Sokoine University of Agriculture

PhD Thesis

IMPACT OF AGRICULTURAL GLOBAL VALUE CHAINS TRADE POLICIES ON LIVELIHOOD AND NATURE: THE CASE OF COFFEE AND SUGAR IN TANZANIA

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Thesis Submitted to Sokoine University of Agriculture in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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EXTENDED ABSTRACT

Agricultural global value chains (GVCs) are “organizational systems that operate across multiple nations and are always integrated”. The GVCs commodities link producers to consumers worldwide through a global network of multinational enterprises (MNEs). GVCs trade is managed using trade policies both in producing and importing countries. GVCs trade policies in developing countries, including Tanzania, must optimally deliver social, economic, and environmental benefits to trade participants. The socio, economic and environmental benefits realized sometimes are offset by socio and environmental costs. This happens to all trade policies, whether in trade agreements, trade rules, regulations, or global standards such as certifications. It is thus essential to assess the impact of GVCs trade policies to suggest appropriate policy levers that can optimise social, economic, and environmental benefits. Thus, this study uses coffee and sugar GVCs in Tanzania to assess the impact of certification policy, which is one of the GVC’s trade policies, the trade policies landscape of the country (trade governance), and the role played by GVCs in ensuring delivery of social, economic, and environmental benefits. Specifically, the study evaluates how governance affects the sugar trade, determines the impact of coffee certification policy on livelihood and environmental conservation and finally analyzes the contribution of the coffee trade to livelihood improvement and gender equity. The study hypothesizes that trade governance does not affect Tanzania's sugar trade and trade policy landscape; coffee certification does not improve household incomes and environmental conservation. Coffee production and trade do not contribute positively to livelihood improvement and gender equity. The study uses data collected from randomly sampled 400 coffee farmers and 375 randomly selected sugar supply chain actors in Tanzania. The study used a mixed method of data analysis. The endogenous switching regression (ESR) model is used to ascertain the impact of the coffee certification policy. Exploratory (factor analysis) and confirmatory (weighted least square regression)

models are applied to evaluate the level of trade governance in Tanzania and ascertain its effects on the sugar trade. The Oaxaca–Blinder decomposition and Gini coefficient models evaluate coffee income distribution and how general coffee production and trade contribute to gender equity and livelihood improvement. The major findings are that trade governance is essential in ensuring the delivery of benefits to all participants in trade. The study confirms that governance affects the sugar trade, with the magnitude of its effects being felt differently between farmers and traders. The findings show further that abrupt trade policy change significantly ($p<0.05$) reduces sugar trade by almost half (47.7%) and lowers the overall level of efforts to invest within the sugar supply chain. The study shows further that the evaluated GVCs certification trade policy does not offer socio-economic benefits but contributes significantly to environmental conservation. This is because the study rejects the hypothesis of certification to improve household income but accepts its contribution to improved awareness and environmental conservation practices among coffee farmers. Additionally, GVCs trade contributes positively to livelihood improvement and gender equity since the study found coffee to have income inequality-reducing effects. Therefore, using sugar and coffee GVCs and one of the GVC policies, certification, the study has confirmed that certification does not optimally deliver social, economic, and environmental benefits to trade participants. However, participation in trade is essential for inclusive socioeconomic benefits. The study confirms further that good sugar trade governance is a panacea for Tanzania to achieve optimal trade policies in the sugar sector. Predictability of the trade policies in the sector is a major factor for allowing forward contracting of imports and/or exports and investments. Thus, the study has provided the importance of trade governance in shaping how countries should implement trade policies. The study recommends ensuring trade policies are stable and predictable for increasing trade and allowing forward contracting and investments. It is also essential to create awareness of institutions and organizations

managing the GVCs by encouraging transparency in trade policy administration and practices. The certification policy should be implemented by easing the transmission of price premiums to coffee farmers for an increased supply of sustainably grown coffee, improving coffee farmers' livelihood and helping attain environmental sustainability goals within the coffee supply chain. This must be supported with awareness creation and making certification services accessible and cost-effective to coffee farmers. In striking a balance between people and nature, participation in the GVCs trade is encouraged. This is because coffee is an essential crop with an inequality-reducing effect, contributing to livelihood improvement. Investing in supporting the coffee supply chain impacts poverty reduction, as the income earned from coffee favours people experiencing poverty more than other income sources. Participation should be supported through empowerment for equal access to land and credit. Production and trade policies should also be gender-responsive by providing opportunities to offer trade facilitation services to increase the participation of women in coffee supply chain activities and control their participation benefits.

IKISIRI KUU

Minyororo ya thamani ya kimataifa ya mazao ya kilimo (GVCs) ni "mifumo ya mashirika ambayo inafanya kazi katika mataifa mengi na daima huunganishwa". Bidhaa za GVCs zinaunganisha wazalishaji na watumiaji duniani kote kupitia mtandao wa kimataifa wa makampuni ya kimataifa. Biashara ya GVCs inasimamiwa kwa kutumia sera za biashara katika nchi zinazozalisha na kuagiza. Sera za biashara za GVCs katika nchi zinazoendelea, ikiwa ni pamoja na Tanzania, lazima zitoe faida za kijamii, kiuchumi, na mazingira kwa washiriki wa biashara. Faida za kijamii, kiuchumi na kimazingira zinazotambuliwa wakati mwingine hazipatikani. Hii hutokea kwa sera zote za biashara, iwe katika makubaliano ya biashara, sheria za biashara, kanuni, au viwango vya kimataifa kama vile uthibitishaji. Kwa hivyo ni muhimu kutathmini athari za sera za biashara za GVCs ili kupendekeza mbinu sahihi za kisera ambazo zinaweza kuboresha faida za kijamii, kiuchumi, na mazingira. Hivyo, utafiti huu unatumia kahawa na sukari GVCs nchini Tanzania kutathmini athari za sera ya uthibitishaji, ambayo ni moja ya sera za biashara za GVCs, mazingira ya sera za biashara za nchi (utawala wa biashara), na umuhimu wa GVCs katika kuhakikisha utoaji wa faida za kijamii, kiuchumi, na mazingira. Hasa, utafiti unatathmini jinsi utawala unavyoathiri biashara ya sukari, unatambua athari za sera ya uthibitishaji wa kahawa juu ya maisha na uhifadhi wa mazingira na hatimaye kuchambua mchango wa biashara ya kahawa kwa kuboresha maisha na usawa wa kijinsia. Utafiti huu unakisia kuwa utawala wa biashara hauathiri mazingira ya sera ya biashara ya sukari nchini Tanzania; Uthibitishaji wa kahawa hauboreshi mapato ya kaya na uhifadhi wa mazingira. Uzalishaji wa kahawa na biashara hauchangii vyema katika kuboresha maisha na usawa wa kijinsia. Utafiti huu unatumia takwimu zilizokusanywa kutoka kwa wakulima wa kahawa 400 na wadau wa sukari 375. Utafiti huu ulitumia njia mchanganyiko ya uchakataji wa takwimu zilizohusisha mbinu za kimahesabu. Matokeo makubwa ni kwamba utawala wa biashara ni muhimu katika kuhakikisha utoaji wa faida kwa washiriki wote katika

biashara. Utafiti huu unathibitisha kuwa utawala unaathiri biashara ya sukari, na ukubwa wa athari zake unahisiwa tofauti kati ya wakulima na wafanyabiashara. Matokeo yanaonyesha zaidi kwamba mabadiliko ya sera ya biashara ya ghafla kwa kiasi kikubwa ($p<0.05$) hupunguza biashara ya sukari kwa karibu nusu (47.7%) na hupunguza kiwango cha jumla cha juhudi za kuwekeza ndani ya mnyororo wa usambazaji wa sukari. Utafiti unaonyesha zaidi kwamba sera ya biashara ya uthibitishaji wa GVCs iliyotathminiwa haitoi faida za kijamii na kiuchumi lakini inachangia kwa kiasi kikubwa katika uhifadhi wa mazingira. Hii ni kwa sababu utafiti unakataa dhana ya uthibitishaji katika kuboresha mapato ya kaya lakini inakubali mchango wake katika uhifadhi wa mazingira. Zaidi ya hayo, biashara ya GVCs inachangia kwa kiasi kikubwa katika kuboresha maisha na usawa wa kijinsia. Kwa hiyo, kwa kutumia sukari na kahawa GVCs na moja ya sera za GVC, uthibitishaji, utafiti umethibitisha kuwa uthibitishaji hautoi kwa pamoja faida za kijamii, kiuchumi, na mazingira kwa washiriki wa biashara. Hata hivyo, ushiriki katika biashara ni muhimu kwa manufaa ya kijamii na kiuchumi. Utafiti huu unathibitisha zaidi kuwa utawala bora wa biashara ya sukari ni nguzo muhimu kwa Tanzania kufikia sera bora za biashara katika sekta ya sukari. Kutabirika kwa sera za biashara katika sekta hii ni sababu kuu ya kuruhusu mkataba wa mbele wa uagizaji na / au mauzo ya nje na uwekezaji. Kwa hivyo, utafiti umetoa umuhimu wa utawala wa biashara katika kuunda jinsi nchi zinapaswa kutekeleza sera za biashara. Utafiti huu unapendekeza kuhakikisha sera za biashara ni thabiti na zinatabirika kwa kuongeza biashara na kuruhusu mikataba na uwekezaji wa mbele. Pia ni muhimu kujenga ufahamu wa taasisi na mashirika yanayosimamia GVCs kwa kuhimiza uwazi katika usimamizi wa sera za biashara. Sera ya uthibitishaji wa kahawa inapaswa kutekelezwa kwa kurahisisha unufaikaji wa malipo ya bei kwa wakulima wa kahawa kuongeza kahawa inayozalishwa kwa njia endelevu, kuboresha maisha ya wakulima wa kahawa na kusaidia kufikia malengo ya uendelevu wa mazingira ndani ya mnyororo wa usambazaji wa kahawa. Hii lazima ihusishe kutoa elimu juu ya uthibitishaji. Katika

kuhakikisha usawa kati ya watu na utunzaji wa mazingira, ushiriki katika biashara ya GVCs unahimizwa. Hii ni kwa sababu kahawa ni zao muhimu lenye athari ya kupunguza usawa, na kuchangia kuboresha maisha. Kuwekeza katika kusaidia mnyororo wa usambazaji wa kahawa kunapunguza umaskini, kwani mapato yanayopatikana kutokana na kahawa yanawapendelea watu wanaokabiliwa na umaskini zaidi kuliko vyanzo vingine vya mapato. Ushiriki unapaswa kuungwa mkono kupitia uwezeshaji kwa upatikanaji sawa wa ardhi na mikopo. Sera za uzalishaji na biashara zinapaswa pia kuwa na mwitikio wa kijinsia kwa kutoa fursa za kutoa huduma za uwezeshaji wa biashara ili kuongeza ushiriki wa wanawake katika shughuli za biashara ya kahawa na kudhibiti faida zao za ushiriki.

DECLARATION

I, **Rajabu Joseph Kangile**, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____ _____

Rajabu Joseph Kangile Date
(PhD Candidate)

The above declaration is confirmed by:

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Prof. Reuben M. J. Kadigi Date
(Main Supervisor)

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Dr. Zena T. Mpenda Date
(Co-Supervisor)

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DEDICATION

This work is dedicated to Almighty God under whose care I was able to finish this work successfully. Secondly, to my lovely family, my wife Diana and my sons Frank and Fredrick as well as my daughter Frelissa.

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2. Kangile, J.R., Kadigi, R.M., Mgeni, C.P., Munishi, B.P., Kashaigili, J. and Munishi, P.K. (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. https://doi.org/10.3390/ agriculture11100931

3. Kangile, J.R., Kadigi, R.M., Mgeni, C.P., Munishi, B.P., Kashaigili, J. and Munishi, P.K. (2021). The Role of Coffee Production and Trade on Gender Equity and Livelihood Improvement in Tanzania. *Sustainability.* 13 (18): 10191 https://doi.org/ 10.3390/su131810191

LIST OF ABBREVIATIONS AND ACRONYMS

ACP	Africa, Caribbean, and Pacific
AMCOS	Agricultural Marketing Cooperative Societies
ATT	Average treatment effects on the treated
ATU	Average treatment effects on the untreated
CAPI	Computer Aided Personal Interviews
EAs	Enumeration Areas
EBA	Everything But Arms
EPA	Economic Partnership Agreement
ESR	Endogenous Switching Regression
FYDP	Five Year Development Plan
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GPS	Global Positioning System
GVCs	Global Value Chains
ICT	Information Telecommunication Technology
IPT	Irregular Payment for Trade
Kg	Kilogram
KMO	Kaiser-Meyer-Olkin
LTPP	Long Term Perspective Plan
MDAs	Ministries, Departments and Agencies
MITI	Ministry of Industries, Trade, and Investment
MoA	Ministry of Agriculture
MSA	Measure of Sampling Adequacy
NAFCO	National Food Cooperation
OLS	Ordinary Least Square
PO-RALG	President's Office Regional Administration and Local Government
PPS	Probability Proportional to Size
PSUs	Primary Sampling Units
RUF	Random Utility Framework
SACCOS	Saving and Credit Cooperative Societies
SBT	Sugar Board of Tanzania

SDGs	Sustainable Development Goals
TASGA	Tanzania Sugarcane Growers Association
TDV	Tanzania Development Vision
TPSF	Tanzania Private Sector Foundation
TSPA	Tanzania Sugar Producers Associations
TZS	Tanzanian Shillings
USD	United States Dollars
VSLAs	Village Saving and Lending Associations
WLS	Weighted Least Square
WTO	World Trade Organisation

CHAPTER ONE

1.0 Introduction

1.1 Background Information

Agricultural global value chains (GVCs) are “organisation systems that operate across multiple nations and are integrated” (Brennan and Rakhmatullin, 2017). The GVCs commodities are commodities whose transformation from initial conception to final consumption involves many firms that are in different countries (Gereffi and Fernandez-Stark, 2016). Thus, they link producers to consumers worldwide (Trienekens and van Dijk, 2012; OECD, 2020). The firms operating these activities to transform the commodity are always interlinked through the global network of multinational enterprises (MNEs) (Hernández and Pedersen, 2017; McWilliam *et al.*, 2020). For example, green coffee produced by farmers and domestic coffee curing firms in Africa, Brazil, or Colombia is roasted by firms in the United States of America and European countries and brewed into final coffee products such as coffee soda or iced coffee drinks by other firms in other countries. Commodities of this nature are highly involved in trade and are estimated to take up about 70% of global trade (Conde *et al.*, 2015). These commodities involve a forward and backward trade, implying that the product can be exported as an intermediate input of a particular product and then imported as a finished product for end use (Jones *et al.*, 2019).

In managing GVCs trade, trade policies are set by producing and importing countries. Trade policies are general guides for actions that support decision-making in trade by protecting the interest of trade participants, whether individual firms or countries involved in trade (Mubinovna and Nutfulloevna, 2020). Trade policies are formal and informal institutions of trade (“rules of the game”) (De, 2010). They exist in four dimensions: national legislation, unilateral agreements; bilateral and regional agreements; and multilateral agreements. All the trade rules that follow under multilateral agreements are guided by the World Trade Organisation (WTO)

(Ababakr, 2022). Trade policies are implemented using trade policy instruments. Krugman *et al.* (2018) outline domestic regulation of the product, tariff, export subsidies, import quota, voluntary export restraint (limitation on the quantity of export), and local content requirement to be the most frequently used instruments of trade policies.

Trade policies are essential in the management of GVCs and other commodities trade. Trade policies control price, production, consumption, export and import volumes, and consumer and producer surpluses (Diao and Kennedy, 2016). In countries where GVCs trade has been well managed, there is increasing evidence of gains such as employment, increased productivity, access to technologies and innovations, and overall sector growth, which has contributed to improving people's livelihoods (Trienekens and van Dijk, 2012). The anticipated benefits of GVCs trade are only realised through applying good trade policies, which ensures sustainability in trade, implying trade that meets social, economic, and environmental objectives (Lenzen *et al.*, 2012; Mubinovna and Nutfulloevna, 2020).

The benefits of GVCs trade include livelihood improvement, which is associated with increased access to socio-economic opportunities and people becoming capable of generating income through job openings and other activities (OECD, 2020). Better trading conditions, stable prices and price premiums, and market access are also realised by applying good trade policies in supporting the GVCs trade (Conde *et al.*, 2015; Jones *et al.*, 2019; OECD, 2020). GVCs trade does not only contribute to socio-economic benefits but also offers support to nature through environmental protection. Through trade, different countries can access improved technologies that can promote efficient production, conservation of energy, water saving, and stop the use of inputs that are harmful to the environment (Lenzen *et al.*, 2012; Balogh and Jámbor, 2020). This is possible through cross-border trade and the activities of the global network of

multinational enterprises. Multilateral, regional, or bilateral trade agreements may also include provisions for environmental conservation (Morin *et al.*, 2018; OECD, 2021). The WTO rules also support this, provided that the trade-related measures taken to protect nature conform with the “General Agreement on Tariffs and Trade (GATT) rules”.

If not well managed by sound policies, agricultural global value chains trade imposes economic, environmental, and social costs that affect human systems (Balogh and Jámbor, 2020). These socio-economic costs include price and income effects, effect on factor prices, especially wages and the level of employment, and loss of government revenues (Krugman *et al.*, 2018). All these lead to increased poverty and reduced household welfare. Additionally, it leads to decreased biodiversity and ecosystem resilience (Lenzen *et al.*, 2012). It is worth noting that trade causes about 30% of biodiversity loss using the 2012 data (Lenzen *et al.*, 2012) and other environmental challenges. The consumer demands and economic activities performed to ensure the GVCs are produced and moved from one country to another cause environmental challenges. Some of the environmental challenges caused include greenhouse gas (GHG) emissions (Jun *et al.*, 2020), deforestation, land use change, soil erosion, and habitat degradation (Balogh and Jámbor, 2020). Additionally, GVCs trade accelerates climate change through pollution (OECD, 2021) and other forms of GHG emissions.

It is evident that GVCs trade policies can induce costs and benefits to people and the environment depending on how they are crafted to support GVCs trade or investment. This happens to all trade policies, whether in trade agreements, trade rules, regulations, or global standards (Krugman *et al.*, 2018). Global standards are commonly used to stimulate the generation of social, economic, and environmental benefits from GVCs trade by involving producers, farmers, traders, and consumers. This is done through certifications of the agricultural global value chains. Certification is a global rule

used as an economic tool to ensure the realisation of sustainability objectives through generating social, economic, and environmental benefits (Jena *et al.*, 2017; Schleifer and Sun, 2020). However, the realisation of benefits depends on how the certification policies are implemented, the trade policy landscape of the country, the participation of the country in GVCs trade, the type of global value chain, whether coffee, sugar, cotton, or tea, and the role played by the agricultural global value chain in question (Lenzen *et al.*, 2012; Balogh and Jámbor, 2020; OECD, 2021). It is thus essential to assess the impact of GVCs trade policies to suggest appropriate policy levers that can optimise social, economic, and environmental benefits. Therefore, using coffee and sugar GVCs in Tanzania, this study was conducted to assess the impact of certification policy, which is one of the GVCs trade policies, the trade policies landscape of the country (trade governance), and the role played by GVCs in ensuring delivery of social, economic, and environmental benefits.

1.2 Problem Statement

Global value chains (GVCs) trade policies in developing countries, including Tanzania, do not optimally deliver social, economic, and environmental benefits to trade participants (Lentijo and Hostetler, 2011; Lenzen *et al.*, 2012; Chang *et al.*, 2016; Meier *et al.*, 2020). As a result, sustainable trade (a trade that meets social, economic, and environmental objectives) has been hard to achieve in many countries. The participation of nations and individuals in GVCs trade thus has not substantially delivered sustainable benefits to warrant improved livelihoods and environmental conservation (Kowalski *et al.*, 2016). In addition, the certification policy, one of the GVCs trade policies expected to stimulate the generation of sustainable trade benefits, has not delivered the required impact in many countries, including Tanzania (Jena *et al.*, 2017; Schleifer and Sun, 2020).

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The impact of the certification policy depends on the global value chain in question and the country's level of participation in GVCs trade (Meier *et al.*, 2020; OECD, 2020). Coffee, cocoa, soybeans,

cotton, sugarcane, and tea are among the critical global value chains affected by the certification policy in realising the sustainable impact. However, Tanzania actively implements more certification policies in coffee than in other GVCs (Pyk and Hatab, 2018). Despite Tanzania participating in implementing the coffee certification policy for optimising sustainable benefits, the impact of the policy has been patchy. The supply of sustainably grown coffee has been declining, caused by the low participation of coffee farmers. In 2019, Tanzania supplied 17 865 tonnes of certified coffee which is 26% of the total coffee delivered by Tanzania to the world market (ITC *et al.*, 2021). The area under certified coffee was reduced by 31.5% from 2015-2019 (Meier *et al.*, 2020). Additionally, the certification policy does not consistently offer incentives to farmers and other producers to adopt sustainable production practices for a sustainable global trading system (Schleifer and Sun, 2020).

GVCs trade imposes social, economic, and environmental costs if not managed by good trade policies. The socio-economic costs include shifting of the distribution of income leading to increased inequality gap, increased commodity prices, loss of government revenues through illicit trade practices, dumping of the commodities by importing or exporting at a low price, reduced labour wages, and jobs and trade policies instability (Diao and Kennedy, 2016; Andreoni *et al.*, 2020; Mubinovna and Nutfulloevna, 2020). It can thus affect people's livelihoods (OECD, 2020) and discourage private sector investments (Sulle and Dancer, 2019). Additionally, the failure of the GVCs trade policies to provide sustainable benefits will lead to trade accelerating environmental challenges, including biodiversity loss (Lenzen *et al.*, 2012; Chang *et al.*, 2016), climate change, and other environmental challenges (Balogh and Jámbor, 2020; OECD, 2021). These social, economic, and environmental costs can lead to failure in achieving sustainable development.

Past studies, including Lentijo and Hostetler (2011), Ruben and Fort (2012), Van Rijsbergen *et al.* (2016), Jena *et al.* (2017), and Pyk and

Hatab (2018), have been conducted to study the impact of GVCs trade policies including certification policy in various developing countries. The level of participation in GVCs trade that can affect the realised impact has also been studied, including studies by Trienekens and van Dijk (2012), Conde *et al.* (2015), Kowalski *et al.* (2016), Barrientos (2019) and Glazebrook and Opoku (2020). Thus, past studies have identified options for increasing the ability of the global trade system to generate sustainable benefits. As a result, countries are making efforts to integrate sustainable indicators in unilateral, bilateral and multilateral trade agreements and domestic commodities regulations (Balogh and Jámbor, 2020; OECD, 2021). Notably, the studies in various countries and Tanzania have focused on the impact of the GVCs trade policies on income and less on environmental conservation. They have treated the three dimensions of sustainable trade (social, economic, and environmental) separately, which under these circumstances, the suggested policy options can hardly lead to sustainable trade. The ability of the GVCs to generate expected benefits and the required trade policy landscape (trade governance), which is "a necessary and sufficient condition" for achieving sustainable trade practices (Dasandi *et al.*, 2015) in Tanzania, have not been studied.

