The Relationship between Adoption of Coffee Certification Standards and Productivity in Nyeri County in Kenya

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ABSTRACT---- ***Standards have been applied as strategic tools to help organizations increase productivity, and improve competitive advantage. They facilitate free and fair global trade, enhance customer satisfaction through improved quality, open new global markets by preventing trade barriers and increase market share. The objective of this study was to investigate the relationship between adoption of coffee certification standards; Fairtrade, UTZ, and Rainforest Alliance on coffee productivity in Nyeri County. A cross-sectional study design was used to describe the current situation and establish any relationships between adoption of coffee certification standards and productivity. Researcher administered questionnaires were used to collect data from 270 coffee farmers. Stratified random sampling was used to sample the farmers in each agroecological zone. Productivity was defined as kilograms cherry produced per coffee tree. Data on coffee production and marketing activities for the 2013/2014 coffee year was collected and analyzed into descriptive and inferential statistics. Data was analyzed using non- parametric methods after subjecting it to normality test. The productivity populations were significantly different (p=0.008)with a χ^2 value of 13.82. Fairtrade was the most prevalent standard at 70.7% adoption rate. The mean coffee productivity resulting from adoption of Fairtrade, Rainforest Alliance and UTZ were 6.38, 4.11 and 5.21 kg cherry per tree respectively. The mean effect of certification to Fairtrade on productivity compared to Rainforest Alliance was significantly different (p=0.01). Agro-ecological zoning did not have a significant effect (p=0.67) on coffee productivity. The mean productivity rank for Fairtrade was significantly different (p=0.02) compared to that for non-Fairtrade with mean productivity of 6.21 and 4.39 kg cherry/tree respectively. Fairtrade combined with Rainforest Alliance had a synergistic effect resulting to increased productivity of 6.78kg per tree compared to the individual standards. The recommendations from the study are:promotion of coffee certification standardsto coffee farmersas a way of improving productivity and further researchon the effects of adoption ofothersustainability standards on coffee productivity and on other crops.***

Keywords---- Productivity, Coffee certification standards, Strategy, Planned change,

1. INTRODUCTION

According to International Organization of Standardization (ISO IEC Guide, 2004), a standard is defined as "a document, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results. Standards are universal and in business, they are used as strategic tools and guidelines to help organizations operate efficiently and increase productivity, access new markets, and facilitate free and fair global trade (ISO, 2012). According to Giovannucci and Ponte, (2005), the development of standards and certification regimes is an important aspect of the value chain approach that considers Standards as a new form of social contract. Mintzberg (1988), in "the 5 Ps of strategy," viewed strategy as a plan, or a directed course of action to achieve an intended set of goals.Standards are used as strategic tools and guidelines to help organizations deal with business challenges by ensuring efficient business operations, increased productivity and access new markets. Standards could be mandatory regulations developed by government agencies or private and voluntary. Voluntary standards are also referred to as sustainability standards (Potts et al., 2014). In the agricultural sector, voluntary standards on product quality assurance, safety and environmental sustainability have been developed by various stakeholders including producers and non-governmental organizations. Adoption of voluntary standards require certification by an independent certification body that gives assurance that the product/process conforms to the requirements of the standard. A certification agency gives the organization a certificate of compliance to the specific standard. Certification to various standards is employed by organizations and producers as a strategy to gain competitiveness in the marketplace. In the agricultural sector, certification to particular standards has become an important marketing tool for agricultural products

such coffee, tea, cocoa soybean, sugarcane,fruits and vegetables, among others (CIDIN, 2014;UTZ, 2014). Increasing consumer demand on the product information has led to wide adoption of voluntary regulations that address environmental problems by producers. Certification to specific standards, adoption of codes of practice and labelling are used as market-based tools for creation of a market for more environmentally sustainable products (Matus, 2009).Today's consumers are proponents of sustainable production and prefer to be able to place a certain trust in claims on agricultural produce with regard to environmentally or social responsibility. Sustainable production has been defined as the ability to meet the needs of the current generation without compromising that of the future generations. In addition, it is further defined in environmental, economic and social dimensions with biodiversity being the key measure of environmental sustainability in the natural world. Certification provides this guarantee through a certificate of compliance to specific rules and regulations of voluntary standards. It may apply to an individual producer, producer groups, cooperative or even region. The producers must meet certain social, economic, and environmental requirements (ITC, 2011a). In addition to improving productivity,certification is used as a tool to convey value addition and differentiation of a product and as a mechanism that helps in traceability through identifying the quality and origin of products or production process. The final consumer is able to verify sustainability claims by the producer. The potential for better prices, market access, efficiency in production and sustainability encourages producers to adopt the certification standards.

