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COST AND RETURN ANALYSIS OF SMALLHOLDER ORGANIC CROP FARMS IN SOUTH AFRICA

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Abstract: Organic farming is identified as one of the sustainable approaches to farming and believed to guarantee substantial net gains and promote sustainable natural resource management. Notwithstanding, organic farming is still being perceived negatively in South Africa and there is shortage of empirical studies which focus on cost and return of smallholder organic crop farms. It is in this regard that the study therefore seeks to analyze cost and return of smallholder organic crop farms in the Eastern Cape Province of South Africa to contribute to knowledge on the relative economic advantages of organic agriculture at the smallholder sector. A multi- stage random sampling technique was used to obtain primary data from one hundred and sixty smallholder organic crop farmers with the aid of structured questionnaires. Data collected were analyzed by gross margin. The analysis of the data showed that smallholder organic crop farms are undoubtedly profitable farm business, with lower production costs. It is in this regard that the government is advised to encourage the practice of organic farming by giving short-term loans to smallholder farmers, to enable them invest more in their organic crop farms.

Keywords: Cost and return; gross margin; organic farming; profitability.

1. INTRODUCTION

Agriculture remains an influential sector in South Africa in terms of its contributions to economic development and poverty reduction, notably in the rural areas (Stats. SA, 2012). These include providing sufficient and affordable food for the constantly increasing population, and cheap food for the developing industrial labor force, providing employment and livelihoods to a considerable percentage of the population, and supplying raw materials to the country's rising domestic industrial sector. Without doubt, agriculture remains a key sector of the South African economy (DAFF, 2012). Despite phenomenal progress in integrating of smallholder farmers (Kisaka-Lwayo and Obi, 2014), since democratic reforms in South Africa, smallholder farmers' agricultural production has been on a downward slope (AGRA, 2014). The decline in productivity could be traced to absence of suitable investment, research and development and supply side constraints (DAFF, 2011). Some of the supply side constraints include insufficient availability of credit facilities, deteriorating soil quality through poor agricultural practices, land erosion, acidification and mineral deficiency (Mudzonga and Chigwada, 2009).

Shiferaw *et. al.*, (2011) stated that over the long-term, large public and private sector investment and sustained political commitment and policy support for technology generation and delivery are implemented to overcome insufficient availability of credit facilities and decline in agricultural productivity in the country. This also includes intensive agricultural policy based on modern technologies adoption and application of fertilizers as a way to increase production, ensure food security,

and protect the environment. Such policy changes are particularly crucial because many regions of Sub-Saharan Africa (SSA) are no longer land abundant. Land scarcity is compounded by low soil fertility, resulting from the shortening or elimination of the fallow period without concurrent efforts to increase soil nutrients through fertilizer application (Rosegrant *et. al.,* 2014). Increased use of fertilizer has a key role to play in this process. Because of the high labor intensity and low quality of organic fertilizer, restoration of soil fertility increasingly requires the use of agro-chemicals. Expectedly, farmers, governments, researchers and input suppliers have been responding to the expanding demand for agro-chemical usage. During 2003 to 2008, the use of fertilizers in maize production increased annually by 6.0 percent in Asia, 5.0 percent in Latin America, and 2.3 percent in SSA (FAOSTAT, 2010). In the previous years, the increase in the use of fertilizers in maize area in Asia and Latin America is by 3.5 percent annually (FAOSTAT, 2010).

Nonetheless, the increases fell short of those needed to prevent food insecurity and price hikes in 2015. Therefore, use of agro-chemical is no longer a sustainable option and often comes with an environmental cost in terms of increased land degradation (Pearce *et. al.*, 2013). For instance, the World Health Organization (WHO) estimated that "in 2004", 70 percent of 1.5 billion cases of agro chemical poisoning occurred through synthetic chemicals. These chemicals penetrate the body structure by consuming conventional foods and thus weaken the body systems, leading to obesity, diarrhea, diabetes, abortions, birth deformities and cancers (Benbrook, 2009). In 2011, the WHO published about three to five million agro chemical poisoning incidents, resulting to more than 40 000 deaths per year in developing countries. For further illustration, in a review conducted by Gojmerac *et. al.*, (2006) on South Africa's maize farms twenty percent agrological chemicals were found in both soil and groundwater. These chemicals were equally discovered to have led to early sexual development during prenatal growth in infants. Studies show vulnerability to agricultural chemical such as atrazine changes male frogs into sterile hermaphrodites, which could be tied to different diseases in children (De Coster and van Larebeke, 2012).

