

RISK MANAGEMENT STRATEGIES ADOPTED BY SMALL-SCALE VEGETABLE FARMERS IN THABA CHWEU LOCAL MUNICIPALITY, MPUMALANGA PROVINCE IN SOUTH AFRICA

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Abstract. Agriculture is one of the sectors considered to be an extremely risky business. This has led to many farmers adopting different risk management strategies in order to deal with the prevailing risks. The objectives of the study were to identify the types of risk and risk management strategies; and to determine the level of risk management strategies adopted by small-scale vegetable farmers in Thaba Chweu Local Municipality. Descriptive statistics and the adoption index were employed to address these objectives. Purposive and snowball sampling procedures were used to select 40 small-scale vegetable farmers in Thaba Chweu Local Municipality. The study identified pest attacks and unfavorable weather conditions as the major risks faced by small scale vegetable farmers in the study area. Furthermore, the study revealed that majority of these farmers use pesticides, forward contracts and crop rotation as the risk management strategies.

Keywords: adoption, adoption index, risk management, small-scale vegetable farmers

INTRODUCTION

It has been estimated that 70% of Africa's population resides in rural areas and 80% depend on agriculture for food and income (Oruko et al., 2011). According

to Lehohla (2016), the number of households engaged in agriculture in South Africa amounted to 2.3 million in 2016. Among those farmers, 8.4% live in Mpumalanga Province. Despite the importance of agriculture in the country, the sector faces many challenges, including climate variability, price volatility, high production costs and unintended policy effects (DAFF, 2015). The agricultural value chain is prone to multiple risks which have an impact on production value and on the profitability of different enterprises along the value chain. These risks range from production, marketing, financial, institutional to human risk (FAO, 2013). All of them need management strategies so that production and revenues can be increased. Thus, households need to make better decisions on managing the risks that occur in their farms since most of them depend on agriculture for food security and income.

The South African government is committed to assist farmers in managing risks, however it is the attitude of the farmer towards the risk which determines whether he/she adopts the risk management strategies or not. For example, in 2012, DAFF released a Sectoral Disaster Risk Management Plan with the purpose of improving risk identification and assessment, hazards and vulnerability monitoring, and the relevant capabilities. The plan

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also seeks to improve communication and information among stakeholders in identifying and assessing risks. However, due to the riskiness of agriculture – especially including vegetable production – the farmers’ appropriate risk decision is a prerequisite for selecting an effective risk coping strategy. This is because a farmer who is not clearly aware of the risks occurring in the farm is likely to face problems in managing such risks (Sulewski and Kłoczko-Gajewska, 2014).

Thus far, agriculture is not only a contributor to Gross Domestic Product (GDP) but also plays a major role in improving household food security. Yet, the sector faces greater risk of being affected by natural disasters such as floods, drought and hail than any other sector in the economy (Du Toit, 2015). Studies conducted by Ogada et al. (2009), Cavatassi et al. (2011), Brown et al. (2013) and Baiyegunhi and Fraser (2014) indicated that the adoption of risk management strategies by small-scale farmers is generally low due to a variety of factors, including lack of information, lack of financial resources and poor access to productive inputs. In addition, the types of risk management strategies that farmers adopt also vary by location and socioeconomic characteristics (Aditto et al., 2012). Therefore, this study intended (i) to identify the types of risk and risk management strategies adopted by small-scale vegetable farmers and; (ii) to determine the level of risk management strategies adopted by small-scale vegetable farmers in Thaba Chweu Local Municipality.

METHODOLOGY

The study used primary data collected from Thaba Chweu Local Municipality (TCLM) in Mpumalanga Province, South Africa. The TCLM falls within the summer rainfall region with rainy seasons normally lasting from October to March. The average annual precipitation varies between 500 mm and 1700 mm. The average temperature varies from a minimum of 2°C to a maximum of 32°C, with warmest days in December and coldest nights in June. Hence, the climate of TCLM is suitable for vegetable production (TCLM, 2017). Therefore, the study area was chosen because of its distinctiveness with regard to agricultural potential.

The study used questionnaires administered via face-to-face interviews to small-scale vegetable farmers of TCLM. The questionnaire entailed the demographics of the farmers, the types of risks faced, vegetables

produced, and the risk management strategies adopted. Purposive and snowball sampling procedures were used to select 40 small-scale vegetable farmers. They were selected due to the unknown number of small-scale vegetable farmers in the study area. Descriptive statistics was used to identify the types of risks faced by small-scale vegetable farmers in TCLM and risk management strategies adopted. Furthermore, an adoption index was employed to determine the level of risk management strategies adopted by the farmers. An adoption index ranges from 0 to 1. An index score of 0 indicates farmers who are non-adopters, and an index score of 1 indicates farmers who adopt all the risk management strategies.