Coffee is the world's most traded agricultural commodity, grown mainly by smallholder farmers. Consumer concerns over poverty, social economic conditions facing the farmers have led to the development of sustainability standards and labels in the food and beverage market. Coffee that is grown under conditions of social, economic and environmental standards that are independently accredited by a third party is termed as "sustainable coffee" (ITC, 2011b). Coffee certification standards are rules or regulations that are adopted by coffee growers and processors as tools for coffee value- addition, access to international markets and for good agricultural, environmental and social practices. The International Coffee Agreement (2007), encourages coffee stakeholders to address sustainability in the coffee sector. This includes the social, economic and environmental issues that affect the coffee growing, processing, marketing and consumption. Certification requires audits on farmers (suppliers), buyers, traders and processors. The certification programs aim to promote a responsible production following one or more of the following aspects: social, environmental, economic and quality (ITC, 2011a). The social aspects seek to improve the quality of life of the workers and farmers; the environmental aspects seek to have environmentally friendly production that reduces impacts on biodiversity and environment; the economic aspects are meant to gain adequate market access and fair prices for farmers, and, the quality aspects set a minimum quality standard for the coffee beans (CIDIN, 2014). There are different types of certification standards addressing varying aspects of coffee production such as social, economic, and environmental aspects to varying degree. These include Fairtrade, Organic, Common Code for Coffee Community (4C), Rainforest Alliance and UTZ certification. UTZ means "good inside' in Maya language from Guatamala (The Coffee Exporters' guide, 2011).The main coffee certification standards adopted in Kenya are; Fairtrade, UTZ, Rainforest Alliance and 4C. The 4C is designed as a baseline standard and therefore complementary to more demanding standards and does not use a product label (ITC, 2011a).

Statement of the problem

Studies in coffee growing regions of the world provide varying information regarding the potential benefits of adoption of coffee certification standards by coffee producers. Some of the studies show increased coffee prices for farmers, training and connection with stable markets, improved quality of life and strengthened farmer organizations (Ronchi, 2002; Bacon, 2005). In East African region, studies on coffee certification have focused mainly on Fairtrade and UTZ (CIDIN, 2014, Kamau, Lawrence, Ricardo and Ruerd, 2010). The studies showed that certification had potential to benefit farmers through increased efficiency, access to technical and commercial services, improved coffee quality and quantity, and, good governance of farmer organizations leading to increased prices for the certified farmers compared to non-certified farmers. In coffee production, certification to sustainability standards is used as a strategy to increase yield and quality. However, other reports indicate that price and welfare effects gained from certification are limited due to the high cost for certification incurred by farmers. In addition, the limitation of quantities of coffee sold under certified schemes do not reach sustainable livelihood effects even with the higher prices (Raluca and Nunn, 2014). Mixed results of certification on standard social indicators for Fairtrade certified producers in Nicaragua, Peru, and Guatemala have been reported (Arnould,Plastina and Ball, 2009a) calling for further research.According to the Coffee Board of Kenya (CBK, n.d), there has been a decline in coffee production from a peak high of approximately 129,000 tonnes in the 1988/1989 production year, to approximately 40,000 metric tonnes in the 2012/2013 production year. This has been attributed to low market prices, price fluctuation, high cost of production, long payment period, poor cooperative society governance and climate change (CIDIN, 2014). Consequently, some coffee producers have neglected their coffee farms in the country and particularly in Nyeri County and have divested (World Bank, 2006) into other farming activities such as dairy farming in an effort to make regular income. According to CIDIN (2014), the impact of certification to sustainability standards remains poorly understood even though the standards are regarded as a promising way of improving smallholder coffee farmer welfare.