Therefore, to contribute to crafting GVCs' trade policy levers that optimise their impact on livelihoods and environmental conservation in Tanzania, it is necessary to study how these policies can maximise their influence to provide benefits. The study is also essential for suggesting options for increasing incentives to producers of GVCs to adopt sustainable practices and increase participation in the trade of sustainably grown commodities for social, economic, and environmental improvement. Therefore, using sugar and coffee GVCs, this study assessed the impact of certification policy, which is one of the GVCs trade policies, the Tanzania trade policies landscape (trade governance), and the role played by GVCs in ensuring delivery of social, economic, and environmental benefits. This study also integrated gender, given the

fact that it is an essential driver for participation and realisation of the benefits of GVCs trade (Said-Allsopp and Tallontire, 2015; ICO, 2018; Barrientos, 2019).

1.3 Justification of the Study

The study contributes empirically to sustainable trade policies in Tanzania and other developing countries. The contribution to policy is through the suggested options that optimise the impact of trade policies on livelihoods and environmental conservation in Tanzania. These options will improve the implementation of the certification policy in the country, support sectors' growth and environmental improvement, and improve the trade policy landscape in the country. Additionally, the policy levers suggested in this study can increase the ability of the supporting organisations to offer incentives that will increase participation in GVCs trade by stimulating trade and investments; hence the country and individual trade participants can substantially gain from GVCs trade. An improved trade policy implementation landscape is expected to increase positive engagement and investment in the private sector and trust among stakeholders.

The study is aligned with national and global policy frameworks. It is aligned with the Tanzania Development Vision (TDV) 2025, which focuses on 1) "achieving quality and good life for all; (2) achieving good governance and the rule of law; and (3) building a strong and resilient economy that can effectively withstand global competition". The suggested policy levers feed into the five-year development plans (FYDP) and the long-term perspective plan (LTPP), which are critical implementation plans of the TDV. Additionally, the study contributes to five sustainable development goals (SDGs). These are (1) no poverty, (2) zero hunger, (5) gender equality, (13) climate action, and (16) peace, justice, and strong institutions. In tandem with policy and empirical contributions, the study also contributes to the methodology of measuring the country-level trade policy landscape.

1.4 Objectives of the Study

1.4.1 General objective

The general objective of this study was to assess the impact of selected agricultural global value chains (GVCs) trade policies on livelihood outcomes and environmental conservation benefits in Tanzania.

1.4.2 Specific objectives

In order to achieve the stated general objective, the following specific objectives were pursued: -

i. To evaluate how governance affects sugar trade
ii. To determine the impact of coffee certification policy on livelihood and environmental conservation
iii. To analyze the contribution of coffee trade into livelihood improvement and gender equity

1.5 Hypotheses of the Study

This study was guided by the following hypotheses: -

1: Trade governance does not affect the sugar trade in Tanzania

$$H_1: \quad \beta_k = 0$$

Where β_k represents the coefficient of governance indicators (indices).

2: Coffee certification does not improve household incomes

$$H_2a: \quad \phi_{fjk} = 0$$

Where ϕ_{fjk} represents the coefficients of household incomes

2: Coffee certification does not improve environmental conservation

$$H_2b: \quad \phi_{fjk} = 0$$

Where ϕ_{fjk} represents the coefficients of environmental conservation index

3: Coffee production and trade do not contribute positively to livelihood improvement and gender equity

$H_3: \quad \gamma_k < 0$

Where γ_k represents the coefficients of livelihood and gender equity outcomes

1.6 Theoretical Framework of the Study

This study is guided by the New Trade Theory (NTT) and the institutional theory. NTT states that governments are justifiable to intervene in the economic sectors and set trade policies for managing the trade of global value chains (GVCs) (Dixit and Stiglitz, 1977; Krugman, 1979; Ahmed, 2012; Dollar et al., 2017). Krugman (1979), in this theory, deduced that trade should not be driven by differences in technology or factor endowment as proposed by the theory of comparative advantage and gains from trade (Ricardian theory) and Heckscher and Ohlin's (O-H theory) of factor endowment. Instead, trade may entirely be done for harnessing the existing economies of scale of the traded global value chains among firms and nations (Dollar *et al.,* 2017), leading to greater product diversity and lowering product prices.

Firms and individuals are assumed to be rational as they decide to participate in trade. Their decisions are always guided by the random utility theory (Nicholson and Snyder, 2008) and the profit maximisation theory. In this study, the farmers are hypothesized to be rational decision-makers, maximising utility relative to their choice of participating in voluntary certification schemes or not. This means that the decision of the farmers to participate in trade and engage in a specific trade policy depends on the level of utility expected to be gained. This utility gain is always monetary for the farmers or any other trade participant. Thus, one of the objectives of the trade participants are maximising profits to gain monetary returns. The profit maximisation theory guides the decision and the self-interest to maximise profit, as Debertin (2012) and Dorman (2014) stated. Nevertheless, trade participants are always men and women, and

the gender theory guides their differences. The gender theory shows the sexual distinctions of people in society (Gerish, 2005). This means it is crucial to consider the differences between men and women that influence their participation in trade. This is related to the gender roles between men and women as they participate in trade.

Under the NTT theory, the consumers of the product (households and industrial users) thus maximise utility from the consumption of the products (domestic production and imports), as presented in Equation 1.1. The purchase will be done using income earned by renting labour, capital, or services to firms under the production process. The combination of production inputs such as labour and capital for the firms under the production process is presented using the production function, and firms are rational striving to maximise profits.

$$Max\ U=\sum_{i=1}^{n} C_i^{\theta}+\sum_{i=n+1}^{n+n^*} C_i^{\theta} \quad \text{……..……..…….. (1.1)}$$

Whereby C_i^{θ} is the consumption of the ith good, θ is income shares such that $0<\theta<1$, $1.....n$ is the commodity produced in the home country and $n+1.....n+n^*$ is a commodity from foreign countries.

The critical requirement in this theory is for the government to set and apply limited and selective interventions of trade policies that would increase participation and impact of global value chains (Dollar *et al.,* 2017). The interventions can be in trade facilitations that would ease imports or exports, standards, tariffs, and other services (Krugman *et al.,* 2018). The theory relies on the assumption of imperfect competition, trade in intermediates, increasing returns to scale and differentiated products (Ahmed, 2012; Ciuriak *et al.,* 2015).

The institutional theory is central to governance practices, organisations and institutions that are key in setting the scene for trade policies and trade policy governance of the GVCs. According

to North (1994), institutions are ‘‘the rules of the game’’ and imply humanly devised constraints that structure human interactions. Institutions exist as formal (binding trade rules, trade regulations, legal orders) and informal (conventions, accepted way of doing things, norms of behaviour). Institutions conform to the regulative, normative and cognitive (Scott, 2014). In tandem with institutions being the rules of the game, North (1994) described organisations as players of the game. Additionally, Williamson (1996) asserts that governance is the play of the game. The study uses this theory to assess trade governance through governance practices, organisations, and pillars of institutions (regulative, normative and cognitive) for proposing actions for efficient implementation of trade policies.

1.7 Conceptual Framework of the Study

Trade policies are formal and informal institutions of trade used to manage and control the trade and investments of global value chains (GVCs) (De, 2010; Krugman *et al.*, 2018). They include standards such as agricultural commodities certifications, regulations, rules, agreements, and domestic regulation of the commodities. In addition, they involve using instruments of trade policies that follow the three categories of trade policies. These are tax and price policies such as tariffs and subsidies; quantitative restriction (e.g., the use of import quotas and export bans); and macro-economic management, which involves the manipulation of the macro-economic variables such as exchange rate management (Thurlow *et al.*, 2018).

Efficient implementation of trade policies in managing trade and investments requires a fair-trading ground known as trade governance to optimise social, economic, and environmental benefits from GVCs trade. According to North (1994) and Williamson (1996), “trade governance is used to refer to how issues such as stability of the trade policy, irregular payment for trade, participation, transparency, accountability, the rule of law and regulatory quality are implemented in the country”. However, synergies of the GVCs’ trade policies with policies of other sectors of the economy (i.e.,

trade policy coherence) are also an essential component of trade governance (Siitonen, 2016). Trade policy coherence implies that the trade policies should not only control and manage the trade of agricultural commodities but also promote synergies with other sectors and must be aligned with national plans and objectives (Andreoni *et al.*, 2020).

The efficient trade policy landscape of the country (trade governance) can optimise the impact of GVCs trade policies to support trade and investment to deliver social, economic, and environmental benefits simultaneously. Nevertheless, the participation of nations and individual men and women in GVCs trade is essential for realising benefits (World Bank and World Trade Organization, 2020). The socioeconomic benefits include increased income, better health, enhanced market access, stable prices and price premiums and better trading conditions. In addition, environmental conservation is enhanced through benefits such as reduced use of inorganic fertilisers and agrochemicals, water conservation, enhanced soil health, biodiversity conservation, protection of natural ecosystems, and resilience resulting from climate change (Figure 1.1).

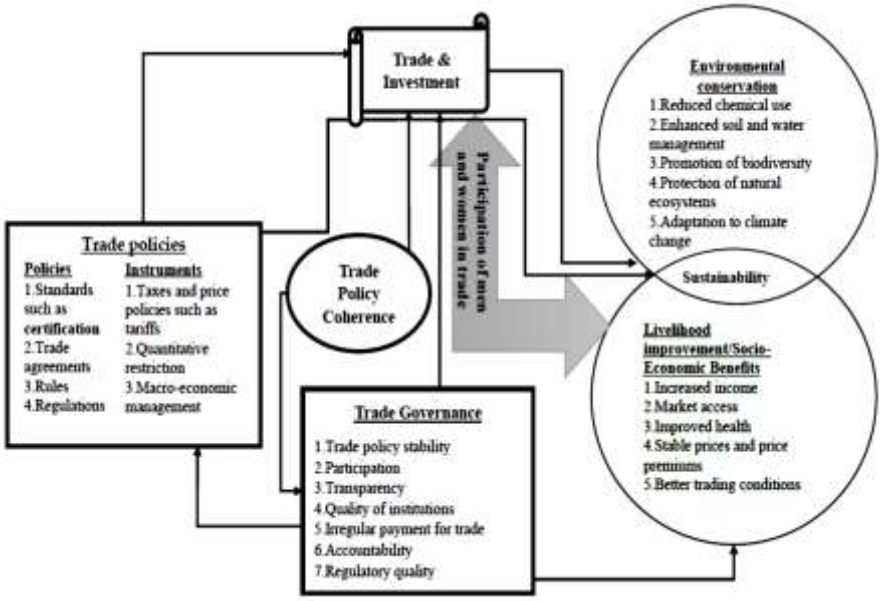

Figure 1.1: The conceptual framework for the study
Source: Author's conceptualization based on literature review (North, 1994; Williamson, 1996; Rosen and Kishawy, 2012; Siitonen, 2016; Krugman *et al.*, 2018; World Bank and World Trade Organization, 2020).

1.8 Scope of the Study

Many trade policies are used to manage the trade of global value chains (GVCs) to maximise their socio-economic and environmental impact and achieve sustainable trade. However, this study focuses exclusively on the impact of certification policy as a global rule that ensures GVCs trade is sustainable. It is also factual that sustainable trade policies' social, economic, and environmental dimensions are multifaced and go beyond livelihoods and nature/environmental conservation. This study uses livelihood to depict the socio-economic dimension of a sustainable trade through income, equality, food security and living standards that include housing conditions and access to utilities such as water, electricity, and other forms of energy. The environmental dimension is studied through environmental practices. The case studies are drawn from coffee

and sugar, even though there are many global value chains in Tanzania, including cotton, tea, cocoa, rubber, soybeans, and others. Additionally, the trade policies landscape of the country (trade governance), which is a necessary condition for efficient implementation of trade policies, is also investigated.

1.9 Organisation of the Thesis

This thesis is organised into six chapters. Chapter one elaborates on the background of the study. It highlights the concept of agricultural global value chains (GVCs) and the trade policy landscape, including how the trade policies are used in managing GVCs trade to achieve social, economic, and environmental benefits. The associated effects are also highlighted if there are non-optimal GVCs trade policies. It gives details of the research problem, the objectives, hypotheses, and the justification of the study. The framework of the study, including the conceptual and the theoretical frameworks, is also detailed in this chapter. It finally outlines the scope and the limitations of the study. Chapter two evaluates how governance affects Tanzania's landscape of sugar trade and trade policy practices. Chapter three presents the impact on livelihood and environmental conservation of one of the global value chain trade policies, coffee certification. Chapter four highlights the role of coffee as one of the GVCs on livelihood improvement and gender equity. Gender is included in this chapter, given that it is one of the critical crosscutting issues for efficient participation of countries and individuals in GVCs trade and that GVCs trade policies do not produce gender-neutral results. Chapter five synthesises the whole thesis and adds to the extant literature by conforming to and contradicting previous research findings. Chapter six gives the conclusion of the thesis, recommendations, and the study's contribution to knowledge and highlights areas for future research. Finally, the appendices present the essential data collection tools used.

CHAPTER TWO

2.0 The Effects of Trade Governance on Sugar Trade and Its Landscape of Policy Practices in Tanzania

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The Effects of Trade Governance on Sugar Trade and Its Landscape of Policy Practices in Tanzania

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2.1 Abstract

Trade governance is important for the efficient implementation of trade policies that support and control most of the global value chains (GVCs) trade in African countries. Poor trade governance leads to misalignment of trade policies and affects the sustainability of the agricultural commodities supply chains. This study used cross-sectional survey data from 375 randomly selected sugar supply chain actors in Tanzania to evaluate the level of trade governance in Tanzania and ascertain its effects on the sugar trade. Exploratory (factor analysis) and confirmatory (weighted least square regression) models were used for data analysis. The major findings are that governance affects the sugar trade with the magnitude of its effects being felt differently between farmers and traders. The findings show further that abrupt trade policy change significantly (p<0.05) reduces sugar trade by almost half (47.7%) and lowers the overall level of efforts to invest within the sugar supply chain. Ensuring trade policies are stable and predictable will increase trade by allowing forward contracting and investments. It is also important to create awareness of institutions and organizations managing the sugar supply chain by encouraging transparency in trade policy administration and practices for improving trade governance.

Keywords: Trade policy; Governance; Supply chain; Institutions; Global Value Chain (GVC).

2.2 Introduction

Global value chains (GVCs) are key in connecting farmers of agricultural commodities with consumers across the world to acquire the benefits of trade (OECD, 2020). Trade in GVCs is managed using trade policies that require a good trade governance system to achieve its efficiency. Trade policies are set to facilitate the movement of goods and services within and outside the country. Trade policies can take the form of national legislation, regional, bilateral, or multilateral agreements (Kumari and Bharti, 2021). They are formal and informal institutions of trade (rules of the game) (De, 2010). Trade policies include trade regulations, rules, agreements, goals, safety, and quality standards that are set to manage and control production, prices, domestic trade, imports, and exports (Zhang, 2008). Trade policies involve the use of instruments of trade policies that include tax and price policies such as tariffs and subsidies and domestic regulation of the products; quantitative restrictions such as the use of import quotas and export bans; and macro-economic management which involves the manipulation of the macro-economic variables such as exchange rate management (Thurlow *et al.*, 2018). However, there exist inefficiencies in the implementation of trade policies in many countries which are linked to the challenges in achieving good trade governance (Hoekman, 2018).

Sugar is one of the GVCs in Tanzania that experiences inefficiencies in the implementation of trade policies. The existing inefficiencies in the implementation of sugar trade policies in Tanzania can be attributed to the challenges of achieving good trade governance in the sector (Rabobank, 2013; Agritrade, 2014; Sulle and Dancer, 2019; Andreoni *et al.*, 2020). The key challenges regarding the implementation of sugar trade policies include international trade challenges in sugar-related to dumping which leads to the importation of cheap sugar, unstable policy administration, high tariffs, and indirect taxes, ad hoc price controls as well as the difficulties surrounding the issuance of import permits. The

implementation of these policy instruments has been resulting in illicit trade practices such as traders hoarding to create artificial scarcity, smuggling, and millers/producers' cartel for raising profit margins (Rabobank, 2013; Andreoni *et al.*, 2020). For example, Tanzania used to lose an average of 462 billion (January, 2015) Tanzanian shillings annually from sugar tax evasion and smuggling (The Citizen Reporter, 2015).

The existing challenges have resulted in complaints from various trade participants in the sugar sector regarding the implementation of trade policies and the quality of institutions managing the sugar sector (Rabobank, 2013; Sulle and Dancer, 2019). The quality of institutions is key in supporting trade growth and development in the country (Álvarez *et al.*, 2018). These include complaints of consumers about increased prices, loss of government revenues through illicit sugar trade practices, dumping, reduced wages, and jobs and trade policy instability affecting decisions of various trade participants including the decisions regarding forward contracting and investments. According to Machimu (2020), sugarcane out-growers complain of the lack of opportunity to oversee various activities of the supply chain and loss of sovereignty on quality controls, price settings, weighing of sugarcane, and timing of payments.

The prevailing challenges in the Tanzania sugar sector present an opportunity to explore governance problems affecting most of the GVCs trade in African countries. Therefore, the objective of this study is to evaluate the level of trade governance in the sugar sector in Tanzania and to ascertain its effects on the sugar trade. The study uses indicators that measure the perceptions of trade participants on trade governance.

This study is important given the fact that trade governance is indispensable for the efficient implementation of trade policies. This means that trade policies cannot efficiently control trade in the

absence of good trade governance. Trade governance aims to create a fair-trading ground (play of the game) that can ensure there is efficient delivery of benefits to all participants of trade (Williamson, 1996). Additionally, Dasandi *et al.* (2015) assert that past studies have concentrated on global governance with little emphasis on country-specific governance which is the precondition for achieving the Sustainable Development Goals (SDGs), especially goal number sixteen which calls for strong institutions.

2.3 Development of the Sugar Sector in Tanzania

Sugar is the most widely traded agricultural commodity in the world with a total value of 44.3 billion dollars (January, 2020) (OEC, 2022). It is a key commodity in Tanzania which is produced from a sizeable manufacturing sector (Rweyendela and Mwegoha, 2021). Tanzania produces an average of 372 210 tons of sugar per annum (May, 2022) (SBT, 2022a). However, the produced quantity does not meet the domestic demand which means Tanzania is a sugar trade deficit country. The total domestic demand is estimated at 585 000 tons (May, 2022), of which 71% (May, 2022) is for human consumption or direct consumption and 29% is for industrial use (SBT, 2022b). The demand is met through imports. Tanzania imports sugar from Thailand, India, United Arab Emirates, Pakistan, and Brazil (ITC, 2022). The country also imports from the major sugar-producing countries in Africa which are South Africa and Egypt (Andreoni *et al.*, 2020). Exports are minimal and mostly molasses which is exported to Uganda. The country occasionally exports sugar to Malawi, Oman, and Yemen.

Sugar is one of the most intervened commodities in Tanzania. The sugar market is an oligopoly in nature dominated by four millers who also own estates. Of the four millers, two millers are locally owned and the other two are owned by transnational corporations. The country implements import quotas and domestic price controls as key instruments of trade policies in managing the sector (Agritrade, 2014). The sugar trade policies in Tanzania are aligned to its

trajectory it has taken since it was established in 1924 through private firms. In 1967, private firms were nationalized, and the development of the sugar sector was then done by the National Food Cooperation (NAFCO). According to SBT (2022b), “In 1992, sugar trade was liberalized, followed by the privatization of the sugar companies starting with Kilombero Sugar Company Limited in 1997/98, Mtibwa Sugar Estates Limited in 1998/99, Tanzania Plantations Company (TPC) in 2000/01 and finally Kagera Sugar Estates in 2001/02”. This was followed by the enactment of the Sugar Sector Act of 2001 that transformed the Sugar Development Cooperation into the Sugar Board of Tanzania (SBT), which is charged with the role of promotion, improvement, development, and regulation of the sugar sector. This means that the actions of trade participants and the dynamics of demand and supply in the sugar sector depend on the actions of SBT. This is because the act provides power to SBT to set prices and control imports. The changes in trade policies and management landscape such as domestic millers to import gap sugar, tightening rules to stop sugar smuggling and change in import taxes have increased the level of sugar production by 61% over the past five years spanning 2016-2020 (BOT, 2021). Nevertheless, the country is still set to accelerate its growth to close the supply gap and achieve self-sufficiency in sugar production.

Increased sugar production is expected to be achieved through the establishment of new factories and farms under the ongoing industrialization and agricultural transformation process (SBT, 2022b). Two new factories that have been established Mkulazi Holding Company Ltd and Bagamoyo Sugar Company Ltd are expected to contribute 300 000 tons annually of sugar. It is evident that the increased sugar production will contribute to the livelihood improvement of the people in the country. The sugar sector in Tanzania contributes to employment, food security and government revenues (Andreoni *et al.*, 2020; Rweyendela and Mwegoha, 2021).

Increased sugar production will also create social and environmental costs. Studies such as Solomon *et al.* (2019), and Rweyendela and Mwegoha (2021) have shown that growth of the sugar sector is associated with sustainability challenges. The social costs include land fragmentations and food insecurity which are likely to face the people living close to the sugar-producing areas. Environmental costs are high in the production of sugar. They include soil acidification, the addition of heavy metals to the soil, water pollution, emission of greenhouse gases and habitat destruction.

The demand for sugar in the country is expected to keep growing due to the increase in population, demand for sugar-based products, processed food products especially soft drinks, baking and confectionary (Andreoni *et al.*, 2020). However, the growing global health concerns about reducing the consumption of sugar are likely to affect the demand in the country as well (Thow *et al.*, 2021). This signifies that as Tanzania develops the sugar sector to the level of a net exporter, trade policies should also be aligned to sustainability standards to ensure the sugar trade is sustainable. Sustainable production of sugar (a production that meets social, economic and environmental objectives) has been achieved in many countries (Solomon *et al.*, 2019). This is also possible for Tanzania given the fact that it currently benefits from a number of regional trade agreements in the sugar sector (Chisanga *et al.*, 2016). According to Chisanga *et al.* (2016), the agreements include “Africa, Caribbean and, Pacific (ACP); Lome Convention; Cotonou Agreement; Everything But Arms (EBA); and the Economic Partnership Agreement (EPA) with duty free and quota free imports and exports of sugar between the European Union and African countries”. However, the sugar industry in Tanzania does not benefit from these agreements due to the shortage of sugar to export as these agreements offers duty and quota free access of exports from developing countries (Seleka and Dlamini, 2020).