South Africa appears to be one of the leading importers of agrochemicals in Africa, and this has created public health and ecological risks (Quinn *et. al.,* 2011). According to FAOSTAT (2014), data indicated that in 2012 South African's imported agrochemicals to the rate of US$341m, representing about 95 percent of chemicals imported into the country and a measured rise of 200 percent from 1997.These imported chemicals considered by the International Agency for Research on Cancer (IARC) to be negative on crop farms are still being applied on crop fields in the provinces (Goldblatt, 2010). This may compromise the well-being of farmers, workers and the surrounding communities. Thus, there is need to protect individual health and natural environment, enhance overall food production to ease the widespread hardship in the country.

The foregoing suggests that, organic production may be one way to sustainable farming in the agricultural areas. Organic farming increases crop yield per unit of land and is identified as one of the many ways to boost food production in SSA and reduce the effects of agrological chemicals (IFOAM, 2012). Although modern agricultural practices add to international food security and nutrition particularly use of agricultural chemical to double food production. Food and Agriculture Organization (FAO) (2007) mentioned that famine and environmental degradation continue to linger even as worries about global human health and food security issues increases. Furthermore, the last ten years have brought undeniable evidence of diminishing returns on food production in spite of the rise in the application of chemicals in agriculture to intensify food production. This ends in loss of confidence by the foreign bodies that these high synthetic inputs will not cater for equitable household and communal food security in the future (Shiferaw *et. al.,* 2011).

In terms of development, organic farming is best fit for smallholder farmer's transformations, which are located in the rural areas. These resource poor farmers did not rely on artificial inputs and this has assisted them to experience higher returns and food security (IFAD, 2013). Organic farming in developing countries has assisted to keep strong traditional heritage of the people. It has been said to sustain communities and provide youth incentive to fully engage in farming, then reducing rural-

urban migration. In addition, organic farming reduce risks because farmers and their household are no longer exposed to agricultural chemicals, which is one of the main sources of risks in the farm (IFAD, 2013).

In South Africa, for instance, there is a small but effective group of organic farmers in provinces of the Western Cape, KwaZulu-Natal, Eastern Cape, Northern Cape and Gauteng Province (Kisaka-Lwayo and Obi, 2014). Organic farming has made lots of jobs available for smallholder farmers, youth and women in South Africa and cares for their financial welfare (DAFF, 2011). In addition, the market for organic food in the country has become a stable expanding business. It increased by an extraordinary 300 percent from 2004 to 2005, and still predicted to rise above 30 percent yearly in the next five years (UNDP, 2012).

This practice also increase yields and profitability and has been identified as a pathway to sustainable development and enhanced food security of smallholder farmers (Kisaka-Lwayo and Obi, 2014). However, organic farming is still being perceived negatively in South Africa probably due to information asymmetry on cost and return. For example, organic farming is subjected to derogatory campaigns in the media by groups advocating adoption of synthetic chemicals as a better approach to boost profitability and yields (Herath and Wijekoon, 2013). The agricultural input suppliers' give misleading report that organic farming is high risk and not capable of doubling yields and profitability. Smallholder farmers still think this farming practice is for the wealthy and prominent farmers (Negi, 2014). More so, the production process correlates with local issues such as spread of weeds, conditional on agrochemical resources for yields increase and profitability (Organic Research Centre, 2014). Smallholder farmers are again not satisfied that organic farming can increase yields and profitability, and suitable for a growing global community (Searchinger et. al., 2013). Organic farming has grown beyond these perceptions despite public and private antagonism. The willingness of farmers to experiment and of consumers to pay premiums on organic food represents a major progress in the sector (VanDoorn and Verhoef, 2011).