The main objective of the research was to study the relationship between adoption of certification standards (Fairtrade, Rainforest Alliance and UTZ) on productivity, a case of coffee production in Nyeri County, Kenya. The specific objectives were: (i) to evaluate the relationship between each of the three certification standards and coffee productivity, and (ii) to compare the relationships between adoption of the three Fairtrade, Rainforest Alliance and UTZ certification to coffee productivity.

2. LITERATURE REVIEW

The Kurt Lewin model summarizes the process of planned change in three stages: (i) the unfreeze stage where the quasi-stationary equilibrium needs to be destabilized, creating the need for change, (ii) the movement or transition stage during which the change is planned and implemented ensuring that the driving forces such as economic gain, growth and improved situation exceed the restraining forces and, (iii) the refreeze stage in which there is stabilization of the new equilibrium at a higher level of performance after the change, reinforcing it through support mechanism/polices and structures (Lewin, 1947 as cited by Burnes, 2004). The model is used in different ways, ranging from exploring high-level changeprocesses to explaining the internal logic of an intervention through to hypothesizing cause and effect links between important changes (White and Carvalho, 2004).In coffee certification, the model can be used to show how certification standards are used to bring about the planned change that help achieve set goals of increased productivity, market access and sustainable farming. The intended social, environmental and economic changes that the certification program aims to create through rules and regulations are defined. Coffee certification standards are a form of intervention that contribute directly to one or more tangible outputs in coffee production, such as improved market prices, access to markets, training on good agricultural practices and farm management practices. The outputs contribute to various outcomes, such as more viable and resilient small producer businesses, improved infrastructure in communities, and growth in specialized markets. The outcomes in turn contribute to long-term impacts, such as improved household income and livelihoods, and more sustainable trading systems. The model shows how to create the need for change for the producer/farmer, to plan and implement the change through adoption of certification standards and how to maintain the change. During the first stage, the unfreeze stage, the need for change is created and producers are sensitized on the benefits of adopting a standard such as Fairtrade that include access to markets, minimum price in addition to premium price offered for Fairtrade label (ITC, 2011a). The second stage of the model, the movement/transition stage, comprises of planning and implementation. There is need to manage the change through strategies and actions plans (Beckhard, (1969) as cited by Brisson-Banks, (2010)). In coffee production, producers are trained on how to implement the standards, rules and regulations that govern the specific standard, for example, for certification to Rainforest Alliance standard, the regulations include environmental sustainability aspects such as growing coffee using integrated pest management practices, wildlife conservation and safety of workers (Rainforest Alliance, n.d). The main driving forces are economic gain and environmental sustainability. In the final stage of the model, the refreeze stage, there is consolidation of the change at a new level of equilibrium with support structures from the certification body. According to Kotter (2007), there is need to be institutionalize the new approaches for them to have an impact. After implementation of a standard, continual training, monitoring and evaluation ensures conformance (ITC, 2011a). A set of performance indicators are used for monitoring the effectiveness of certification on short and medium-term outcomes such as: productivity, climate change, living wage and costs (UTZ, 2014; KPMG, 2013). The change effected through adoption of certification standards leads to skills development from training, improved product quality and higher productivity which, in turn result in higher incomes for farmers. As long as the benefits outweigh the cost of certification, the livelihoods of producers have potential to improve (KPMG, 2013). In this study, the performance indicator of the expected outcomes from adoption of certification standards was productivity and it was measured as the average coffee cherry production per tree. According to Fairtrade model of change, adoption of the standard is expected to result to increased yield and quality as a main outcome (Fairtrade, 2013).

As per the Lewin's model, producers are sensitized on the benefits of adopting certification standards and the need for change at the unfreeze stage. The three certification standards, Fairtrade, UTZ and Rainforest Alliance emphasize different aspects of sustainability that contribute to good agricultural practices and improved farm management practices, the variables in the model that cause the expected move/transition resulting in outcomes such as increased productivity and sustainable production in the final re-freeze stage as shown in Figure 1below. These are maintained through monitoring and evaluation support policies/structures.

