AN EVALUATION OF A VALUE CHAIN APPROACH OF TECHNICAL EFFICIENCY OF RURAL ENTREPRENEURSHIP: A CASE STUDY OF JERKY BEEF (KILISHI) PRODUCTION IN KATSINA STATE, NIGERIA

Adamu Usman Musa
School of Management
Katsina State Institute of Technology & Management
adamu.usman@ksitm.edu.ng; +2348036179146

ABSTRACT

This study is an attempt at an evaluation of the technical efficiency of rural enterprises in Katsina state, with focus on Jerky beef (Kilish) which is a diary delicacy produce in Northern Nigeria and exported around West African countries. In the course of the study, efforts have been put determine the efficiency level of rural entrepreneurship performance in the study area. To achieve the study objectives, samples were selected using sampling technique, whereby a total number of 540 respondents were utilized. A structured questionnaire was used as an instrument for the collection of the primary data. Survey of selected rural entrepreneurship activity of Jerky business owner was carried out using questionnaire and interview ddescriptive statistics and Data Envelopment Analysis techniques have been employed to analyse the data collected. The study findings show that despite the challenges faced by rural entrepreneurship in the study area, performance assessment revealed that rural entrepreneurship operated at 68.9%optimal level while they operated at 5.8% and 25.3% above optimal and below optimal level respectively. The study therefore recommended for intervention in the activities of the rural entrepreneurship, especially in the areas of capital/financing and seminars, business skill drill and provision of infrastructures such as water, electricity, roads and hospitals.

JEL CODE: D24, D61, L25, L26, 013, P41

1. INTRODUCTION

One way to increase the competitiveness of an industry or product on the global market is to produce more efficiently. Increases in efficiency are captured by measuring the value added per worker, which is also a proxy for productivity. Value chains compete globally, and African agriculture competes in international and domestic markets with the exporters and products of Asia, Europe, and the Americas. The rapid rate at which globalization of the Agricultural markets is growing has significantly influenced the generation of new production and distribution in the system, as well as new consumption patterns. One of the objectives of modern agriculture is to reduce to the barest minimum the problems associated with agricultural loss, wastages and output underutilization by ensuring an efficient optimization of all the linkages between the producer and final consumer through the "Value-Chain" concept (Kaplinsky & Morris, 2019).

The local and informal markets provide opportunities for value addition by the poor, not just as farmers, but also as input suppliers, producers, labourers and employees, market agents and retailers. The involvement of rural entrepreneurs' in different segments of the chains can play an especially critical role in creating a more extensive and more profound development impact. Although these markets provide different opportunities for some, there is inequalities and power differences that exist among the value chain actors which means that these opportunities are not always realized by the poor (Kaitibie et al., 2018).

Studies by UNIDO-Nigeria, 2015 show that entrepreneurship has the propensity to drive the Nigerian Economy, and data reveal that there are currently over 17 million Enterprises employing over 31 million Nigerians. Micro Small Medium Enterprises (MSMEs) account for over 80% of enterprises that employ about 75 % of the Nigeria's total workforce, and therefore formulating and effectively implementing MSMEs friendly policies represents innovative ways of building the capacity to engage in entrepreneurial activities and creating job opportunities thus, playing a central and invaluable role in helping Nigeria realize its quantity advantage. (Popoola, 2014). Like most other countries in the sub-Saharan Africa, Nigeria economy is predominantly agricultural. The sector accounts for 24.2% of the GDP, over 60% of exports, 75% of the total labour force and over 80% of industrial raw materials. Therefore, agricultural productivity remains crucial to the nation's economic development and welfare of her people. Due to this, rural entrepreneurship is identified as engine for economic growth which aims at transforming the economy to a newly industrialized economy. (World Bank, 2015)

Value addition in the meat sector in Nigeria is quite low with little market segmentation of Meat products. The predominant domestic consumption is in the form of raw hot meat; only 1% of total meat production is converted to value-added products. Value addition by further processing of meat into Kilishi is an essential economic activity for any country as it reduces waste, improves profit for stakeholders, adds variety and convenience to consumers and more importantly extends shelf life of the meat. Among the various and diverse value-added meat products, shelf-stable ready-to-eat meat snacks (Kilishi) are one of the fastest growing categories in Nigeria due to changing lifestyle and favourable image perception of meat snacks (Kilishi). (Bahta & Malope, 2014).

