

Unlocking Smallholder Coffee Grower Knowledge of Coffee Certification Schemes in Tanzania: Insights from the Implementation of Coffee and Farmer Equity Practices

Makangila, S.S.¹ and A.K. Ahmad²

¹Assistant Lecturer, Institute of Continuing Education, Sokoine University of Agriculture, Morogoro, Tanzania. P.O. Box 3044, Morogoro, Tanzania

²Senior lecturer, Department of Agricultural Extension and Community Development, Sokoine University of Agriculture, Morogoro, Tanzania. P.O. Box 3002, Morogoro, Tanzania

*Corresponding author e-mail: salummakangila@sua.ac.tz; Tel.: +255714565152

Abstract

The study was conducted to assess smallholder coffee growers' knowledge of coffee certification schemes particularly Coffee and Farmer Equity (C.A.F.E) Practices in Mbinga District, Tanzania. The sample size of the study was 188 respondents who were randomly selected and surveyed. The study deployed a mixed research design and data were collected through Questionnaires, Focus Group Discussions and Key Informant Interviews. Quantitative data were analyzed by employing descriptive statistics involving computation of means, frequencies and percentages whereas a thematic analysis procedure was adopted to analyze qualitative data where themes were generated for reporting the results. The study findings revealed that the majority of smallholder coffee growers were knowledgeable about the C.A.F.E. Practices. However, a small proportion of respondents had inadequate knowledge of the scheme. Based on these findings, the study recommends that coffee certification promoters should intensify their efforts in providing training and guidance specifically to those minority farmers who are not yet knowledgeable about the certification scheme.

Keywords: Coffee and Farmer Equity Practices, Certification Knowledge

Introduction

Over the years, coffee production has been a vital component of the economy of coffee-producing countries in Africa, Latin America and Asia (International Coffee Organization, 2021). It is one of the most traded commodities and the primary source of foreign exchange earnings. On top of that, it connects people, provides employment opportunities, and livelihoods of the millions of individuals (FAO, 2022b). Therefore, its significance extends far beyond the simple act of coffee production, but, it is a truly global commodity with profound implications to coffee producing communities, and other value chain actors (Muriithi *et al.*, 2018).

An analysis of sales records in Tanzania since independence reveals a significant contribution of coffee to the country's economy. For instance, in the year 2023 coffee contributed a total amount of \$231 million to Tanzania's

export earnings (The Citizen, 2023). In addition, the industry serves as a substantial source of income and livelihood, providing direct and indirect employment to 2.6 million people, including 600,000 smallholder coffee farmers (TCB, 2021). For that potential, coffee production in Tanzania is not just a commodity; it is an integral part of the economy, social, and cultural life of the country. The multiple benefits of the coffee industry underscore the urgency of safeguarding its long-term sustainability (Ibnu, 2017).

Despite its potential, locally and globally the coffee industry faces significant sustainability and ethical challenges that have profound implications for coffee-producing regions, exporters, and consumers worldwide. These challenges encompass coffee production abnormalities, environmental issues, social inequalities, food safety issues, and economic irresponsibility within and outside the coffee

supply chain (Grabs *et al.*, 2016). These challenges arise from a combination of factors that affect the economic, environmental, and social aspects of coffee production. These include price fluctuations, climate change, pests and disease infestation, environmental issues, consumer preferences, the fragile coffee production, and resource constraints Hillary *et al.*, 2018).

To respond to these practical challenges, coffee certification schemes were introduced by coffee stakeholders in the Global North to operate in the Global South (Borrella *et al.*, 2015). Coffee certification schemes are programs or systems designed to ensure that coffee production and trade adhere to certain social, environmental, and economic standards (Ponte, 2004). Some of the well-known coffee certification schemes include Fair Trade, Good certified coffee (UTZ certification), Rainforest Alliance (RA), Organic certification, Coffee and Farmer Equity (C.A.F.E.) Practices, Global coffee platform formally known as the Common Code for the Coffee Community (4C Association), and Bird-friendly certification (Kangile *et al.*, 2021). These schemes aim to promote sustainability, fair trade practices, and ethical production in the coffee industry by setting and implementing standards that ensure fair prices for farmers, environmentally friendly cultivation, and social responsibility (Ibnu, 2017). To ensure the certification standards are well-implemented, accreditation is done by a third-party organization, which provides written documentation that communicates to the stakeholders' whether the coffee is grown, processed, and traded sustainably or vice versa (Takahashi and Todo, 2017).

However, to realize these benefits it is imperative to ensure that smallholder coffee growers, often considered as the gatekeepers of the supply chain, possess a comprehensive knowledge of these schemes. To harness the comprehensive knowledge, coffee certification promoters in Mbinga District pioneered coffee certification training programs for smallholder farmers since the year 2006 (Lazaro *et al.*, 2008). These include Tutunze Kahawa Company Limited, Techno Serve Tanzania, Taylor Winch Tanzania, Starbucks Tanzania farmer support

canter, and Dan and Associates Enterprises Limited. Therefore, a training program intended to equip coffee producers with the knowledge and skills needed to meet coffee certification standards.