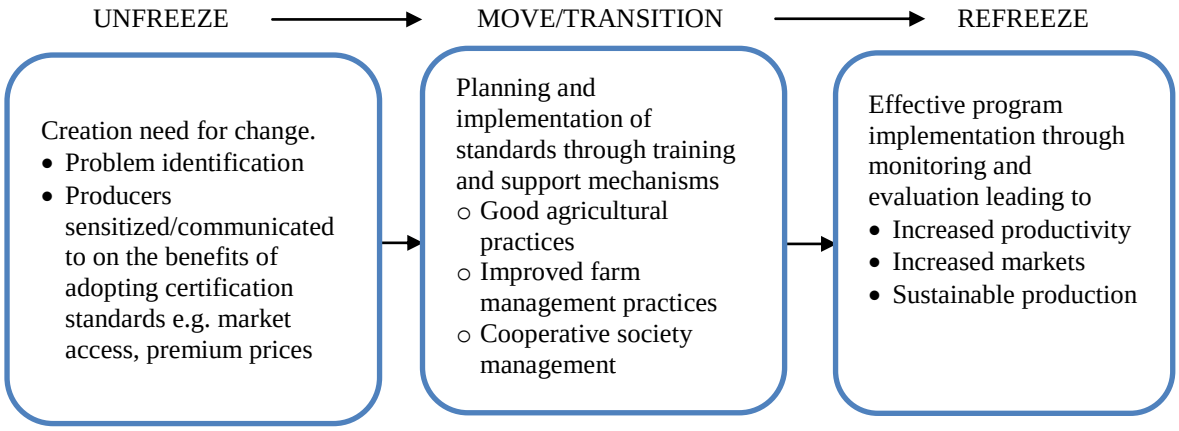

Figure 1. Theoretical Framework
Adopted from Lewin, 1947 as cited by Burnes, 2004 and modified by author, 2014

The purpose of this study was to investigate the effect of adoption of certification standards (independent variables) on productivity (dependent variable). The study sought to quantify and qualify their effectiveness in achieving positive outcomes using coffee production.

3. METHODOLOGY

3.1 Study design, area and Target population

A descriptive study design adopting a cross-sectional analytical approach was used to describe the existing situation and to establish potential relationship between adoption of coffee certification standards (the independent variables) and productivity(dependent variable) in Nyeri County. Questionnaires were administered to farmers in order to find out their attitudes and opinionsregarding adoption of coffee certification standards. In addition, secondary data from factory records and coffee publications was used.The study was undertaken in Nyeri County, Kenya. The County records the highest coffee production in the country and coffee farmers have embraced different forms of certification. The County is located in the central region of Kenya along the equator between longitudes 36º East and 37º East.The target population was the small holder coffee farmers in Nyeri County who were certified in any one of the three standards for at least two years. They were organized into thirteen cooperative societies. The small holder farmer was defined as a farmer who has an acreage of equal or less than 2 hectares (MOALF, 2014).

3.2Sample size and sampling technique

Sample size was determined using the formula by Fisher *et al* (1998). The proportion of farmer population that was certified was approximately 80%. The sample size was246 farmers and another 10% to cater for attrition, making a total sample of 270 coffee farmers.The sample comprised of farmers certified to any of one or more of the standards. They were proportionately sampled to reflect the composition of target population. Nyeri County is divided into three agro-ecological zones depending on the climatic conditions. To take into account the potential effect of zoning, sampling was stratified by zone. Stratified random sampling was used as it helps improve the accuracy of sampling results, prevent bias, and assure a more representative sample. In the respective stratum, simple random sampling was used to sample the factories. Thirty three percent (33%) of the seventy nine certified factories were randomly sampled as shown in Table 1. The coffee factories were proportionately sampled per farmer cooperative society within each stratum. Ten farmers per factory were assembled at the factory and questionnaires administered by trained research assistants.