In a report on transforming Nigeria's agricultural value chain by PwC (2017)**,** it was revealed that 80% of the challenges in the meat value chain are in processing and storage. The report had it that Nigeria's agriculture value chain which is characterized by 80% small holder farmers, few commercial processors, low funding, inadequate research, weak institutions, limited storage facilities, requires massive investments to increase production and to create value addition across the most profitable segments of the value chain. A report by PwC (2017) further reveal that Nigeria is losing about $10bn worth of export in agriculture annually due to the absence of value addition to agricultural produce. More worrisome is that of the 20 million estimated cattle population, 2.3 million are utilized for dairy production while others are utilized for meat. Meanwhile, storage and preservation which are critical activities across the value chain segments are either insufficient or nonexistent (Richardson, Johnson, & Abah, 2019**).**

It is noted that there is no previous study that examines empirically technical efficiency of rural entrepreneurship. Therefore, this study attempts to fill this research gap by examining empirically evaluate the technical efficiency of rural entrepreneurship with a special focus on Jerky Beef (Kilishi) Production in Katsina State, Nigeria and the use of certain modelling methodology in which no previous study does so in Katsina State. The remaining parts of the study are organised as follows; section two provides a review of the related literature in relation to conceptual, empirical literature and the theoretical background of the study; section three outlines the methodology of the study. Section four discusses the results and findings of the study. The last section provides conclusions and policy implications of the study.

2. LITERATURE REVIEW

2.1 Conceptual Literature

Several studies have identified several factors influencing the productive efficiency of rural entrepreneurship. Thus some of these studies are hereby reviewed in this section. Rural

entrepreneurship may mean different things to different scholars, but it could, in this case, implies emerging entrepreneurship in rural areas. Rural entrepreneurship represents the collection of the informal sector of the economy, characterised by small-scale businesses, involving petty traders and artisans (Ibukunoluwa & Oluwadamilola, 2017). Rural entrepreneurs can be views as those who carry out the entrepreneurial business activities in rural areas with the underlying goal of utilising of local resources. In so doing, these rural entrepreneurs increase the standard of living and purchasing power of the people, by offering employment opportunities to people in the villages (Gandhi & Mohan, 2014).

Literature describe a value chain as a set of activities that a firm performs in order to deliver a valuable product or service for the market (De Marchi, Giuliani, & Rabellotti, 2018). Along the chain a value is added which give such product a competitive advantage in terms of quality and attracting a higher price at the market (Gereffi, 2018). In other words, a value chain is a series of activities or processes that aims at creating and adding value to an article (product) within it analysing the opportunity cost of the new sequence along the product worth (Lee et al., 2018). Thus making the concept of value chains as decision support tools and competitive strategies paradigm.

Value chains provide a framework for assessing opportunities for poor people in livestock markets. A Value chain is referred to in the literature as a network of different functions or stages ranging from production to consumption of a given commodity or product. It also includes the interrelationships among the main actors along the chain and all of the ancillary support services (Kaplinsky & Morris 2019). Conceptually, an agricultural Value chain can be viewed as from the perspective of a particular finished product or closely related products and includes all firms and their activities engaged in input supply, production, transport, processing and marketing (or distribution) of the product or products (Kaplinsky & Morris 2019).

Value chains are key framework necessary for understanding how a product moves from the producer and value created before getting to the customer. As such, the value chain perspective provides a veritable tool to understand the vertical and horizontal relationships, available and potential opportunities, and ways to increase productivity and add value that is beneficial to all the stakeholders. It is a vehicle for pro-poor initiatives and for linking small businesses with the market (Richardson. et al., 2019).

Rural entrepreneurship, conceptually speaking, is not much different from entrepreneurship. Indeed, rural entrepreneurship could be seen as using the process and methods of entrepreneurship to exploit untapped potential of rural areas, to bring about growth and development. Rural entrepreneurship is viewed as all business undertakings among rural dwellers aimed at income generation, while also serving as a major source of livelihood. These include small scale industries such as blacksmithing, gold-smiting, watch repairing, bicycle repairing, basket weaving, barbing, palm wine tapping, cloth weaving, dyeing, food selling, carpentry, brick-laying, pot-making, leather works and drumming etc. (Kolawole & Torimiro, 2015).