According to Wolfenson and Rome (2013), organic farming provides up to four times higher outputs and nourishment per hectare. Other surveys indicate conversion to organic farming in developing countries leads to higher yield and profitability for smallholder farmers (Seufert *et. al.*, 2012). Notwithstanding these perceptions, several reviews have proved that organic farming is a profitable investment (Nemes, 2009; IFOAM, 2013; Ndungu *et. al.,* 2013). However, there appears to be inadequacy of empirical studies which focus on the cost and return of smallholder organic crop farms. This has hindered the improvement and promotion of sustainable smallholder organic crop farms. One disadvantage of not having empirical information on costs and returns is that measures to reduce costs and increase returns cannot be effectively designed because there is no solid basis for such efforts. If farmers and policy makers know the costs and returns structures with precision, they will be in a position to identify areas of flexibility in the system that can form the basis of a meaningful transformation to improve farmer profitability. Smallholder farmers therefore need technical knowledge on cost and return to make better choices on the farm. This study was therefore conducted to fill that gap by generating costs and returns data to allow for the determination of costs and returns and profitability of organic crop farms in South Africa so that to be in a position to advice the practice appropriately.

2. METHOD

2.1. Description of the Study Area

Eastern Cape Province lies on the southeastern coast of South Africa and is the second largest Province after Northern Cape Province, with an area of 169 580 km^2 and 13.9 percent of South Africa's total land mass (Eastern Cape Development Corporation (ECDC), 2013).The population of the Province is around 6.5 million people, while most of the inhabitants in the province speak isiXhosa, followed by Afrikaans and English (SA. info reporter), 2012). The Province natural vegetation is made of rocky cliffs, bumpy seas and dense green vegetation known as the Wild Coast. Eastern Cape Province comprises six district municipalities: Cacadu, Amathole, Chris Hani, UKhahlamba, O.R. Tambo and Alfred Nzo, and one metropolitan known as the Nelson Mandela Metropolitan Municipality.

2.2. Sampling Frame and Technique

The sampling frame used for this study was the population of all the smallholder organic crop farmers in the Eastern Cape Province of South Africa. Hence, cross- sectional research design was adopted to sample the farmers because they are quantitative in nature. To achieve this, multi-stage sampling technique was chosen to collect data on costs and returns aspect of organic farming. This was used because of the several stages involved in selecting the smallholder organic crop farmers. In the first stage purposive sampling was used to select Amathole Municipality from the six District Municipalities in the Eastern Cape Province, because it's well known for agricultural practices, potential for organic crop farming and the population of smallholder crop farmers (Kisaka-Lwayo and Obi, 2014). In the second stage, simple random sampling technique was used to select Ntselamanzi, Upper and lower Gqumashe, Mavuso, Mqayise, Mathole, Fort Beaufort and Mdantsane villages in Amathole District Municipality. These villages were randomly selected based on literature and information from extension officers. The third stage involved snow ball technique to locate the smallholder organic crop farmers through the help of extension officers from the Department of Agriculture in South Africa. A total of 160 smallholder organic crop farmers' were selected, which made up the sample size for the study.

2.3. Data Collection

The data for this study were collected from primary sources which are the smallholder organic crop farmers. A structured and validated questionnaire was the instrument for collecting the primary data. To make sure unbiased data were collected and capture most vital details for the study, the questionnaire was subjected to validity and reliability tests. The questionnaires were used to collect data from the smallholder organic crop farmers in South Africa and were divided into the following sections; capital investment and variable costs and returns.

2.4. Data Analysis and Analytical Framework

The study applied gross margin analysis to find out the cost and return and estimate profitability of the smallholder organic crop farms. This analytical framework follows appropriate procedure of literature. The detailed descriptions are presented in the sub-sections that follow.

2.4.1. Costs and Returns of the Smallholder Organic Crop Farms

In order to determine the costs and returns of the smallholder organic crop farms, gross margin analysis was adopted. Hence, gross margin analysis is a much simpler and non-parametric test and was used to estimate the costs and returns of smallholder organic crop farms. It is the difference between the total revenue (TR) and the total variable cost (TVC). It is an important planning technique where capital investment is an insignificant fraction of a farming business as seen in the smallholder organic crop farms (Omotesho *et. al.,* 2010; Abdullah, 2012; Ohen and Ajah, 2015). In simple terms, gross margin of an organic crop farm enterprise is the total revenue minus the total variable costs. Total revenue is the product of physical production measured in tonnes and current market price. Total variable costs are summation of operational costs that fluctuate with changes in size of production and include inputs such as organic manures, seeds, transport costs, labor and land preparation (Ohen and Ajah, 2015).

