ANALYSIS OF THE EFFECTS OF FARM SIZE ON JOB CREATION CAPACITY IN SMALLHOLDER MANGO ENTERPRISES IN LIMPOPO PROVINCE OF SOUTH AFRICA: A Hierarchical Multiple Linear Regression Analysis

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ABSTRACT

The Limpopo Province is one of the prime mango producers in South Africa, where smallholder farmers produce mangoes for both their household consumption and formal markets. Although smallholder farmers are an integral part of the farming communities, their contribution to job creation is undocumented and often unreported. The study analysed the contribution of farm size to job creation for smallholder mango farmers in the Limpopo Province. A random cluster sample of farmers (n= 84) was identified in an explanatory sequential mixed-method research design. The quantitative data collection was aided by a semi-structured questionnaire, with qualitative data being collected through face-to-face interviews. The study found that farm size significantly ($\beta = 0.061$, $p < 0.005$) increased the influence of smallholder mango farmers' potential to create formal jobs when other confounding variables were held constant in all models specified. In conclusion, the study recommends that the provision of land resources to smallholder farmers could create greater numbers of formal jobs and thereby impact positively on achieving economic growth and development.

JEL classification: D2, O5

1. Introduction

Unemployment is referred to as an economic condition in which individuals seeking jobs remain unhired (Ventura, 2018). According to this author, high unemployment rates threaten growth and social cohesion. Global unemployment trends have shown that unemployment has stabilized at 5.7% in developing economies (International Labour Organization, 2018). It has been recorded that medium-scale farms contributed 4.6% of the annual growth rate of agricultural production between 2000 and 2018 in sub-Saharan Africa, which led to the reduction of unemployment (Jayne and Muyanga, 2018). According to the international labour market report, global unemployment is expected to decrease by 0.2% in 2018. However, it was reported that in emerging economies such as South Africa, unemployment rate has been increasing from 2012 to date (Ventura, 2018). According to Trading Economics (2018), South Africa ranked second after Congo in terms of high unemployment rates (see figure 1).

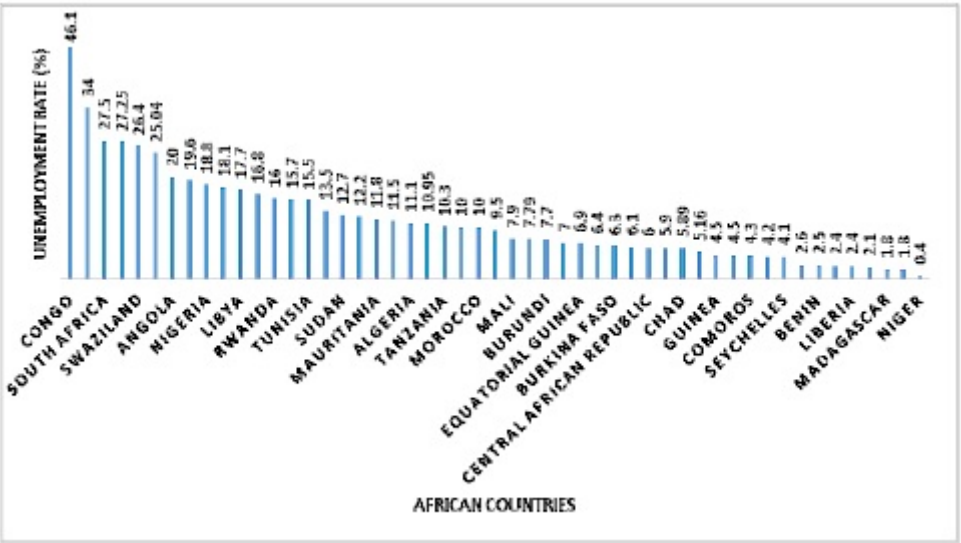

Figure 1. Unemployment rate in Africa (Trading Economics, 2018).

It was reported that unemployment rate reached 26.7% in the first quarter of 2018, and has affected approximately 6 million South Africans (Masutha, 2018). Furthermore, in the second quarter of the same year, it increased to 27.2%, affecting a total of 6.1 million people (Eye Witness News, 2018). This occurred in spite of various interventions, such as Accelerated and Shared Growth Initiative South Africa (ASGISA), the New Growth Path (NGP) and the National Development Plan (NDP), which sought to reduce the unemployment rate in South Africa to between 6 and 15% (Festus et al., 2015).