In the same vein, Jibrilla (2017) rural entrepreneurship assist in employment generation, transformation of traditional to modern technology, stimulation of indigenous entrepreneurship, reversal of urban-rural migration, greater utilization of raw materials, promotion of local technology, mobilization of local savings, linkage balance by spreading investment more evenly, ability to operate profitably in very narrow markets with low purchasing power, among others.

Farrell's (1957) posits that technical efficiency led to the development of methods for estimating the relative technical efficiencies of farmers. The common feature of these estimation techniques is that information is extracted from extreme observations from a body of data to determine the best practice production frontier (Lewin and Lovell, 1990). From this the relative measure of technical efficiency

for the individual farmer can be derived. Despite this similarity the approaches for estimating technical efficiency can be generally categorized under the distinctly opposing techniques of parametric and non-parametric methods (Seiford and Thrall, 1990).

2.2 Theoretical Literature

Efficiency is a very important factor of productivity growth, especially in developing agricultural economies where resources are meagre and opportunities for developing and adopting better technologies are dwindling (Agner, Lovel, & Schmdt, 1977). In such economies, inefficiency studies help to indicate the potential possibility to raise productivity by improving efficiency without necessarily developing new technologies or increasing the resource base. The concept of efficiency is concerned with the relative performance of the processes used in transforming given inputs into outputs. Economic theory identifies at least three types of efficiency. These are technical, allocative and economic efficiencies. Our main concern in this study is technical efficiency, which according to Ali & Chaudhry (1990) is defined as a production system that achieves a maximum attainable quantity of output from a given inputs. The approaches widely used in estimating technical efficiency are parametric and non-parametric methods. In this study, the parametric approach was used. In the parametric approach, econometric methods of either deterministic or stochastic methods are applied (Kumbhakar, Hung-Jen, & Horncastle, 2015). According to Kumbhakar, et al., (2015), the deterministic model regards all deviations in output as technical inefficiency effects regardless of the fact that deviations in output could be beyond the control of the producer. The Stochastic Frontier Production (SFP) Kumbhakar, et al., (2015) allows for estimation of the household efficiency score by accounting for factors beyond the control of each producer. This also enhances the understanding of the factors that determine technical inefficiency of farm households (Onumah, Brümmer, Hörstgen-Schwark, 2010).

This study is underpinned to the Alert theory of entrepreneurship and the Resource-based theory of entrepreneurship. The Alert theory of entrepreneurship put forward by Kirzner (1973) conceived entrepreneurship as alertness to profit opportunities. The theory suggests that the source of entrepreneurial profit is superior foresight, and this superior foresight brings about competition. Through which there are discoveries of new products and costs saving technologies unknown to other market participants are brought forward. This discovery process is seen in the Kilishi business used as a case study in this study. Entrepreneurs who are alert, conscious and have a superior foresight of the workings of markets in an economy put forward their discoveries of new profit opportunities in the form of business concepts and business plans under the platform of the innovative kilishi business. However, since the theory does not take into cognizance the resources needed by the entrepreneur(s) to carry out the business ideas, the study synthesizes this theory with the Resource-Based theory of entrepreneurship. This theory emphasized the importance of financial, social and human resources.

2.3 Empirical Literature

Evidence from literature shows that there had been concerted efforts at investigating the efficiency of different agribusiness value chains across the globe (including Rodriguez-Alvarez et al., 2007; Coelli et al., 2002; Fan, 1999; Ali and Byerlee, 1991). The developing economies in general and Nigeria in particular are by no means exception to this regard (examples include Chepng'etich et al., 2014; Ambali et al., 2012; Baruwa and Oke, 2012; Adeyemo et al., 2010; Okoruwa et al., 2009; Ike and Inoni, 2006; Akinwunmi and Djato, 1997; 1996). The uniqueness of most of the studies is their common understanding and definition of a technically efficient farmer to be one located on the frontier, as against an inefficient farmer located farther away (Okoruwa et al., 2009; Greene, 2007; Coelli et al., 2002).