Coffee certification training programs in Mbinga District encompassed a comprehensive process to ensure that coffee producers and their organizations are well-prepared to meet the rigorous standards and requirements of a particular certification scheme. It involved sensitization meetings, registration of individual coffee growers and their respective organizations, weekly hands-on field instruction to coffee producers about the specific standards and requirements of a particular certification scheme, and final auditing of standards compliance. The meetings provided the opportunity for the general introduction of the certification process, farmers' registration established accountability structures, hands-on field instructions demonstrated how to implement standards, and auditing exercises validated farmers' compliance with certification standards.

According to Starbucks (2016), C.A.F.E Practices is a set of social, environmental, and economic guidelines developed by Starbucks, the global coffee company. Farmers learn to embrace these guidelines through a well-structured training program delivered by either Starbucks experts or coffee certification promoters. In Mbinga District the trainings were delivered through coffee growers' platforms composed of farmers' groups, associations, networks and Primary Agricultural Marketing Cooperatives Societies (AMCOS). Based on the KIMULI AMCOS report of the year 2022, on average 2,153 coffee growers who are the members of the AMCOS had received C.A.F.E Practices training programs. The training program not only addresses a wide range of crucial topics but also intends to ensure that coffee growers are equipped with the knowledge and skills necessary to meet certification requirements. This commitment of the promoters to build capacity of the producers and their organizations underscores the importance of sustainability, equitable access to premium markets, and the well-being of both farmers and

labourers.

Although coffee certification training is a recent phenomenon in coffee-producing regions, studies evaluating its impacts particularly producer's knowledge of the schemes are now on the increase. Some of these studies include Maguire *et al.* (2018), Bray and Neilson (2017), Klaus (2015), as well as Ruben and Heras (2012). However, two major strands have been identified based on the results of these studies. The first strand acknowledges that the majority of smallholder coffee growers are knowledgeable about the schemes (Maguire *et al.*, 2018; Bray & Neilson 2017; Vellema *et al.*, 2015). Their assertion is based on the fact that certification incentives, training support from certification promoters, effective continuous peer learning, and regular updates contribute to high levels of knowledge of certification schemes among coffee farmers (Rueda *et al.*, 2017; Van Rijnsbergen *et al.*, 2016; Bose *et al.*, 2016). The second strand argues that the majority of smallholder farmers are not knowledgeable about coffee certification schemes (Bravo-Monroy *et al.*, 2016; Klaus, 2015; Ruben & Heras, 2012). They point out that language barriers, limited access to information, ineffective training programs, and inadequate farmer participation in certification have resulted in low levels of coffee certification knowledge and low productivity among coffee growers (Snider *et al.*, 2018, Kangile *et al.* 2021). For instance, Kangile *et al.* (2021) disclosed that organic certified farmers in Tanzania obtained lower productivity by 34.7 kg/ha compared to their counterparts due to limited knowledge of the scheme among others reasons. Reflection on the conflicting camps in the literature indicate as gap in this area. Therefore, addressing this knowledge gap is essential for fostering sustainable coffee production practices and for ensuring that smallholder farmers can access the economic opportunities that certification programs offer.

It is further argued that these inconclusive results might be attributed to the diversity of coffee farmers' demographics, government initiatives, size and type of farmers' organization, efforts of certification promoters, narrow theoretical lens, methodological differences,

and timing of the studies. In addressing the identified knowledge gap, the current study employed a mixed design and contextual specificity approach. Furthermore, the study integrated multiple theories to investigate coffee growers' knowledge of the C.A.F.E. Practices certification scheme. This approach enriches the quality of the study findings and increase its potential to inform policies, programs, projects, initiatives, and practices which benefit coffee-producing communities across the global.

Theoretical and conceptual framework

Theoretical framework

Theories or frameworks explaining how individuals learn and understand different phenomena including coffee certification schemes are well abundant. Santos *et al.* (2023) documented some of these theories/frameworks, including social learning theory, social capital theory, the Knowledge, Attitude, and Practice (KAP) framework, and Social cognitive theory. Others include Malcolm Knowles andragogy theory, Human capital theory, and Cognitive theory (Eise *et al.*, 2021). However, after reviewing the mentioned theories/frameworks, a deliberate choice was made to employ the Malcolm Knowles Andragogy Theory and the KAP Framework. While Malcolm Knowles' andragogy theory offers perspectives on how adult learners learn during training sessions, the KAP framework was appropriate to measure and determine the degree of knowledge about C.A.F.E Practices schemes among smallholder coffee growers. Similarly, these theoretical perspectives have been adopted by previous empirical studies such as those of Bray and Neilson (2017) and Sharma and Pudasaini (2021) to understand the learning processes and knowledge acquisition of smallholder farmers within the context of crop farming and processing.