2.4 Literature Review

2.4.1 Theoretical framework

This study is grounded in the institutional theory which is central to governance practices, organizations and institutions that are key in setting the scene for trade policies and trade policy governance in the sugar sector. According to North (1994), “institutions are the rules of the game and imply humanly devised constraints that structure human interactions”. Institutions exist as formal (binding trade rules, trade regulations, legal orders) and informal (conventions, accepted ways of doing things, norms of behavior).

Institutions conform to the framework of regulative, normative and cognitive pillars (Scott, 2014). The regulative pillar is key in the sugar sector due to the high level of commercialization and vested government interests in the sugar supply chain. The regulatory pillar includes rules, regulations, laws, and sanctions. The government uses this pillar in setting rules, monitoring, and sanctioning various activities related to sugar trade. The normative pillar includes standards, quality and other compliance issues and practices in the sugar trading activities. The cultural cognitive pillar refers to the shared attitude, common values, and knowledge among the sugar trade participants. In tandem with institutions being rules of the game, North (1994) described organizations as players of the game. The functioning of the institutions requires legitimate organizations which are socially accepted and credited in the country. Additionally, Williamson (1996) asserts that governance is the play of the game. This study uses this theory to assess sugar trade governance through governance practices, organizations, and pillars of institutions (regulative, normative, and cognitive).

2.4.2 Empirical review

Trade policies require trade governance which is key in enhancing trade flow within the country and among nations including the associated investments in the sector (Dehshiri *et al.*, 2013). The sector growth and reliability of the trade policy practices in the

country depend on how good governance can improve the business environment to spur trading activities and investments (Ng and Yeats, 1999). The institutions of trade such as trade agreements are also supported by good governance (Adedoyin *et al.*, 2020). This implies that trade governance is an important condition to achieve optimal implementation of trade policies.

Past studies have indicated that trade governance is key in supporting the application of instruments of trade. It enhances free trade, trade agreements, and trade facilitation services such as easing the rules of imports, exports, and domestic trading (Kumari and Bharti, 2021; Ababakr, 2022). The study by Nadeem *et al.* (2014) found trade governance to be an important determinant of trade. However, the actual impact of trade governance on trade, implementation of trade policies, or economic development in general, depends on its measurement.

The measurement of trade governance has been a concern for many scholars. The "Worldwide Governance Indicators (WGIs)" by the World Bank are the commonly used measures of governance. According to Kaufmann *et al.* (2011), "the World Bank measures governance using six indicators which include: voice and accountability, political stability, efficiency and government effectiveness, the financial burden of regulations, rule of law, and corruption". These indicators have been criticized as being too general, having measurement bias, and literally unable to measure trade governance within the specific supply chain unless operationalized to reflect the key dynamics within the supply chain under consideration (Langbein and Knack, 2010; Thomas, 2010; Fukuyama, 2016). Additionally, Álvarez *et al.* (2018) assert that data used in the computation of WGIs are collected from various sources of country experts' interviews and aggregated which introduces bias when specifically used for a particular supply chain. To avoid these critiques and contribute to the trade governance literature, this study uses the institutional theory and extant literature to develop

indicators from data collected from specific sugar supply chain actors to enable innovative evaluation of trade governance.

2.4.3 Conceptual framework

Trade governance requires synergies with policies of other sectors of the economy (i.e., trade policy coherence) for efficient implementation of trade policies in the sugar sector in Tanzania. This means that trade policies should promote synergies with other sectors and have to be aligned with national plans and objectives (Andreoni *et al.*, 2020). Trade policy coherence is important given the fact that agricultural trade policies involve a lengthy and complicated process at the national level that requires coordination of various sectors of the economy. Trade policies require a horizontal coordination process as trade encompasses more than one sector of the economy (Siitonen, 2016).

Trade governance directly affects the trade in-country and outside the country (imports/exports) and the associated investments in the sugar sector. Thus, this study thought to test the null hypothesis that trade governance does not affect sugar trade. That is $H_0: \quad \beta_k = 0$, Where β_k is the coefficient of governance indicators (indices). According to North (1994) and Williamson (1996), “trade governance is used to refer to how issues such as stability of the trade policy, irregular payment for trade, participation, transparency, accountability, rule of law and regulatory quality are implemented in the country” (Figure 2.1).

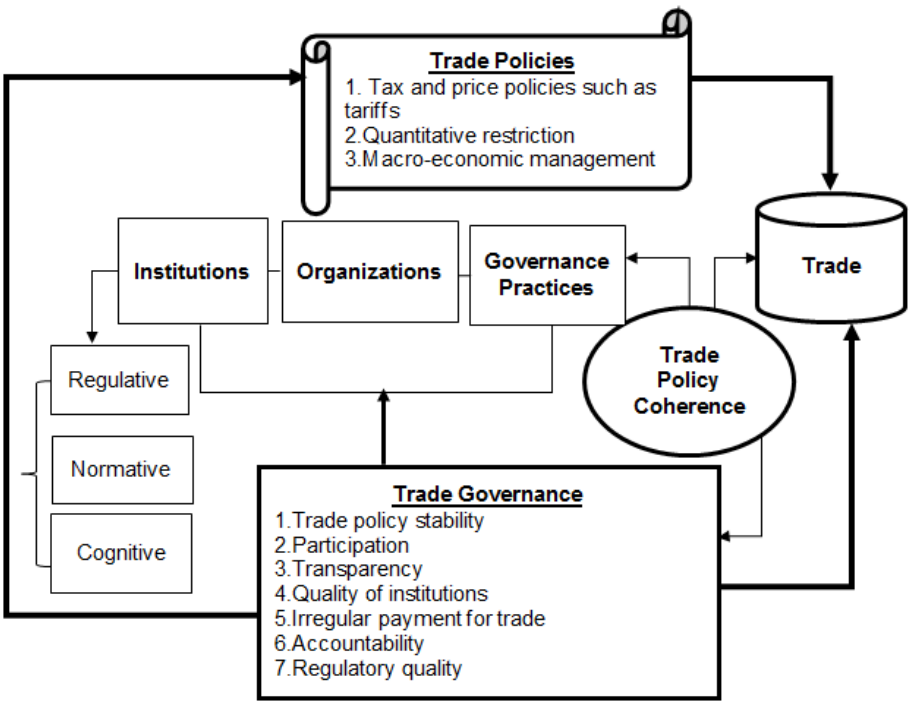

Figure 2.1: The conceptual framework of the study
Source: It is based on the authors' conceptualization through literature review (North, 1994; Williamson, 1996; Siitonen, 2016; Krugman *et al.*, 2018).

2.5 Data and Methodology

2.5.1 Study design

A cross-sectional study design was used. The cross-sectional study of trade governance was preferred because it is an excellent measure of a country-based and value chain-specific trade governance indicators. Previous studies such as Williams and Siddique (2008) have shown that responses on governance issues are provided by actors directly affected by the institutional environment of the trade policy landscape in the country when a cross-sectional study design is used.

2.5.2 Sampling methods and sample size

The study used a two-stage cluster sampling. The first cluster was the list/sample frame of sugar-producing regions, and the second cluster was the list of cities in Tanzania. The Simple Random Sampling (SRS) method was used in the first stage to select areas of the study "(primary sampling units or the enumeration areas)". SRS was implemented by randomizing the names of the regions using Excel rand syntax (RAND). This established a unique number for each region (random number). The unique number was sorted in an ascending order and the selection of regions was then conducted. Two study regions that are sugar producing-, Morogoro and Kilimanjaro - and two trading cities - Dar es Salaam and Tanga were selected (Figure 2.2).

The second stage was the selection of sugar supply chain actors/respondents from sampling frames. Respondents were selected independently from every region and from each category/stratum of traders (super agents/stockists, importers, exporters, and domestic traders mainly wholesalers) and farmers using systematic random sampling. Sampling frames for traders were obtained from regional offices whereas for farmers were obtained from out-growers' associations (Table 2.1). Systematic random sampling was implemented by selecting each fourth supply chain actor from the sampling frame after reshuffling it.

Table 2.1: The sampling frames for the traders and farmers

Sample frame.				
Region	**Traders**	**Super-agents**	**Farmers**	**Total**
Morogoro	386	2	2297	2685
Kilimanjaro	292	5	0	297
Tanga	286	4	0	290
Dar es Salaam	1894	8	0	1902
Total	2858	19	2297	5174
Sample				
Region	**Traders**	**Super-agents**	**Farmers**	**Total**
Morogoro	49	1	160	210
Kilimanjaro	47	3	0	50
Tanga	48	2	0	50
Dar es Salaam	48	2	0	50
Total	**192**	**8**	**160**	**360**

The study covered 360 respondents. Equation 2.1 by Cochran (1963) was used in estimation of the sample size (*n*).

$$n = \frac{Z^2 P(1-P)}{e^2} \quad \text{..... (2.1)}$$

Where "*Z* score = 1.96 (95% confidence level), *P* = 0.5 maximum variability and *e* = margin of error/desired level of precision ± 5.2%". It follows therefore that,

$$n = \frac{(1.96)^2 \times (0.5) \times (1-0.5)}{(0.05165)^2} = 360.0075 \approx 360$$

The sample size of each category/stratum for traders and farmers was determined using the proportionate stratification formula in Equation 2.2

$$n_s = \left\lfloor Ns/N \right\rfloor * n \quad \text{..... (2.2)}$$

Where "n_s=sample size for the stratum; Ns=population size for the stratum; N=total population size of all the strata; and *n* =total sample size in Equation 2.2 above".

2.5.3 Description of the study areas

Morogoro region contributes 46% (January, 2022) to the total sugar produced and traded in the country. The region is the home of two sugar manufacturing plants that are “Kilombero Sugar Company Limited and Mtibwa Sugar Estates Limited”. Kilimanjaro region hosts one sugar manufacturing plant known as Tanganyika Plantation Company (TPC) which makes up to 29% of the total national sugar production. Thus, the two regions involved in the study contribute about 75% (January, 2022) of the total sugar production in the country (SBT, 2022a). Dar es Salaam region is the biggest city and a trading hub in the country with the population of 5.4 million people (June, 2021) (NBS, 2021). It is the region with the highest consumption base in the country. Likewise, Tanga region is the trading hub connecting the Northern part of the country through the Tanga harbour.

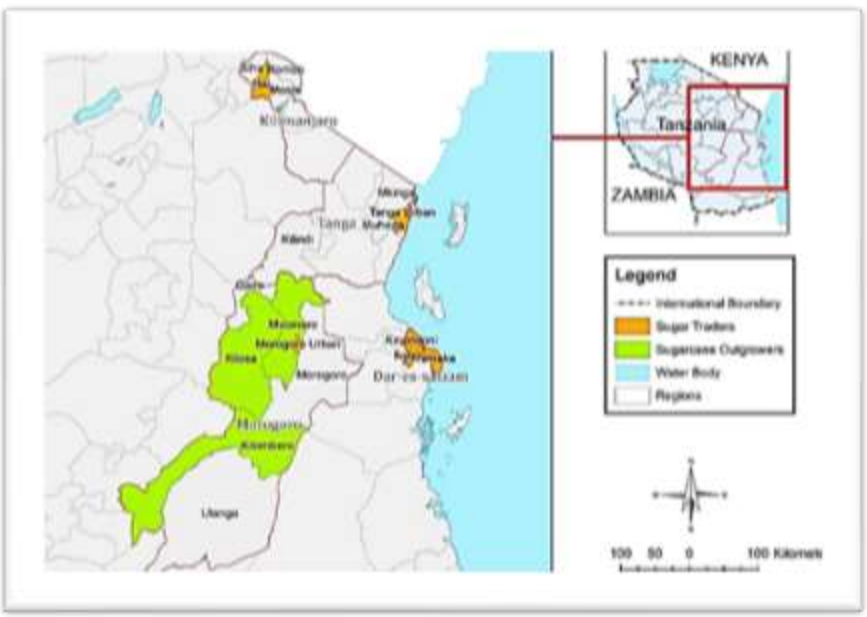

Figure 2.2: A section of the Tanzania map showing the study regions

Source: Authors’ sketching using the National Bureau of Statistics (NBS, 2021) shapefile

2.5.4 Data and methods used in data collection

The study collected both quantitative and qualitative data from 375 respondents randomly selected among key supply chain actors in the sugar sector in Tanzania. The 360 respondents were traders and farmers. For triangulating the data and study findings, the study also collected data from 15 key informants. These were organizations for collective actions and policy advocacy (3) which included cooperatives and the Tanzania Sugar Producers Association (TSPA); representatives from Ministries, Departments, and Agencies (MDAs) (5); sugar producing companies/millers (4); research institute (1); and financial institutions (2).

Ethical clearance procedures were followed before start of data collection activity. This included the Sokoine University of Agriculture (SUA) research clearance and authorization letter from the President's Office Regional Administration and Local Government Authority (PO RALG). Additionally, it involved inquiring a permit "approval on Code of Practice on Ethical Standards in Research which includes the General Data Protection Regulations (GDPR)". The ethical clearance was provided by the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) through the Trade, Development and the Environment Hub (TRADE Hub) Research Ethics Committee. After getting ethical clearance a semi-structured questionnaire was developed. The questionnaire was developed to capture governance indicators (table 2.1) and other socio-economic characteristics of trade participants. Additionally, the data collection was also preceded by the training of enumerators on data collection ethical issues and data handling using tablets. Data were collected through individual interviews. The study collected qualitative and quantitative cross-sectional data. Data collection was implemented using tablets specifically on KoBoCollect application through the humanitarian response platform. After the data collection, data were then downloaded from the server and accordingly cleaned before analysis.

2.5.5 Data analysis methods

The Two methods “descriptive statistics and an econometric method” were used in evaluating how governance affects sugar trade in Tanzania. The descriptive statistics included proportions, frequencies, and cross-tabulations of the variables under the study. In econometrics, the study used two models which were “exploratory (factor analysis) and confirmatory (regression) models”. The exploratory factor analysis model was applied in data reduction from the 5-point Likert scale questions and creation of summated scales of the trade governance indicators. It involved combining indicators to form a single score. Hair *et al.* (2019) defines summated scale as a “method of combining several variables that measure the same concept into a single variable in an attempt to increase the reliability of the measurement”.

The Likert scale was such that “1=Strongly disagree, 2=Disagree; 3=Neutral/undecided; 4=Agree; and 5=Strongly agree”. The disagreement scale represented that the perception of the trade participant on the trade governance indicator is unfavorable (negative), and the agreement scale represented a favorable (positive) perception as mostly suggested by Ajzen and Fishbein (1975). The study operationalized and applied seven indicators to measure trade governance in the sugar supply chain in Tanzania. Some of these indicators were operationalized from the “Worldwide Governance Indicators (WGIs)” by the World Bank (Table 2.2).

Table 2.2: Governance indicators used in evaluating how governance affects sugar trade

Governance Indicator	Descriptions
1.Trade policy stability	Predictability of trade policies such that there is no abrupt trade policy change. Provision of prior information on any policy changes such as export/import restrictions or price controls to enable forward contracting and support investment.
2.Irregular Payment for Trade (IPT)	Frequency of additional payments made to get things done (corruption). It refers to how frequent a person makes bribes connected with sugar trade, imports/exports, sugar stock acquisition or sale of sugarcane
3.Participation	The right to take part in the debate or decision-making process
4.Transparency	Timely access to accurate and up-to-date information on sugar trade
5.Accountability	The system where decision makers are answerable for their actions, decisions, and compromises
6.Regulatory quality	The burden of government regulations such as price controls, prevalence of trade barriers, and high compliance costs
7.Rule of law	This is the quality of institutions. It is the ability of the government to establish fair and predictable rules for private transaction. According to Langbein and Knack (2010), "It is the quality of contract enforcement and protection of property rights".

Source: Operationalized from "Worldwide Governance Indicators (WGIs)" by the World Bank and past studies

The factor analysis model was specified as shown in Equation 3.3.

$$y_{ij} = Z_{i1}b_{1j} + Z_{i2}b_{2j} + \ldots\ldots\ldots\ldots Z_{ik}b_{kj} + \varepsilon_{ij} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.3)$$

Where; k=factors from 1 to k; y_{ij}=Value of the i^{th} observation on the j^{th} variable; Z_{ik} is the i^{th} observation on the k^{th} common factor;b_{kj} is the set of linear coefficients (factor loadings) and $\varepsilon_{ij}$is the j^{th} unique factor similar to the residual.

Measure of Sampling Adequacy (MSA) and sphericity tests were performed as model adequacy tests. This was meant to test the suitability of the factor analysis method in data reduction. The findings indicated that the Kaiser-Meyer-Olkin (KMO) which measures MSA was 0.64 which is acceptable. The rule of thumb is that this value should be greater than 0.5 (Cleff, 2019). The Bartlett's Test of Sphericity was found to be significant (*p<0.01*) (Table 2.3). These findings suggested suitability of the use of factor analysis method.

Table 2.3: Factor analysis model adequacy tests

Measure		**Value**
The Kaiser-Meyer-Olkin value for measuring sampling adequacy		0.638
Sphericity test by Bartlett***	Chi-square value	547.912
	Degree of freedom	45
	Level of test significance	0.000

*** $p < 0.01$

Source: Authors' calculations using sugar supply chain actors 2021 survey data

The Kaiser or latent root criterion was used in retaining factors. According to Cleff (2019), "the criterion requires extracting all factors with eigenvalue greater than 1". Therefore, all factors or components above the break line were retained (Figure 2.3).

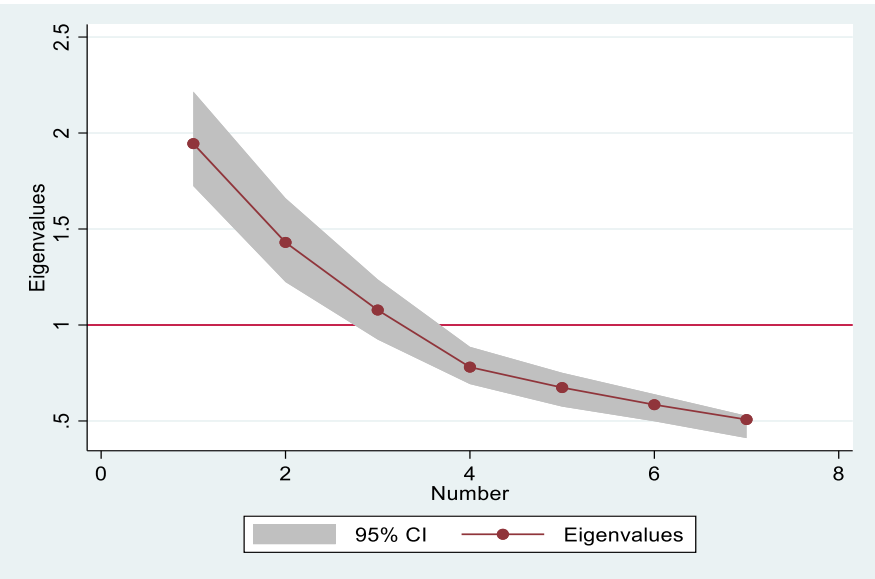

Figure 2.3: Eigenvalues of the trade governance indicators
Source: Authors' sketching using sugar supply chain actors 2021 survey data

The governance indicators factor loadings showed that among all the seven indicators, five indicators loaded in one component or factor and the other two indicators loaded in different components or factors (Table 2.4). Thus, the five governance indicators were combined into a composite measure of trade governance using summated scale since they have been shown to be measuring the same concept. The summated scale is the composite measure which increases the reliability of the measurement by reducing the measurement errors (Cleff, 2019; Hair *et al.*, 2019).

Table 2.4: Factor loadings of the governance indicators

Variable	Factor1	Factor2	Factor3
Transparency†	0.634	-0.070	0.086
Participation†	0.615	0.157	-0.100
Regulatory quality†	0.445	0.237	0.231
Accountability†	0.291	-0.217	-0.060
Irregular payment for trade‡	0.080	0.519	-0.053
Rule of law†	0.508	0.118	0.244
Trade policy stability§	-0.049	0.033	0.507

Number of observations =360; Retained factors=3; LR chi^2(21) = 334.21; prob> chi^2 =0.000

†Indicate loading was found in the first factor; ‡ loading was found in the second factor and § loading was found in the third factor

Source: Authors' calculations using sugar supply chain actors 2021 survey data

The composite measure of trade governance was then used to empirically ascertain how governance affects sugar trade. According to Dehshiri *et al.* (2013), Nadeem *et al.* (2014), and Fuller and Kennedy (2019), trade is hypothesized to have a linear relationship of Ordinary Least Square (OLS) with governance that can be represented as shown in Equation 2.4.

$$Y_i = \beta_0 + \beta_k X_{ij}' + \varepsilon_k \quad \text{..... (2.4)}$$

Where Y_i=Value of sugar traded and X_{ij}'=Indices of governance indicators and other variables hypothesized to affect sugar trade (years in sugar trading, level of specialization, abrupt trade policy change, and irregular payment for trade) and ε_k is the model error. The sucrose level obtained by each farmer which is the proportion of sugar in sugarcane harvested (it ranged from 5 to 12%) was used in converting sugarcane to sugar.

However, greater variations in the level of value of sugar traded were observed among the respondents who participated in the study indicating presence of heteroscedasticity and failure in meeting the

normality assumptions. Under these situations, the OLS becomes biased and inconsistent which requires to be corrected using a weighted OLS that is the Weighted Least Square (WLS) model. The Weighted Least Square (WLS) model was obtained by substituting the linear standard model into the Weighted Least Square (WLS) Fit Function shown in equation 2.5.

$$F_{WLS} = [S - \sigma(\theta)]\, W^{-1} [S - \sigma(\theta)] \quad \text{..... (2.5)}$$

Where "S is the vector of sample statistic; $\sigma(\theta)$ is the model implied vector of proportional element in the $\sum(\theta)$; and W is the positive definite weight matrix". Therefore, it follows that substituting equation 2.4 into equation 2.5 above gives the WLS model shown in equation 2.6.

$$F_{WLS} = \left[S - \sigma\left(\sum_{i=1}^{n} W[Y_i - f(\beta_k x_{ij})^2] \right) \right] W^{-1} \left[S - \sigma\left(\sum_{i=1}^{n} W[Y_i - f(\beta_k x_{ij})^2] \right) \right] \quad \text{..... (2.6)}$$

The WLS model shown in equation 2.6 was estimated using Weighted Least Square (WLS) estimator shown in equation 2.7.

$$\hat{\beta} = [\textstyle\sum_{i=1}^{n} W_i x_i x_i']^{-1} [\sum_{i=1}^{n} W_i x_i Y_i] \quad \text{..... (2.7)}$$

Where W_i are weights that is $W_i = 1/\sigma_i^2$; $\hat{\beta}$ are model parameters to be estimated and the model error is assumed to be $\varepsilon_i \sim N(0, \sigma_i^2/W_i)$. The WLS model was estimated using a log-transformed dependent variable (value of sugar traded) thus the interpretation followed the log-linear relationship such that % change in Y=100*$(e^{\beta} - 1)$.