According to Dimant et al. (2016), approximately 829,000 (39%) people were unemployed in Limpopo Province, using the expanded definition of unemployment rate. Two years later, Statistics South Africa (2018) reported a decrease of 1.6% in the unemployment rate in this province. In spite of the aforesaid decrease in unemployment and the report by Dimant et al. (2016), Limpopo Province is still prone to high numbers of black South Africans (2.2 million, 42.2%) living in relative poverty, compared to both coloured (59,140; 39%) and white South Africans (1,405; 1.0%). In this province, high poverty rates were reported for the Vhembe (74.7%) and Mopani (73.4%) district municipalities, relative to other district municipalities such as Capricorn (72.3%), Waterberg (59.1%) and Greater Sekhukhune (72.8%), which have slightly lower poverty rates (Dimant et al., 2016).

In addition, it was revealed as early as 2014 by Statistics South Africa that a massive proportion (94.1%) of the households in Limpopo Province were involved in agricultural activities because they desired to increase their sources of food for household food security, while very few (0.6%) were involved in agriculture as a hobby, and others (0.7%) for income sources. Given their intended involvement in agricultural activities, smallholder farmers seem to aim more for securing food security than for deriving economic benefits from their farming practices, thereby perpetuating inequality and under-employment.

Notwithstanding this, Fenyes et al. (1998) have confirmed that South Africa is a country with significant incidences of inequalities in terms of race, class, and gender. These inequalities seem to be reflective of the lack of significant employment opportunities offered by the smallholder agricultural system of South Africa, which has been negatively influenced by the inadequate land resources that have resulted from and are the legacy of the old apartheid-era Land Act of 1913. It has been noted that this legislation formed the foundation

of productive asset poverty, which has led to the vast inequalities between commercial and smallholder farming sectors (Monteiro et al., 2018; van Rooyen and Nene, 1998).

Land deprivation has mainly led black South African farmers to practise smallholder farming while their white counterparts practice commercial farming. Groenewald (1998) reported that smallholder farming is crucial for the reduction of unemployment in rural areas where economic activities are sparse. Unfortunately, poverty is rampant in the rural district municipalities. Hence, the creation of formal jobs will help residents of any district to gain disposable money that could be used to improve the livelihoods of their households. This paper analyses the effect of farm size on the creation of formal employment by smallholder farmers in the mango industry of Limpopo Province. The objectives of the study were to analyse the improvement of employment capacity, high production potential, and improved product supply as a mechanism to reduce the rampant unemployment, inequality, and poverty affecting black rural South Africans, especially in the district municipalities of Limpopo (Vhembe and Mopani). The paper is organized as follows: presents a comprehensive literature review in section 2, followed by the presentation of the data and the methods applied in section 3. The results are presented in section 4, followed by discussion in section 5. Sections 6 and 7 provide the conclusion and policy implications and recommendations respectively.

2. Literature Review

2.1 Background of global mango production

Mango (*Mangifera indica L. Anacardiaceae*) is a popular nutritious fruit with a high economic value that is grown in the subtropical regions of numerous countries around the globe (Mohammed et al., 2018; Jahurul et al., 2015; Sellamuthu et al., 2013). Over 1000 mango varieties have been reported worldwide (Sellamuthu et al., 2013). Of the available varieties, only a few are grown on a commercial scale and traded in various agro-food chain markets (Solís-Fuentes & Durán-de-Bazúa, 2011). Contemporary studies indicate that this fruit tree is grown on an area of approximately 5.7 million hectares of land, and its production amounts to 45.8 million tons. Mango trees grow in more than 110 countries located in tropical and subtropical regions across the globe (Testa et al., 2018; Jahurul et al., 2015). According to Testa et al. (2018), India is the

largest producer of mangoes (18.4 million tons), followed by China (4.7 million tons), Thailand (3.6 million tons), and Indonesia (2.4 million tons).

Muchiri et al. (2012) found that, on the global scale, mango fruit occupies the second position as a tropical crop, behind only bananas regarding production and acreage used. The importance of this fruit is widely recognised, not only for its micronutrients such as vitamins and other phytochemicals, but also for its provision of energy, antioxidants, dietary fibre, carbohydrates, proteins, fats, sodium, potassium, beta-carotene and phenolic compounds (DAFF, 2010; Tharanathan et al., 2006). Mango is viewed as one of the most popular and economically essential fruits due to its admirable sensorial characteristics (sweet taste, bright colour, and delicious flavour) as well as nutritional composition (carbohydrates such as abundant glucose, fructose and sucrose, vitamins, minerals, fibre, and phytochemicals) (Dars et al., 2018; Barbosa et al., 2017).