Conceptual model

The conceptual framework of the study (Fig. 1), portrays the independent and dependent variables of the study. The dependent serves as the focal point, representing the principal outcome or response under examination. This dependent variable which is farmers' knowledge

of C.A.F.E. Practices among smallholder coffee growers, encapsulates the core objective of the research. It is influenced by five distinct independent variables, namely; certification training, orientation to coffee certification (CC), farmers' readiness to learn, learning motivations, and farmers' demographic characteristics. These variables collectively serve as the building blocks potentially driving the level of farmers' knowledge during learning processes (Eise *et al.*, 2021). Additionally, five reflective indicator variables were employed to measure the extent of farmers' knowledge of C.A.F.E. Practices. These include an understanding of C.A.F.E. Practices certification criteria, processes, benefits, and challenges.

coffee is grown in deep, well-drained, and fertile soil at an altitude not less than 900m above sea level. The height above 900m facilitates the cultivation of coffee which has a superior taste compared to lowland. The unique combination of high altitude, fertile soils, and good climate contributes to the exceptional quality of Arabica coffee, making it a sought-after commodity renowned for its distinctive taste and aroma.

Therefore, Mbinga District Council was selected as the study area due to its prominent role in coffee cultivation and certification practices, making it highly relevant to the research topic. The district offers a diversity of coffee production systems, including smallholder farms, different farmers organizations, and various certification

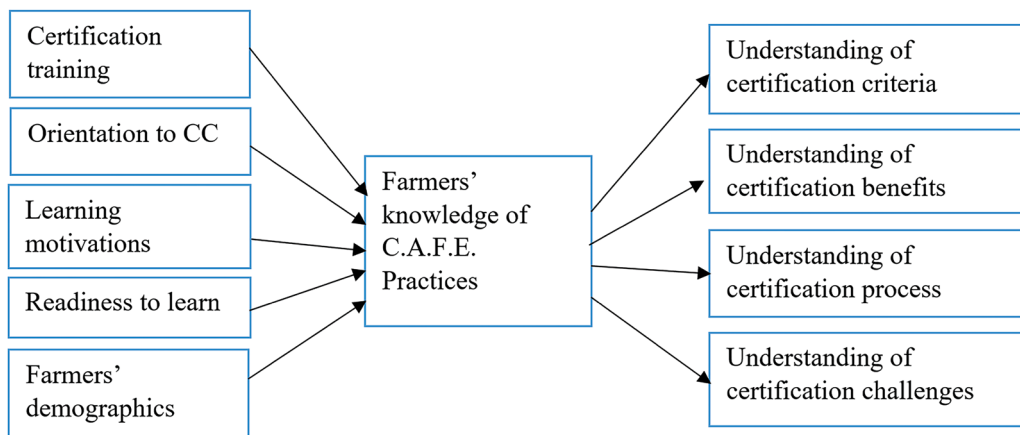


Figure 1: Conceptual model of the study

Methods and data

Study area

The study was carried out in Mbinga District, Ruvuma, Tanzania. Location-wise it is located at latitude 10°50'00.0" S and longitude 34°50'60.0"E. The district has a total area of 4,840km². The main income-generating activity for most people is agriculture. Therefore, a large area is typically under agricultural activities. Farms are widely distributed in highland, midland, and lowland zones.

The main cash crop which is grown in the highland zone is Arabica coffee. In addition, wheat, banana, timber trees, maize, cassava, beans, vegetables, tomatoes, avocado, macadamia, and mango trees are also cultivated by smallholder farmers. Nevertheless, Arabica

schemes, providing a comprehensive source of data. Moreover, its accessibility and familiarity to the first author, availability of well-documented information about coffee certification process, and the presence of local expertise and prior collaborations with the community made it an ideal location for conducting the study. Finally, availability of resources, alignment with the research goal and logistical considerations further solidified its selection as a key site for inquiry in the study (Barglowski, 2018).

Sampling procedure

To determine the knowledge and attitudes regarding the deployment of the C.A.F.E. Practices coffee certification scheme, coffee farmers who are members of KIMULI IAMCOS

were chosen as the study population. This choice was motivated by the fact that the AMCOS represents a specific group of coffee farmers participated in the implementation of the scheme. Including these farmers as the study population was of substantial importance, as they possess firsthand experience and in-depth insights related to the intricate dynamics of the certification landscape (Fillippa and Hatab, 2018). By concentrating on this group, the study was effectively captured information describing variables under examination making the findings more applicable and actionable. To ensure that every member had an equal chance to participate in the study, a simple random sampling technique, as suggested by Taherdoost (2016) was employed. The sample size of 188 respondents, who were surveyed based on their respective locations, was calculated using sample size formula for finite population expressed below. This sample size was chosen to achieve a desired level of confidence (95%) with an acceptable margin of error of 4%, while considering the size of the population being surveyed and resources constraints.

$$n = \frac{N * Z^2 * \sigma^2}{(N - 1)e^2 + Z^2 * \sigma^2}$$

Where: n is the desired sample size, N is the total population size, Z is the Z -score at confidence level of 95%, σ is the estimated error term, and e is the margin of error.