Gross margins were estimated by this expression:

$$GM_i = TR_i - TVC_i \quad (1)$$

where, TR_i *is* total revenue from production of crop *i* and TVC_i is total variable costs from the production of crop *i*. Total revenue which is equivalent to crop income from each crop was calculated as:

$$TR_i = P_i \times Q_i \quad (2)$$

where, P_i is the farm-gate price of each crop and Q_i is total quantity produced sold for each crop respectively.

Variable costs in the study emanate from the hired labour, manures costs, seeds and seedlings, transport costs and hired tractor. Total expenditures on each input were calculated from the quantities used times the respective prices.

2.4.2. Profitability of the Smallholder Organic Crop Farms

To estimate the profitability of smallholder organic crop farms, gross margin analysis was also used. According

to Tweeten (1979) and Doll and Orazem (1984), profit can be defined operationally as the total revenue less total production costs and it is the basic economic measurement of profitability. Profitability can be measured by net income, Internal Rate of Return (IRR) to investments and gross margin analysis (Omotesho *et. al.,* 2010; Abdullah, 2012; Ohen and Ajah, 2015). Gross margin, which is the return over variable costs, is an appropriate measure to use for comparing enterprises that place similar demands upon limiting resources of farmers, for short run and annual planning decisions (Castle *et. al.,* 1987). However, there are criticisms of gross margins in determining profitability because it does not include fixed costs as part of total production costs. For example, in studies done in many developed countries to determine profitability, fixed costs are not included when calculating profitability; the reason may be the different levels of debts to be serviced and land tenure system (Nemes, 2009).

Despite the criticisms, many studies have used gross margin to calculate profitability of organic crop farms and livestock farms and found to be a realistic measure of farm profitability (Kraybill and Kidoido 2009; Malaiyanda *et. al*., 2010; Hyuha *et. al.,* 2011). It is also a good measure for short run and annual planning decisions (Castle *et. al.,* 1987). Given the farm characteristics in the study area, gross margin was found suitable in determining profitability of the smallholder organic crop farms hence it was used to model the farm's overall enterprise mix. Gross margin was used since it indicate economic efficiency of a perfect enterprise and comparisons can be made across enterprises with similar characteristics on production systems (capital and labour), (Lampkin and Padel, 2004).

Gross margins were estimated by this expression:

$$GM = TR - TVC \quad (3)$$

$$GM = \sum_{i=1}^{n} p_i q_i - \sum_{i=1}^{m} c_j x_j$$

where, GM = Gross margin per organic crop farm in the Eastern Cape Province

TR = Total revenue calculated as the product of price per unit output of organic crop farm and the amount of organic crops sold in market

TVC = Variable cost associated with smallholder organic crop farms in the Eastern Cape

p_i = Market unit price of output i

q_i = Quantity of output i

c_j = Unit cost of variable input j

x_j = Quantity of variable input j

m = Number of input used

n = Number of output sold in market

3. RESULTS AND DISCUSSIONS

Table 3.1
Estimated Cost and Return and Profitability of Organic Crop Farms

Items	*Value (rand)*	*Percent (%)*
Variable Cost		
Cost of Seeds and Seedlings	20944.00	22.5
Cost of Animal Manure	5550.00	6.1
Cost of Hired Labor	13580.00	14.6
Cost of Hired Tractor	35350.00	38.0
Cost of Transportation	17482.00	18.8
Total Variable Cost	92941.00	100.0
Total Revenue	1035536.05	
Gross Margin(TR- TVC)	942595.05	

Source: Field Survey, 2016.

Information on cost and return, and profitability of organic crop farms per hectares were obtained, and the results presented in Table 3.1. The important items of total variable costs were cost of hired labor, cost of hired tractor, seeds and seedlings, animal manures and transport cost. Cost of hired labor is included in the variable cost items in line with the studies by Gibbon and Bolwig (2007) and Chavas *et. al*., (2009) where hired labor is regarded as part of variable costs of production. The result shows cost of hired tractor accounted for the highest share R 35350, representing 38.0 percent, followed by cost of seeds and seedlings that accounted for R 20944. 00 indicating 22.5 percent in the total variable cost. Cost of animal manures is the least R 5550.00 representing 6.1 percent in the total variable cost because animal manures can be easily collected for free from farm animals reared by the farmers or from other livestock farms in the area. The

depreciation and interest on working capital, borrowed for cultivation is not considered because many of the farmers use simple farm tools such fork, spade, hand trowel, rake, wheelbarrow, watering can and hose pipe. Besides, the result also indicates many of the farmers' cultivated freehold land and communal land, making it difficult to calculate depreciation. The costs breakdown show that the total variable cost is R 92941.00. This result conforms to the findings of diverse researchers who contend that costs of production have a tendency to decline in carefully managed organic crop farms (Eyhorn *et. al.*, 2007; Nemes, 2009; IFOAM, 2013; Delate *et. al.,* 2015).