2.6 Empirical Results

2.6.1 Sugar supply chain actors' awareness of institutions and organizations supporting and/or regulating the sugar supply chain

The study established the level of awareness of organizations and institutions responsible for regulating and/or supporting the sugar supply chain including the sugar trade. It included awareness of existing rules, standards, laws, and regulations guiding the sugar trade. The study findings indicate significant variations in the level of awareness among supply chain actors ($p<0.05$). Nevertheless, the overall level of awareness was found to be low. Study findings indicated that 23.3% and 38.6% of the sugar supply chain actors were aware of organizations and institutions respectively. The Sugar Sector Act of 2001 (Cap. 251) and its regulations are among the key institutions guiding the sugar sector, including its trade. The "Sugar Board of Tanzania, Tanzania Sugar Producers' Association (TSPA), Research Institutions, Tanzania Sugarcane Growers Association (TASGA), and ministries (Ministry of Agriculture-MoA, Ministry of Industry, Trade and Investment-MITI, and President's Office Regional Administration and Local Government-PO RALG)" are among the organizations in the sugar supply chain.

Super agents/stockists of sugar were found to be more aware of the organizations and institutions than traders and farmers. It shows that 87.5% of the stockists were aware of the prevailing rules, standards, laws, and relevant regulations in the sugar supply chain (Table 2.5). On the one hand, farmers were relatively more aware of the organizations than the institutions in the sector. On the other hand, traders were more aware of the institutions than the organizations regulating or supporting sugar trade. This implies that the increase in the scale of trade increases the level of awareness of institutions regulating trade of the commodity.

Sex and age of the trade participant varied with the level of awareness of organizations. Results show that among the trade

participants, male were more aware than female. There were no variations in the level of awareness of institutions between male and female. Youth were found to be more aware of the institutions (45.1%) than the organizations (10.8%). The overall findings suggest significant variations between age of the trade participant and the level of awareness of both the organizations and institutions ($p<0.05$). Youth were found to be the prime on the level of awareness on institutions whereby old age trade participants lead in the level of awareness of organizations. Additionally, membership in private sector organizations and education varied with the level of awareness on organizations and institutions. Findings indicate that 60.9% of traders and farmers with above secondary level education were aware of the existing institutions regulating sugar trade.

Table 2.5: Level of sugar supply chain actors' awareness of organizations and institutions regulating or supporting sugar supply chain

Variable		Level of awareness (%)	
		Organizations	**Institutions**
Sugar supply chain actor	Super agents/stockists (n=8)	37.5	87.5
	Traders (n=192)	15.6	64.1
	Farmers (n=160)	31.9	5.6
	Actors χ^2 statistics	13.80 (0.001) ***	133.9(0.00) ***†
Sex	Male (n=263)	25.9	40.7
	Female (n=97)	16.5	33.0
	Sex χ^2 statistics	3.47(0.06) *	1.77(0.18)
Age	Youth (≤ 35 years) (n=102)	10.8	45.1
	Adult (36 to 59 years) (n=199)	27.6	39.7
	Old (≥60 years) (n=59)	30.5	23.7
	Age χ^2 statistics	12.7(0.002) ***	7.4(0.02) **
Level of education	Without formal education level (n=5)	20.0	20.0
	With primary education level (n=219)	22.4	28.3
	With secondary level of education (n=90)	23.3	53.3
	Above secondary level education (n=46)	28.3	60.9
	Education χ^2 statistics	0.77 (0.86)	28.4 (0.00) ***
Membership	Member in private sector organization (n=157)	32.5	7.6
	Non-member in private sector organization (n=203)	16.3	62.6
	Membership χ^2 statistics	13.03 (0.00) ***	112.6 (0.00) ***

The significance values are such that "*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$". † Indicates that the values in enclosed in brackets are p-values.

Source: Authors' calculations using sugar supply chain actors 2021 survey data

2.6.2 Sources and media used to get trade-related information to enhance trade transparency

Transparency in terms of releasing sugar trade related information from ministries, departments, and agencies (MDAs) was found to be low (8.4%) (Table 2.6). Many of the respondents involved in the study (70.6%) indicated to have obtained sugar trade-related information through private sector industry-based organizations such as traders or farmers' associations. These associations which were also responsible for trade policy advocacy and marketing include the Tanzania Sugar Producers' Associations (TSPA) and Agricultural Marketing Cooperative Societies (AMCOS). The private sector organization-Tanzania Private Sector Foundation (TPSF)-was mentioned as one of the sources of trade-related information, especially to super agents/stockists of sugar. Additionally, 93.8% of the traders were found to have obtained trade-related information from unknown sources.

The use of information and telecommunication technology (ICT) in communicating and sharing sugar trade-related information was found to be emerging in the sugar supply chain, especially to traders. The study findings show that 37% of the respondents used at-least one ICT facility to obtain trade-related information. However, the majority of the traders and farmers (73.1%) used face-to-face contacts to get sugar trade-related information. Farmers were the major users of face-to-face, phones, and radio compared to other media. Traders used many ICT-based media especially radio, television, website, and social media platforms. The study results suggest that there was increased use of social media platforms in sharing trade-related information than websites and newspapers. Therefore, social media platforms have the potential to be used successfully to enhance the transparency of the sugar trade policies.

Table 2.6: Sources and media for conveying trade-related information

Variable		Sugar supply chain actor (%)			
		Traders (n=192)	Super agents (n=8)	Farmers (n=160)	Overall (n=360)
Sources of trade-related information	Ministries and other government agencies	76.7	3.3	20.0	8.4
	Private sector organizations such as TPSF§	0.0	100.0	0.0	0.3
	Private sector industry-based organizations	38.5	2.0	59.5	70.6
	Not known	93.8	3.7	2.5	22.7
Media used to get trade-related information	Radio	59.7	3.0	37.3	37.2
	Television	66.1	1.7	32.2	32.8
	Mobile phones	49.3	2.8	47.9	19.7
	Newspapers	80.0	5.0	15.0	5.6
	Websites	81.3	12.5	6.3	4.4
	Social media platforms	90.0	10.0	0.0	2.8
	Face to face with fellow traders or farmers	52.5	3.0	44.5	73.1

§ TPSF=Tanzania Private Sector Foundation

Source: Authors' calculations using sugar supply chain actors 2021 survey data

2.6.3 The level of trade governance

The level of accountability of many decision-makers managing the sugar trade was found to be low. The study findings indicate that 79.5% of the interviewees responded unfavorably/disagreed with the statements that suggested the existence of a system in which decision-makers were answerable for their actions, decisions, and compromises within the sugar supply chain. The responses of traders were more unfavorable than that of farmers and stockists as

their mean negative scores were above the overall score on accountability (Figure 2.4).

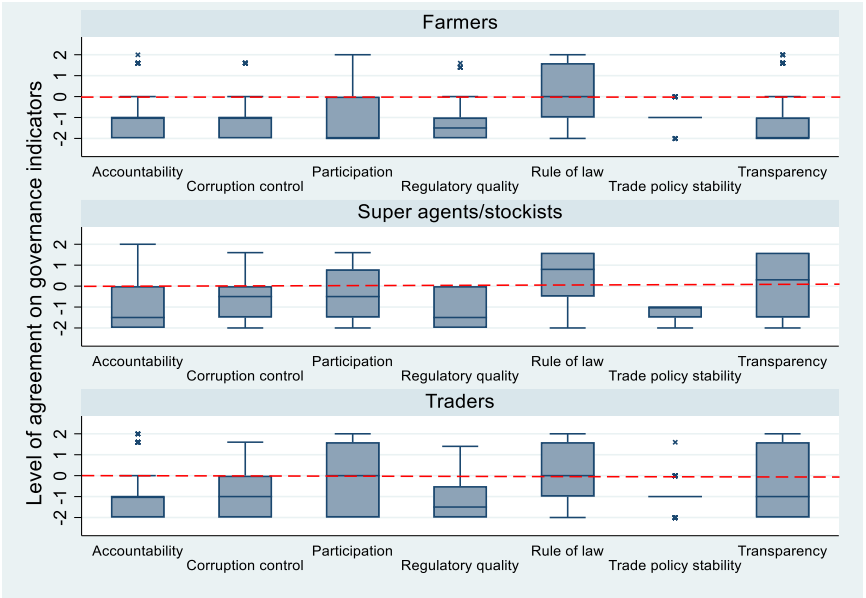

Figure 2.4: Level of agreement on governance indicators
Source: Authors' calculations and plotting using sugar supply chain actors 2021 survey data

Many respondents (37%) agreed with the situation of the existence of institutions of good quality “(Rule of law)”. These findings imply that the attributes of good institutions which include "the quality of contract enforcement and protection of property rights” were viewed as satisfactory by farmers, super agents, and traders. However, 70% of them disagreed about the existence of less-burden government regulations which is an indication of regulatory quality. Many (77.2%) disagreed with the statements that trade policies were stable. Trade policy stability was rated the lowest by all respondent categories, especially super agents. This implies that sugar trade policies were less predictable. This suggests the existence of abrupt trade policy changes with no prior information on the policy changes which is likely to affect forward contracting and investments within the sugar sector.

Additionally, 23.3% of the respondents agreed to be involved in debates or decision-making processes that are participation. However, more of the farmers responded unfavorably on participation than traders and super agents. Likewise, 23.9% of the respondents agreed to have been provided with timely but accurate and up-to-date information on the sugar trade. This implies that transparency of trade policies and participation of sugar supply chain actors were low especially among farmers. This is validated by the results of the analysis of qualitative information (Figure 2.5) where many respondents who were involved in the study reported participation and transparency of trade policies as being the key challenges in the management of the sugar trade.

The level of participation and transparency varied across different sugar trade participants. For example, farmers reported to lack opportunity of overseeing the harvesting process and control over the amount of cane being produced. Farmers were also confronted with the loss of sovereignty in quality controls, price settings, weighing of sugarcane, and timing of payments which they are all connected to participation and transparency. Inadequate transparency leads to irregular payment for trade (corruption). The challenge of corruption was reported by many respondents (67.9%) who also linked it to the existence of sugar smuggling. These findings are consistent with Andreoni *et al.* (2020) who also noted practices of corruption in the Tanzania sugar sector.

Figure 2.5: Word cloud of the qualitative information on trade governance indicators

Source: Authors' plotting using sugar supply chain actors 2021 qualitative data

2.6.4 Effects of trade governance on the sugar trade

Trade governance positively influenced trade among sugar supply chain actors (Table 2.7). There were variations in the level of effects of trade governance on trade between traders and farmers. There was a significant effect of trade governance on the sugar trade among traders. The findings further confirm that the effect was more intense for traders than farmers. These findings suggest that all other factors held constant, a unit improvement in trade governance would increase sugar trade for traders by about 24.4%. These findings suggest rejecting the hypothesis that trade governance significantly affects sugar trade for farmers and accepting it for traders.

The level of specialization and experience in trading affected the sugar trade. The level of specialization is measured by the proportion of sugar trading portfolio to depict the level of economies of scale that was found to positively influence the sugar trade. Assuming all factors to be constant, a 1% increase in the proportion of sugar trading portfolio would increase sugar trade by 0.4%. The effect of the level of specialization was more intense for traders (2.2%) than farmers (0.5%). Sugar trading experience was found to significantly affect the sugar trade positively for both traders and farmers. Results show that the sugar trade is expected to increase by 2.1% for every additional year spent by the sugar supply chain actor in doing the trading activities.

The absence of abrupt trade policy change stands out to be the main factor with high significant effect on sugar trade ($p<0.05$). Findings reveal that one abrupt policy change experienced within the period of 12 months reduces the level of sugar trade by 35.2% and 29.1% for traders and farmers respectively. Generally, the abrupt trade policy change was found to affect the sugar trade, reducing trade by almost half (47.7%) implying that ad hoc policy change significantly affects the level of sugar trade. However, the effect of the abrupt trade policy change on farmers was found to be minimal and not statistically significant. The abrupt trade policy changes affected traders and other supply chain actors on the level of efforts to invest in the sugar sector since they are uncertain about the status of their business situation. Additionally, some respondents involved in the study indicated encountering a situation where they had to make bribes connected with sugar stock acquisition or supplying sugarcane to the factory in the past 12 months. The frequency of irregular payment for trade (IPT) was found to reduce the level of trade by 6%. This implies that IPT reduces trade once practiced by supply chain actors.

Table 2.7: Effect of trade governance on sugar trade

Variable	Regression Coefficients		
	Farmers	**Traders**	**Pooled data**
Trade governance	0.0001 (0.999) †	0.2186(0.0490) **	0.0008(0.994)
Years in sugar trading activities	0.0239(0.005) ***	0.0391(0.097) *	0.0210(0.009) ***
Level of specialization	0.0050(0.054) *	0.0213(0.000) ***	0.0044(0.030) **
Abrupt trade policy change	-0.3438(0.197)	-0.43418(0.053) *	-0.6486(0.000) ***
Irregular payment for trade	-0.1037(0.403)	-1.1346(0.002) ***	-0.0617(0.610)
Constant	14.6379(0.00) ***	13.9936(0.000) ***	14.7264(0.00) ***
Number of observations	N=160	N=200	N=360
Model statistic	F (5,154) =4.390; Probability > F = 0.001.	F (5,194) =11.67; Probability > F = 0.000.	F (5,354) =7.32; Probability > F = 0.000.

Level of significances are such that "*** *p<0.01*, ** *p<0.05*, and **p<0.1"*. † Indicates values in brackets being *p*-values.
Source: Authors' calculations using sugar supply chain actors 2021 survey data

2.7 Discussion

Most studies on governance have not attempted to measure trade governance using cross-sectional survey data. This study has filled this knowledge gap using specific cross-sectional survey data and indicators that reflect the key dynamics in the sugar supply chain. The study has revealed that governance positively influences the sugar trade. The finding suggests being consistent with earlier studies such as Dehshiri *et al.* (2013), Gani and Scrimgeour (2016), Álvarez *et al.* (2018), and Adedoyin *et al.* (2020), "who found a positive relationship between trade and governance" implying that institutional quality is important in enhancing trade. This suggests that domestic production and trade, imports and exports depend on trade governance. However, the current study has established further that governance affects trade and trade participants differently. Traders are more affected by poor governance than farmers.

In policy practices for sustainability of the supply chains, stability of the trade policies is imperative. The findings show that sugar trade policies in Tanzania are not stable and difficult to predict. It is clear from the findings that the abrupt policy change is the key factor with

a highly significant effect on the sugar trade. This affects the level of trade along the supply chain. The study has shown that the abrupt trade policy changes affected trade and the overall level of efforts to invest in the sugar sector due to uncertainties caused by the policy shifts. The abrupt policy change is sometimes interpreted as a lack of policy. For trade policy to be supportive it needs to be stable and predictable to allow forward contracting and investments. Policy instability leads to misalignment of all policies supporting the sector. Therefore, in these situations, it is also difficult to achieve policy coherence. This is because previous studies such as Siitonen (2016) have established that policy coherence can be achieved under a stable policy environment in the sector. However, it is also factual that the trade policy landscape in the sugar sector is highly aligned with the implementation of the Sugar Sector Act of 2001, which has some influence on the supply dynamics of sugar.

To improve trade governance within the supply chain it is important for government ministries, departments, and agencies to embark on extensive awareness creation to farmers and traders about institutions and organizations managing the sector. This is because awareness of the trade participants on the institutions and organizations managing the supply chain is important and varies from one supply chain actor to another. Study findings show that the level of awareness of the regulative institutions such as acts, rules, and regulations, is low and varies with the scale of trade. The level of awareness increased with the scale of trade. The normative institutions that are standards and quality were more known to many sugar supply chain actors than the other pillars of institutions (regulative and cognitive). Additionally, the study established that the level of awareness of institutions and organizations managing the supply chain varies with the socio-economic features of the trade participants. The findings showed that youth are more aware than the other age groups of trade participants. Male were found to be more aware than female. This implies that trade governance and the implementation of sugar trade policies cannot produce gender-

neutral results, hence gender differences should be considered. However, the overall level of awareness of organizations and institutions was found to improve with the level of education of the trade participants.

The level of awareness of institutions and organizations can be improved by encouraging transparency in trade policy administration and practices. This is due to the fact that previous studies such as Fukuyama (2016) have established that transparency and accountability improve the policy practices in many of the global value chains. The findings from this study suggest that to enhance the transparency of trade policies and make many supply chain actors aware of institutions and organizations, trade information needs to be availed using different media platforms/outlets. This is because the type of media source used to get trade information varied with the type of sugar supply chain actor. Traders were more active in sourcing information through ICT than farmers who were found to depend on face-to-face and radio. This has a positive contribution to trade development. Wang and Choi (2019) argued that increased use of ICT is important for increasing the level of trade in the country. Nevertheless, industry-based organizations were found to be the main source of trade-related information for both traders and farmers. These findings imply that trade related information on agricultural commodities supply chains should be channelled through supply chain actors' collective actions especially farmers and traders' associations.

2.8 Conclusion, Limitations, and Areas for Further Research

This study has used cross-sectional survey data and indicators that reflect the key dynamics in the sugar supply chain to evaluate trade governance and how it specifically affects sugar trade in Tanzania. This is because good sugar trade governance is expected to be the panacea for Tanzania to achieve optimal trade policies in the sugar sector. The study has revealed that governance affects sugar trade with the magnitude of its effects being felt differently between

farmers and traders within the sugar supply chain. The study shows further that abrupt trade policy change significantly ($p<0.05$) reduces sugar trade by almost half (47.7%) and lowers the overall level of efforts to invest in the sugar sector due to uncertainties caused by the policy shifts.

It is thus important to ensure that trade policies are stable and predictable to allow forward contracting of imports and/or exports and investments. To improve trade governance within the supply chain it is important to create awareness of institutions and organizations managing and/or supporting the sector. The level of awareness of institutions and organizations can be improved by encouraging transparency in trade policy administration and practices. This should include availing trade information using different media through industry-based organizations which are supply chain actors' collective actions.

The study has provided the importance of trade governance in shaping the way countries should implement trade policies. The awareness of the trade participants in organizations and institutions leads to a trust in the trading system landscape of the country. It has shown further that stability and predictability of the trade policies are key in supporting trade and investment in the sector. However, notwithstanding the contribution of this study to the trade governance and trade policy practices empirical literature, it still has some limitations and areas for further research. This study did not include all the categories of sugar supply chain actors. Consumers (households and industrial consumers), and input suppliers and service providers in the sector were not included. Further research can also be done to assess trade policy coherence which is also a key component of trade governance and an important issue in the efficient implementation of trade policies.

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References

Ababakr, A. (2022). Global Trade Governance and WTO: Beyond the Model of the Club. *Asian Social Science* 18(2): 1 – 32.

Adedoyin, F. F., Bello, A. A., Abubakar, I. F. and Agabo, T. J. (2020). How does governance factors influence the trade impact of migration and capital flows in the EU? *Journal of Public Affairs* 2020: e2207.

Agritrade (2014). Challenges faced in Tanzania in balancing growing demand with efforts to promote local sugar production. [https://agritrade.cta.int/Agriculture/Commodities/Sugar/Challenges-faced-in-Tanzania-in-balancing-growing-demand-with-efforts-to-promote-lo cal-sugar-production.html] site visited on 17/11/2021.

Ajzen, I. and Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological Bulletin* 82(2): 261–277.

Álvarez, I.C., Barbero, J., Rodríguez-Pose, A. and Zofío, J. L. (2018). Does institutional quality matter for trade? Institutional conditions in a sectoral trade framework. *World Development* 103: 72 – 87.

Andreoni, A., Mushi, D. and Therkildsen, O. (2020). *The Political Economy of 'Scarcity'in East Africa: A Case Study of Sugar Production, Smuggling and Trade in Tanzania.* Working Paper No. 31. Institute for Innnovation and Pulic Purpose Univerity Coolege, London. 55pp.

BOT (2021). *Annual Report 2020/21*. Bank of Tanzania, Dodoma. 255pp.

Chisanga, B., Gathiaka, J., Nguruse, G., Onyancha, S. and Vilakazi, T. (2016). Agricultural development, competition and investment: The case of sugar in Kenya, South Africa, Tanzania and Zambia. In:*Competition in Africa: Insights from Key Industries.* (Edited by Simon, R.). HSRC Press, South Africa. pp. 41 – 65.

Cleff, T. (2019). *Applied Statistics and Multivariate Data Analysis for Business and Economics: A Modern Approach Using SPSS,*

Stata, and Excel. Springer Nature Switzerland, Cham, Switzerland. 474pp.

Cochran, W. G. (1963). *Sampling Techniques* (2nd Ed.). John Wiley and Sons, Inc., New York. 28pp.

Dasandi, N., Hudson, D. and Pegram, T. (2015). And institutions. . In: Thinking Beyond Sectors for Sustainable Development. (Edited by Waage, J. and Yap, C.). Ubiquity Press, London. 110pp.

De, P. (2010). *Does Governance Matter for Enhancing Trade? Empirical Evidence from Asia.* East Asian. Bureau of Economic Research, Bangkok. 27pp.

Dehshiri, H. M., Renani, H. S. and Mirfatah, M. (2013). Analysis the Impact of Good Governance on the Non-Oil Export of Oil Exporting Countries. *Journal of Economic Policy and Research* 8(1): 1 – 10.

Fukuyama, F. (2016). Governance: What do we know, and how do we know it? *Annual Review of Political Science* 19(1): 89 – 105.

Fuller, K. and Kennedy, P. L. (2019). A determination of factors influencing sugar trade. *International Journal of Food and Agricultural Economics* 7(561): 19 – 29.

Gani, A. and Scrimgeour, F. (2016). New Zealand's trade with Asia and the role of good governance. *International Review of Economics and Finance* 42: 36 – 53.

Hair, J. F., Black, W., Babin, B. J. and Anderson, R. E. (2019). *Multivariate Data Analysis.* (8th Edition). Cengage Learning EMEA, North Way Andover, Hampshire, United Kingdom. 814pp.

Hoekman, B. (2018). Global trade governance. In: International Organization and Global Governance. (Edited by Weiss, T. G. A. and Wilkinson, R.), Routledge, London. pp. 603 – 615.

ITC (2022). Trade statistics for international business development. [https://www.Trade map.or g/] site visited on 6/1/2022.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2011). The Worldwide Governance Indicators: Methodology and Analytical Issues. *Hague Journal on the Rule of Law* 3(2): 220 – 246.

Krugman, P. R., Obstfeld, M. and Melitz, M. (2018). *International Economics: Theory and Policy*. Pearson Education Limited. United Kingdom. 808pp.

Kumari, M. and Bharti, N. (2021). Linkages between trade facilitation and governance: Relevance for post-COVID-19 trade strategy. *Millennial Asia* 12(2): 162 – 189.

Langbein, L. and Knack, S. (2010). The worldwide governance indicators: Six, one, or none? *The Journal of Development Studies* 46(2): 350 – 370.