Research instrument

A structured questionnaire, pre-tested before actual data collection, was used to collect quantitative data from respondents. In addition, detailed information regarding coffee growers' knowledge and attitudes toward the certification scheme was gathered through Focus Group Discussions (FGDs), Key Informant Interviews (KII), and document reviews. Data collection took place from January to February 2020. Using a combination of data collection methods enabled collection of a wide range of data and gaining insights of the respondents in relation to the knowledge of the certification scheme in the context (Fleming *et al.*, 2017). This approach yielded a deeper understanding of the topic, enhanced the validity of the

findings, and provided a well-rounded basis for recommendations.

Operationalization of Variable

In this study, knowledge is defined as the amount of information held in memory that affects the way individuals assess interpret, and react to stimuli around them (Bolisani *et al.*, 2018). To investigate farmers' knowledge regarding C.A.F.E. Practices certification standards, twenty structured statements were adopted. These statements captured respondents' understanding of certification standards as outlined in C.A.F.E. Practices generic scorecard version 3.4 of 2016. Respondents were required to specify their position regarding their level of understanding of the content contained in each statement by writing 'False' for incorrect statements and 'True' for the correct statements. A score of one mark (1) was assigned for each correct response, while a false answer was scored zero marks (0). If a respondent correctly responded to all statements, they were expected to score a maximum of 20 marks; if all responses were incorrect, the expected score was zero (0). To investigate knowledge levels, a decision rule was applied as follows: scores of 0 to 9 were termed as 'not knowledgeable,' scores of 10 to 15 were termed as 'knowledgeable,' and scores of 16 to 20 were termed as 'highly knowledgeable.' Consequently, the total scores of respondents were calculated, and their knowledge level was documented according to the aforementioned decision rule.

Data Analysis

The Statistical Package for the Social Sciences (SPSS), version 20, was employed to analyze the quantitative data after it had been collected, coded, and edited. Descriptive statistics, involving the computation of frequency, percentages, mean, and total scores, were used to report the study findings. Conversely, qualitative data were analyzed through content analysis.

This method involved content transcription, translation, and coding. The themes derived from the content were described as the findings of the study. This combined approach, incorporating both quantitative and qualitative data analysis,

facilitated a comprehensive and well-rounded examination of the research topic, ensuring the robustness of the study findings and addressing the complexity of the subject matter.

Results and discussion

Demographic Characteristics of Respondents and its Implications

Study findings showed that 37(19.7%) of all 188 respondents were women and 151 (80.3%) were men (Table 1). By tradition in the study area, cash crops are controlled by men. The domination of men was also proven by membership in KIMULI AMCOS where 75% of the members were men. The gender composition of the study sample highlights the importance of addressing gender disparities and promoting gender-inclusive approaches in coffee certification schemes. Understanding the specific needs and challenges faced by women in coffee farming is essential for creating equitable and effective learning opportunities and ensuring that the benefits of certification extend to all members of coffee-producing communities. The findings from this study resonate well with that of Bayisenge *et al.* (2019) which revealed minimal participation of women in coffee production activities including certification. This was largely because many women, influenced by traditional and cultural norms, perceived cash crops as being primarily for men.

On the age of respondents, 75 (39.9%) were between 18 to 40 years, 88 (46.8%) were between 40 to 60 years and 25 (13.3%) were beyond 61 years. Study findings imply that 87% of farmers were in their active working age (18 to 60 years). The high percentage of farmers in their active working age is advantageous for learning and applying knowledge related to coffee certification schemes (Fleming *et al.*, 2017). It suggests a receptive and productive group of individuals who can benefit from certification training and have a more significant and lasting impact on learning of sustainable coffee production.

The study finding is consistent with Filippa and Hatab (2018), who reported that 91% of coffee farmers involved in Fairtrade coffee certification in Tanzania, were aged between 15

and 60 years and were capable of understanding the training delivered to them.

Furthermore, the majority of respondents (86.7%) had completed primary school education, followed by 11% with secondary education, 1.1% with post-secondary education, and only 2% with no formal education (Table 1). This implies that the majority of farmers were capable of comprehending coffee certification training and instructions, as they could read and

Table 1: Demographic Characteristics of Respondents (n=188)

Variable	Frequency	Percent
Sex		
Women	37	19.7
Men	151	80.3
Total	188	100
Age (Year)		
18-40	75	39.9
41-60	88	46.8
>61	25	13.3
Total	188	100
Education level		
None	3	1.6
Primary	163	86.7
Secondary	20	10.6
Post-secondary	2	1.1
Total	188	100
Farm size (acre)		
Below 3	105	55.9
3-6	74	39.4
>7	9	2.8
Total	188	100
Number of coffee trees		
<1000	52	27.7
1000 – 3000	106	56.4
>3001	30	15.9
Total	188	100
Coffee as a source of income		
Yes	157	83.5
No	31	16.5
Total	188	100

write. This finding aligns with Bray and Neilson (2017), who also found that the majority of farmers in coffee-growing areas were educated. Education appears to be a key factor in defining the likelihood of participating in certification programs because it enables farmers to write, read, and understand the guidelines related to certification schemes and, more importantly, the requirements for record-keeping.