Table 3.1 shows various measures of return (income) over other cost concepts. According to Table 3.1, total return is R 103553605.00 and, gross margin is R 94259505.00. To get the total return from organic crop farms, present market prices multiply by quantity of yield sold per hectare in market is used to decide the return. Gross margin is determined by deducting total revenue from total variable costs. The positive value indicates organic crop farm without doubt is profitable in South Africa. It is also a proof that smallholder organic crop farm is a profitable venture with less production costs. This result concurs with the findings of many authors to the effect that organic farming is profitable with lower production costs (Nieberg and Offermann, 2003; Delate *et. al.,* 2003; Pimentel *et. al.,* 2005; IFAD, 2005; Eyhorn *et. al.,* 2007; Gibbon and Bolwig, 2007; Nemes, 2009; Greene *et. al.,* 2010; IFAD, 2013; IFOAM, 2013; Brown *et. al.,* 2015).

4. CONCLUSIONS AND RECOMMENDATIONS

In the context of the objective of the study to determine costs and returns of smallholder organic crop farms, it could be said that costs and returns analysis is an indicator of profitability in any farming system. The smallholder organic crop farmers enumerated in this study exhibited clear shortage of information on costs and returns of organic crop farms. This research therefore throws a useful light on aspects of organic crop farms which call for careful analysis of costs and returns among smallholder farmers with similar characteristics in the Eastern Cape Province of South Africa. The results indicated that smallholder organic crop farm undoubtedly, is a profitable farm business, with lower production costs. Therefore, government is advised to encourage the practice of organic farming by giving short-term loans to smallholder farmers. Government is also advised to finds ways of integrating smallholder organic farmers into the on-going agricultural restructuring process by providing the basic legal framework for sustainability, among other actions to create an enabling environment for private sector operations. It is also strongly recommended that the private sector should promote the practice of organic farming whose demand outlook is quite bright. This is particularly crucial in view of the finding that organic production is highly profitable.

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REFERENCES

Abdullahi, A., (2012). Comparative economic analysis of rice production by adopters and non-adopters of improved varieties among farmer in Paikoro Local Government Area of Niger State. *Nigerian Journal of Basic and Applied Sciences*, 20(2), pp. 146-151.

Alliance for a Green Revolution in Africa [AGRA], (2014). Africa agriculture Status report: Climate change and smallholder agriculture in Sub-Sahara Africa. Nairobi, Kenya.

Benbrook, C., (2009). The organic factor tilting the odds toward healthy development. Six ways organic food can help prevent disease throughout life. Organic Processing Magazine. [Online]: http://www.organic-center.org/reportfiles [Accessed 10 March 2016]

Brown, E.O., Rosario, B. and Aganon, C.P., (2015). The role of market intermediaries in promoting organic rice production. Food and Agriculture Organization.

Castle, E.N., Becker, M.H. and Nelson, A.G., (1987). Farm Business Management: *The Decision-making Process*. 3rd Ed, Macmillan Publishing Company, New York.

Chavas, J.P., Posner, J.L. and Hedtcke, J.L., (2009). Organic and conventional production systems in the Wisconsin Integrated Cropping Systems Trial: II. Economic and risk analysis 1993–2006. *Agronomy Journal*, 101(2), pp. 288-295.

De Coster, S. and van Larebeke, N., (2012). Endocrine-disrupting chemicals: associated disorders and mechanisms of action. *Journal of environmental and public health*, *2012*.

Delate, K., Duffy, M., Chase, C., Holste, A., Friedrich, H. and Wantate, N., (2003). An economic comparison of organic and conventional grain crops in a long-term agroecological research (LTAR) site in lowa. American Journal of Alternative Agriculture, 18(02), pp. 59-69.

Delate, K., Cambardella, C., Chase, C. and Turnbull, R., (2015). A review of long-term organic comparison trials in the US. Sustainable Agriculture Research, 4(3), p. 5.