Machimu, G. M. (2020). Sugarcane out-growers' views on contract farming services quality In Kilombero Valley, Tanzania. *East African Journal of Social and Applied Sciences* 2(2): 22 – 36.

Nadeem, M., Hayat, M. A. and Nazir, R. (2014). Exploring interlinks between globalization and governance. A panel data evidence. *Pakistan Economic and Social Review* 52(2): 187 – 208.

NBS (2021). Tanzania in Figures 2020 [https://www.nbs.go.tz/ index.php/en/tanzania-in-figures] site visited on 20/11/2021.

Ng, F. and Yeats, A. (1999). *Good governance and trade policy: are they the keys to Africa's global integration and growth?* The World Bank, Washington DC.0 91pp.

North, D. C. (1994). Economic performance through time. *The American Economic Review* 84(3): 359 – 368.

OEC (2022). Product Trade Data. Observatory of Economic Complexity [https:// oec.world/en/profile/hs92/sugars-and-sugar-confectionery?Redirect =tr ue] Site visited on 12th January 2022.

OECD (2020). *Global Value Chains In Agriculture And Food: A Synthesis of Analysis.* Organisation for Economic Co-operation and Development, Paris. 26pp.

Rabobank (2013). *Tanzania Sugar: Foreign Investors Need Enabling Environment.* Note No. 386. Rabobank International Industry, 6pp.

Rweyendela, A. G. and Mwegoha, W. J. S. (2021). Industrial symbiosis in Tanzania: A case study from the sugar industry. *African Journal of Science, Technology, Innovation and Development* 13(5): 595 – 606.

SBT; (2022a). Tanzania Sugar Production Data. Sugar Board of Tanzania [http://www.sbt.go.tz/pages/sugar-production-data] Site visited on 26/05/ 2022.

SBT; (2022b). Upcoming new large scale sugar projects. Suagr Board of Tanzania [http://www.sbt.go.tz/projects/9] site visited on 6/01/2022.

Scott, W. R. (2014). *Institutions and organizations: Ideas, interests, and identities* (Fourth Edition). Sage Publications. Thousand Oaks, California. 360pp.

Seleka, T. B. and Dlamini, T. S. (2020). Competitiveness of ACP sugar exporters in the global market. *The International Trade Journal* 34(2): 247 – 277.

Siitonen, L. (2016). Theorising politics behind policy coherence for development. *The European Journal of Development Research* 28(1): 1 – 12.

Solomon, S., Quirk, R. G. and Shukla, S. (2019). *Green Management for Sustainable Sugar Industry.* Springer. pp. 183-185.

Sulle, E. and Dancer, H. (2019). Gender, politics and sugarcane commercialisation in Tanzania. *The Journal of Peasant Studies* 2019, 1 – 20.

The Citizen Reporter (2015). Smuggling of sugar causes Tsh 462 billion loss. [https://www. Thecitizen.co.tz/News/Smuggling-of-sugar-causes-Sh462bn-loss/1840340-2608266-8mm0foz/index.html] site visited on 25/10/2021.

Thomas, M. A. (2010). What do the worldwide governance indicators measure? *The European Journal of Development Research* 22 (1): 31 – 54.

Thow, A. M., Lencucha, R. A., Rooney, K., Colagiuri, S. and Lenzen, M. (2021). Implications for farmers of measures to reduce sugars consumption. *Bulletin of the World Health Organization* 99(1): 41 – 49.

Thurlow, J., Randriamamonjy, J. and Benson, T. (2018). *Identifying Priority Value Chains in Tanzania*. International Food Policy Research Institute, Michigan, USA. 20pp.

Wang, M. L. and Choi, C. H. (2019). How information and communication technology affect international trade: A comparative analysis of BRICS countries. *Information Technology for Development* 25(3): 455 – 474.

Williams, A. and Siddique, A. (2008). The use (and abuse) of governance indicators in economics: a review. *Economics of Governance* 9(2): 131 – 175.

Williamson, O. E. (1996). *The Mechanisms of Governance*. Oxford University Press Inc., New York. 448pp.

Zhang, W. B. (2008). *International Trade Theory*. Springer-Verlag Berlin Heidelberg. German. 415pp.

CHAPTER THREE

3.0 Dynamics of Coffee Certifications in Producer Countries: Re-Examining the Tanzania Status, Challenges and Impacts on Livelihood and Environmental Conservation

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Article

Dynamics of Coffee Certifications in Producer Countries: Re-Examining the Tanzanian Status, Challenges and Impacts on Livelihoods and Environmental Conservation

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3.1 Abstract

Certification is increasingly becoming necessary for accessing coffee export markets and practicing environmental conservation, especially at this time when many of the farmers in developing countries strive to achieve agricultural transformation. Using data from 400 randomly selected coffee farmers in Tanzania, the study determined the status, constraints, key drivers, and impact of coffee certifications. Descriptive statistics and the endogenous switching regression (ESR) model were used for data analysis. Results indicated that the level of coffee certification is low, being constrained by unawareness and inaccessibility, the prevalence of coffee diseases, failure in realizing price advantages, and certification not being cost effective. Economies of scale, experience, and participation in collective actions are significant factors affecting coffee farmers' decision to join certification schemes. Additionally, the study rejects the hypothesis of certification to improve household income. However, certification improved awareness and practices of environmental conservation among coffee farmers. It is thus important to embark on awareness creation and make certification services accessible and cost effective to coffee farmers for increased access to niche export markets. Easing transmission of price premiums to coffee farmers will also increase the supply of sustainably grown coffee, improve coffee farmers' livelihood, and help in the attainment of environmental sustainability goals within the coffee supply chain.

Keywords: Sustainability; endogenous switching regression; coffee; certification; environmental conservation; livelihood

3.2 Introduction

Certification is an important economic tool that is used to promote social-economic and environmental conservation objectives in the world (Jena *et al.*, 2017). It is used to stimulate quality and sustainability standards where consumers pay price premiums to promote social and economic change and environmental sustainability in the world (Bellmann and Hepburn, 2017; CBI, 2021). Through these arrangements, farmers adhere to set standards so that they can benefit from price premiums and other related advantages associated with certification. However, certification is voluntary, and it is used as a tool to access markets while attaining sustainability goals within the commodity supply chains. Farmers are thus required to comply with the set sustainability measures and regulations in order to enable them to access the benefits of certification (Makita and Tsuruta, 2017).

Certification involves a number of stakeholders, hence there are various certification schemes covering a range of issues within the sustainability framework. For example, retailers introduce quality standards responding to the consumers' requirements; non-governmental organizations focus on achieving suitability goals; and governments in exporting countries aim at promoting a sustainable crop commodity industry. Other certification schemes are developed by specific product industries, such as the coffee industry with an interest in promoting coffee products (CBI, 2021). This is done to achieve sustainable development. According to the Food and Agriculture Organization of the United Nations (FAO, 2010), sustainable development is "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture sector in particular) conserves land, water, plant and animal genetic resources, in environmentally non-degrading, technologically appropriate, economically viable and socially acceptable way".

Therefore, retailers, non-governmental organizations, governments, and other actors of the private sector have developed certification schemes aimed at achieving sustainable development.

For coffee, the most widely used certification standards are Fairtrade (according to Fair Trade Labelling Organization International), organic (according to the International Federation of Organic Agriculture Movements), 4C (Common Code for the Coffee Community), and Rainforest Alliance, which was merged with UTZ, certified in January 2018(Bravo-Monroy *et al.*, 2016; Pyk and Hatab, 2018; CBI, 2021). Some private companies, such as Coffee and Farmer Equity (C.A.F.E) Practices by Starbucks and Nespresso AAA, provide their own coffee certifications. There are also many others, such as Smithsonian Migratory Bird Center (SMBC) Bird Friendly Certification, and Demeter, just to mention a few. These certification schemes provide independent, credible, traceable, and innovative solutions for sustainable supply chains of coffee (Lentijo and Hostetler, 2011; CBI, 2021). They ensure that farmers produce certified coffee for specific intended markets. Certified coffee is intended to be grown in a healthy environment, it is economically viable to farmers, and promotes social equity among farmers and other workers within the coffee supply chain (Lentijo and Hostetler, 2011).

Coffee certification schemes work along three main sustainability dimensions of social, economic, and environmental conservation. Social and economic benefits include access to markets, price premiums, better trading conditions, and stabilization in coffee prices (Lentijo and Hostetler, 2011; Pyk and Hatab, 2018). Environmental conservation is enhanced through practices such as reduced use of agrochemicals, water conservation, soil erosion, energy use, and biodiversity conservation (Rosen and Kishawy, 2012; Pyk and Hatab, 2018). Additionally, the benefits of certification can extend to increased yields and better management of farmer associations (Jena *et al.*, 2017). This is because some certification schemes such

as Fairtrade, which is granted to cooperatives and associations and not to individual farmers, are accompanied by improved management of collective action groups.

Certification has made progress in the world and continues to show its importance due to the increasing demand for certified coffee by buyers in consuming countries. The demand for sourcing healthier and sustainably grown coffee has grown in recent years (Voora *et al.*, 2019). Therefore, many coffee-producing countries in the world are supplying sustainably grown coffee to consumers. Tanzania is one of the developing countries supplying non-sustainable and sustainably grown coffee, including organic, rainforest-certified, and fair-traded coffee.

Coffee production in Tanzania started in 1898. The crop was first introduced in Kilimanjaro region, Northern zone of Tanzania by Catholic missionaries, and the crop is now grown in three zones of the country (Mhando and Mdoe, 2018). These are the Northern zone made up of Kilimanjaro, Arusha, and Manyara regions; the Western zone made up of Kagera, Mara, and Kigoma regions; and the Southern highlands zone made up of Mbeya, Songwe, and Ruvuma regions. There are also emerging regions which have started to grow coffee in the Southern highlands (i.e., Iringa and Rukwa regions). Other coffee-producing regions are shown in Figure 3.1.

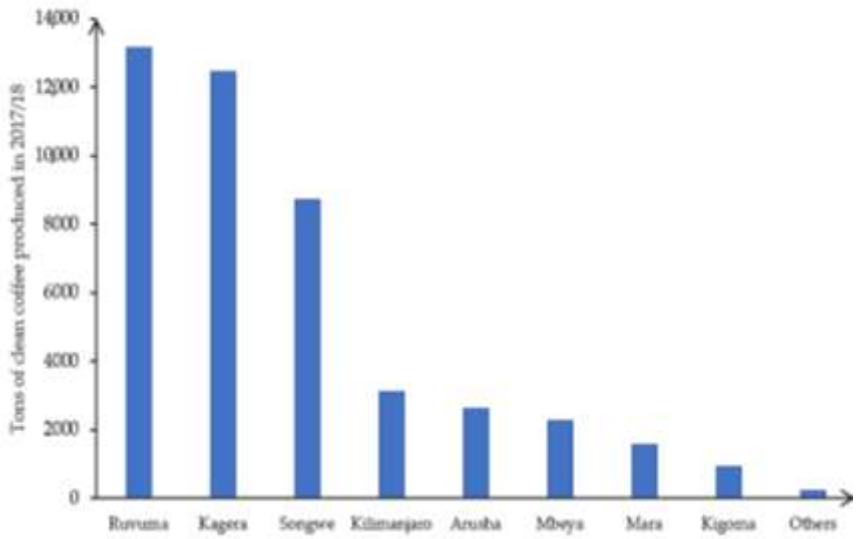

Figure 3.1: Coffee-producing regions in Tanzania.
Source: **Computed from Ministry of Agriculture (MoA), 2018 data.**

There are two types of coffee grown in Tanzania, namely, Robusta (*Coffea canephora L.* (Gentianales: Rubiaceae)) and Arabica (*Coffea arabica L.).* Arabica coffee makes up about 70% of the total coffee produced in Tanzania. The Arabica coffee produced in Tanzania is of Colombian origin, “Colombian Mild Arabica”, which is used as filler with other coffee types. Robusta coffee makes up 30% of the total coffee produced in the country (TCB, 2021). The level of coffee production in the country has increased from 33 000 tons in 1961 to 51 529 tons of green coffee (859 thousand 60 kg bags) in 2019 (FAO, 2020) (Figure 3.2). The coffee production trajectory reached its increasing trend in the year 2000 to 2005, attaining a production level of 95 390 tons of green coffee, which was the highest in Tanzania coffee production history.

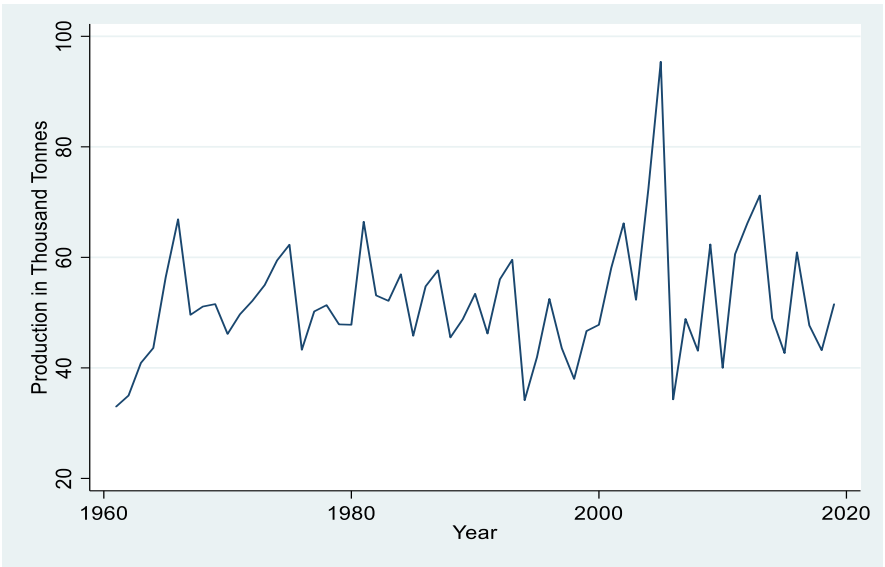

Figure 3.2: Coffee production in Tanzania.
Source: **computed from FAOSTAT 2020 data.**

Tanzania has continued producing coffee and it is now among the top five coffee-producing countries in Africa. Africa makes up about 11% of the total global coffee production with Ethiopia, Uganda, Côte d'Ivoire, Madagascar, and Tanzania being the top five coffee producers (ICO, 2021). These five countries produce about 76% of the total coffee produced in Africa (FAO, 2020). Tanzania contributes about 1.7% to the total share of coffee production in the world (Marwa, 2019). Coffee production in Tanzania is dominated by small-scale farmers (90%).

Tanzania experiences a positive static export trend for coffee. The country exports about 93% of the total coffee produced (TCB, 2021). For example, Tanzania exported coffee worth USD 165 million in the year 2019 (ITC, 2021). Available statistics indicate that about 70% of the Tanzania coffee is exported to six markets, which are Germany, Italy, the United States of America, Japan, Belgium, and the United Kingdom (ITC, 2021). The coffee trade is increasing due to favorable Arabica coffee prices and the accessibility of the country to niche

export coffee markets. These niche export markets are Fairtrade, Rainforest Alliance, and organic coffee markets (Pyk and Hatab, 2018). For example, the Arabica price increased by 10.3% for the coffee exported by Tanzania in the year 2020 (BOT, 2021).

Certification policies are now becoming necessary for accessing international markets for most of the global value chains including coffee (Junior *et al.,* 2016; Jena *et al.,* 2017, Minten *et al.,* 2018; CBI, 2021). Tanzania, as with many other coffee-producing countries in the world, accesses niche export coffee markets by complying with quality and standards set in these markets. Standards set in these markets include sustainability standards. The main certification schemes operating in Tanzania are Organic, Fairtrade, and Rainforest Alliance. There are also specific companies' certifications in Tanzania such as C.A.F.E Practices by Starbucks. All these certification schemes ensure that coffee sourced from Tanzania is healthier and sustainably grown.

Despite an increasing demand for sustainably sourced coffee, the level of certified coffee production has been declining in the world. Available statistics show that in the period of 2014 to 2018 the production of certified coffee dropped by 15.1% (Meier *et al.*, 2020). In the same period, the area under certified coffee production also dropped by 12.2%. Certified coffee represented a 25.8% share of the global total coffee production by the year 2018 (CBI, 2021). Likewise, in Tanzania, as one of the coffee-producing countries, the trend is the same.

Certification schemes are charged with being ineffective, especially in sustainability awareness, transparency, and monitoring of social, environmental, and economic impacts (Junior *et al.*, 2016). In many coffee-producing countries, the overall impact of certification schemes on the coffee farmers has been hard to establish (Van Rijsbergen *et al.*, 2016; Jena *et al.*, 2017; Minten *et al.*, 2018; Schleifer and Sun, 2020). Therefore, understanding the key

constraints to certification, drivers, and impact of certification on the coffee sector in producer countries is important for crafting policies that will spur the production of sustainably grown coffee, social equity, and overall sustainability within the coffee supply chain. This study established the status, constraints, key drivers, and the impact of coffee certification in Tanzania.

3.3 Methodology

3.3.1 Description of the study areas

The study was conducted in three main coffee-producing zones of Tanzania. The Southern highlands comprised Ruvuma and Songwe regions. In the Northern zone, the study was carried out in Kilimanjaro region. The Western zone was represented by Kagera region. The study was carried out in districts with a high level of coffee production. These districts were Muleba and Karagwe in Kagera region; Mbinga and Songea in Ruvuma region; Mbozi and Ileje in Songwe region; and Moshi and Hai in Kilimanjaro region. The four regions surveyed are among the 13 regions involved in coffee production in Tanzania. These four regions represent 83% of the total coffee production in the country. Ruvuma and Kagera regions are the leading regions in coffee production. Ruvuma alone represents about 30% of the total coffee produced in the country (NBS, 2017). The distribution of coffee farmers involved in the study is shown in Figure 3.3.

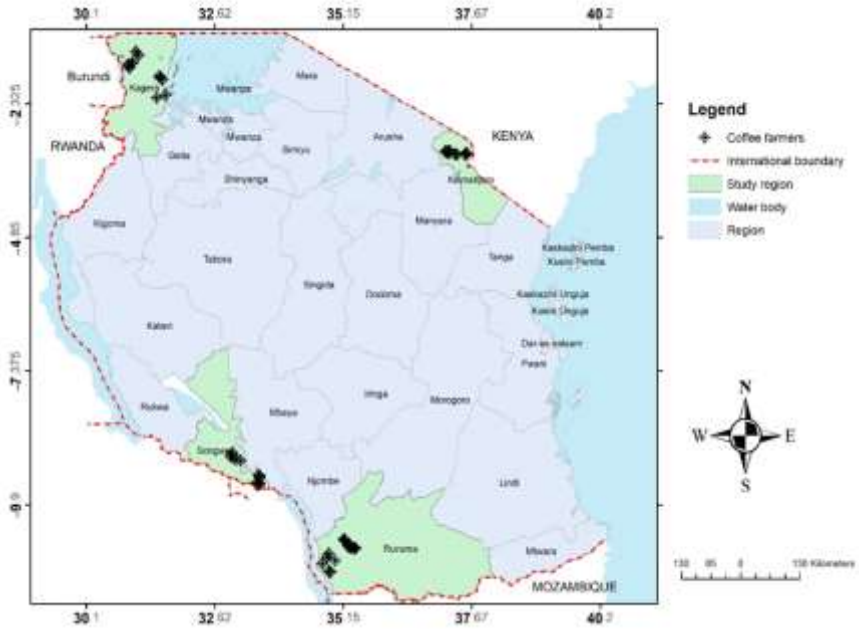

Figure 3.3: Map showing regions in Tanzania and the distribution of coffee farmers involved in the study.

Source: Sketched using coffee farmers' household survey global positioning system (GPS) 2021 data.

3.3.2 Conceptual and Theoretical Framework

This study synergizes two theories in explaining what influences coffee farmers to become certified. These theories are the random utility theory and the profit maximization theory. The random utility theory is based on the random utility framework (RUF) and its assumptions as stated by Nicholson and Snyder (2008) and Cascetta (2009). The theory hypothesizes that every farmer is a rational decision maker, maximizing utility relative to his or her choice of participating in voluntary certification schemes or not. In tandem, according to the profit maximization theory, the farmer is attracted by monetary returns in making the decision. In theory, farmers always act in self-interest to maximize profits (Debertin, 2012; Dorman, 2014).

Farmers are the maximizers of the utility of the potential monetary payoffs (Weersink and Fulton, 2020). In maximizing profits, farmers are assumed to equate marginal revenues to marginal cost of producing the commodity. The decision of the coffee farmer $i$whether to become certified or not is based on the following rationality assumptions: -

(i) The coffee farmer $i$considers the choice between becoming certified or not as being mutually exclusive alternatives.
(ii) The coffee farmer i assigns to each alternative a perceived utility and selects the alternative that maximizes utility.
(iii) The utility assigned to each choice alternative $j$depends on a number of attributes of the alternative itself and of the coffee farmer i.

$$U_j^i = U(x_j^i) \quad \text{..... (3.1)}$$

where x_j is the vector of attributes relative to the alternative j and to the decision-maker i.

(iv) The utility assigned by the coffee farmer is not known with certainty and thus is represented by a random variable.

Conceptually, the decision of the coffee farmer to select whether to join a certification scheme or not is influenced by many factors which are conditioned on the farmer i (Figure 3.4). These determinants of certification include education level, economies of scale in coffee production, membership in organizations, the market outlet used in selling coffee, sex, experience in coffee production activities, and wealth or poverty level. In the choice of becoming certified, the coffee farmer maximizes utility. However, based on the random utility assumptions, the utility assigned depends on the attributes of the alternative chosen. The attributes associated with certifications are the socioeconomic and environmental benefits. It follows therefore that coffee farmers are attracted by monetary payoffs which are in terms of socioeconomic and environmental benefits. The socioeconomic benefits include increased coffee farmers' income, enhanced market Access, price premiums, better trading

conditions, and stabilization in coffee prices. The practices associated with complying with certification may contribute to the improved Health status of the coffee farmers. Environmental conservation is enhanced through benefits such as reduced use of inorganic fertilizers and agrochemicals, water conservation, enhanced soil health, biodiversity conservation, protection of natural ecosystems, and resilience as the result of adaptations to climate change.