Mangoes provide an excellent quantity of antioxidant activity and bioactive compounds, playing a beneficial role in human health. These bioactive compounds help prevent different pathological conditions, such as cardiovascular disease, and in decreasing the risk of various types of cancers and atherosclerosis (Dars et al., 2018; Nemec et al., 2017; Ulla et al., 2017). These nutrients comprise some of the essential nutritional requirements for healthy human growth, development, and health (Jahurul et al., 2015). Furthermore, Jahurul et al. (2015) highlighted the point that, besides the mango fruit, other parts of the mango tree, such as its leaves, flowers, bark, fruit, pulp, peel and seeds, contain essential nutrients that are very useful.

2.2 Mango production in Africa

Available statistics on mango production and its products in Africa are sparse. However, Nigeria and Egypt are some of the African countries that are ranked as the top mango growers (FAOSTAT, 2007). One of the countries that have a high potential for mango production is Ethiopia (Dessalegn et al., 2014). According to these authors, this country is one of the countries that have large tracts of land suitable for mango production. The climatic and soil conditions in Ethiopia seem to be suitable for mango production. According to Dessalegn et al. (2014), mango in Ethiopia is mainly produced in the Oromia, Benishangul Gumuz, Amhara, Harari, and Gambela regions. Historical evidence shows that Ethiopia has experienced increased mango production. For instance, from

2003/04 to 2013/14, Ethiopia recorded a massive increase in the total production of mango products, i.e., 208.4% and 247%, respectively. However, these production records were found to be way below Ethiopia's mango production potential. Moreover, mango markets in different parts of the country were found to be inadequately supplied. The mango production was also found to be unable to meet the demand of the local consumers, in both quantity and quality (Dessalegn et al., 2014).

In South African communities, mango was found to be among consumers' favourite fruits (Mbhenyane et al., 2005). These authors endeavoured to rank the popularity of mango, and their study revealed that the fruit was ranked the fourth in popularity among the top fruits in South African communities, relative to other popular fruits. The percentages of popularity were cited as follows: apples (92%), oranges (84%), bananas (81%), mangoes (51%), guavas (43%), canned apricots/peaches (41%), grapes (38%), and fresh peaches (24%). Regarding consumption in South African communities, the mango seems to be highly (99%) consumed in the local markets (Ntombela, 2012). According to this author, mango is consumed fresh or in processed products supplied at the local markets. These findings indicate that there may be massive domestic demand for this fruit in South African communities alone.

Studies have further revealed that there are several mango varieties in different countries (DAFF, 2010; Jahurul et al., 2015). Of these varieties, few are recognised as commercial varieties that could provide the much-needed quality and volume of mango fruit, for both domestic and international markets (Jahurul et al., 2015). Most importantly, the mango cultivars that are commonly produced in South Africa are classified among the common commercial varieties, being Tommy Atkins, Sensation, Kent, Heidi, Keitt and Zill (DAFF, 2010; Mohammed et al., 2012). For these varieties to perform as expected, certain environmental considerations need to be adhered to.

It may be beneficial to use commercial varieties where these are highly adapted to mass cultivation. The commercial production of mangoes would also demand sufficient water sources. Therefore, it is of vital importance that farmers ensure that water resources and soil nutrient conditions would support the growth and development of the fruit tree. Most (84%) of the mango trees may need to be planted under micro, drip, sprinkler or flood irrigation to guarantee the water availability for the fruit tree. The latter may be applicable in cases

where there are sufficient and reliable water sources for mango production (DAFF, 2014). Dryland production has been used in the past but is no longer favoured as it often leads to reduced yields.

In South Africa, formal industry producers are in the minority (20%) (DAFF, 2014; Ntombela, 2012). According to these authors, 80% of mango production on the national scale is by approximately 20% of the formal producers. Thus, the number of smallholder farmers who contribute to national mango production appears to be negligible. It cannot be discounted that smallholder farmers may play an essential role in household food security by producing this fruit for home consumption and free local markets.

Of all the provinces, Limpopo Province was found to be the top mango producer in South Africa (DAFF, 2014). This province produced 66% of national mango production (DAFF, 2010). Most of the mango production in Limpopo was found to come from the Soutpansberg, Northern, Central and Southern Letaba, and Hoedspruit regions. The products mentioned above exclude mango production in the smallholding and subsistence (household) farming environments, predominantly in the Vhembe district of Limpopo Province, where such farmers are in the majority.