Department of Agriculture, Forestry and Fisheries [DAFF], (2011). National Policy on Organic Production Confidential Discussion Paper 8th Draft. [Online]: http://www.nda.agric.za/doaDev/sideMenu/ [Accessed 11 November 2015].

Department of Agriculture, Forestry and Fisheries [DAFF], (2012). A framework for the development of smallholder farmers through cooperative development. [Online]: http://www.nda.agric.za/doaDev/sideMenu/ [Accessed 15 March 2016].

Doll, J.P. and Orazem, F., (1984). Production Economics: Theory with Applications, 2nd Ed. John Wiley and Sons, New York, NY.

Eastern Cape Development Corporation [ECDC], (2013). Annual Report - Eastern Cape Development Corporation, 2013 enquiries: Marketing and Communication Unit. Eastern Cape Development Corporation.

Eyhorn, F., Mahesh, R. and Mader, P., (2007). The viability of cotton-based organic farming systems in India. *International Journal of Agricultural Sustainability*, 5: 25–38.

FAO, (2007). Assessment of the World Food Security Situation, CFS: 2007/2. Rome.

FAO Statistics, (2010). Statistical databases and data-sets of the Food and Agriculture Organization of the United Nations [Online]: http://faostat.fao.org/default.aspx. [Accessed December 2016].

FAO Statistics, (2014). Statistical databases and data-sets of the Food and Agriculture Organization of the United Nations. [Online]: http://faostat.fao.org [Accessed 13 December 2015].

Gibbon, P. and Bolwig S., (2007). The economics of certified organic farming in tropical Africa: A preliminary assessment. DIIS Working Paper 2007:3, January 2007.

Gojmerac, T., Ostojić, Z., Pauković, D., Pleadin, J. and Žurić, M., (2006). Evaluation of surface water pollution with atrazine, an endocrine disruptor chemical, in agricultural areas of Turopolje, Croatia. Bulletin of environmental contamination and toxicology, 76(3), pp. 490-496.

Goldblatt, A., (2010). Agriculture: Facts and Trends, South Africa. In World Wildlife Forum. Available [Online]: http://awsassets.wwf.org.za/downloads/facts [Accessed 29 June, 2016].

Greene, C., Dimitri, C., BiingHwan, L., McBride, W., Oberholtzer, L., Smith, T. and Cochran, T.J., (2010). Emerging issues in the US organic industry (pp. 1-29). Nova Science Publishers, Inc.

Herath, C.S. and Wijekoon, R., (2013). Study on attitudes and perceptions of organic and non-organic coconut growers towards organic coconut farming. Idesia (Arica), 31(2), pp. 5-14.

Hyuha, T.S., Bukenya, J.O., Twinamasiko, J. and Molnar, J., (2011). Profitability analysis of small scale aquaculture enterprises in Central Uganda. International Journal of Fisheries and Aquaculture, 3(15), pp. 271-278.

IFAD, (2005). *Organic agriculture and poverty reduction in Asia: China and India focus. Thematic evaluation. Report No. 1664*. Rome: IFAD

IFAD, (2013). African agricultural development: opportunities and challenges. Statement by IFAD President at the 6th Africa Agriculture Science Week and FARA general assembly, 2013**. [**Online]:http://www.ifad.org/vevents/op/2013/fara.htm [Accessed 17 March 2016].

IFOAM, (2012). Organic Agriculture- A Strategy for Climate Change Adaptation. IFOAM publication [Online]: http://www.ifoameu.org/sites/default/file[Accessed 7 July 2016].

IFOAM, (2013). Productivity and Profitability of Organic Farming Systems in East Africa. [Online]:http://www.ifoam.bio/sites/default/files/organic_[Accessed 12 December 2015].

Kisaka-Lwayo, M. and Obi, A., (2014). Analysis of production and consumption of organic products in South Africa. Chapter on Creative Commons Attribution, INTECH. pp. 1-26.

Kraybill, D. and Kidoido, M., (2009). Analysis of relative profitability of key Ugandan agricultural enterprises by agricultural production zone. International Food Policy Research Institute (IFPRI).

Lampkin, N. and Padel, S., (2004). *2004 Organic farm management handbook*. Organic Farming Research Unit, Institute of Rural Studies, University of Wales.

Malaiyandi, S., Bayite-Kasule, S. and Mugarura, S., (2010). Enterprise Budget Survey: An Analysis of Crop and Livestock Enterprises. International Food Policy Research Institute (IFPRI).