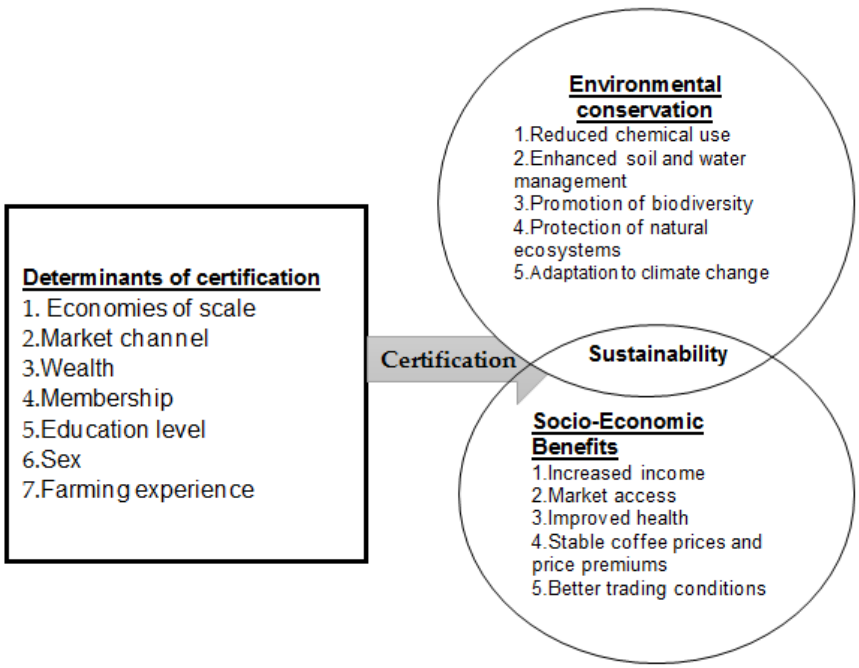

Figure 3.4: Conceptual framework.
Source: **Adapted from Rosen and Kishawy (2012) and Pyk and Hatab (2018).**

3.3.3 Data, sampling procedures, and sample size

Data for the study were collected by field survey method in January 2021 from 400 coffee farmers in four selected regions of Tanzania. The data collection activity was preceded by requesting the approval

on Code of Practice on Ethical Standards in Research which includes the General Data Protection Regulations (GDPR). Data were collected using a semi-structured questionnaire implemented using Computer Aided Personal Interviews (CAPI).

The study used a multistage random sampling method comprising four stages. The first stage was purposive selection of four regions, taking into consideration their level of coffee production (based on production level, Ministry of Agriculture, 2018 data). The second stage of district selection was also based on the same criterion of high level of coffee production, and it involved selection of two districts from each region. The third stage involved selection of five enumeration areas (Eas)/villages using probability proportional to size (PPS) from each of the selected districts in stage two. The fourth stage involved systematic random selection of 10 farmers from each enumeration area, making a total of 50 farmers per district.

The sample size (*n*) was estimated considering the target population (N) and using a 95% confidence interval level that is d = 5% based on Yamane (1967) as shown in Equation (3.2) below. Available statistics indicate that these four regions have a total of 172 688 coffee farmers (N) (NBS, 2017). This gives a sample size of 399.1, which is exactly 400 farmers that were interviewed.

$$n=\frac{N}{1+Nd^2}=\frac{172,688}{1+\left[172,688*(0.05)^2\right]}=399.0756\approx 399.1=400 \quad \text{..... (3.2)}$$

3.3.4 Analytical framework

This study used a combination of approaches in its analytical framework. This included descriptive statistics analysis to depict the levels of the variables under study and the association among the variables. In showing the association among the variables of interest, the chi-square statistic was used. Tests of significance between the variables were implemented using t-tests.

Data reduction for Likert scales and creation of summated scales were conducted using the exploratory (factor analysis) model. Measure of sampling adequacy (MSA) and sphericity tests were performed prior to estimation of the factor analysis model to see whether the correlations are large enough to be suitable for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found to be greater than 0.5 and the Bartlett's test of sphericity was significant ($p < 0.05$), implying that the correlations were large enough, hence it was necessary and sufficient to use the factor analysis model in data reduction.

Participation in voluntary certification schemes was modelled under RUF. This means that if a coffee farmer decides to enter into the certification scheme, it means that there is utility gain that the farmer expects to obtain from participating in the scheme. The expected benefits that can be gained include social, economic, and/or environmental conservation gains. RUF is assumed to guide coffee farmers on making choices between being certified and not being certified. Coffee farmers choose the alternative which maximizes utility such that; U_{1^1} is the utility that coffee farmer i gets if certification is chosen and U_{0^i} is the utility that coffee farmer i gets if they choose not to join the certification scheme. The endogenous switching regression (ESR) model was used in 68odelling the two scenarios in two stages. The first stage of the ESR model is the estimation of the decision to become certified which was estimated through the probit model. The second stage is the estimation of the effect of the decisions on two outcome variables, which are household income and benefits of environmental conservation. The choice of whether to become certified or not is influenced by various factors (Z_i), thus the latent model in Equation (3.3) could be estimated.

$$C_i^* = \underset{\sim}{Z_i}\underset{\sim}{\alpha_k} + \varepsilon \qquad \text{……………………………………………… (3.3)}$$

The problem with the above model is that $Ci^*$is unobservable as the utility of a coffee farmer cannot be observed (Nicholson and Snyder,

2008), but choices made by a coffee farmer give some information. Considering Equation (3.4), it follows that, if Ci = 1 then Ci^* > 0 and if Ci = 0 then Ci^*≤ 0. This implies that, if a coffee farmer makes choice 1, it must be the case that utility of alternative 1 is the highest.

$$C_i^* = U_1 - U_o \quad \text{..... (3.4)}$$

The probability of a coffee farmer deciding whether to become certified or not was determined by combining the regression equation for the unobservable Ci^* and the equation that links Ci and Ci^* as expressed in Equation (3.5).

$$C_i^* = \underset{\sim}{Z_i}\underset{\sim}{\alpha_k} + \varepsilon_i; \; C_i = \begin{cases} 1 \; if \; C_i^* > 0 \\ 0 \; if \; C_i^* \leq 0 \end{cases} \quad \text{..... (3.5)}$$

where $\underset{\sim}{Z_i}$ represents an array of factors hypothesized to influence the decision of whether to become certified or not (Table 3.1) and $\underset{\sim}{\alpha_k}$represents the parameters to be estimated.

Table 3.1: Description of variables for the endogenous switching regression model

Level of the Variable	Variable	Description of the Variable
Environmental conservation and household income level impact variables	X_1 =Sex	Sex of the coffee plot manager measured as 1 if male and 0 if female
	X_2 = Education	Years spent in formal training by the plot manager
	X_3 = Level of specialization	The measure of economies of scale calculated as the ratio of the coffee farm size to the total farm size of the entire household crop enterprise.
	X_4 = Membership	Membership in organizations as the measure of participation in collective action presented as number of organizations where the farmer has membership
	X_5 = Market outlet	The type of market used by the farmer in selling coffee, coded as 1 if sold through the designated Agricultural Marketing Cooperative Societies (AMCOS) and 0 otherwise.
Drivers of certification decision	Z_1 = Education	Years spent in formal training
	Z_2 = Level of specialization	The measure of economies of scale calculated as the ratio of the coffee farm size to the total farm size of the entire household crop enterprise
	Z_3 = Membership	Membership in organizations as the measure of participation in collective action presented as number of organizations where the farmer has membership
	Z_4 = Market outlet	The type of market used by the farmer in selling coffee, coded as 1 if sold through the designated AMCOS and 0 if sold directly through private buyers and other outlets.
	Z_5 = Sex	Sex of the coffee plot manager measured as 1 if male and 0 if female
	Z_6 = Experience	Years of experience in coffee-farming activities
	Z_7 = Wealth	Wealth of the coffee farmer measured as total value of household owned assets in USD †

† 1 USD = 2305.10 TZS, the average exchange rate for the year 2020; BOT, Bank of Tanzania. Annual Report, 2020, Bank of Tanzania: Dar es Salaam, p. 247, data. X1–X5 are the factors hypothesized to affect the outcome variables that is environmental conservation and household incomes; Z1–Z7 are factors assumed to drive the decision of farmers to get certified; AMCOS is the Agricultural and Marketing Cooperative Societies

The effects of certification on household income and the gains from environmental conservation were estimated in two equations. The ESR model was run two times since the outcome variables of interest were two. The first run involved the outcome variable being livelihood improvement which was measured by total household income and the second run of the model involved using environmental conservation as the outcome variable. The total household income was calculated from the coffee income, livestock income, vegetable and fruits income, income from other crops, remittances, salaries/wages, businesses, and income from off-farm economic activities.

The environmental conservation outcome variable was calculated through the data reduction method using factor analysis. The summated scale method was used in creating the variable to measure environmental conservation from 5-point Likert scale statements. These statements were awareness of environmental effects; awareness of sustainable practices; practice of sustainable coffee production; existence of barriers to sustainable coffee production; and the measures used to minimize environmental effects.

The outcome equation for the two regimes, which involves certification status (1 if certified and 0 if not certified), was estimated in two equations that were combined in the ESR model (Jena *et al.*, 2017; Ssebunya *et al.*, 2019; Schleifer and Sun, 2020). The models in Equations (3.6) and (3.7) were combined and estimated in Stata software using the *movestay* command with the full information maximum likelihood method (Lokshin and Sajaia, 2004; Greene, 2018).

Regime 1: $Y_{1i} = \underset{\sim}{X}_{1i}\underset{\sim}{\beta}_{k} + \varepsilon_{1i} \quad \text{if } C_1 i = 1$; certified coffee farmers……..(3.6)

Regime 2: $Y_{0i} = \underset{\sim}{X}_{0i}\underset{\sim}{\beta}_{k} + \varepsilon_{0i} \quad \text{if } C_0 i = 0$; not certified coffee farmers…(3.7)

where Yirepresents the outcome variables total household income and environmental conservation and $\underset{\sim}{X}'$ are the factors assumed to affect the outcome variables (Table 3.1).

The post-estimation was implemented using the *mspredict* (Lokshin and Sajaia, 2004) command and the procedure was used in the estimation of the average treatment effects on the treated (ATT) and the average treatment effects on the untreated (ATU) to deduce the effects of the certification decisions on the outcome variables which are household income and environmental conservation. ATT was calculated as the difference between the expected value of the real scenario outcome from certification and its corresponding counterfactual outcome scenario (*the outcome had the certified farmers decide not to certify*). Similarly, ATU was calculated as the difference between the expected value of the real scenario outcome from non-certified coffee farmers and its corresponding counterfactual outcome scenario (*the outcome non-certified farmers decide to certify*).

3.4 Results and Discussion

3.4.1 Socioeconomic characteristics of coffee farmers

Participation of coffee farmers in certification schemes is low. Findings indicate that 70.5% of the farmers involved in the study were not participating in any certification scheme. The remaining proportion of farmers (29.5%) was in various certification schemes which are Organic, Rainforest Alliance, and Fairtrade certification schemes. Summary statistics of the sampled coffee farmers are provided in Table 3.2. It is clear that most farmers who were not engaged in certification schemes were male adults. They were not specialized in coffee production and had a high level of literacy. The results indicate significant variations between the level of specialization, age of the coffee farmer, and certification ($p < 0.05$). The more specialized coffee farmers were engaged more in certification schemes than their counterpart coffee farmers with low

levels of specialization. Additionally, old people (≤60 years) participated more in the certification schemes than adults (36–59 years) and youth (≤35 years). Generally, coffee production activities seemed to not be economically attractive to youth as only 11% of the farmers were youth. Land ownership might also be constraining youth from taking part in coffee production activities given the fact that the crop is perennial.

Table 3.2: Socioeconomic characteristics of coffee farmers involved in the study

Socioeconomic Variable (%)		Certification			
		Certified (*n* = 118)	Non-Certified (*n* = 282)	Overall (*n* = 400)	χ^2 Statistics
Sex	Male	88.98	86.17	87	0.582(0.446) †
	Female	11.02	13.83	13	
Age	Youth (≤35 years)	4.24	13.83	11	9.723(0.008) ***
	Adult (36 to 59 years)	56.78	57.45	57.25	
	Old (≥60 years)	38.98	28.72	31.75	
Education level	No formal education	0.85	0.71	0.75	0.048 (0.976)
	Primary education	82.2	82.98	82.75	
	Secondary education and above	16.95	16.3	16.50	
Level of specialization	Less than 25%	11.86	27.3	22.75	22.12 (0.00) ***
	25–50%	45.76	51.06	49.50	
	More than 50%	42.38	21.7	27.75	

† Values in brackets are *p*-values; *** $p < 0.01$; *n* is the number of farmers/observations

3.4.2 Coffee farmers' participation in collective action

The participation of coffee farmers in collective actions facilitated access and decision to participate in certification schemes. Our results of analysis show that 91.3% of all the farmers have membership in various organizations. Many farmers who have membership in various organizations (98.1%) had membership in agricultural/livestock/fisheries farmer groups, including marketing groups such as agricultural and marketing cooperative societies. The other organizations with a high proportion of coffee farmers were trade and business associations and credit or microfinance groups, including saving and credit cooperative societies (SACCOS)

and village saving and lending associations (VSLAs), with 13.7% and 12.6% of coffee farmers, respectively.

Additionally, participation in collective action facilitated collective sales of coffee and other agricultural produce. Results show that 89.5% of the coffee farmers used AMCOS as the key market outlet for their coffee. This shows that more coffee farmers who were members in various organizations and used AMCOS as their market outlets were in certification schemes (Table 3.3). Coffee farmers who did not use AMCOS as their market outlet sold their coffee through middlemen, local villagers/neighbors, cottage processors, and other processing companies. In fact, many studies have reported the importance of agricultural farmers participating in collective action activities. Participation in collective action will not only make farmers benefit from collective sales but there are other advantages, including environmental conservation methods that can be obtained through participation in collective action. The studies by Barham and Chitemi (2009), Ochieng *et al.* (2018), and Twine *et al.* (2019) have showed that sharing of technical knowledge and access to credit constituted several benefits that can be obtained through farmers' participation in collective action.

Table 3.3: Participation in collective action and points of sale among coffee farmers

Variable (%)		Certification		Overall (*n* = 400)	χ^2 Statistics
		Certified (*n* = 118)	Non-Certified (*n* = 282)		
Membership in organizations	Members	99.15	87.94	91.25	13.09(0.00) † ***
	Non-members	0.85	12.06	8.75	
Market outlet	AMCOS	95.76	86.88	89.5	6.96(0.008) ***
	Others‡	4.24	13.12	10.5	

‡ Others include middlemen, cottage processors, and local villagers/neighbors. † Values in brackets are *p*-values; *** $p < 0.01$; *n* is number of farmers/observations

3.4.3 Determinants of certification decisions among coffee farmers

Level of specialization, membership in organizations, and years of experience in coffee farming activities significantly influenced the decision to engage in the certification scheme under the two outcomes of household income and environmental conservation ($p < 0.05$) (Table 3.4). We used the level of specialization as the measure of economies of scale (Assa *et al.*, 2013). The findings show that an increase in the level of specialization in coffee production activities increased the predicted probability for coffee farmers to become certified. This means that the more specialized the coffee farmers were, the more they were likely to become certified. However, farming households tend to pursue risk diversification objectives which reduce their level of specialization. Therefore, the most important indicator for coffee farmers to have a high chance of joining the certification schemes is economies of scale. Economies of scale indicate how a farmer can be able to intensify in the coffee production system. Farmers exercising a high level of intensification in coffee production may have a high chance of joining the certification scheme. Similarly, the study by Volsi *et al.* (2019) indicated how specialization is essential for driving intensification in the production system.

Table 3.4: Determinants of certification decisions among coffee farmers

Variable	Household Income		Environmental Conservation	
	Coeff.	*P* > |Z|	Coeff.	*P* > |Z|
Education	−0.030	0.285	−0.034	0.211
Level of specialization	0.009 ***	0.001	0.009 ***	0.001
Membership	0.792 ***	0.000	0.536 ***	0.000
Market outlet	0.273	0.405	0.527 *	0.098
Sex	0.212	0.323	0.247	0.244
Experience	0.015 ***	0.001	0.013 ***	0.000
Wealth	−0.000017 ***	0.002	-1.49×10^{6}	0.708
Constant	−3.303	0.000	−2.595	0.000
Correlation (r1)	0.077	0.860	−1.756	0.000
Correlation (r2)	1.033	0.000	−0.360	0.181
n	400		400	
Model statistic	Wald chi2(5) = 14.02; prob > chi2 = 0.029		Wald chi2(5) = 28.34; prob > chi2 = 0.000	

*** $p < 0.01$, * $p < 0.1$.

Membership in organizations increased the predicted probability of becoming certified. Membership is the measure of participation in collective action. The participation of coffee farmers in collective action is an important method to obtain information on various niche markets that would lead to their involvement in certification schemes. Collective actions are also essential to spur knowledge transfer among the coffee farmers. Therefore, coffee farmers should be encouraged to have membership in various organizations which will support their coffee production and marketing activities, easing the chance of becoming certified. Participation in collective action is vital. Similarly, a study by Bravo-Monroy *et al.* (2016) in Colombia indicated membership to be a key element in supporting coffee farmers to make decisions on certification.

Years of experience in coffee farming activities increased the chance of farmers making a decision to become certified. An increase in years of coffee farming experience increases the predicted probability of becoming certified. This means that the more experienced coffee farmers have a higher chance of becoming

certified than the less experienced coffee farmers. Experience is always accompanied by improved knowledge and skills in farming practices. Experienced farmers have skills in managing coffee and other related activities. This increases the efficiency of their farming activities, leading to them being in a better position for making a decision to become certified.

Surprisingly, the wealth status of the coffee farmers reduced the chance of becoming certified. The findings indicate that an increase in the wealth of the coffee farmer reduces the predicted probability of becoming certified. The wealthier coffee farmers have a lower chance of joining the certification schemes. This is due to the fact that rich farmers have diversified their capital into investing in production of other better-paying crops such as banana, avocado, and other horticultural products.

In pursuing environmental conservation objectives, the market outlet used by the coffee farmers was found to be imperative. Coffee farmers selling through AMCOS were found to have a higher predicted probability of becoming certified than farmers who sold coffee via the other market outlets. Additionally, sex of the plot manager and level of education were not significant determinants of coffee farmers' decision to engage in certification schemes.

3.4.4 Coffee farmers' awareness and practice of environmental conservation

The study established the level of awareness and practice of environmental conservation among coffee farmers. Results indicated that 59.5% of coffee farmers are not aware of the environmental effects associated with coffee production activities. This brings out the need for environmental education to be provided to coffee farmers. Interestingly, the sustainable production practices for coffee that conserve the environment, general biodiversity, and ecosystem were known to many coffee farmers (53.6%), especially the certified coffee farmers (63.6%), and they practiced sustainable production.

However, some non-certified coffee farmers (39.4%) indicated that they faced barriers in practicing sustainable coffee production/trade in their area. The barriers included inaccessibility to knowledge and some of the production inputs. Generally, certified coffee farmers face fewer barriers in practicing sustainable coffee production/trade in their area. They are more informed, and they practice sustainable coffee production that conserves the environment, biodiversity, and ecosystems in contrast to the non-certified coffee farmers.

Nevertheless, many coffee farmers (65%) in both groups (77.1% for certified farmers and 59.9% for non-certified farmers) were found to be using measures that minimize environmental effects associated with coffee production. These measures include use of the mulching method for increasing water porosity, water retention capacity, and stability. This was practiced by 46% of the coffee farmers, of which many were certified farmers and were statistically significantly different from the non-certified farmers (Table 3.5) ($p < 0.05$). These methods conserve the environment and protect coffee farms from soil erosion. The other methods used to avoid soil erosion are planting trees, use of contours, construction of water streams, and terracing. However, this method was used by few (28.2%) farmers. The construction of water streams is used to avoid soil erosion and water loss. Additionally, many coffee farmers (92%) practice intercropping of coffee with leguminous crops to improve soil health by adding soil nutrients. The intercropping of coffee with trees and other beneficial plants enhances biodiversity in coffee production activities.

Table 3.5: Environmental conservation practices among coffee farmers

Environmental Practice	Farmers Practicing (%)			
	Certified (n=118)	Non-Certified (n=282)	Overall (n=400)	χ^2 Statistics
Use of mulching method for increasing water porosity, water retention capacity, and stability	69.2	35.5	46.0	43.975(0.00) † ***
Planting trees, use of contours, construction of water streams, and terracing	39.3	23.2	28.2	13.39 (0.00) ***
Intercropping coffee with trees and other beneficial plants	94.0	91.1	92.0	6.473(0.011) **
Water resources conservation	6.0	10.0	8.8	1.188 (0.276)
Proper use of agrochemicals	16.2	22.4	20.5	1.067 (0.302)

† Values in brackets are *p*-values; *** $p < 0.01$, ** $p < 0.05$

Water resource conservation is another method that was practiced by a few coffee farmers (8.8%) for minimizing environmental effects associated with coffee production and did not vary between the two groups. The practices of water conservation included the construction of a water sewage system, especially during the processing of coffee to reduce environmental pollution. Coffee primary processing requires a lot of water. Coffee farmers indicated performing home processing using their own pulping machines. Water is the most important ingredient in pulping. Some coffee farmers ensure that there is no washing of coffee alongside water sources such as ponds, rivers, springs, and canals. Additionally, coffee farmers ensure they practice farming away from water sources in order to minimize water pollution caused by agrochemicals used in farming, especially during the rainy season.

The proper use of agrochemicals is another area being observed by some coffee farmers (20.5%) in conserving the environment. This includes the use of recommended application methods, amount, and frequency of using herbicides, pesticides, and insecticides. However, coffee farmers involved in certification schemes, especially organic farming, reported using herbs in pest and disease treatment methods that are environmentally friendly. Other methods for those using agrochemicals included the collection and burning of

packaging materials used for agrochemicals that could add poison to the environment and affect biodiversity as well as endanger personal health.

3.4.5 Factors affecting the outcome variables between certified and non-certified farmers

Sex of the coffee plot manager, education, market outlet, level of specialization, and membership in organizations were found to significantly affect the outcome variables which are household income and environmental conservation ($p < 0.05$) (Table 3.6). Sex of the farmer and level of education influenced the total household income generated by the farmer. Male farmers were found to have a greater predicted probability of obtaining higher household incomes than females. This was true for both certified and non-certified coffee farmers. This is because women have low access and control over various resources in the study areas which are key contributors to household incomes. Additionally, an increase in the level of education was found to increase the predicted probability of obtaining high household incomes for certified coffee farmers.

Table 3.6: Factors Affecting the Outcome Variables between Certified and Non-Certified Farmers.

	Variable	Household Income		Environmental Conservation	
		Coeff.	***p* > |Z|**	**Coeff.**	***p* > |Z|**
Certified farmers	Sex	0.509 *	0.069	−0.446 *	0.098
	Education	0.0916 ***	0.007	0.006	0.866
	Level of specialization	0.0002	0.965	−0.013 ***	0.000
	Membership	−0.004	0.985	0.689 ***	0.000
	Market outlet	−0.639	0.150	−0.527	0.220
	Constant	5.697	0.000	6.895	0.000
Non-certified farmers	Sex	0.690 ***	0.001	0.214	0.212
	Education	0.0357	0.142	0.025	0.219
	Level of specialization	0.005	0.109	−0.002	0.394
	Membership	0.235 *	0.086	0.214 *	0.076
	Market outlet	0.574 **	0.014	0.301	0.114
	Constant	5.051	0.000	2.566	0.000
	Correlation (r1)	0.077	0.860	−1.756	0.000
	Correlation (r2)	1.033	0.000	−0.360	0.181
	N	400		400	
	Model statistic	Wald chi2(5) = 14.02; prob > chi2 = 0.029		Wald chi2(5) = 28.34; prob > chi2 = 0.000	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; r1 and r2 are first and second correlations respectively.