Table 1 Sampling frame

Agro-ecological zone	1	2	3	
Total no. of factories/zone	28	44	8	
No. of factories sampled	10	14	3	
No of farmers sampled/factory	10	10	10	
Total no. of farmers/zone	100	140	30	
Total sample population				**270**

3.3Research instruments

Data collection methods were by research administered questionnaire and document analysis. This enabled the researcher to avoid deficiency that would arise from using one instrument for data collection (Burns, 2000). Questions included both open ended and closed questions to allow for variety and in depth information. The main data types collected included: farm characteristics,certification standards requirements, coffee production and marketing characteristics. Data was collected for the coffee production and marketing activities for the 2013/2014 coffee year and compared it with production before adoption and certification to coffee standards.The questionnaire was pre tested using farmers from one of the factories not included in the test sample. Questionnaires were administered to a small sample (4 % of sample size) for the purpose of validation of research instrument. The researcher used the data to revise the instrument (Burns, 2000).

3.4Data Analysis

Questionnaires were scrutinized to ensure that they were duly filled according to instructions and were consistent. Data was cleaned, coded and entered into the computer using MS Excel. The statistical package of social sciences (SPSS) was used to analyze the data into descriptive statistics such as frequencies, mean and standard deviation. Data was analyzed using non- parametric methods after subjecting it to Kolmogorov-Smirnov test for normality. The null hypothesis proposed that all the coffee productivity population distributions resulting from adoption of certification standards were equal. It was tested using the Kruskal-Wallis test, which uses rank sums to determine whether three or more independent samples are from the same population. The Kruskal-Wallis test statistic (H) uses the Chi-square distribution.Post-hoc test between pairs of samples were done using the paired-sample Wilcoxon Signed Rank test to determine which of the pairs were significantly different at $p<0.05$. The model for the study proposed that certification standards had similar mean effects on the coffee productivity.

4. RESULTS AND DISCUSSION

4.1 Results

4.1.1 Composition of sample population

The study response rate was 98.15%. Distribution of adopted coffee certification standards in the sample population is shown in Table 2. Five categories of standards were identified, Fairtrade, Rainforest Alliance (hereafter referred to as Rainforest), UTZ, and a combination of Fairtrade with Rainforest and, Fairtrade with UTZ. The Fairtrade standard was most widely adopted by the farmers at 70.7 %. Rainforest and UTZ comprised of 14.7% of the sample while 14.6% was a combination of Fairtrade with rainforest and with UTZ.

Table 2. Distribution of the standards by the number of farmers

Standard	Frequency	Percent
Fairtrade	188	70.7
Rainforest	29	10.9
UTZ	10	3.8
Fairtrade + Rainforest	19	7.1
Fairtrade + UTZ	20	7.5
Total	266	100.0

4.1.2Comparison of the effects of the three standards on productivity

Data was subjected to the Kruskal-Wallis non parametric method of testing that compares means through ranking. The mean productivity for each standard category and the mean ranks on productivity are shown in Table 3. Mean productivity ranged from 4.03 to 6.78 kg coffee cherry per tree. Productivity was highest for farmers who had implemented a combination of Fairtrade and Rainforest. However, Fairtrade certification resulted in the highest productivity at 6.38kg cherry per tree compared to Rainforest and UTZ whose respective productivity outputs was 4.11 and 5.21 kg cherry per tree. Combining Fairtrade and UTZ resulted to decreased productivity (4.03 kg cherry per tree) compared to each of the two standards. Adoption of any of the three standards resulted in increased mean productivity compared to the Nyeri County average productivity at approximately 3.0 kg cherry per tree (MOALF, 2014).

Table 3. Mean productivity rank and mean productivity per standard

Standard	Frequency	Mean productivity kg/tree	Mean productivity Rank	χ^2 4df	*p*-value
Fairtrade	188	6.38	138.78		
Rainforest	29	4.11	98.28		
UTZ	10	5.21	134.20		
Fairtrade + Rainforest	19	6.78	167.13		
Fairtrade + UTZ	20	4.03	102.65		
				13.82	0.008
Total	266				