Mudzonga, E. and Chigwada, T., (2009). A case study of Zimbabwe's food security. Minitoba: *International institute for Sustainable Development*.

Ndungu, S.K., Macharia, I. and Kahuthia-gathu, R., (2013). Analysis of profitability of organic vegetable production system in Kiambu and Kajiado counties of Kenya. In African Crop Science Conference Proceedings (Vol. 11, pp. 605-611).

Negi, V., S., (2014). Where Have All the Small Farmers Gone! The Story of Agriculture and the Small Indian Farmer Edited by: Rimli Borooah, [Online]: http://focusweb.org/sites/www.focusweb.org/files [Accessed 17 February 2016].

Nemes, N., (2009). Comparative analysis of organic and non-organic farming systems: A critical assessment of farm profitability. Food and Agriculture Organization of the United Nations, Rome.

Nieberg, H. and Offermann, F., (2003). June. The profitability of organic farming in Europe. Organic agriculture: sustainability, markets and polices. OECD workshop on organic agriculture, Washington, UK, USA.

Ohen, S.B. and Ajah, E.A., (2015). Cost and return analysis in small scale rice production in Cross River State, Nigeria. *International Research Journal of Agricultural Science and Soil Science*, 5(1), pp. 22-27.

Omotesho, O.A., Muhammad-Lawal, A. and Yusuf, Y.K., (2010). Economics of small scale rice production in Patigi and Edu local government areas of Kwara state, Nigeria. *African Journal of Agricultural Research*, 5(4), pp. 45-58.

Pearce, D., Barbier, E. and Markandya, A., (2013). *Sustainable development: economics and environment in the Third World*. Routledge.

Pimentel, D., Hepperly, P., Hanson, J., Douds, D. and Seidel, R., (2005). Environmental, energetic, and economic comparisons of organic and conventional farming systems. *BioScience*, 55(7), pp. 573-582.

Quinn, L., de Vos, J., Fernandes-Whaley, M., Roos, C., Bouwman, H., Kylin, H., Pieters, R. and van den Berg, J., (2011). Pesticide use in South Africa: One of the largest importers of pesticides in Africa. [Online]:http://liu.divaportal.org/[Accessed 16 December 2015].

Rosegrant, M.W., Koo, J., Cenacchi, N., Ringler, C., Robertson, R.D., Fisher, M., Cox, C.M., Garrett, K., Perez, N.D. and Sabbagh, P., (2014). *Food security in a world of natural resource scarcity: The role of agricultural technologies*. Intl Food Policy Res Inst.

Searchinger, T., Hanson, C., Ranganathan, J., Lipinski, B., Waite, R., Winterbottom, R., Dinshaw, A. and Heimlich, R., (2013). Creating a Sustainable Food Future: a Menu of Solutions to Sustainably Feed more than 9 billion people by 2050. *World Resources Report*, 14, pp. 10-12. Interim Findings

Seufert, V., Ramankutty, N. and Foley, J.A. (2012). Comparing the yields of organic and conventional agriculture. *Nature,* 485(7397), pp. 229-232.

Shiferaw, B., Prasanna, B.M., Hellin, J. and Bänziger, M., (2011). Crops that feed the world 6. Past successes and future challenges to the role played by maize in global food security. *Food Security*, *3*(3), pp. 307-327.

South Africa. Information Reporter, (2012). South Africa. Pretoria, [Online]: http://www.southafrica.info/about/people/population [Accessed 12 December 2015].

Statistics South Africa, (2012). Agricultural Survey, 2011. Statistical Release PP1101. Pretoria: Statistics South Africa.

Tweeten, L., (1979). Farm Commodity Prices and Income. *Consensus and Conflict in US Agriculture*.

UNDP, (2012). *Africa Human Development Report 2012*: Towards a Food Secure Future. By the United Nations Development Programme Regional Bureau for Africa (RBA) 1 UN Plaza, New York, NY 10017, USA.

Van Doorn, J. and Verhoef, P.C., (2011). Willingness to pay for organic products: Differences between virtue and vice foods. *International Journal of Research in Marketing*, *28*(3), pp. 167-180.

Wolfenson, K.D.M. and Rome, A., (2013). Coping with the food and agriculture challenge: smallholders' agenda. United Nations Conference on Sustainable Development (Rio+20) Rome, April 2013.