Following Kebede and Tadesse (2015) and Miruts (2016), the adoption index for individual farmers can be computed by:

$$AI_i = \frac{TRA_i}{TRI} \quad (1)$$

where:

AI_i is the adoption index of the i^{th} farmer

TRA_i is the total number of risk management strategies the i^{th} farmer adopted

TRI is the total number of risk management strategies identified in the study.

Low adopters of risk management strategies are given a score of 0.01 to 0.33, medium adopters are given a score of 0.34 to 0.66. High adopters of risk management strategies fall between 0.67 and 1.

RESULTS AND DISCUSSION

Table 1 provides the socioeconomic characteristics of farmers from the study area. A total of 40 small-scale vegetable farmers were considered for this study with an average age of 42 years, indicating that most of the farmers are still in their active stage. The households in TCLM have an average household size of 5 members. From the sample, the results showed that farmers have an average of 8 years’ experience in vegetable production.

The average arable land that farmers operate on is 0.84 ha. In the small-scale farming sector, crop production is mainly for subsistence purposes. Hence, on average, farmers can make a profit of ZAR 2707.50 per annum. The sample results further revealed 2.4 km as the average distance the farmers travel to the market.

Table 1. Demographic characteristics of farmers

Variables	N	Minimum	Maximum	Mean	Standard deviation
GEN	40	1	2	0.50	0.506
AGE	40	18	82	42.48	17.07
HHS	40	1	11	4.85	2.23
EXP	40	1	30	7.80	8.50
SAL	40	0.5	2.5	0.84	2.23
TFI	40	0	18 000	2 707.50	4 430.74
DIS	40	0	15	2.42	4.23

GEN: gender; AGE: age; HHS: household size; EXP: farming experience; SAL: size of arable land; TFI: total farm income; DIS: distance to the market.

Source: elaborated based on research survey, 2017.

Types of risks farmers face

Table 2 indicates the types of risk faced by farmers in the study area. It indicates how many times the risk was mentioned by the farmers. Most farmers indicated pest attack as the major risk they face, followed by unfavorable weather conditions, crop failure and lack of market access.

Table 2. Types of risks farmers face

Type of risk	Frequency
Pest attack	37
Unfavorable weather conditions	28
Crop failure	21
No market access	3
Theft	0

Source: elaborated based on research survey, 2017.

Risk management strategies employed by small-scale vegetable farmers in Thaba Chweu Local Municipality

The risk management strategies used by farmers in TCLM are presented in Table 3. The results indicate how many times farmers mentioned the risk management strategies they employ. For example, majority of the farmers in TCLM apply pesticides as a way of reducing risk. Abate et al., (2000) and Alamerie et al.

(2013) found that the use of pesticides and enterprise diversification are the most common strategies adopted by vegetable farmers. This is supported by Demeke et al., (2016) indicating that farmers are able to manage some of the risks through diversification by themselves. However, how each of these strategies is applied depends on the availability of resources, priorities and opportunities (Demeke et al., 2016). Although farmers adopt risk management strategies differently, there is a group who use no risk management strategy (12.5%). There are also farmers who use multiple risk management strategies

Table 3. Frequency of risk management strategies employed by small-scale vegetable farmers in Thaba Chweu Local Municipality

Risk management strategies	Frequency
Crop rotation	9
Applying pesticides	26
Forward contract	10
Crop sharing	5
Hiring security	1
Enterprise diversification	1
Off-farm employment	0
Crop insurance	0
none	5

Source: elaborated based on research survey, 2017.

(37.5%) and those who use a single risk management strategy (50%). Huirne et al. (2007) indicate that multiple risk management strategies on the farm seem to be more efficient than a single risk management strategy. Furthermore, Jallow et al. (2017) indicate that vegetable farmers adopt more than one strategy to deal with risks. Thus, if the risk associated with vegetable production is reduced, it will also reduce the food supply gap (Osuji et al., 2017). The study further indicated that adopting adequate risk management strategies to address the risk intensity perceived by vegetable farmers may enhance their profitability and output.

Differences in vegetable production between adopters and non-adopters of risk management strategies

Table 4 shows the type of vegetables produced by small-scale farmers in Thaba Chweu Local Municipality. The results indicate how many times a certain vegetable was mentioned by the farmers. For instance, the results show cabbage (45%), carrots (30%), green pepper (23%) and onions (15%) as the major vegetables produced by both non-adopters and adopters of risk management strategies. This is in line with a study by Alamerie et al.