According to ITC, (2012) Fairtrade certification has potential for higher yield and quality through higher income thereby increasing possibility of purchasing farm input and hiring labour, Rainforest may increase quality but negatively affect yield while UTZ has limited effect on yield and quality. Fairtrade farmers have potential to access well established markets, technical assistance and credit, and improved organizational skills leading to higher productivity. Kruskal Wallis test for mean productivity ranks was significant at$p$=0.008 with Chi-square (χ^2) test statistic value of 13.82. This was greater than the critical value of 9.49 at four degrees of freedom indicating that at least two of the five mean productivity ranks were different. This led to the rejection of the null hypothesis that the population distributions were equal. The research hypothesis that stated that the populations were significantly different was accepted. The results indicate that adoption of certification standards had different effects on mean productivity ranks. Post–hoc analysis of pairs of all the five categories of means were compared in pairs using the Wilcoxon Signed Rank /Mann-Whitney Test and the results are shown in Table 4. There were three significant different (p<0.05) observations for the productivity mean ranks: Fairtrade compared to Rainforest (p= 0.01), Fairtrade combined with Rainforest compared to Rainforest alone (p=0.001), and, Fairtrade combined with Rainforest compared to Fairtrade combined with UTZ (p=0.002). It is noteworthy that UTZ and Rainforest are not significantly different on their effect on coffee productivity but addition of Fairtrade certification to either of them changed their effect on productivity. Certification to Rainforest aims at conserving biodiversity, enhanced soil fertility and improving farmer livelihoods (Rainforest Alliance, 2010). When combined with Fairtrade's social-economic objective, adoption of the two standards increased coffee productivity when implemented together. Riisgaard et al. (2009) reported that adoption of Fairtrade and organic standards by coffee farmers in East Africa resulted in a larger welfare impact compared to UTZ combined with organic standard. This was attributed to improved contractual conditions such as more stable prices and greater opportunity for bulk selling. However, the authors noted that when accompanied by interventions such as farmer training, all standards have potential to improve farmer welfare.

Table 4. Pairwise comparison of mean ranks on productivity showing p -values

Standard	Fairtrade	Rainforest	UTZ	Fairtrade + Rainforest
Rainforest	0.01*			
UTZ	0.85	0.10		
Fairtrade + Rainforest	0.18	0.001*	0.11	
Fairtrade + UTZ	0.53	0.77	0.29	0.002*

Values followed by an asterisk (*) show significant difference

Further analysis of the effect of each standard compared to others is shown in Table 5. Mean productivity of Rainforest (5.17 kg/tree) and UTZ (4.42 kg/tree) are lower compared to that of farmers who had not adopted Rainforest (6.11 kg/tree) and UTZ (6.13 kg/tree) respectively. However, the mean productivity rank for Fairtrade was significantly (p= 0.02) higher than for the Non-Fairtrade producers. This is supported by the high mean productivity rank for Fairtrade.

Table 5. Mean productivity ranks and mean productivity for each standard compared to non-standard

Standard	Frequency	Mean productivity kg/tree	Mean productivity rank	*p* value
Fairtrade	227	6.21	137.97	0.02*
Non-Fairtrade	39	4.39	107.49	
Rainforest	48	5.17	125.53	0.43
Non-Rainforest	218	6.11	135.25	
UTZ	30	4.42	113.17	0.12
Non-UTZ	236	6.13	136.08	

Values followed by an asterisk (*) show significant difference

Figure 2 shows the average effect of certification to all standards on parameters of coffee production including cherry and, dry cherry (BUNI) yield, coffee growing acreage, income and price in addition to the aspect whether coffee was the main source of income for the farmer. From the findings, coffee was the main source of income for 72.56% of the sample population with 79.32 % of the farmers reporting an increased coffee production after adoption of certification standards and 72.56 % reporting increased income. Few farmers, 26.69 % were satisfied with the coffee prices while 24.06 % increasing their coffee acreage after certification. The average productivity for all standards was 5.40 kg cherry per tree.Verkaat, (2008) reported that coffee farmers in Uganda and Tanzania indicated that the primary reason for adopting certification standards was raising their income. Adoption of coffee certification standards was perceived to result to increased production and income. This could be attributed to the training that farmers received during the certification process, improved farm management practices such as production records management and access to agricultural inputs.