2.3 Contextualization of the study and hypothesis

According to Genis (2018), rural employment is a crucial policy issue in South Africa. As a result, the National Development Plan (NDP) of 2012 suggests that one million jobs could be created in agricultural production, processing, and related activities (National Planning Commission, 2012). Genis (2018) further discussed that this plan anticipates that more jobs could be created by an increase in investment in water and irrigation infrastructure, linking smallholder farmers with markets, and by creating tenure security for farmers in communal areas, together with innovative financing and joint ventures. According to this author, the plan depicts a matrix which is termed "agricultural growth and employment potential." The matrix displays citrus, nuts, subtropical and deciduous fruit, and vegetables as demonstrating high growth and labour-intensive job creation potentials.

2.3.1 *Job Creation Derivable from Smallholder Farming*

Employment creation capacity is affected by a variety of factors such as farm size, dominant cultivar, sales (retailers), sales vendors, and yields (Ha et al., 2015). To date, none of these factors has been empirically investigated in the mango smallholder farming sub-sector of South Africa. As a result of this gap, this section of the study seeks to determine which of the factors mentioned above affect the generation of employment by the smallholder farming sector. Agriculture, forestry, and fisheries are widely recognised as being sectors with significant job creation potential (Operation Phakhisa, 2016). Operation Phakhisa reported that between 1994 and 2014, agricultural employment (i.e., from primary and agro-processing) in South Africa had declined by about 30% to 40%. The real contribution of the agriculture, forestry, and fisheries sectors to the gross domestic product (GDP) increased by 29% over the years 1994 to 2012.

However, the general perception in South Africa seems to suggest that smallholder farming is not capable of creating employment and that it is instead aimed at supporting household livelihoods and food security. This perception is partly right, given the limited resource base on which smallholder farming depends for its production capabilities. Ngaka (2016) augmented this fact by reporting that smallholder farmers also lack the essential skills required for modern agricultural production. This study seeks to find out which factors might influence the probability of smallholder mango farmers creating employment in rural areas where the soil and climate are highly suitable for producing mangoes. The following hypothesis guided the investigation:

Null hypothesis (H1a): On average, farm size, dominant cultivar, retail sales, vendor sales, and mango yields have the same influence on employment creation among smallholder farmers in South Africa.

2.3.2 *Exploring the Causes of Job Creation in Smallholder Mango Production*

The causes of employment in the smallholder mango farming sector have been under-reported. Thus, it is currently challenging to pinpoint which factors might cause employment creation in this sector. Consequently, this section seeks to determine which factors could cause the generation of employment by the smallholder farming sector. The following hypothesis was formulated to accomplish this empirical investigation:

Null hypothesis (H2a): Vendor sales, farm size, mango yields, and income have the same causal effect on employment creation of smallholder farmers in South Africa.

3. Materials and Methods

3.1 Participants

The respondents for this study came from those smallholder mango producers in Limpopo Province who were in the database of the Department of Agriculture and Rural Development. The selection of the participants followed particular criteria. Participants were selected from smallholder farmers who were deemed to be active in mango production and trade. They were requested to give their consent for participation before the commencement of the study. Employment creation in this study was also deemed to be one of the essential criteria for the selection of a participant, in that a smallholder participant ought to demonstrate a certain level of job creation through his or her farming enterprise. The average ages of the participants were 60 (SD=12.75) and 53 (SD=12.61) years in Vhembe and Mopani District Municipalities respectively. The employment creation status was found to be at an average of 3 (SD=2.09) in Vhembe and 15 (SD=27.20) in Mopani District Municipalities. The enumerators were selected and trained from the Department of Agriculture and Rural Development, and were supported by a research team, composed of the department officials and members of the National Agricultural Marketing Council (NAMC). In order to identify the large mango-producing areas of Limpopo Province, the team relied on existing publications and information received from district managers. The team agreed that the large mango-producing areas are Mopani and Vhembe District Municipalities.

3.2 Procedure

A mixed-method research design (i.e., explanatory sequential) was used to carry out the empirical investigation (see figure 2). Quantitative data was, therefore, collected, first through a close-ended questionnaire, and then validated through an in-depth qualitative interview, which was guided by an open-ended questionnaire. Each of these approaches was applied to complement and enrich the quality of information gathered. The gathering of data followed the views

expressed by Saunders et al. (2016) and used a participatory rural appraisal methodology, where primary and secondary data were collected from various sources. These qualitative and quantitative approaches enabled a broad interpretation to be made of the findings (Bryman & Bell, 2017). The sampling design utilized in this part of the task comprised a cluster randomized sampling technique. This technique was preferred because of the existence of representative clusters in the smallholder mango commodity database (Christensen et al., 2015). At the cluster level, most socio-demographics were similarly distributed as well, with income being an exception (Friedrich et al., 2018). According to Palys (2008) and Tustin et al. (2010), a cluster sampling technique can guarantee the representativeness of the participants.