Table 4. Differences in vegetable production between adopters and non-adopters of risk management strategies in Thaba Chweu Local Municipality

Vegetable	Frequency	%	Non-adopters	Adopters
Cabbage	18	45	5	13
Carrots	12	30	1	11
Green pepper	9	23	3	6
Onions	6	15	1	5
Tomatoes	5	13	3	2
Beetroot	4	10	1	3
Sweet potatoes	4	10	0	4
Spinach	3	8	0	3
Potatoes	3	8	2	1
Red pepper	2	5	1	1
Lettuce	2	5	0	2
Broccoli	2	5	0	2

Source: elaborated based on research survey, 2017.

(2013) who found that 42.6% of farmers in Kombolcha Worenda produce cabbage and 20% produce carrots. These vegetables provide an affordable source of proteins, vitamins and other elements vital for human health and wellbeing (Ngegba et al., 2016).

The study also found that ca. 8% of the farmers produced potatoes and spinach. Moreover, ca. 13% of the farmers in the study area produce tomatoes. The study also found that beetroot and sweet potatoes are produced by 10% of the farmers. Only 5% of non-adopters and adopters of risk management strategies produce red pepper, lettuce, and broccoli. This concurs with a study by Alamerie et al. (2013) who found lettuce as one of the least produced vegetables by farmers in Kombolcha Worenda.

The results of the study reveal that there are differences between the type of vegetables produced by the adopters and non-adopters of risk management strategies in Thaba Chweu Local Municipality. This might be because vegetable production is a risky business due to its perishable and biological nature (Alamerie et al., 2013). Moreover, most farmers produce for consumption and the surplus is sold to improve household income. Although vegetable production is prone to multiple risks, Mitra and Sharmin (2019) emphasize that the risk management depends on the attitude of the farmer. Furthermore, the degree of adoption by farmers is influenced by farm size and farmer characteristics (Kalinda et al., 2014). Hence, farmers prefer to produce certain vegetables based on the type of risk associated with them.

Level of adoption of risk management strategies

Figure 1 illustrates the level of risk management strategies adopted by small-scale vegetable farmers in TCLM. An adoption level between 0.01 and 0.33 indicates farmers who are low adopters of risk management strategies. An adoption level of 0.34 to 0.66 indicates farmers who are medium adopters, whereas a level of 0.67 to 1 is characteristic of high adopters of risk management strategies (Miruts, 2016).

The results showed that ca. 50% of the farmers are low adopters of risk management strategies in TCLM. About 32% were found to be medium adopters whereas 5% of the farmers are high adopters of risk management strategies. Lastly, 13% of farmers in TCLM are non-adopters. In agreement with these results, Duong et al. (2019) recently argue that the farmers' management

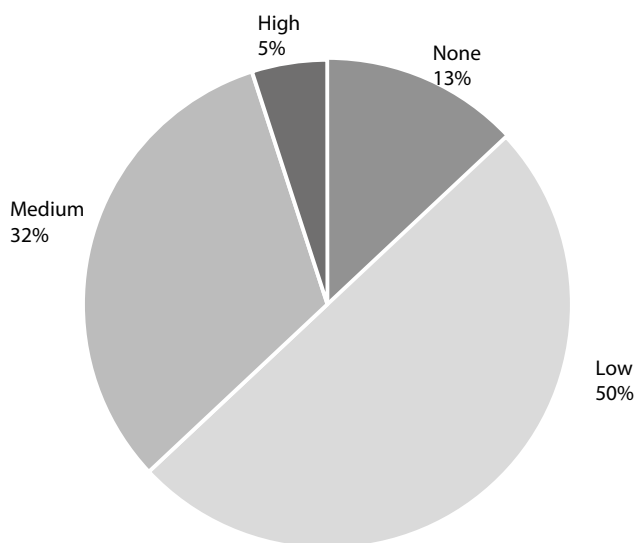


Fig. 1. Level of adoption of risk management strategies
Source: elaborated based on research survey, 2017.

response to risks is influenced by their perceptions of the risk concerned on a case-by-case basis. This is because the farmers develop a wide range of strategies to limit the impacts of agricultural risks, thus employing strategies spanning from informal mechanisms at the farm level (crop and animal diversification and advanced technology applications) to formal mechanisms such as insurance and contracting (Meuwissen et al., 2001; World Bank, 2005; Bergfjord, 2009). Also, given the different socioeconomic circumstances such as age, education, culture, religion, farming practice, income, peer pressure, and community values, the farmers have different risk perceptions which result in different economic behaviors and decision-making (Ahsan, 2011; Bergfjord, 2013). Knutson et al. (2011) and Woods et al. (2017) also shared similar findings, establishing that a farmer's level of adoption of risk management strategies and successful risk management is affected by certain factors which include the absence of transparent information, limited institutional support and lack of capital. To this point, given the study results, and a proposition by Duong et al. (2019), improved institutional support for risk management is therefore essential so as to understand the farmers' risk perceptions, the socio-economic factors that influence risk perceptions and the likely response to risks, and the barriers to implementing risk management strategies (Lewerin et al., 2015).