Concerning the size of coffee farms, the average farm size was three acres, with a mean of 2094 coffee trees. The farm size and number of coffee trees highlight the predominance of smallholders, resource limitations, environmental considerations, livelihood strategies, and market access opportunities. This information might inform the decision to participate effectively or ineffectively in coffee certification training, which, in turn, influences the understanding of the scheme. Kattel (2017) revealed that group certification is employed as a means to increase group learning and enhance smallholder coffee growers' participation through economies of scale.

In summary, demographic data played a pivotal role in the study of farmers' knowledge regarding coffee certification schemes. Understanding the demographics of the farming community provided crucial insights into the diverse factors that influenced the acquisition of knowledge in this context. Factors such as age, education, sex, and farm background significantly impacted how farmers engaged with and comprehended certification schemes. By accounting for demographic variables, certification promoters, and policymakers can develop more targeted strategies to enhance farmers' awareness and understanding of certification schemes, ultimately promoting sustainable and ethical agricultural practices and facilitating equitable economic opportunities in the coffee enterprise.

Knowledge of Coffee Farmers Regarding CA.F.E Practices Coffee Certification Scheme

The results of the study revealed that over 60% of the farmers were highly knowledgeable about certification standards, 27% were knowledgeable, and only 12% were not knowledgeable (Table 2). The study findings

suggest that the knowledge component of the KAP framework is reflected in the distribution of farmers across these categories. The majority of farmers fall into the "knowledgeable" and "high knowledge" categories, which indicates that a significant portion of the target population has been effectively informed about the certification scheme. This could be attributed to capacity-building activities such as training and communication conducted by coffee certification promoters from Taylor Winch Tanzania and the Starbucks farmer support center.

Furthermore, analysis of FGD results revealed that coffee growers received training every week for four months during the 2022 training year leading up to the audit of standards compliance. Smallholder coffee growers also acknowledged close supervision, active participation, and routine follow-up from Taylor Winch experts, government extension officers, and KIMULI AMCOS leaders. This is revealed by the following extract

You know during that year of training we attended training every week under a close supervision of our facilitators (FGD, Mahande Village; January 29, 2022).

The study findings align with Malcolm Knowles' andragogy theory, which emphasizes the importance of effectively engaging adult learners, such as farmers, during training. As it was revealed by respondents, the training programs harnessed the self-concept, experience, readiness, motivation, and problem-solving orientation of adult learners to ensure their success as key players in the coffee supply chain. Furthermore, consistent with the study findings, Janvry *et al.* (2016) found that undertaking capacity-building activities is necessary to enhance farmers' acquisition of new knowledge, understanding, and compliance with the requirements of innovations.

Furthermore, the current paper's findings align with those of Bray and Neilson (2017), Vellema *et al.* (2015), and Rubben, and Hoebink (2014), who reported that training linked to coffee certification schemes improved farmers' knowledge of the standards, particularly in coffee agronomic and processing best practices, records management, and health and safety measures. However, in Ethiopia, the limited

Table 2: Overall farmers' knowledge of the C.A.F.E Practices certification scheme (n=188)

Knowledge level	Frequency (n)	Percentage (%)
Highly knowledgeable	115	61.2
Knowledgeable	51	27.1
Not knowledgeable	22	11.7
Total	188	100

and poor involvement of farmers in capacity-building activities reduced their knowledge of coffee certification standards (Ruben and Heras, 2012). This disappointment was attributed to the inefficiency of coffee marketing cooperatives in effectively disseminating information about certifications to their members.

In addition, a statement-wise analysis was made to recognize what exact facets of coffee certification farmers were knowledgeable or not knowledgeable about. The findings revealed that out of twenty knowledge statements, eleven statements were highly scored (over 80 %) by respondents. These statements were about forbidden practices focusing on agrochemical use, child labour, and sourcing of coffee from uncertified farmers. However, others were those statements with content focusing on encouraging certification practices such as record keeping, the use of mulches, shade tree planting, and terrace construction in the coffee farm with a slope greater than 15% (Table 2). Analysis of FGD results demonstrates that coffee service providers placed exceptional emphasis on communicating information targeting these statements and every farmer was encouraged to fully understand and observe them. Further analysis disclosed that the statements contained standards that had direct effects on coffee marketability and farmers'/consumers' health and safety were well understood. The remarks made by one of the interviewed respondents attributed the level of knowledge as a result of training provided by the coffee service provider. He remarked;

"Formerly, I used to burn empty agrochemical containers or left them in coffee

farms, but after the C.A.F.E Practice training, I knew that the proper way of disposing of empty containers is to bury them in the pit" (FGD, Utiri Village; January 29, 2022).