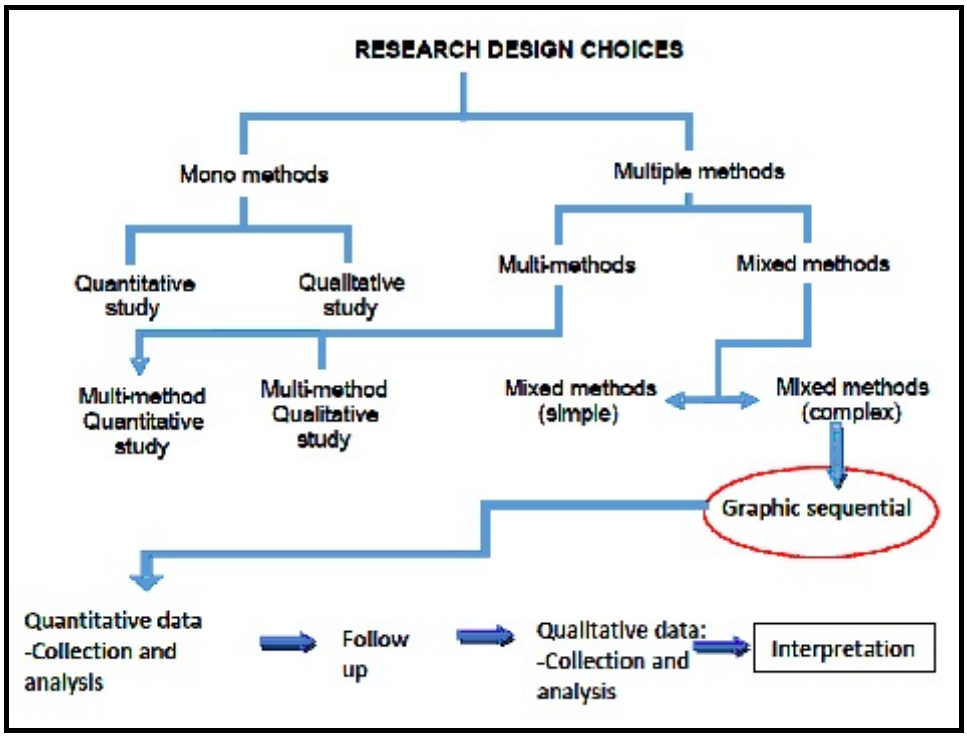

Figure 2. Research design choices or strategies (Saunders et al., 2016).

3.3 Measurements

A survey questionnaire with close-ended questions was developed, discussed, and approved by the team of experts. The questionnaire was drafted in

accordance with the principles outlined by Christensen et al. (2015). A data spreadsheet was developed to enable the managers to collect a consistent data set. Only participants who were in the Limpopo Department of Agriculture and Rural Development database were considered and interviewed.

3.4 Analytical framework

As a result of the research design employed in this study, two data sets were analysed. The quantitative data was analysed for predictive output, while the qualitative data provided the context, deep understanding, and description of the phenomenon. A desktop analysis was employed as a secondary data source. For quantitative analysis, multiple linear regression and structural equation modelling (SEM) results were utilized, while the qualitative analysis involved interviews, desktop analysis, and observations.

Model specifications

a) Multiple linear regression models

For multiple linear regression, models were specified in a stepwise manner in respective models after testing the three conditions of regression (normality, heteroskedastic, and multi-collinearity tests).

Model 1 was constituted by three predictor variables, namely farm size, dominant cultivars, and sales (retailers). These are illustrated in equation (1):

$$Y_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + E_1 \quad (1)$$

where:

$Y_{1,2,3}$ = employment creation

α = constant

E = residual (error term)

X_1 = farm size

X_2 = dominant cultivar

X_3 = sale (retailers)

X_4 = sale vendor

X_5 = yield

The second model included sales vendors as comprising an additional predictor variable. The equation is illustrated as follows:

$$Y_2 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + E_2 \quad (2)$$

The last model included yield (mango production) as an additional predictor variable. Cumulatively, this model consisted of five predictor variables, as illustrated in the equation below:

$$Y_3 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + E_3 \quad (3)$$

b) Structural Equation Modelling

This model predicted that sales of mangoes have a propensity to cause employment or job creation in smallholder mango enterprises.

$$Y_1 = \alpha_1 + \beta_1 X_1 + E_1 \quad (1)$$

The second model also predicted that farm size causes job creation to occur in these enterprises.