Studies conducted either in Nigeria or elsewhere have identified several factors affecting the efficiency of resource use by crop farmers. Some of these studies are reviewed in this section. Ogunfowora, Essang & Olayide (1974), in examining resource productivity in traditional agriculture in Kwara State, Nigeria, estimated a Cobb–Douglas production function through a method of ordinary least square (OLS) and discovered that labour and seed inputs were inefficiently utilized. Farm size (scale of operation) and the level of technology were not taken into consideration, however, which made the result too generalized. Using the same Cobb–Douglas production function in Imo State (Oludimu 1987) examined the efficiency of resource use in various farm enterprises and concluded that the efficient use of resources took place only at the rational stage of production (i.e., at the decreasing but positive return to scale stage). Further examination of the independent variable, however, revealed a diminishing marginal return and decreasing return to scale on farm investment and over-utilization of resources. This study suffered the same drawback as the one mentioned earlier.

Heshmati and Mulugata (1996) estimated the technical efficiency of Ugandan matoke producing farmers and found that the farmers face production technologies with decreasing return to scale. The mean technical efficiency was 65%, but there was no significant variation in technical efficiency with respect to farm size. Seyoum, Battesse & Fleming. (1998) investigated the technical efficiency and productivity of maize producers in Ethiopia. The findings show that farmers who participate in a programme of technology demonstration are more technically efficient than farmers who do not. Townsend, Kirsten & Vink (1998) used data envelopment analysis to investigate the relationships among farm size, return to scale and productivity among wine producers in South Africa. Their study found that most farmers operate under constant return to scale, with a weak inverse relationship between farm size and productivity. Also, Enwerem and Ohajianya (2013) examined the technical efficiency and the sources of inefficiency in base for investment, poor extension contact, and poor access to credit as major factors that influenced the farmers' level of technical efficiency. In another study that compared the relative economic efficiency of small and large rice farms in the central Nigeria, Okoruwa et al. (2009) applied the profit function approach and found that improved seed, fertilizer, capital, and gender of respondents significantly affected economic efficiency. They also observed existence of significant difference in economic efficiency between small and large farms.

Ajibefun, (2016) in studies concluded that socio-economic and policy variables significantly influenced the level of technical efficiency. Also, Yusuf and Malomo (2017), in their study, concluded that years of experience and educational level have a positive effect on technical efficiency. Ajibefun and Abdulkadri, (2018) in their study concluded that age and years of experience of the primary decision maker have a significant influence on the level of technical efficiency. In contrast, Etim (2017) analyzed the technical inefficiency of urban entrepreneurship among households in Akwa Ibom State, and he concluded that decreasing returns to scale in all the physical inputs, thereby experiencing inefficiency. Similarly, a lot more studies have been done on technical efficiency and its determinants in the field of rural entrepreneurship than in urban entrepreneurship in Nigeria and other countries of the world. For instance, studies by Adesina & Djato (1996), Seyoum, Battese & Fleming (1998), Wadud & White (2000), Weir & Night (2000), Owens, Hoddinott & Kinsey (2001) and many more investigated technical efficiency (TE) and determinants of TE on various rural entrepreneurship and entrepreneurs' characteristics. Their general conclusions are that there exist reasonable degrees of inefficiencies among entrepreneurs in developing countries (Nigeria inclusive).

2. METHODOLOGY

The study used a cross-sectional study of questionnaire survey approach with a multistage sampling where the entrepreneurs/owner-managers of Kilishi business in Katsina State were selected as the targeted population of this study. The sample respondents in this study included both the entrepreneurs and owner-managers who are registered with the Katsina state government. The respondents were

identified through the Department of Cooperative and rural development of Katsina State Ministry of Agriculture to obtain a comprehensive list of rural entrepreneurs. In this work, a total of Four Hundred and Sixty (460) copies of questionnaire were administered to the respondents of the study. Of the Four Hundred and Sixty (460) copies of the questionnaire, (153) copies each were administered to each of the local government areas chosen for the study. The selection of Three LGAs was purposive because of their ruralness. A multi-stage sampling technique was used in selecting three (3) rural communities. The rural communities are Kayauki (*Batagarawa* LGA); Marbar Kankara *(Kankara* LGA*) and Fargo (Sandamu* LGA*).* In each of the randomly selected communities, (153) Kilishi business producer through Co-operative societies were identified and purposively chosen. Also, from each of the Cooperatives, some members were randomly selected in addition to other respondents, which were randomly chosen within each of the communities. In all, Four Hundred and Sixty (460) respondents were investigated based on the population size and membership strength of the communities and Cooperatives respectively.

