In this study and in studies done by other researchers it was found that one of the reasons farmer development programs failed in the past in South Africa, was the lack of focus of market availability and access (Kruger 2016:1). Effective markets and distribution networks cannot only improve the access of farmers to inputs but can also help developing farmers with the distribution of their products to the consumer (Baiphethi & Jacobs 2009:471).

The development programmes can play a crucial role in this procedure. Deficient management skills, which were mentioned as a constraint in this study, can be taken care of by mentors in collaboration with development programmes, since improved management skills will augment production and enhance marketing opportunities. According to Larson *et al.* (2013:356) the path to improved lives for the rural poor of Africa lies with application of skilled technologies that can boost the productivity of smallholder and subsistence farming households. Subsistence farmers in Rwanda indicated that their productivity increased when making use of advanced agricultural equipment and farming methods as well as improved seed and fertilizer (Mbanza & Thanaga-Chitja 2014:265).

Regarding the third objective concerning the level of access subsistence maize farmers have to resources, labour and land as well as infrastructure, small scale and subsistence farmers

rely on informal channels to access resources, including farm saved seed, farmer-to-farmer exchange and irregular sales. Southern African smallholder farmers obtain only 10% of their seed from formal markets (Baiphethi & Jacobs 2009:466).

It is therefore important to improve and develop channels to improve the access of smallholder and subsistence farmers to advanced resources, encouraging subsistence farmers to make use of improved resources that can increase their productivity. Improved and advanced resources include fertiliser, animal traction, organic inputs, water and soil conservation technology (Baiphethi & Jacobs 2009:476). Subsistence maize farmers must take responsibility for reaching the above goal by improving business management related collaboration among each other which can be achieved by, for instance, erecting farmers' associations and working groups to enhance their interests and benefits in terms of marketing and other business management skills.

From a business management view, the fourth objective was to determine the level of support from government, industry, family and community for the development of subsistence maize farmers. It is recommended that collaboration with the above-mentioned instances should be promoted.

Professor Machette proposed a redesign of all government agricultural support programmes with better coordination and better selection of beneficiaries, mentors and strategic partners (Kruger 2016:2).

Firstly adequate support must be given to the large number of people involved in subsistence farming activities and it must be determined if the current level of support is efficient and adequate. Evaluation and monitoring systems must be put in place to assess the current government support programmes.

Secondly, because of the complexity and diversity of the subsistence farming sector, research is needed to determine the nature of the support required by the subsistent farmers (Aliber & Hart 2009:455).

Thirdly, government subsidies can play an important part in enabling these farmers to purchase improved resources and technology that will help to increase productivity. These support programmes must be sustainable in order to generate enough income so that they can continue acquiring the resources beyond the initial support of the programme (Baiphethi & Jacobs 2009:471).

Assistance from industry is indispensable and Grain SA along with the Agricultural Research Council can provide the necessary training and mentoring to the farmers in their home language.

With reference to family support, the literature suggests that the labour capacity of young adults are not fully utilised in family farming operations (Hull 2014:451). In a study by Gouse *et al*. (2016:11) it was found that the formation of community "working groups" among community members and family, resulted in improved labour access and increased productivity of subsistence farmers. The researcher further suggests that mentors in development programmes emphasise the advantages of incorporating family members in their business operations.

The fifth objective of this study was to investigate what the subsistence farmers' ambition and intention to commercialise are in order to develop more successful subsistence farming units. In order to improve the above-mentioned internal motivation that the mentors linked to the development programmes could arrange information and training sessions that would reveal the advantages of commercialisation and the prerequisites for successful business management operations. The content of such information and training sessions could include amongst others ways to:

- Improve the price incentives and public investment
- Improve the effectiveness of product markets
- Improve the access to financial services and reduce the risks
- Improve the performance of producer organisations
- Promote innovation through science and technology

Finally, as indicated by other researchers as well, with the appropriate support subsistence farmers might improve the quality and quantity of the agricultural outputs and this will allow innovative farmers to move from subsistence to more commercial production systems. A situation where subsistent farmers can develop into more commercial farmers, will not only help to decrease food insecurity but will also help those engaged in agriculture to decrease their dependency on the government.

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