$$Y_1 = \alpha_2 + \beta_2 X_2 + E_2 \quad (2)$$

The third model predicted that mango yield/production causes job creation to occur in these enterprises.

$$Y_1 = \alpha_3 + \beta_3 X_3 + E_3 \quad (3)$$

Lastly, the model predicted that income generated could result in job creation occurring in the studied enterprises.

$$Y_1 = \alpha_4 + \beta_4 X_4 + E_4 \quad (4)$$

4. Results

4.1 Demographic analysis

The demographic analysis was conducted in order to ascertain the level of representation of the participants and their farming operations. This analysis provides a picture of the strengths and weaknesses of farming enterprises. It

focused on the age of the farmers, age of the trees, post-harvest losses, sales, yields, farming experience, farm sizes, and employment. Table 1 presents the demographic analysis of the current study. According to the results, smallholder farmers who are farming mangoes are somewhat older in both the district municipalities studied. Regarding the age of the mango trees, it was found that, on average, the Vhembe District Municipality has younger trees, relative to the trees in the Mopani District Municipality. Furthermore, it was shown that Mopani farmers had a superior profile in almost all the aspects of mango production, except for farming experience. It appears that farming experience is the same in all these district municipalities. Interestingly, the yields per ton from smallholder farmers in the Mopani District Municipality are roughly 11 times more than those in Vhembe District Municipality.

Table 1. Demographic Analysis of Smallholder Mango Production in Limpopo Province

Variables	Vhembe (n=42)	Mopani (n=42)
	M (SD)	M (SD)
Age of farmers (years)	60 (12.75)	53 (12.61)
Age of trees (years)	17 (9.42)	29 (18.50)
Post-harvest loss (tons)	3 (3.41)	26 (72.40)
Sales retailers (tons)	4 (9.36)	11 (22.85)
Sales vendors (tons)	8 (13.48)	22 (61.50)
Yield (tons)	18 (21.78)	197 (617.65)
Farming experience (years)	4 (0.73)	4 (0.43)
Farm size (ha)	11 (7.97)	229 (400.05)
Size of mango production (ha)	6 (5.40)	46 (64.18)
Employment	3 (2.09)	15 (27.20)

Furthermore, the average farm size in hectares for smallholder farmers in the Mopani District Municipality was found to be 21 times greater than that in the Vhembe District Municipality. On average, the volume of the mango production in the Mopani District Municipality was found to be eight times greater than in the Vhembe counterpart. Lastly, smallholder farmers in Mopani District Municipality were found, on average, to employ five times the number of workers, as compared with those in Vhembe District Municipality. These findings imply that smallholder farmers in Mopani District are operating within

a semi-commercial setup, while smallholder farmers in Vhembe District appear to be operating within a subsistence farming setup. It can be deduced that these smallholder farmers are operating within different institutional arrangements, and accordingly, the smallholder farmers in Mopani District Municipality are in a better position to attract investors, customers, employees and suppliers (Wickham, 2003). This assertion agrees with both new institutional economics and resource-based theories, in that smallholder farmers in Mopani are functioning in a commercialized environment, with an excellent resource base that is better than what their counterparts have.

4.2 Determinants of employment capacity of smallholder mango farmers

While it is difficult to measure the baseline of smallholder employment creation, this study sought to identify the determinants of employment capacity for smallholder farmers. Factors such as farm size, dominant cultivar, sales (retail and vendor) and yield, were hypothetically selected as factors that might induce employment creation among smallholder mango production enterprises in the studied province to address hypothesis 1a. This was achieved using stepwise multiple linear regression models, as presented in table 2. In these results, three models were presented, and each model had differing confounding variables. The results of the models failed to accept hypothesis 1a, implying that there is at least one factor that could influence employment creation of the smallholder farmers. Examining the overall fitness of the models in question, the goodness of fit of these models was confirmed through the statistical significance of the F-statistics. The variability [multiple correlations squared (R^2)] that the models account for was above 50%, implying that the models were indeed suitable for the current analysis.

The employment creation aspect was significantly predicted by farm size ($\beta = 0.060$, $p = 0.001$) and sales (retailers) ($\beta = -0.126$, $p = 0.05$) in model 1. In model 2, employment was predicted significantly by farm size ($\beta = 0.046$, $p = 0.001$), sales (retailers) ($\beta = -0.128$, $p = 0.001$), and sales (vendor) ($\beta = -0.111$, $p = 0.01$). Furthermore, employment was predicted significantly in model 3 by farm size ($\beta = 0.061$, $p = 0.001$), sales (vendor) ($\beta = -0.049$, $p = 0.001$), and yield ($\beta = 0.017$, $p = 0.001$). Consequently, it was observed that some predictors were important factors of employment creation by smallholder farmers. Of all the factors that were significant in determining employment creation, farm size and

yield had a positive influence on employment creation by smallholder farmers. This implies that increases in farm size and yield have the potential to increase the employment capacity of these farmers, when other confounding variables are held constant.