Study findings show that farmers were highly knowledgeable on the certification standards that promote coffee marketability and are worthwhile to farmers' health and safety. In the same way, Rijsbergen *et al.* (2016) found that training associated with coffee certification schemes such as Fair Trade, UTZ, and Rainforest Alliance prompted high knowledge of farmers on record keeping, traceability, and environmental management in Kenya. The farmer's knowledge of these certification standards not only enhances coffee marketability and farmer well-being but also strengthens the overall sustainability of the coffee industry.

In addition, five statements related to the maintenance of the ecosystem were moderately scored (61 to 74%) by respondents indicating that they were moderately knowledgeable about it (Table 3). Four out of five of these statements were on prohibitive behaviour related to environmental leadership and one on the favorable practices that are important for soil fertility management. These standards were found to have an indirect outcome in coffee production as they are concerned with conserving productive resources and the environment in general (Rueda *et al.*, 2017). These findings underscore the importance of coffee certification promoters actively promoting farmer awareness and adherence to ecosystem maintenance standards.

An interview with one of the key informants revealed that management of buffer zones around water sources was moderately taken into account since some of the farms are near water sources and it is difficult to eliminate productive coffee trees near the water table. The study finding implies that farmers were moderately familiar with C.A.F.E standards which have an indirect but important outcome on coffee production. Gole (2015) also revealed that farmers in Ethiopia had moderate knowledge of environmental protection guidelines due to a lack of meaningful conditions on environmental protection in coffee certification standards.

In addition, study findings divulged four

Table 3: Statements-wise score on C.A.F.E Practice knowledge (n=188)

Knowledge Statement	Response			
	True		False	
	n	%	n	%
C.A.F.E Practices coffee certification standards require				
Farmers to keep coffee production and sales records	186	98.9	2	1.1
Less than 50% of coffee farms to be properly mulched	185	98.4	3	1.6
Appropriate storage of agro-inputs	184	97.9	4	2.1
Correct disposal of empty agrochemical vessels	181	96.3	7	3.7
Prohibition of the entrance on a farm applied with agrochemicals in 3 days	179	95.2	9	4.8
Restriction child labour employment in coffee production and processing farm activities	179	95.2	9	4.8
Wearing of personal protective equipment when spraying agrochemicals	179	95.2	9	4.8
Coffee to be grown under shade trees ranging from 20% - 40%	170	90.4	18	9.6
Soil erosion control in the farm with a slope greater than 20%	169	89.9	19	10.1
Restriction of using WHO-banned agrochemicals to control weeds in a coffee farm	158	84.0	30	16.0
Restriction of mixing of certified and uncertified coffee	156	83.0	32	17.0
Prohibition of applying pesticides 5m before permanent water sources	139	73.9	49	26.1
Maintaining a buffer zone of at least 30m near permanent water bodies	137	72.9	51	27.1
Application of traps to control coffee insects and pests	117	62.2	71	37.8
Conservation of healthy soil for coffee production	117	62.2	71	37.8
On-time inspection of coffee farms	114	60.6	74	39.4
Mandatory use of premiums to fund social projects	62	33.0	126	67.0
Training farmers on issues regarding economic, environmental and social standards	56	29.8	132	70.2
Social standards to address casual workers welfare	26	13.8	162	86.2
Agrochemicals use as the first option to control coffee pests, diseases and weeds	25	13.3	163	86.7

statements that were lowly scored (13 to 33%) by the respondents, implying that respondents were less knowledgeable. These statements contained issues related to “the use of premium to fund social projects, categories of C.A.F.E Practices standards, and the use of chemicals as the first option to control coffee pests, diseases, and weed”. The reason may be these standards are new to most of the farmers. During FGD at Utiri Village on January 29, 2022, it was mentioned

that C.A.F.E Practices limit dependence on agrochemicals to control pests and diseases. The standards further emphasized the role of C.A.F.E. Practices in fostering a holistic approach to coffee production that enhances the well-being of farming communities and preserves the ecosystem.

As a substitute for traditional practices, the scheme promotes the use of integrated pest and disease management methods. Nevertheless,

farmers still perceive that more agrochemicals are needed to control pests and diseases to increase coffee quantity and quality even though it is against health and safety standards. This denies the requirement that pesticides are only sprayed as a last resort (after cultural, physical, and biological) controls have failed (Starbucks, 2016). This shows that knowledge does not by itself essentially lead to the application but how it fits with people's attitude is important.

The finding of the study is in line with Klaus (2015) who exposed that certified farmers in Costa Rica use agrochemicals in their coffee fields as their first option to combat pest and diseases to maintain adequate levels of production. Therefore although coffee farmers are aware and knowledgeable of the standard which limits agrochemical use as a first choice to control diseases in the absence of alternatives the awareness and knowing are ignored to sustain production and quality even if it is against C.A.F.E standards.