However, for data collection in this study, a total of 460 questionnaires were distributed, instead of the pre-determined sample number of 353 rural entrepreneurs. This is to avoid the problem of the non-response rate. According to Jeff (2001), it is not likely that every selected sample will respond; there is a need for researchers to increase the sample size to avoid a non-response bias. (Cited in Danlami, Applanaidu, & Islam, 2017).

Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes and is shown below.

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the level of precision. Thus, the sample sizes will be 353 respondents.

Hence: $n = \frac{3522}{1 + 3522(0.05)^2}$ = 359 respondents.

3.1 Model Specification

3.1.1 Data Envelopment Analysis

Data Envelopment Analysis (DEA) technique was employed in the study to calculate the efficiency level of rural entrepreneurs in Katsina State. DEA is a nonparametric method that has been widely applied to examine the efficiency of individual Decision-Making Units (DMU) in a variety of industries (Heinrichs *et al.* 2013). Its nonparametric nature enables the analyst (i) to avoid having to make assumptions about the distribution of the data, (ii) to estimate the production function with minimal prior assumptions, and (iii) to analyze simultaneously multiple input/output technologies to account for interactions affecting efficiency (Heinrichs *et al.* 2013). DEA measures efficiency relative to an *estimate* of the true (but unobserved) production frontier (Simar and Wilson 2017). Firms lying on the frontier are fully efficient, whereas those away from the frontier are considered inefficient. A technically inefficient producer could produce the same outputs using a lower quantity of at least one input or could use the same inputs to increase the quantity of at least one output (Fried, Lovell, & Schmidt,2018).

In this study, DEA was applied to a sample of rural entrepreneurs (Kilishi business owners), the study assumed VRS and an input orientation, because rural entrepreneurs (Kilishi business owners) in the sample are heterogeneous and because they can more easily access their input use.

The VRS estimate is considered as the pure technical input efficiency of a DMU because it is net of any impact from scale size. As the size of the firm influences, the average product of a DMU, the Scale Efficiency (SE) is used to indicate the distance of the current scale size of a DMU from its "most productive scale size" (Thanassoulis, Portela, & Despić 2018). SE is defined as:

$$Scaleeffic\ iency(SE) = \frac{CRSefficie\ ncy}{VRSefficie\ ncy} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.2$$

The SE of a DMU shows the scale adjustment, which is necessary to achieve optimal efficiency. Hence, SE gives a better insight into the structural adjustment needed. The optimal scale size is the size at which the firm achieves CRS.

3.2 Empirical Model

The stochastic frontier model used in this study is a variant of that of Aigner et al. (1977), Khumbhakar and Heshmati (1995), Yao and Liu (1998), Coelli (1996) and Ogundele (2003). The model specified output (Y) as a function of inputs (X) and a disturbance term (μ).

Arising from the analysis of the Data Envelopment Analysis and the studies of Battese and Coelli. (1995), the empirical model to achieving the objective of the study is explicitly stated as follows:

$$EFF = \alpha_0 + \alpha_1 ES + \alpha_2 QE + \alpha_3 RN + \alpha_4 PW + \alpha_5 AM + \alpha_6 SH + \varepsilon_t$$

where EFF as the dependent variable, is the efficiency score for rural entrepreneur (Kilishi business owner) Efficiency is expressed as the weighted sum of output divided by the weighted sum of inputs (Talluri, 2000). Taking the monetary value of the output and the inputs, it means that any transaction that would lead to an increase in the denominator (input cost) would lead to reduction in efficiency. Increase in the amount expended in Kilishi preparation would therefore lead to increase in the total input cost and reduction in efficiency. a0 is the constant term $\alpha 1-6$ are parameters to be estimated, and εt is the stochastic error term. It is hypothesized that EFF, is influenced by the following exogenously variables. ES is Electricity Supply which is measure in the number of hours' electricity was availability to process Kilishi, QE is Quality Education is the educational/training status of processor (1=formal education; 0=no formal education), RN is Road Network is the availability of good road network to market stated as dummy variable was coded '1' and '0'., PW is Portable Water which is availability adequate hygienic water supply for processing Kilishi stated as dummy variable was coded '1' and '0'., AM is Access to Market is entrance to markets of the finished good (Kilishi) stated as dummy variable was coded '1' and '0'. and SH is Standard Health availability of health centre for medical purpose.