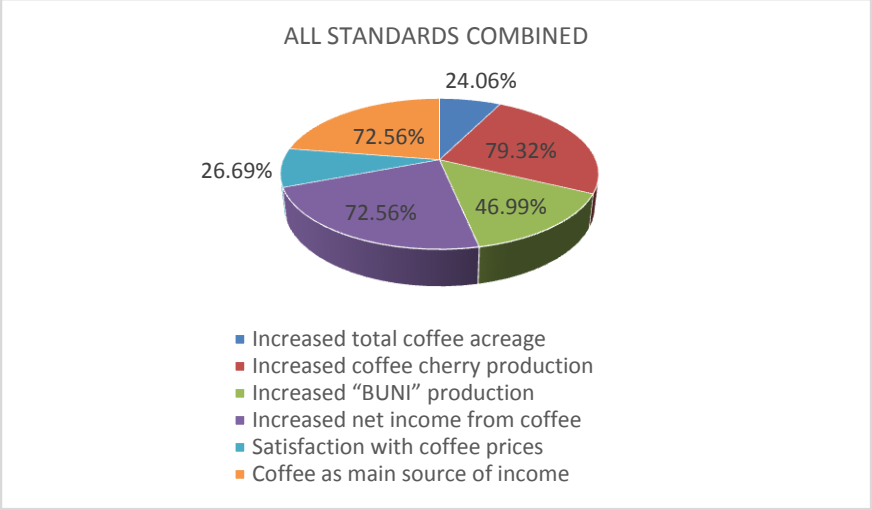

Figure 2. Average effects of all standards on production

4.1.3Effect of zoning on coffee productivity

Table 6 shows the mean productivity and productivity ranks for the three agro-ecological zones where coffee is grown in Nyeri County. The Chi square value for the mean ranks was 0.79 and a p-value of 0.67 indicating that the zoning did not significantly affect the productivity. This means that standards were the main determinants of coffee productivity in the county. Zone 1 farmers had adopted Fairtrade and Rainforest standards. Zone 2 farmers had adopted Fairtrade, UTZ, Fairtrade with Rainforest, and Fairtrade with UTZ. Zone 3 farmers had adopted only Fairtrade standard. The mean productivity ranged from 5.75 kg/tree in zone 1 to 7.11 kg/tree in zone 3. A different observation was made by Berndt (2007) who reported zonal effect on coffee productivity for cooperatives in Costa Rica. Producers located in the prime coffee growing zones sold more coffee as Fairtrade certified compared to producers from areas not ideally suited for growing high grade coffee and who produced lower quality coffee that could not support the price premium. The researchers attributed the zonal effects to the high quality of coffee from the prime zones.

Table 6 Mean productivity and productivity rank per agro-ecological zone

Zone	Frequency	Mean productivity kg/tree	Mean productivity rank	χ^2 2df	*p*value
1	99	5.75	128.73		
2	137	5.81	135.13		
3	30	7.11	141.80		
				0.79	0.67
Total	266				

Interaction between Fairtrade certification and zoning is shown in Table 7. There was a significant difference (p=0.01) in mean coffee productivity between certification to Fairtrade (6.44 kg per tree) and non-Fairtrade (4.11 kg per tree) in Zone 1. Zone 1 farmers had adopted Fairtrade and Rainforest standardsmeaning that adoption of the two standards had an effect on coffee productivity. There were no significant effects in Zone 2. Zone 3 had only Fairtrade certified farmers.

Table 7 Effect of standards and zoning on productivity

Zone	Standard	Frequency	Mean productivity kg/tree	Mean productivity rank	*p* value.
1	Fairtrade	70	6.44	54.69	0.01*
	Non -Fairtrade	29	4.11	38.67	
2	Fairtrade	127	5.86	69.09	0.92
	Non -Fairtrade	10	5.21	67.80	

Values followed by an asterisk (*) show significant difference

4.2Discussion

Riisgaard et al. (2009) studied the impact of certification to Fairtrade, UTZ and Rainforest standards on small scale coffee producers in East Africa and concluded that there are positive benefits from being organized in sustainability