Table 2. Factors of Employment Creation by the Smallholder Mango Production Enterprises of Limpopo Province

Variables	Model 1	Model 2	Model 3
	β (SE)	β (SE)	β (SE)
Farm size	0.060***	0.046***	0.061***
	(0.004)	(0.006)	(0.005)
Dominant cultivar	-0.261	0.078	0.181
	(0.572)	(0.554)	(0.439)
Sales (retailers)	-0.126*	-0.128*	-0.017
	(0.007)	(0.058)	(0.049)
Sales vendor		-0.111**	-0.049***
		(0.004)	(0.004)
Yield			0.017***
			(0.003)
Constant	3.646	1.195	0.842
	(2.677)	(2.604)	(2.069)
F-Stat	271.85	310.99	538.87
P-Value	0	0	0
R2	0.79	0.81	0.67
RMSE	8.42	7.97	6.31

Note: *P<0.05, **P<0.01, ***P<0.001

4.3 The conditions of employment capacity for smallholder mango farmers

The results of the conditions for employment creation in the enterprises of smallholder farmers of Limpopo Province are presented in table 3. According to the results, all factors identified appear to have a significant causal effect on employment creation in these enterprises. As a result, it was deduced that all predictors cause an improvement in employment creation by smallholder farmers. Hence, the null hypothesis that none of the factors identified cause

employment creation by smallholder farmers in South Africa was rejected in favour of the alternative hypothesis.

Table 3. Conditions of Employment Creation in Smallholder Mango Enterprises

Variables	Coefficient	SE	Z	P> |Z|
Employment				
Sales (vendor)	0.09	0.03	2.96	0.003
Farm size	0.06	0.01	12.61	0
Yield	-0.02	0	-7.14	0.009
Income	-1.22	0.73	-1.67	0.015
Constant	3.82	1.57	2.43	
Var (employment)	38.5	6.42		

From these results, sales (vendor) ($\beta = 0.09$, $p = 0.003$) and farm size ($\beta = 0.06$, $p = 0.000$) appear to improve the employment capacity of these farmers, while yield ($\beta = -0.02$, $p = 0.009$) and income ($\beta = -1.22$, $p = 0.015$) seem to have a retrogressive impact on employment creation of these farmers.

5. Discussion

Paul and Wa Gīthīnji (2018) reported that African agriculture is often dominated by smallholder farms, comprised of multiple small plots that are fragmented. According to these authors, these farms have low capacity to increase yields, create employment, and to decrease poverty. Simbanegavi et al. (2018) highlighted the point that deepening poverty and inequality have been a function of the rampant unemployment and underemployment experienced in the African context. In table 3, there seems to be evidence that agricultural yield and income from smallholder farmers have a significant adverse impact on employment creation, while an increase in yields from smallholder farming is positively associated with employment creation and creditworthiness (see table 2). Mitra et al. (2018) confirmed the above assertion by reporting the high creditworthiness of smallholder tomato farmers in Bangladesh that was attributable to high farm productivity, although they did not explain the

conditions under which employment creation could take place for this type of farming enterprise.

According to the World Bank, the agriculture sectors in emerging markets tend to grow from subsistence agriculture, where collective farming is practised with low productive capacity and low-intensity agri-business activities (Walton & Grishin, 2018). From the previous report and others, it appears that the transformation of smallholder farming into intensive commercial enterprises gives credence to the need to employ massive workforces (Mutabazi et al., 2013). However, South African scholars tend to hold an argument that the smallholder farming sector (despite its scarce land and market access) could provide the much-needed employment for the poor rural dwellers of South Africa (Delgado, 1999; Ortmann & King, 2010). This argument seems to be contradicted by this study and the work published by Khapayi and Celliers (2016), which advance good infrastructure, adequate farm size, and access to credit and markets as precursors for job creation. However, Shawon et al. (2018) have reported that shrimp farming in a coastal area of Bangladesh was financially profitable, regardless of the small farm size, contrasting the positive correlation between farm size and job creation. Walton and Grishin (2018) also revealed that small farms are unproductive, even in advanced economies, and gave an example of where the Japanese government had resorted to providing small-scale farmers with generous subsidies, despite crop performance. These experiences make diagnosing smallholder farming profitability and job creation much more complicated.