A priori, it is expected that ES, QE, RN, PW and AM will have a positive relationship with EFF while SH exhibits a negative relationship with EFF. i.e. $\alpha 1 > 0$, $\alpha 2 > 0$, $\alpha 3 > 0$, $\alpha 4 > 0$, $\alpha 5 > 0$, while $\alpha 6 < 0$.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Efficiency scores of rural entrepreneurship performance

Following the methodology proposed by Simar and Wilson (2015), the results were tested for the existence of Returns to Scale. The study has six input factors and one output and obtained for this test

a p-value of 0.0001< 0.05 (with B=2000); hence, the study rejected the null. Therefore, the results adopted in this study are based on the VRS model assuming Variable Returns to Scale.

Table 1 Descriptive statistics of the original and bias-corrected technical efficiency (TE) estimates, and scale efficiency (SE) estimates for the DMU.

Descriptive statistic	TE	Bias-corrected TE	SE
Mean	0.78	0.70	0.78
SD	0.19	0.17	
Min	0.38	0.33	0.23
Share of fully efficient rural entrepreneurs	0.42	0.33	0.17

Source: Data from field study (2021) and computation using Stata 15

Table 1 indicates that, on average, rural entrepreneurs in the study area have a TE score of 0.78. This value is consistent with TE levels reported by Kirner et al. (2007) which mostly vary from 0.66 to 0.92 (Bravo-Ureta & Pinheiro, 1993; Fraser & Cordina, 1999; Arzubi & Berbel 2001; Moreira *et al.*, 2006). The TE in the study found that Kilishi business owners in the study area are within the (in)efficiency range found in other places; it indicates that rural entrepreneurs could reduce their inputs by 12% and still produce the same level of output. The percentage of rural entrepreneurs with a score of unity (fully efficient) was 37% (170 rural entrepreneurs). This is consistent with the 35% of fully efficient rural entrepreneurs reported by Fraser et al. (1999); Candemir and Koyubenbe (2006). This share is in between the 24% of fully efficient as reported by Kirner *et al.* (2007) and 52% reported by Arzubi et al. (2001). The percentage of efficient rural entrepreneurship found indicates that rural entrepreneurs in Katsina State are as efficient as rural entrepreneurs in developed countries. However, compared with the value reported by Arzubi et al. (2001), there is still potential for increasing the number of efficient rural entrepreneurs. Table 1 also shows that, following the bootstrap procedure, the average TE decreased from 0.78 (original TE) to 0.70 (bias-corrected TE). The bias-corrected TE indicates that rural entrepreneurs could reduce their inputs by 30% and still produces the same level of output.

The study found a mean SE of 0.78 as reported in Table 1, and this value is lower than the 0.89 reported by Kirner *et al.* (2007) and the 0.94 reported by Arzubi et al. (2001). This finding indicates that, on average, the rural entrepreneurs can reduce their input use by 22% by producing at an optimal scale, i.e. a scale where they operate under CRS. The percentage of rural entrepreneurs with a score of unity for scale efficiency was 18% (97 Kilishi business owners). This value is consistent with the 14% reported by Arzubi et al. (2001) and 15% reported by Kirner *et al.* (2007).

Table 2 Rural Entrepreneurs are operating under increasing returns to scale (IRS), constant returns to scale (CRS), and decreasing returns to scale (DRS).

Operating scale	No. of RE	% of RE
Increasing Returns to Scale (IRS)	267	58
Constant Returns to Scale (CRS) (scale efficient)	83	18
Decreasing Returns to Scale (DRS)	110	24

Source: Data from field study (2021) and computation using Stata 15 *RE=Rural Entrepreneurs

Results in Table 2 indicate that most rural entrepreneurs in the sample operated under IRS 58% (267 Rural Entrepreneurs). Only 18% (83 Rural Entrepreneurs) of the rural entrepreneurs were operating at the optimal scale size (CRS), and a similar percentage 24% (110 Rural Entrepreneurs) were operating under DRS. This finding is consistent with values reported by some previous studies (Moreira *et al.* 2006; von Cramon-Taubadel & Saldias 2014 and Fraser & Cordina, 1999). This finding implies that the scale at which most rural entrepreneurs were operating is too small (IRS), therefore the rural entrepreneurs can gain efficiency by increasing the size of the operation; this is supported by the work of Assaf and Matawie (2010). Moreover, rural entrepreneurs operating under DRS could gain efficiency by decreasing in size.