The level of specialization and sex of the farmer were found to significantly reduce the predicted probability of being aware of and practicing environmental conservation for certified coffee farmers. Male coffee farmers were found to be less concerned with environmental conservation than female. Likewise, the more specialized coffee farmers were found to be less concerned with environmental conservation practices. However, membership in organizations increased the chance of being aware and practicing environmental conservation for both certified and non-certified coffee farmers. Additionally, membership in various organizations and use of AMCOS as the market outlet increased the predicted probability of obtaining high household incomes for the non-certified coffee farmers.

3.4.6 The effect of certification decisions on environmental conservation and livelihood improvement

Coffee farmers who were not in the certification schemes earned higher coffee and total household incomes than certified coffee farmers. The t-test results indicated significant differences in annual incomes earned between the two coffee farmer groups ($p < 0.05$). Income earned from coffee production activities by certified coffee farmers was USD 490.91 lower than that of non-certified coffee farmers. Similarly, non-certified coffee farmers had a mean annual household income that was USD 762.06 higher than that earned by their counterpart certified farmers (Table 3.7). This implies that there are challenges confronting certified farmers that cause them to fail to gain the anticipated benefits, including increased incomes. The differences are reported to emanate from coffee productivity, farm sizes, and the fact that the price premiums are not paid to certified coffee farmers.

Table 3.7: Annual income differences between certified and non-certified farmers.

Coffee Farmer Group	**Mean Annual Coffee Income (USD)**	**Mean Annual Total Household Income (USD)**	***n* = 400**
Certified	730.12	1587.55	118
Non-certified	1221.03	2349.61	282
Difference	490.12	762.06	
T test statistics	$t = 1.7056$; df = 398. Pr. (T > t) = 0.044**	$t = 1.7293$; df = 398. Pr. (T > t) = 0.0423**	

United States Dollars (USD) = 2305.10 Tanzanian Shillings (TZS), the average exchange rate for the year 2020 (BOT, 2021); ** $p < 0.05$ for *t* test of differences in mean incomes; *n* is the number of farmers/observations; df = degrees of freedom and *Pr* is the probability.

Further analysis on the average treatment effects on the treated (ATT) and the average treatment effects on the untreated (ATU) showed a negative value of ATT for the total household income outcome variable and a positive on the environmental conservation. This suggests that coffee farmers who are not in the certification

schemes earned higher household incomes than certified farmers. This means that the findings reject the hypothesis of certification to improve household income, on the one hand. On the other hand, certification improves awareness and practice of environmental conservation among coffee farmers (Table 3.8). Certified coffee farmers are better placed in conserving the environment. These findings are in line with Kattel (2017), who found certification, especially group organic certification, enhances environmental sustainability. Therefore, certification leads to improved environmental conservation. This is due to the fact that certification schemes are always accompanied by environmental conservation indicators such as pesticide use, water and energy conservation, and biodiversity. Therefore, smallholder coffee certification contributes more to environmental conservation and other sustainability indicators than increased incomes, especially for developing countries like Tanzania.

Table 3.8: Average treatment effects for certified and non-certified coffee farmers.

Variable	Household Income ‡		Environmental Conservation	
	ATT	ATU	ATT	ATU
Mean	−2.783 ***	2.449 ***	2.801	1.418 ***
Statistic	−8.85(0.00) †	6.788 (0.00)	14.102 (1.00)	11.169 (0.00)

† Values in brackets are p-values based on ttest; ‡ the log of total household income in USD was used in the analysis; *** $p < 0.01$; ATT is the average treatment effect on the treated/certified farmers and ATU is the average treatment effect on the untreated/non-certified farmers.

3.4.7 Key challenges in coffee certifications

The study identified challenges in accessing certification schemes for some of the coffee farmers. Farmers indicated that they experienced compliance issues with some of the certification schemes. The terms and conditions spelt out in joining the schemes were difficult to comply with. The level of awareness on the availability of different niche markets and opportunities from

certification schemes was not known with certainty by many coffee farmers in the study areas. This can be linked to the inefficiencies in sharing market information within the coffee supply chain.

Many coffee farmers (49.8%) disagreed on whether it was easy to access niche export coffee markets. Few coffee farmers (23.3%) were indifferent, and the remaining proportion (26.9%) indicated that they agreed with the statement. The level of agreement on the statements is shown in Figure 3.5. The Likert scale responses were such that 1 (20%) was strongly disagree, 2 (40%) was disagree, 3 (60%) was neutral/indifferent, 4 (80%) was agree, and 5 (100%) was strongly agree. Coffee farmers who agreed on a statement are above the neutral/indifferent line (60%) which separates level of agreement and that of disagreement, while coffee farmers who disagreed on a stated statement are indicated below the neutral line (60%). Many of the coffee farmers who disagreed on easiness in accessing the niche markets were in the non-certified group. Non-certified coffee farmers experienced difficulties in accessing the certification services. They lacked information on the availability of certification services and experienced issues related to compliance. However, even if the certification services were accessible, many coffee farmers (56.6%) from both groups disagreed with the statement of them being easy to obtain.

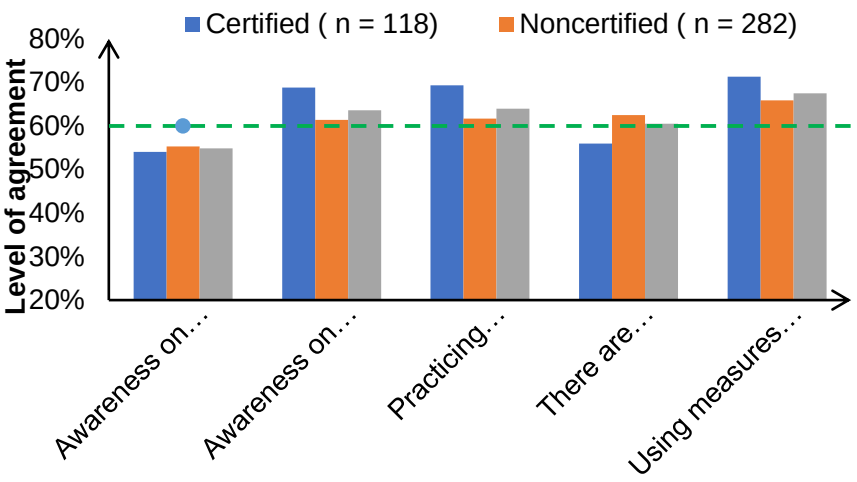

Figure 3.5: Level of agreement on various certification statements
Source: Coffee farmers' household survey, 2021 data

The prevalence of coffee diseases, such as coffee berry disease (CBD) (*Colletotrichum kahawae*), was mentioned as one of the reasons that made some coffee farmers hesitate to obtain organic coffee farming certification. CBD has been affecting coffee farmers for quite a long time. Similarly, the study by Otieno *et al.* (2019) identified CBD as being one of the key diseases affecting coffee farmers in Tanzania. Some coffee farmers reported non-availability of organic agricultural inputs to support them once they are certified. They indicated that these inputs were readily available in their location, but their commercialization and availability in bulk was a major constraining factor. This affected the ability of farmers in the study areas to comply with organic certification. In fact, some coffee farmers could not realize the price advantage and yield gains expected from joining the certification schemes. The findings of our study indicate that some farmers sold their organic coffee at relatively similar prices as those offered by farmers who were not certified, hence failing to benefit from price premiums. Generally, certified coffee farmers sold their coffee at 1.1 USD/Kg

of parchment while the non-certified farmers sold at 1.4 USD/Kg. The difference is attributed to the associated transaction costs in both groups and buyers' differences. Transmission of price premiums to coffee farmers is a challenge in many countries. The study by Rich *et al.* (2018) in India found the premiums to be small. Similarly, the study by Minten *et al.* (2018) in Ethiopia also found the premiums to be hardly transmitted to farmers. This indicates that the price advantages are captured by other actors along the coffee supply chain. The key informants' results from our study revealed the existence of quality-related issues and overregulation of the coffee marketing system, which in turn hindered coffee farmers from benefiting from price advantages. However, many coffee farmers (60.6%) reported that their coffee met international standards in terms of quality. More certified coffee farmers indicated that they had better quality coffee than the non-certified coffee farmers.

The state of government regulation in the sector was mentioned by many coffee farmers as challenging. Our results show that 54.8% of the coffee farmers agreed with the assertion that the existing government regulations and restrictions constitute the major obstacle to coffee trade. The level of agreement was higher for non-certified coffee farmers than the certified coffee farmers. Farmers indicated complications associated with direct coffee exports. The involvement of private buyers in buying coffee directly from farmers has also been limited by the new government regulations that require all coffee to go through the auction system.

The other challenge identified was coffee productivity. Some farmers (25.5%) indicated that they faced productivity challenges regardless of the certification scheme. Organic certified farmers reported obtaining lower productivity by 34.7 kg/ha compared to their counterparts. This is because the organic fertilizers, pesticides, and herbicides are cumbersome to obtain. The low productivity leads to increased production costs affecting the whole coffee production

efficiency. The price premiums that are expected to offset the productivity gap are hard to obtain. Additionally, 56.8% of the coffee farmers surveyed indicated that certification was not cost effective. The costs vary, ranging from 150–500 USD/ha and an annual auditing fee of USD 1 000–5 000. The high cost of certification and auditing makes coffee farmers lose their sovereignty in accessing the price premiums. This is because the certification and auditing costs are thus paid by traders or exporting companies, for which reciprocating the benefits to the coffee farmers seems not to be working for the coffee farmers. However, certification is increasingly viewed as necessary to be able to access export coffee markets.

3.5 Conclusion and Recommendations

Certification is increasingly perceived as necessary for accessing export markets among coffee farmers in developing countries. Coffee farmers need to join the certification schemes to be capable of accessing niche export markets and to gain social, economic, and environmental benefits associated with certification. Certification-enhancing policies will spur the production of sustainably grown coffee, social equity, and overall sustainability within the coffee supply chain.

This study faced two main limitations which were dealt with during data collection, cleaning, and analysis. These limitations were respondents' recall bias and the use of gross income rather than net income to measure livelihood improvement. Many of the respondents do not keep records or inventories of costs, purchases, and revenues. This affects the reporting of the revenues and cost streams. However, the study has well highlighted the status, constraints, key drivers, and impact of the coffee certifications in Tanzania as one of the coffee producers in developing countries. The level of coffee certification is still low, requiring interventions that will address the key constraints of certification. The key constraints include the low level of awareness and accessibility, the prevalence of coffee diseases, failure in realizing price advantage, and

certification not being cost-effective for coffee farmers. The study also found that the decision of the coffee farmer to join a certification scheme was influenced by factors including economies of scale, experience, and participation in collective actions. Additionally, the study rejects the hypothesis of certification to improve household incomes. Nevertheless, certification improved awareness and practice of environmental conservation among coffee farmers.

It is thus important for private and public institutions to embark on awareness creation and make certification services accessible and cost effective to coffee farmers as well as enhancing access to niche export markets. Easing transmission of price premiums to coffee farmers will increase the supply of sustainably grown coffee, improve coffee farmers' livelihood, and attain environmental sustainability goals within the coffee supply chain.

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References

Assa, M., Edriss, A. K. and Matchaya, G. (2013). Cost efficiency, Morishima, Allen-Uzawa and cross-price elasticities among Irish potato farmers in Dedza District, Malawi. *International Journal of Economic Sciences and Applied Research* 6(1): 59 – 73.

Barham, J. and Chitemi, C. (2009). Collective action initiatives to improve marketing performance: Lessons from farmer groups in Tanzania. *Food Policy* 34(1): 53 – 59.

Bellmann, C. and Hepburn, J. (2017). The decline of commodity prices and global agricultural trade negotiations: A game changer? *International Development Policy* (8.1).

BOT (2021). *Annual Report 2020/2021. Bank of Tanzania*. Dodoma. 255pp.

Bravo-Monroy, L., Potts, S. G. and Tzanopoulos, J. (2016). Drivers influencing farmer decisions for adopting organic or conventional coffee management practices. *Food Policy* 58(26): 49 – 61.

Cascetta, E. (2009). Random utility theory. In: Transportation systems analysis: *Models and Applications*. (Edited by Cascetta, E.). Springer, Boston, USA. pp. 89 – 167.

CBI (2021). Exporting sustainable coffee to Europe. Centre for the Promotion of Imports from developing countries [https://www.cbi.eu/market-information/coffee/sustainable-coffee] site visited on 25/3/2021.

Debertin, D. L. (2012). *Agricultural Production Economics*. Macmillan Publishing Company, Upper Saddle River, USA. 432pp.

Dorman, P. (2014). *Microeconomics*. *Springer Texts in Business and Economics*. Springer Verlag Berlin, Heidelberg. 528pp.

FAO (2010). The broad range of certification schemes. [http://www.fao.org/3/ai388e/AI388E 09.htm] site visited on 5/4/2021.

FAO (2020). Production quantity data. [http://www.fao.org/faostat/en/#data/QC] site visited on 26/6/2021.

Greene, W. H. (2018). *Econometrics Analysis* (Eighth Edition). Pearson Education, Inc., Publishing Prentice Hall Upper Saddle River, New Jersey. 1168pp.

ICO (2021). Coffee production report. [http://www.ico.org/prices/pr-prices.pdf] site visited on 26th March 2021.

ITC (2021). Trade statistics for international business development. [https://www. Trademap.org/] site visited on 2/6/2021.

Jena, P. R., Stellmacher, T. and Grote, U. (2017). Can coffee certification schemes increase incomes of smallholder farmers? Evidence from Jinotega, Nicaragua. *Environment, Development and Sustainability* 19(1): 45 – 66.

Junior, R. M., Franks, D. M. and Ali, S. H. (2016). Sustainability certification schemes: evaluating their effectiveness and adaptability. *Corporate Governance* 16(3): 579 – 592.

Kattel, R. (2017). Impacts of group organic certification of coffee on socio-economic and environmental sustainability in Nepal. *Journal of Agriculture and Forestry University* 1(2017): 49 – 60.

Lentijo, G.M. and Hostetler, M. (2011). *Evaluating Certified Coffee Programs*. Institute of Food and Agricultural Sciences, University of Florida. Florida, USA. 6pp.

Lokshin, M. and Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *The Stata Journal* 4(3): 282 – 289.

Makita, R. and Tsuruta, T. (2017). *Fair Trade and Organic Initiatives in Asian Agriculture: The Hidden Realities: Routledge Studies in Development Economics*. Taylor and Francis. New York, USA. 160pp.

Marwa, N.; (2019). Unlocking coffee production in Tanzania: What does the future holds? Tanzania agricultural development bank. [https://www.tadb.co.tz/wp-content/uploads /2020/07/ Policy-Brief_7_2019_Coffee.docx.pdf] Site visited on 25th June 2021.

Meier, C., Sampson, G., Larrea, C., Schlatter, B., Voora, V., Dang, D., Bermudez, S., Wozniak, J. and Willer, H. (2020). *The*

State of Sustainable Markets 2020: Statistics and Emerging Trends. International Trade Centre, Geneva. 84pp.

Mhando, D. G. and Mdoe, N. (2018). Why do smallholder famers in four Tanzanian Districts continue with coffee production despite fluctuating prices? *Journal of Agriculture and Life Sciences* 5(2): 14 – 23.

Minten, B., Dereje, M., Engida, E. and Tamru, S. (2018). Tracking the quality premium of certified coffee: Evidence from Ethiopia. *World Development* 101(2018): 119 – 132.

NBS (2017). *2016/17 Annual Agricultural Sample Survey Report*. National Bureau of Statistics, Dar es Salaam, Tanzania. 99pp.

Nicholson, W. and Snyder, C. (2008). *Microeconomic Theory: Basic Principles and Extensions* (10th Edition). Thomson South-Western. Natorp Boulevard, USA. 763pp.

Ochieng, J., Knerr, B., Owuor, G. and Ouma, E. (2018). Strengthening collective action to improve marketing performance: evidence from farmer groups in Central Africa. *The Journal of Agricultural Education and Extension* 24(2): 169 – 189.

Otieno, H. M., Alwenge, B. A. and Okumu, O. O. (2019). Coffee production challenges and opportunities in Tanzania: The case study of coffee farmers in Iwindi, Msia and Lwati Villages in Mbeya Region. *Asian Journal of Agricultural and Horticultural Research* 3(2): 1 – 14.

Pyk, F. and Hatab, A. (2018). Fairtrade and sustainability: motivations for fairtrade certification among smallholder coffee growers in Tanzania. *Sustainability* 10(5): 1551.

Rich, K. M., PG, C., Muniyappa, A., Yadava, C., Manjyapura, G. S., Pradeepa Babu, B., Shubha, Y. and Rich, M. (2018). Coffee certification in India: Awareness, practices, and sustainability perception of growers. *Agroecology and Sustainable Food Systems* 42(4): 448 – 474.

Rosen, M. A. and Kishawy, H. A. (2012). Sustainable manufacturing and design: Concepts, practices and needs. *Sustainability* 4(2): 154 – 174.

Schleifer, P. and Sun, Y. (2020). Reviewing the impact of sustainability certification on food security in developing countries. *Global Food Security* 24(2020): 100 – 337.

Ssebunya, B.R., Schader, C., Baumgart, L., Landert, J., Altenbuchner, C., Schmid, E. and Stolze, M. (2019). Sustainability performance of certified and non-certified smallholder coffee farms in Uganda. *Ecological Economics* 156 (2019): 35 – 47.

TCB (2021). Tanzania coffee industry profile. Tanzania Coffee Board [https://www.Coffeeboa rd.or.tz/tzcoffee_%20profile. php] site visited on 26/6/2021.

Twine, E. E., Rao, E. J., Baltenweck, I. and Omore, A. O. (2019). Are technology adoption and collective action important in accessing credit? Evidence from milk producers in Tanzania. *The European Journal of Development Research* 31(3): 388 – 412.

Van Rijsbergen, B., Elbers, W., Ruben, R. and Njuguna, S.N. (2016). The ambivalent impact of coffee certification on farmers' welfare: a matched panel approach for cooperatives in Central Kenya. *World Development* 77(2016): 277 – 292.

Volsi, B., Telles, T. S., Caldarelli, C. E. and Camara, M.R.G. (2019). The dynamics of coffee production in Brazil. *PLoS One* 14(7): e0219742.

Voora, V., Bermúdez, S. and Larrea, C. (2019). *Global Market Report: Coffee*. The International Institute for Sustainable Development, Winnipeg, Manitoba, Canada. 6pp.

Weersink, A. and Fulton, M. (2020). Limits to profit maximization as a guide to behavior change. *Applied Economic Perspectives and Policy* 42(1): 67 – 79.

Yamane, T. (1967). *Statistics: An Introductory Analysis. Second Edition*. Harper and Row. New York. 919pp.

CHAPTER FOUR

4.0 The Role of Coffee Production and Trade on Gender Equity and Livelihood Improvement in Tanzania

Article

The Role of Coffee Production and Trade on Gender Equity and Livelihood Improvement in Tanzania

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4.1 Abstract

Achieving the sustainable development goals in developing countries will require the realization of benefits from the global supply and value chains, such as coffee, for inclusive economic development and poverty reduction. This study uses the data of 400 men and women randomly sampled coffee farmers from a developing country, Tanzania, to evaluate coffee income distribution, and how coffee production and trade contribute to gender equity and livelihood improvement. Oaxaca–Blinder decomposition and Gini coefficient models are used for data analysis. We find a gender imbalance from the ownership and control of resources to the participation of men and women in coffee production and trade However, investing in supporting the coffee supply chain has an impact on livelihood improvement and reducing income inequality. There is a gender gap in the income earned from coffee production and trading, which is 44% of the women's structural disadvantages compared to men. Empowerment for equal access to land and credit and offering trade facilitation services will bridge the existing gender gap. Additionally, developing and disseminating new coffee production technologies that will reduce discrimination, by offering new opportunities and making coffee an inclusive supply chain, remains imperative.

Keywords: Gender; Trade; Supply chain; Coffee; Livelihood

4.2 Introduction

Coffee is a commercial crop that is widely produced and traded in the world. The coffee trade amounted to USD 30 billion in 2019, representing 0.17% of the total world trade (OEC, 2021). The main coffee importers in the world are the United States of America, Germany, France, Italy, and Belgium. These five countries imported coffee worth USD 13.81 billion in 2019 (OEC, 2021). Coffee is produced by over 60 countries in the world. The main coffee producers are Brazil, Vietnam, and Colombia. These three countries produced about 56% of the total world coffee in 2019 (FAO, 2020b). Similarly, the same countries were the top exporters of coffee in the world in the same year. Brazil alone registered a USD 4.7 billion export value. Brazil is driving the coffee production and trade growth in the world. The world coffee production experienced a growth rate of 6.4% in the year 2020, while Brazil's coffee production grew by 18.5% (ICO, 2021).

Africa grows about 11% of the total global coffee production (ICO, 2021). The main coffee producers in Africa are Ethiopia, Uganda, Côte d'Ivoire, Madagascar, and Tanzania (Figure 4.1). These five countries produce about 76% of the total coffee production in Africa (FAO, 2020b). The coffee trade in Africa provides foreign currency to coffee-producing countries. The top five coffee-producing countries exported coffee worth USD 1.64 billion in the year 2019 (ITC, 2021). Coffee is among the key crops for economic growth, development, and livelihood improvement.

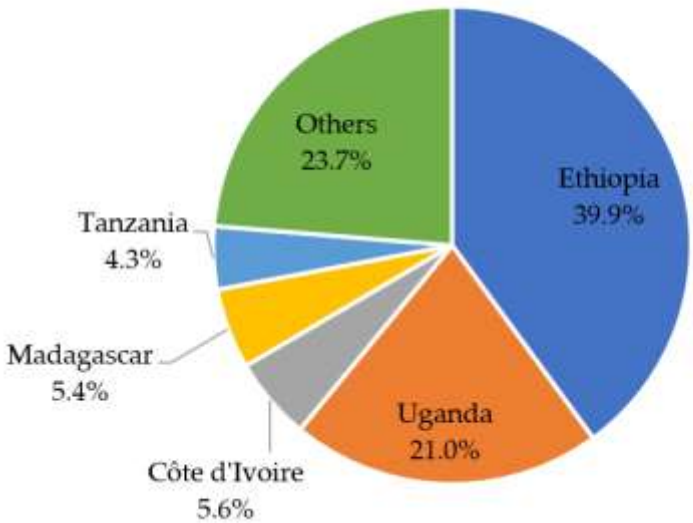

Figure 4.1: Top five coffee-producing countries in Africa.
Source: Computed from FAOSTAT 2019 data.