related schemes, for all the standards adopted. However, they reported that certification to Fairtrade resulted in a higher gross income compared to UTZ and Rainforest with minimal difference observed betweenUTZ and Rainforest. The average total coffee production reported in this study for the 2013/2014 coffee year was 1,133 kg cherry per farmer and productivity was 5.40 kg cherry per tree. This is above the average coffee productivity of approximately 3kg/tree in the county (MOALF, 2014). According to the Nyeri County taskforce report (2013), the main objective on coffee productionin the County is to increase productivity to 10kg cherry per tree with certification to coffee standards as one of the recommended strategies to be used to attain the target.The farmers who increased their coffee acreage were 24.06 % and this could be explained by the land size constraint in the region caused by high population density. Satisfaction with coffee prices was low as only 26.69 % of the farmers were satisfied with the pricing, notwithstanding the Fairtrade minimum and premium price. Poor coffee prices could be attributed to the fact that, not all of certified coffee was sold with the certified label. Coffee that is not sold as certified end up in the conventional market and the farmers do not get the full benefit from the premium price offered through Fairtrade or from the high prices for UTZ and Rainforest labelled coffee. Low prices are a disadvantage in that the cost of the certification process (training, inputs, controlled management practices and process audits) incurred by the farmers in adopting any of the standards is not compensated through coffee pricing. Verkaat, (2008) studied the effects of UTZ and Fair Trade certification on coffee producers in Uganda and Tanzania and reported that UTZ certification did not rely on higher coffee prices to cover the cost of certification but on the potential increase in productivity and efficiency that arise from certification related good production management practices, better labour conditions and related social wellbeing. According to Bitzera et al. (2008) and Giovannucci and Ponte (2005), certification to any standard pays off if the ratio of the extra revenues generated from adopting certification standards and the cost of certification is positive. The increased revenue could result from price premiums, access to new markets, cost reduction associated with increased efficiency, in addition to increased productivity. When coffee is not sold in the certified label market, the farmers potentially lose on the pricing. Potts (2007), reported that adoption and certification to sustainability standards has potential to improve farm management systems and to help producers access high value specialty markets that offer more stable business and pricing relationships. Standards help farmers improve management and farming practices with respect to environment, health and community welfare and their potential degree of impact remains relatively undocumented as most studies focus on income.Giovannucci and Ponte (2005), argued that there are shortcomings of sustainability standards such as additional costs, dependency on the specific markets for certified coffee, inadequate extension services and potential to create barriers to trade. In their analysis of profits and poverty among Nicaraguan Fairtrade and organic coffee producers, Beuchelt and Zeller (2011) reported that even though prices for certified coffees are higher that of conventional coffees, the profitability of the former and subsequent effect on farmers' livelihoods is not clear as certified coffee farmers were poorer compared to conventional producers. They concluded that coffee productivity, efficiency and profitability require to be increased as higher prices for certified coffee did not compensate for low productivity, land and labour constraints. Further, Saragih (2013) observed that certification to coffee standards did not provide significant benefits to farmers in Sumantra, Indonesia. He argued that productivity could be achieved by intensification strategy through increased use of farm inputs such as fertilizers, optimization of land use, labour, access to credit, application of good agricultural practices and disease control and not only through adoption of certification standards.Notwithstanding the challenges of adopting certification standards, Panhuysen and Pierrot (2014) argued that certification should be used as a means by which coffee producers upgrade their production systems, improve productivity, reduce costs and increase quality eventually leading to financial benefits and increased profits for the producers. However, the authors noted the increasing gap between the certified coffee available from the producers and the volume that is finally procured as certified by the buyers. In addition to differences between demand and supply of certified coffee other factors play a role in explaining this gap such as quality aspects, variety and origin of the coffee.

5. CONCLUSION AND RECOMMENDATIONS

Based on the research findings, the following conclusions were made: adoption of coffee certification standards increased coffee productivity in Nyericounty at varying levels. Fairtrade was the most adopted standard with a significantly higher effect on coffee productivity than Rainforest or UTZ. Certification to a combination of two standards resulted to different effects on coffee productivity. Fairtrade combined with Rainforest had a synergistic effect that increased coffee productivity compared to either Rainforest or Fairtrade on their own. Agro-ecological zone did not affect coffee productivity making adoption of certification standards a major variable affecting coffee productivity. The differences in coffee productivity levels resulting from the various standards could be explained by farm management practices emphasized in the implementation of individual or combined standards. From this study, farmers should be encouraged to adopt sustainability standards in order to benefit from increased productivity that results from good production management systems. Further research on the effects of adoption of other sustainability standards on coffee productivity and on other crops is recommended.

6. ACKNOWLEDGEMENT

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