4.2 Performance Level of rural entrepreneurship

Despite the challenges confronting rural entrepreneurship (Kilishi business) in Katsina State Nigeria, performance assessment of the rural entrepreneurship (Kilishi business) revealed that rural entrepreneurship performance on self-rating operated at three primary levels: above optimal, optimal, and below optimal. The optimality levels as used in this research were likened to the rural business operating above average (normal), average, and below average, respectively. Analysis on the optimality of the rural entrepreneurship (Kilishi business) was based on the frequencies and percentages that attest to each of the levels (Table 3) with the profit generated from the venture and the ability of the business to improve and sustain the standard of living of the entrepreneurs'.

Table 3: Rural performance in Katsina State, Nigeria

Performance Level	Frequency (N=460)	Percentage
Above optimal	28	6
Optimal	317	69
Below optimal	115	25

Source: Data from field study (2021) and computation using Stata 15

The result of the analysis showed that 69 per cent of the rural entrepreneurs were of the view that their rural business was operating at an optimal level as against 6 per cent and 25 per cent that was of the opinion that their rural investments were operating above optimal and below optimal, respectively. The optimal or average performance of rural entrepreneurship in Katsina State Nigeria stems from the individual entrepreneurial activities of the entrepreneurs in which every participant seeks to be a principal actor in the market environment. Relatively in terms of satisfaction with the operation of the rural entrepreneurship (Kilishi business) in the state, it was derived that the 69% of the rural entrepreneurs that attested earlier were satisfied while 6% and 25% were very satisfied and not satisfied with the operation of the rural entrepreneurship (Kilishi business) in the state. In justification of the findings, Togar (2000) posited that industries in Africa have continued to grow at a rate of more than 10 per cent annually; and with the accompanying increase in the income of the middle-income group and with improvements in the quality of rural products, the demand for quality food has become much stronger. Hence, rural business is expected to expand further.

5. CONCLUSIONS AND RECOMMENDATIONS

The study used a nonparametric approach to analyze the efficiency of rural entrepreneurs Kilishi business and the efficiency measures found in the study show that it is possible to increase the

efficiency of the rural entrepreneurs (Kilishi business owners). The results show two options for increasing the efficiency of (Kilishi business owners) rural entrepreneurs. Firstly, by decreasing the use of inputs, i.e., location, labour and size. Secondly, by improving scale efficiency, i.e., increasing the size of the operation. Both options would be beneficial for productivity and increase profit at an optimal level. The analysis indicated that distance is positively related to efficiency, whereas other entrepreneurs' income, cooperative participation, entrepreneurship age, family size, and family labour were negatively related to efficiency. Because of differences in methods and input-output variables, it is not possible to determine how much better or worse rural entrepreneurs are compared to rural entrepreneurs in other countries. The motivation of rural entrepreneurs to stay in business was not significantly related to the efficiency of rural entrepreneurship.

The study revealed that rural entrepreneurship (Kilishi business) provides profitable returns and acts as a means of livelihood to several people among other attractions. It required the adoption of certain complementary and capacity enhancing measures that would boost the activities of the business which require government intervention into the activities of the rural entrepreneurship. Besides, the government should encourage informal sector businesses to grow and be formalized. Furthermore, the government should identify measures to enable rural entrepreneurs, especially women and youth, to take part in rural entrepreneurship business. Also, it should ensure the provision of financial services to rural entrepreneurship in rural areas as well as in the urban sector that is engaged in this business.

There is a scarcity of business information on rural entrepreneurship in Katsina State. The State government in collaboration with the Federal government should organize seminars and business drills for these rural entrepreneurs. Other development partners like banks and saving and credit organizations should also educate these rural entrepreneurs so that they may become performer better.

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