Hendriks (2003) and Aliber and Hart (2009) have also reported that this type of smallholder farming is also essential for two distinct nutritional benefits; the provision of food for household consumption and the saving of income for other indispensable food items that cannot be produced on their farms. However, such a role might not be sustainable if these enterprises are not able to attract the necessary revenue from financial institutions and reserves that could combat the effects of climate change. Moreover, Asfaha and Jooste (2006) also found that, without smallholder agricultural activities, rural-to-urban migration might increase at an alarming rate, leading to seemingly high incidences of peri-urban and urban poverty and unemployment. Matshe (2009) further argued that smallholder farmers have a potential for reducing unemployment, poverty, and hunger if they are well resourced for generating adequate income, and they

experience an expansion of their skills base (DAFF, 2016). Given the perceived impact of this sector of farming in reducing the above-mentioned socio-economic challenges in South Africa and the Southern African region in general, poor rural households have convinced the government departments to empower their farming capacities in order to increase their potential to create the much-needed employment (DAFF, 2016).

The programme of the South African government from 1994 to 2018 appears to be committed to empowering smallholder farmers as they constitute one of the crucial role players in the emancipation of rural people from the high levels of the effects of unemployment (Mmbengwa, 2009; Mmbengwa et al., 2018). Rosegrant and Hazell (2000) reported that in Asia, smallholder farming has effectively reduced unemployment, poverty, and hunger. On the other hand, Matshe (2009) and FAO (2004) further reported that in sub-Saharan Africa and Southern Asia, the proportions of unemployed and undernourished people have decreased over the last decades. Furthermore, Matshe (2009) argued that the absolute decrease in the number of undernourished people in the developing world has fallen by nine million over this period because of the significant role that smallholder farming has been playing in tackling food insecurity in this part of the world.

The current study found that there are factors that can determine the conditions and capabilities for employment creation by these farmers. Factors, such as farm size and yield, were seen to have a positive influence on the creation of jobs by smallholder farmers. These findings are consistent with those of Bruynis et al. (2001) and Walton and Grishin (2018). Bruynis et al. (2001) found that the business volume examined in that study could lead to a 2.563 increase in business growth and employment creation of agricultural cooperatives, while Walton and Grishin (2018) found that in the United States, the minimum efficient scale for a maize farm is about 324 hectares.

However, the required business volume cannot be achieved without the necessary machinery and farm size. The smallholder farmers in South Africa, regardless of the commodity they produce, were historically deprived of acquiring optimum farm sizes during the period of apartheid government (Groenewald, 1998; van Rooyen & Nene, 1998). This deprivation seems to be more pronounced among the Vhembe smallholder farmers, and thus their employment capacity was found to be highly negligible, as compared with their

studied counterparts. The study found that, among other things, yield and income have a negative causality on employment creation by these farmers, concerning the cause of the conditions of the employment. These findings appear to be counter-intuitive and are not supported by economic theories (Wickham, 2003).

6. Conclusion

This study sought to address the question of whether smallholder mango farmers can contribute to the creation of employment. Theoretically, smallholder farmers are considered to have no appetite for the creation of formal jobs because these farmers are risk-averse, and they lack the necessary resources. Furthermore, the limitation of the existing theoretical framework that guides the identification of the factors that might influence job creation was explored. The factors that were identified as being influential in the creation of jobs by these farmers could form an essential part of the existing theory, and its amendment to suit the smallholder farming situation.

7. Policy Implications and Recommendations

Smallholder farming policies in South Africa are crafted without a link with specific commodities. The existing policy trajectory, such as land reforms, Comprehensive Agricultural Support Programme (CASP), National Development Plan Vision 2030, and growth path, provide generalised policy directions for all smallholder farming. The current policy domain provides an expression that supporting smallholder farming with agricultural inputs, such as pesticides and fertilisers, without increasing the farm size, could improve the job creation capacity.

On the contrary, the results of the current study appear to suggest that land size and yield have a significant and positive impact on the increase in job creation efforts. Given these results, the policies should be amended to provide emphasis on strategies that would ensure that smallholder farmers have access to adequate land size and production technologies. Lastly, smallholder farmers are known for lack of adequate land resources and volumes of production. It is, therefore the recommendation of this study that smallholder farmers should be supported with adequate land facilities needed for them to have a meaningful impact on job creation and social stabilization. Future studies on employment

creation by smallholder farmers should focus on the different categories of these farmers and the impacts of farm size and yield per hectare. A comparison of farmers, based on similar farm sizes, could give a better indication of which farm size could enhance employment creation.

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