Adoption of risk management strategies

Figure 2 indicates the number of farmers who adopt risk management strategies and those who do not use any risk management strategy. The study found that most farmers are adopters of risk management strategies (87%) and only 13% are non-adopters. These results indicate that ca. 87% of the farmers either employ a single strategy or multiple strategies to manage risk in their farms. A chi-square test value of 3.073 with a probability of 0.0786 revealed a significant difference between adopters and non-adopters of risk management strategies in the study area. In relation to the results observed, previous research points out that farmers are not likely to adopt new technologies. However, they adopt innovative risk management practices in order to control and manage risk (particularly in agricultural production) for sustainability and efficiency (Awan et al., 2015; Duong et al., 2019). Hence, there is an observed higher statistic of farmers who adopt risk management strategies in the study area. In this context, the lack of institutional support from the government is currently identified as a major barrier to managing agricultural risks for farmers in both developing and developed countries (Duong et al., 2019). This has resulted in farmers becoming vulnerable to agricultural risks (especially when it comes to

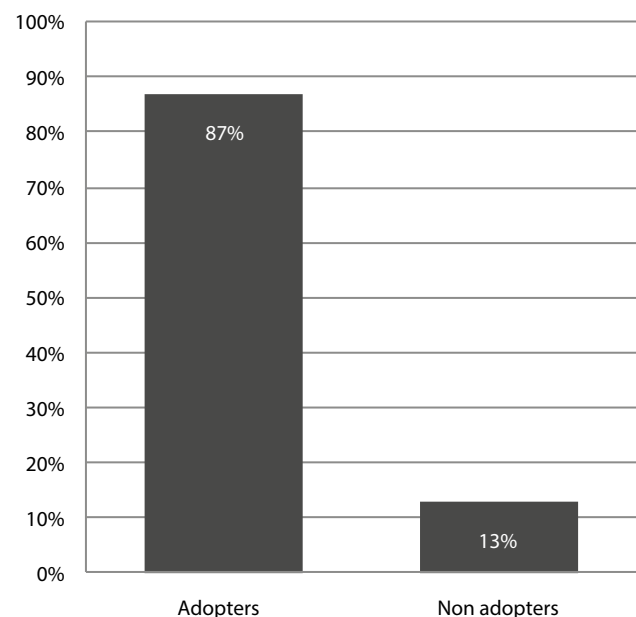


Fig. 2. Adoption of risk management strategies
Source: elaborated based on research survey, 2017.

small-scale farmers) and having difficulties in adopting new technologies of risk management due to inadequate technical knowledge, lack of funds and limitations of their production technology (Atreya, 2007; Awan et al., 2015).

CONCLUSION

This paper concludes that pest attack is the major risk faced by small-scale vegetable farmers in the study area, followed by unfavorable weather conditions which might lead to crop failure. The study found cabbage, carrots, green pepper and onions as the major vegetables produced by both non-adopters and adopters of risk management strategies. However, these vegetables are prone to various risks such as pest attack, unfavorable weather conditions, crop failure and lack of market access. Farmers use risk management strategies such as pesticides, forward contracts and crop rotation in order to manage these risks. Note that few farmers (12.5%) use no risk management strategies. The paper therefore argues that pesticides are a well-known risk management strategy employed by vegetable farmers in the study area, yet other risk management strategies, such as enterprise diversification, crop rotation, off-farm employment or crop insurance, can also be employed to manage risk. Therefore, farmers need education and awareness campaigns regarding different risk management strategies to be employed.

LIMITATIONS OF THE STUDY

The study was limited to Thaba Chweu Local Municipality which resulted in a small number of farmers engaged in vegetable production. However, this limitation does not invalidate the results of the study because of the use of appropriate statistical methods in the analysis. Additionally, the study leaves a gap for analysis of the adoption of risk management strategies by small-scale vegetable farmers in the entire Ehlanzeni District of the Mpumalanga Province, South Africa, in order to assess the different risk coping strategies employed by vegetable farmers.

ACKNOWLEDGEMENT

The authors acknowledge the South African Agricultural Research Council for funding this study.

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