Therefore, the statement-wise analysis of the study has revealed a diverse landscape of farmers' knowledge of coffee certification standards. While some statements received high scores, indicating a commendable level of understanding and compliance, others were moderately or even lowly scored, signifying areas where improvement is needed. This variance in knowledge highlights the complex nature of coffee certification programs associated with the multidimensional requirements. To ensure the success of such programs, it is imperative for stakeholders, including coffee certification promoters and farmers organizations, to adopt a targeted approach, emphasizing both the reinforcement of well-understood standards and the elevation of those that are less familiar to the farmers.

Conclusion and recommendation

The study focused on determining smallholder coffee grower knowledge of C.A.F.E Practices Coffee Certification Schemes in Tanzania. Based on the findings it is concluded that the training programs and other promotion activities conducted by the certification scheme were effective as the majority of coffee growers were highly knowledgeable on most of the

mandatory C.A.F.E Practices standards (safe use of agrochemicals, coffee marketability, and farm management). Unfortunately, the respondents demonstrated moderate to low knowledge of supplementary standards focusing on social well-being. The implication is that coffee certification organizers placed considerable focus on standards that had zero tolerance for business and less emphasis on extra standards that had no zero tolerance. Similarly, coffee growers articulated that the scheme failed to address coffee price volatility, it was not transparent and the safe use of allowed agrochemical among individual farmers were not improved. Therefore, the study recommends coffee certification promoters including Taylor Winch Tanzania, Starbucks Tanzania farmers support center, and Mbinga District Council, provide timely certification training and guidance to empower farmers' knowledge, especially on additional standards touching coffee marketing, agronomic and processing best practices, and safety use of agrochemicals.

Acknowledgement

I extend my sincere gratitude to Sokoine University of Agriculture for their unwavering support throughout the implementation of this study. This study was made possible through the support provided by the University. Furthermore, I extend my thanks to the participants of this study, the smallholder coffee growers at KIMULI AMCOS in Mbinga Tanzania, whose willingness to share their experiences and perspectives has been instrumental in the success of this research.

References

- Barglowski, K. (2018). Where, what and whom to study? Principles, guidelines and empirical examples of case selection and sampling in migration research. *Qualitative research in European migration studies*, 151-168.
- Bayisenge, R. Shengde, H. Harimana, Y. Karega, J. Nasrullah, M. and Tuyiringire, D. (2020). Gender equality, Agriculture and rural development: Evidence from Nyamasheke coffee production in Rwanda. *International Journal of Gender and Women's Studies*

- 7(1): 29-40.
- Bolisani, E., Bratianu, C., Bolisani, E., & Bratianu, C. (2018). The elusive definition of knowledge. Emergent knowledge strategies: Strategic thinking in knowledge management, 1-22.
- Borrella, I., Mataix, C., & Carrasco, R. (2015). Smallholder farmers in the specialty coffee industry: Opportunities, constraints and the businesses that are making it possible. Institute of Development Studies Bulletin, Oxford UK, 46(3): 3-12.
- Bose, A., Vira, B., & Garci, C. (2016). Does environmental certification in coffee promote “business as usual”? A case study from the Western Ghats, India. *Ambio*, 45: 946–955
- Bravo-Monroy, L., Potts, G., & Tzanopoulos, J. (2016). Drivers influencing farmer decisions for adopting organic or conventional coffee management practices. *Food Policy*, 58: 49-61.
- Bray, G., & Neilson, J. (2017). Reviewing the impacts of coffee certification programmes on smallholder livelihoods. *International Journal of Biodiversity Science, Ecosystem Services and Management* 13(1): 216-232.
- Eise, J., Lambert, J., & Wiemer, C. (2021). Leveraging communities’ network strengths to support climate change adaptation information-sharing: a study with coffee farmers in Risaralda, Colombia. *Climatic Change*, 168, 1-19.
- Fillippa, P., & Hatab, A. (2018). Sustainability motivation from fair-trade certification among smallholder coffee growers in Tanzania. *Sustainability*, 10(1551): 24-39.
- Fleming, J., Becker, K., & Newton, C. (2017). Factors for successful e-learning: does age matter? *Education Training*, 59(1), 76-89.
- Food and Agriculture Organization of the United Nations. (2022b). Markets and trade: <https://www.fao.org/markettrade/commodities/coffee/en/#:~:text=Coffee%20is%20one%20of%20the,consuming%20and%20importing%20markets%20globally>. Accessed on June 18th, 2022.
- Gole, T. (2015). Coffee: Ethiopia’s Gift to the World; The traditional production systems as living examples of crop domestication and sustainable production. Assessment of different certification schemes. Proceedings of coffee forum workshop, Addis Ababa, Ethiopia, 23rd June 2015. 41pp.
- Grabs, J., Kilian, B., Hernandez, D., & Dietz, T. (2016). Understanding coffee certification dynamics: A spatial analysis of voluntary sustainability standard proliferation. *International Food and Agribusiness: Management Review*, 19(3): 3-6.
- Hillary, O., Beryle, A., & Oliver, O. (2019). Coffee Production Challenges and Opportunities in Tanzania. Case Study of Coffee Farmers in Iwindi, Msia and Lwati Villages in Mbeya. *Asian Journal of Agricultural and Horticultural Research*, 3(2): 1-14.
- Ibnu, M. (2017). Gate Keepers of Sustainability: On coffee smallholder standards and certifications in Indonesia. Published Dissertation for Award of PhD Degree at Maastricht University. 180pp.
- International Coffee Organization. (2021). Coffee market report. [<https://www.ico.org/news/cmr-0121-e.pdf>]. Accessed on November 14th, 2022.
- Janvry, A., Macours, K., & Sadoulet, E. (2016). Learning for Technology Adoption in Developing Country Agriculture. Ferdi Publisher, 63 000 Clermont-Ferrand, France. 92pp.
- Kangile, R., Kadigi, M., Mgeni, P., Munishi, P., Kashaigili, J., & Munishi, P. (2021). Dynamics of coffee certifications in producer countries: re-examining the Tanzanian status, challenges and impacts on livelihoods and environmental conservation. *Agriculture*, 11(10), 931.
- Kattel, R.R. (2017). Impacts of group organic certification of coffee on socio-economic and environmental sustainability in Nepal. *Journal of Agriculture and Forestry University*, 1, 49-60.
- Kraus, E. (2015). The impact of sustainable certifications on coffee farming practices in Tarrazu, Costa Rica. Published Dissertation for Award of MSc Degree at the University of Copenhagen, Denmark. 87pp.
- Lazaro, E., Makindara, J., & Kilima, T. (2008). Sustainability standards and coffee exports

- from Tanzania. Danish institute for international studies, Strandgade 56, DK-1401 Copenhagen, Denmark. 34pp.
- Maguire-Rajpaul, V., Rajpaul, V., McDermott, C., & Guedes, L. (2020). Coffee certification in Brazil: compliance with social standards and its implications for social equity. *Environment, Development and Sustainability*, 2(3), 2015-2044.
- Muriithi, L., Macharia, I., & Gichuru, E. (2018). Impact of coffee certification on smallholder coffee farming in Embu, Kenya. *International Journal of Agriculture*, 3(1), 1-10.
- Ponte, S. (2004). Standards and sustainability in the coffee sector: A global value chain approach. [<https://www.iisd.org/library/standards-and-sustainability-coffee-sector-global-value-chain-approach>], accessed on December 2nd 2021.
- Rubben, R., & Hoebink, P. (2014). Coffee certification in East Africa. *Wageningen Academic Publishers*, The Netherlands. 265pp.
- Ruben, R., & Heras, J. (2012). Social Capital, Governance and Performance of Ethiopian Coffee Cooperatives. [<http://hdl.handle.net/10.1111/j.1467-8292.2012.00473.x>], accessed on March 14th 2021.
- Rueda, X., Rachael, G., & Eric, L. (2017). Corporate investments in supply chain sustainability: instruments in the agri-food industry. *Journal of Cleaner Production*, 142: 2481-2492.
- Santos, P., Ribeiro, P., & Rodrigues, B. (2023). Sustainability of coffee production in Brazil. *Environmental Science and Pollution Research*, 30(4), 11099-11118.
- Sharma, M., & Pudasaini, A. (2021). What motivates producers and consumers towards organic vegetables? A case of Nepal. *Organic Agriculture*, 11(3), 477-488.
- Snider, A., Krams, E., Sibelet, N., & Faule, S. (2016). Influence of voluntary coffee certifications on cooperatives' advisory services and agricultural practices of smallholder farmers in Costa Rica. *Journal of Agricultural Education and Extension*, 10: 2-6.
- Starbucks, C. (2016). Coffee and Farmer Equity Practices terms and conditions. [<https://www.scsglobalservices.com/starbucks-cafe-practices>]. Accessed on December 3rd 2021.
- Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *International Journal of Academic Research in Management*, 5(2):20-21.
- Takahashi, R., & Todo, Y. (2017). Coffee certification and forest quality: evidence from a wild coffee forest in Ethiopia. *World Development*, 92, 158-166.
- Tanzania Coffee Board. (2021). Tanzania Coffee Industry Report 2020-2021. [<https://coffee/tanzania-coffee-industry-report>], accessed on February 6th 2022.
- The Citizen. (2023). Newspapers article, details at [<https://www.thecitizen.co.tz/tanzania/news/national/tanzania-coffee-exports-earnings-hit-230-million-record-4259914>], accessed on 16th August 2023.
- Van Rijsbergen, B., Elbers, W., Ruben, R., & Njuguna, S. (2016). The Ambivalent impact of coffee certification on farmers' welfare: A matched panel approach for cooperatives in central Kenya. *Journal of World Development*, 77: 277-292.
- Vellema, W., Buritica, A. Gonzalez, C., & D'Haese, M. (2015). The effect of speciality coffee certification on household livelihood strategies and specialization. *Food Policy*, 57:13-25.