Small-scale farmers are the main actors in the coffee supply chain in many of the developing countries, including Tanzania. The benefits accrued from participating in various functions of the coffee supply chain are beneficial to these developing countries, and most men and women farmers. The ability to benefit from the supply chain depends on how farmers participate, and whether the distribution of income gains from the crop equitably accrues to both men and women. Gender equality is a necessary and sufficient condition to achieve inclusive economic development in any supply chain (Leach, 2015). Gender equality increases the competitiveness and participation in economic activities, which contributes to economic growth (Rubin *et al.*, 2019).

Gender equality implies equal opportunities, responsibilities, and rights for men and women. There should be equal conditions for benefiting from social, economic, cultural, and political development (Leach, 2015). However, gender equality is hardly achieved, hence a need to exercise gender equity. This is because variations exist in

the distribution of productive resources, rights, and responsibilities between men and women (Quisumbing *et al.*, 2014).

Gender equity is the process that can be followed to achieve gender equality. It entails empowerment in the form of resources and agency (Sharaunga *et al.*, 2019). Kabeer (1999) explains agency to be key in enhancing gender equality, as it shows the capacity to define one's own goals and make strategic choices in pursuit of these goals, particularly in a context where this ability was previously denied. Thus, there needs to be fair treatment for men and women within the supply chain. This fairness can be achieved by compensating for historical and social disadvantages that prevent men and women from carrying out various functions on an equal opportunity and fair field (Kabeer, 1999; Leach, 2015; Sharaunga *et al.*, 2019). Equity always leads to equality.

Increased fair participation of men and women within the supply chain is expected to enhance the equal distribution of benefits, hence contributing to gender equity as well as livelihood improvement. Improved livelihood implies increased access to economic opportunities and ability to generate incomes for a living. This has a direct contribution to achieving the sustainable development goals on poverty, hunger, jobs, environmental conservation, and gender equality (Glazebrook and Opoku, 2020). Fair participation of men and women is not always attained for most of the cash crops, including coffee, in developing countries (Leach, 2015; Rubin *et al.*, 2019; Filho *et al.*, 2021). To achieve this requires gender-responsive policies that govern the value chains.

Previous studies, such as Quisumbing *et al.* (2014), Leach (2015), and Rubin *et al.* (2019), have established the existence of evidence that the distribution of income gains from the commercial crops, including coffee, does not equally favor both men and women in developing countries. Other studies, such as Korinek *et al.* (2021), affirm that social disadvantages lead to low participation of women in

trade, which increases the level of inequality. The extent and sources of inequality are explicitly unknown and vary from one value chain to another. Inequality in trade can also emanate from trade policies. This is due to the fact that, despite trade promoting gender equality according to the World Bank and World Trade Organization (2020), trade and value chain-specific policies impact men and women differently, due to historical and social disadvantages. It is thus important to understand income generation and distribution, and how it leads to gender equity and livelihood improvement, in order to suggest gender-responsive policies. A study on gender and trade is also an important contribution to the body of knowledge, under the circumstances that gender-specific trade data and studies are scanty (World Bank and World Trade Organization, 2020; Korinek *et al.*, 2021). Therefore, this study uses data from a developing country, Tanzania, to evaluate coffee income distribution, and how general coffee production and trade contribute to gender equity and livelihood improvement. Specifically, the study examines the livelihood conditions, and determines whether coffee production and trade have income inequality-reducing effects and implication on gender equity.

4.3 Coffee Production and Trade Situation in Tanzania

Coffee is one of the most important crops, which brings foreign exchange to Tanzania. Tanzania produced 51 529 tons of green coffee (859 thousand 60 kg bags) in 2019 (FAO, 2020). Tanzania contributes about 1.7% to the total share of coffee production in the world (Marwa, 2019). Tanzania exported coffee worth USD 165 million in the year 2019 (ITC, 2021). The available statistics indicate that about 70% of the Tanzania coffee is exported to six markets, which are Germany, Italy, the United States of America, Japan, Belgium, and the United Kingdom (ITC, 2021). The coffee export value grows at the rate of 4.9% annually (NBS, 2021). Coffee production and trade has been fluctuating with a positive growth trend in Tanzania. Coffee export is growing at 1767 tons annually, whereas production is growing at 919.5 tons of green

coffee. This means that there is more growth in trade than production (Figure 4.2).

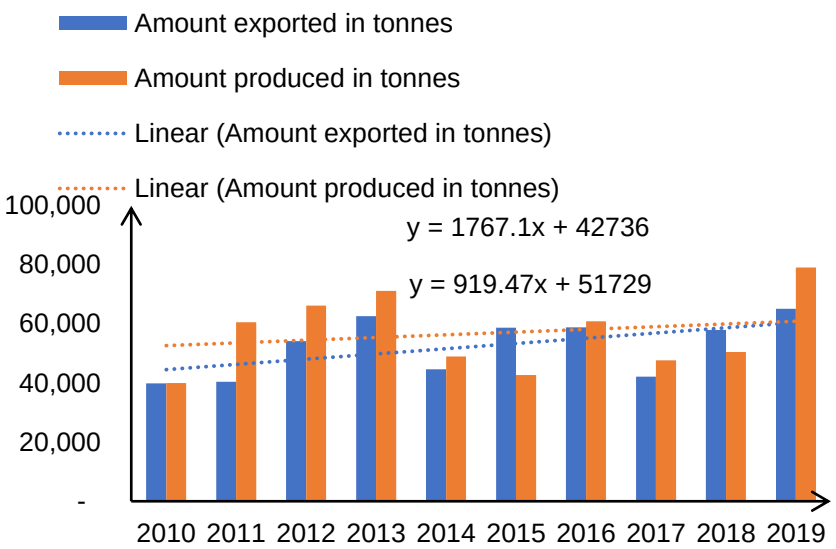

Figure 4.2: Coffee production and trade in Tanzania.
***Source*:** Computed from NBS 2019 data.

Increased production and trade are important, given the fact that coffee contributes positively to multiple country goals. It contributes to job creation; economic growth and development; and livelihood improvements. Coffee contributes about 1% to the share of the agriculture sector gross domestic product (GDP) and generates a GDP per worker of about USD 433 (Thurlow *et al.*, 2018). There are a lot of indirect benefits that are obtained from increased coffee production and trade. However, these benefits vary depending on how the supply chain actors actively participate along the coffee supply chain to achieve inclusive economic development. Inclusive economic development can only be achieved if the supply chain actors benefit equitably in relation to their efforts and risks taken.

The coffee supply chain in Tanzania involves different actors in each stage, from production, trading, to consumption. The systematic stages of the coffee supply chain are input supply and services; production; aggregation; value addition and processing; and trading (Figure 4.3). Several actors play roles in the provision of inputs and services. The Tanzania Coffee Research Institute (TaCRI) in collaboration with district councils deals with the provision/ distribution of seedlings to farmers. TaCRI also conducts coffee research and provides technical backstopping on emerging coffee diseases. Other coffee inputs, such as fertilizer and agrochemicals, are provided by agrodealers and agrochemical companies, through their agents. Service providers include financial institutions, extension agents, coffee curing companies, and other actors supporting the access of market information.

Input suppliers and service providers deliver the inputs and services to farmers. Farmers are the main coffee supply chain actors. Coffee production is dominated by small-scale farmers (90%) (TCB, 2021). Small-scale farmers aggregate their coffee through the Agricultural Marketing Cooperative Societies (AMCOS), which are linked to the cooperative unions. Value addition and processing is conducted at the AMCOS level and sometimes starts with home processing, especially for AMCOS lacking central pulpery units (CPU). AMCOS also extends the processing using coffee curing companies. AMCOS and cooperative unions take part in the trading of coffee in auctions. The main buyers at the auctions include exporters and domestic coffee blenders. The domestic coffee blenders buy green coffee beans from an auction, then they add value before selling them to domestic traders of packed blended coffee.

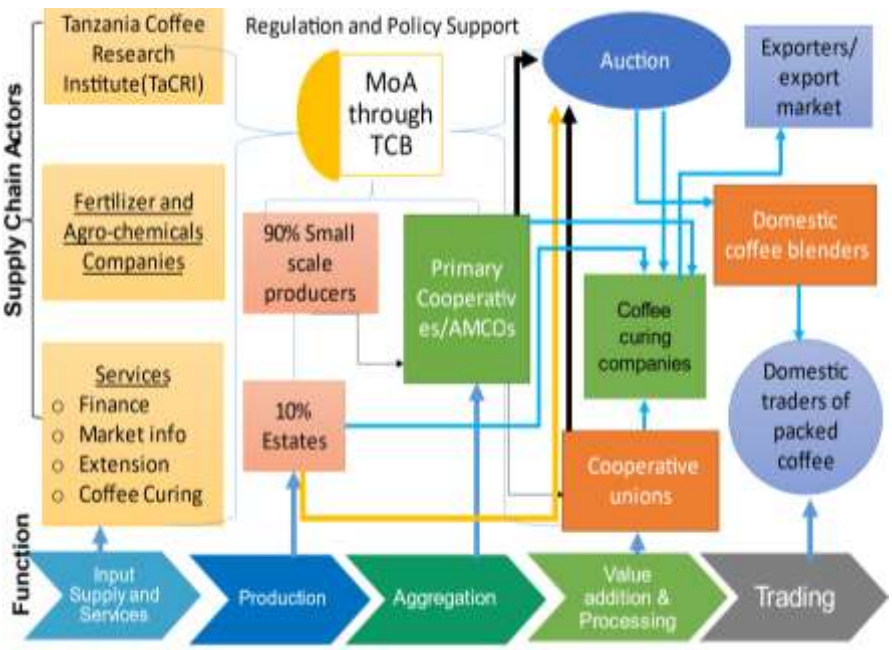

Figure 4.3: The coffee supply chain structure in Tanzania. The direction of the arrows shows the movement of services and/or coffee product from one supply chain actor to another.

Actors under the same node of the supply chain are shown using the same color.

4.4 Methodology

4.4.1 Data, sampling procedures and sample size

Data for the study were collected by field survey method in January 2021 from 400 coffee farmers in four selected regions of Tanzania. Data were collected using a semi-structured questionnaire implemented using tablets which is a computer-aided personal interviews (CAPI).

The study used a multistage random sampling method comprising four stages. The first stage was purposive selection of 4 regions taking into consideration their level of coffee production (based on production level Ministry of Agriculture, 2018 data). Based on the

production level, Ruvuma, Kagera, Songwe and Kilimanjaro regions were selected. These regions represent 83% of the total coffee production in the country. The second stage of district selection was also based on the same criterion of high level of coffee production, and it involved selection of two districts from each region. Muleba and Karagwe were selected in Kagera region; Mbinga and Songea in Ruvuma region; Mbozi and Ileje in Songwe region; and Moshi and Hai in Kilimanjaro region. The third stage involved selection of 5 enumeration areas (EAs)/villages using probability proportional to size (PPS) from each of the selected districts in stage two. The fourth stage involved random selection of 10 farmers from each enumeration area making a total of 50 farmers per district. The distribution of coffee farmers involved in the study is shown in Figure 4.4

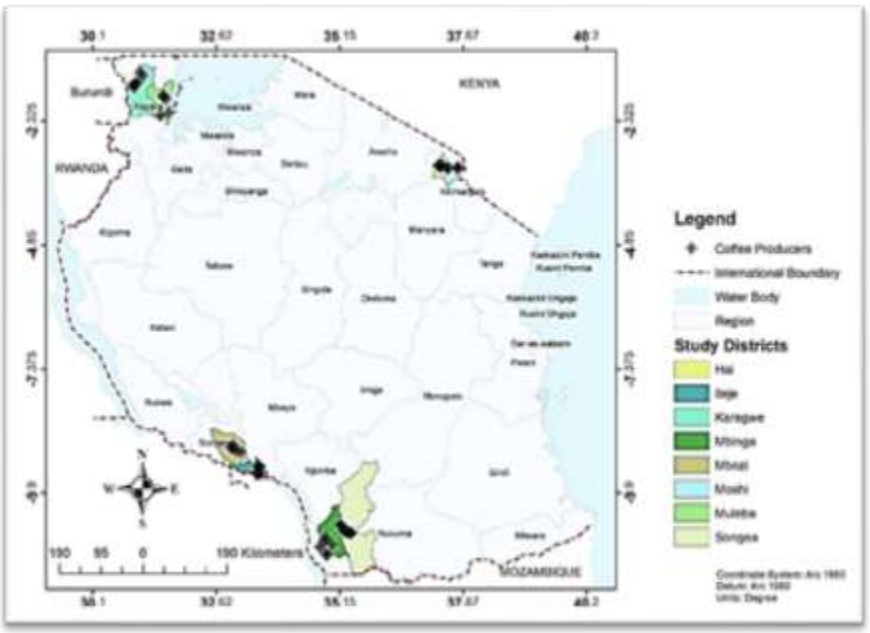

Figure 4.4: Map illustrating study areas and the distribution of coffee farmers involved in the study.

The sample size (*n*) was estimated considering the target population (N) and using a 95% confidence interval level that was d = 5% based on Yamane (1967) as shown in Equation (4.1) below. Available statistics indicate that these four regions have a total of 172 688 farmers (N) (NBS, 2017). This gives a sample size of 399.1, which is exactly 400 farmers that were interviewed.

$$n = \frac{N}{1+Nd^2} = \frac{172,688}{1+[172,688*(0.05)^2]} = 399.1 \approx 400 \quad \ldots\ldots\ldots\ldots\ldots (4.1)$$

4.4.2 Empirical approach

The conceptual framework (Figure 4.5) was used to identify the required empirical approach for the study. According to the New Trade Theory (NTT), nations/firms/individuals should participate in trade regardless of technology differences or factor endowments. Governments should set and apply trade policies that increase participation and impact of the global value chains (Krugman, 1979; Ahmed, 2012; Ciuriak *et al.,* 2015; Dollar *et al.,* 2017). Available literature such as Danso-Abbeam *et al.* (2020) contends that sustainability of global value chains (GVCs) such as coffee requires the participation of men and women trade participants for efficient realization of the socio-economic benefits of their participation. According to gender theory, men's and women's participation levels and gains in trading are influenced by their gender roles, opportunities, responsibilities, social expectations and behaviours (Gerish, 2005). This theory highlights the differences between men and women trade participants and how they approach trading.

Participation is spurred by the availability of a conducive trade policy environment (trade governance), information, technology, assets and access to land and credit as critical resources for empowering participation in production and trade. However, access and control of resources indirectly support the achievement of livelihood and gender equity outcomes (Ahmed *et al.,* 2019). Participation in trade is done through various activities along the coffee supply chain, including production, aggregation, value addition and trading. In

addition, trade participants, as rational producers, and consumers, are also involved in other economic activities and hence obtain income from various sources. These sources include income from coffee, business, off-farm income, salaries and wages, remittances, other household crops, livestock, vegetables, and fruits. The income obtained and employment opportunities in their activities thus contribute directly to the livelihood and gender equity outcomes.

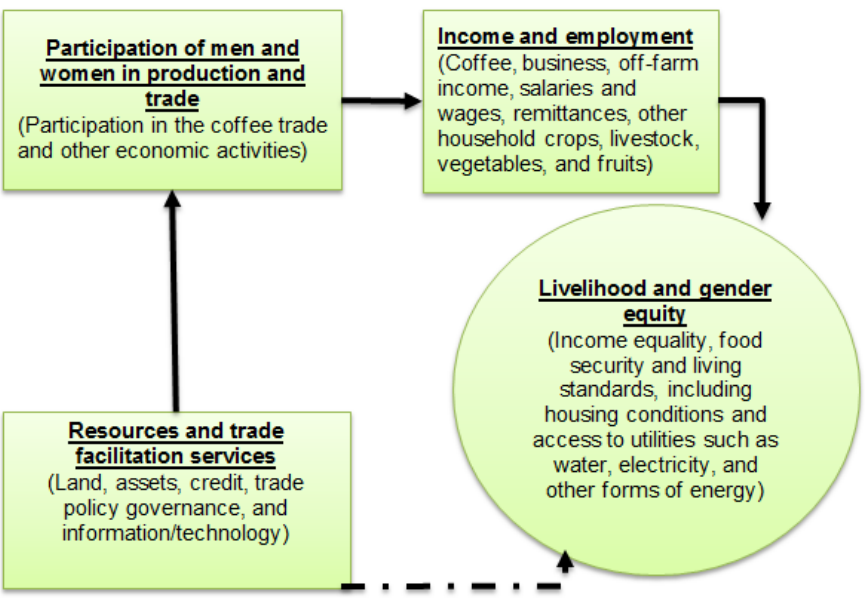

Figure 4.5: The conceptual framework of the study

***Source**:* Authors' conceptualization based on literature review (Leach, 2015; Ahmed *et al.,* 2019; Danso-Abbeam *et al.,* 2020; Glazebrook and Opoku, 2020)

Thus, the study used a combination of approaches in its analytical framework. It included descriptive statistics, which showed proportion levels of the variables. The level of inequality among coffee farmers was measured using Gini coefficient estimation method. The Gini coefficient model has an ability to decompose income inequality by sources of the income streams (Lerman and Yitzhaki, 1984). Therefore, to deduce whether coffee production and

trade has an income inequality reducing effect, the decomposition of income inequality by source was computed using Equation (4.2). The model in Equation (4.2) was estimated using the *sgini* user-written Stata package by Van Kerm (2020).

$$Gini(Y,\upsilon)=\sum_{k=1}^{K}\frac{\mu(Y^k)}{\mu(Y)}*CONC(Y^k,Y;\upsilon) \quad \text{..... (4.2)}$$

where CONC$(Y^k,Y;\upsilon)$ is the generalized concentration coefficient of incomes from source k with respect to total income, $\mu(Y^k)$ denotes means/average of source k and $\mu(Y)$ is the mean of the total income.

Oaxaca–Blinder decomposition was used to explain how much of the mean coffee income difference between men and women coffee farmers[1] is accounted for by their group differences in the predictors. Let the coffee income be denoted by *Y* and the male group be *A* and female group be *B*. The gender gap can be written as follows:

$$\Delta Y^{\mu}=\mu_Y^{(A)}-\mu_Y^{(B)} \quad \text{..... (4.3)}$$

Let **X** be the characteristics of coffee farmers involved in the study such that $Y_i=X'_i\beta_i+\varepsilon_i$, then Equation (4.3) can be written as follows:

$$\Delta Y^{\mu}=\beta_1^T\mu_X^A-\beta_2^T\mu_X^B \quad \text{..... (4.4)}$$

Equation (4.4) can be arranged such that total difference becomes equal to structure effect plus composition effect.

[1] Men and women coffee farmers (coffee farm managers) are individuals within their households responsible for the management and decision-making in the production and trading of coffee.

$$\Delta Y^{\mu} = \underbrace{(\beta_1 - \beta_2)^T \overset{A}{\mu}_X}_{\text{Structure effect}} + \underbrace{\beta_2^T (\overset{A}{\mu}_X - \overset{B}{\mu}_X)}_{\text{Composition effect}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.5)$$

Equation (4.5) above is then written in a three-fold decomposition to represent the average coffee income difference and is estimated in Stata software using the Oaxaca package by Jann (2008).

$$\Delta Y^{\mu} = \underbrace{\beta_2^T (\overset{A}{\mu}_X - \overset{B}{\mu}_X)}_{\text{Endowment}} + \underbrace{(\beta_1 - \beta_2)^T \overset{A}{\mu}_X}_{\text{Group coefficients}} + \underbrace{(\beta_1 - \beta_2)(\overset{A}{\mu}_X - \overset{B}{\mu}_X)}_{\text{interaction}} \quad \ldots\ldots \quad (4.6)$$

The model contains three terms. The first part of the model represents the group differences in the explanatory variables (endowments). The second term represents portion of the average difference in the group coefficients. The last term shows the total gap that exists due to interaction of differences in endowments and coefficients between men and women coffee farmers.

4.5 Results

4.5.1 Summary statistics of the survey results

The income earned by men through coffee production and trading is higher than that earned by women. The t-test statistics indicate a significant difference in coffee income earned between men and women ($p < 0.05$) (Table 4.1). Men own and produce in larger coffee farm sizes than women. The average coffee farm size for men is 6.3 hectares, against the 4.7 hectares for women. The participation of men in off-farm economic activities was found to be higher than that of women. Men were also found to have a higher total value of assets than women. The summary statistics further show that 65.05% of men in coffee farming households are involved in coffee production activities. The proportion of men involved in coffee trading activities averages at 72.5%. However, few men had accessed credit. The results reveal that more women were found to

have accessed credit than men. Nevertheless, the overall access to credit among the coffee farming households was found to be low. Women coffee farmers spent more years in formal training than men. The results further show that there is no significant difference in the level of education, as depicted by the number of years spent in formal training, between men and women. Overall, the farmers spent an average of 9 years in formal training, implying that all the farmers involved in the survey had completed at least primary education level.

Table 4.1: Summary statistics of the survey results.

Variable	Measurement	Sex		Overall (*n* = 400)
		Women (*n* = 52)	Men (*n* = 348)	
Education	Years spent in formal training	9.64	8.59	8.7
Coffee farm size	Hectares	4.68	6.32	6.11 *
Participation in off-farm economic activities	Dummy measured as 1 if participated and 0 otherwise	0.04	0.12	0.11
Involvement of men in coffee production activities	Percentage (%)	52.86	66.87	65.50
Coffee income earned	United States Dollars (USD)	434.37	1172.12	1076.21 **
Access to credit	Dummy measured as 1 if accessed credit and 0 otherwise	0.44	0.29	0.31
Involvement of men in coffee trading activities	Percentage (%)	63.31	73.83	72.46
Value of assets owned	United States Dollars (USD)	6401.75	6478.16	6468.23

** $p < 0.05$, * $p < 0.1$ based on *t*-test statistics.

4.5.2 Involvement of women and men in coffee production and trade

Males dominate the production and trading of coffee. The results show that 87% of the coffee farmers interviewed are male and 13% are female. The structure of the coffee supply chain, from ownership and control of resources to the participation in production and marketing, limits the active involvement of women. Women perform activities such as harvesting and post-harvesting handling activities that include drying and sorting, while men are involved in agrochemicals application, pruning of coffee trees, and other high-level activities in the coffee supply chain. This makes the participation of women less than men in both the production as well as the trading activities.

The results indicate that 34.5% of women are fully involved in coffee production, against the proportion of men, which is 65.5% (Figure 4.6). The participation of women in coffee trading activities is low (27.5%). The results indicate that 72.5% of men participate in coffee trading. The low participation of women in trading is linked to the hurdles they face in ensuring coffee is sold through the Agricultural Marketing Cooperative Societies (AMCOS). Qualitative data confirm that women also have low control over the proceeds coming from coffee sales.

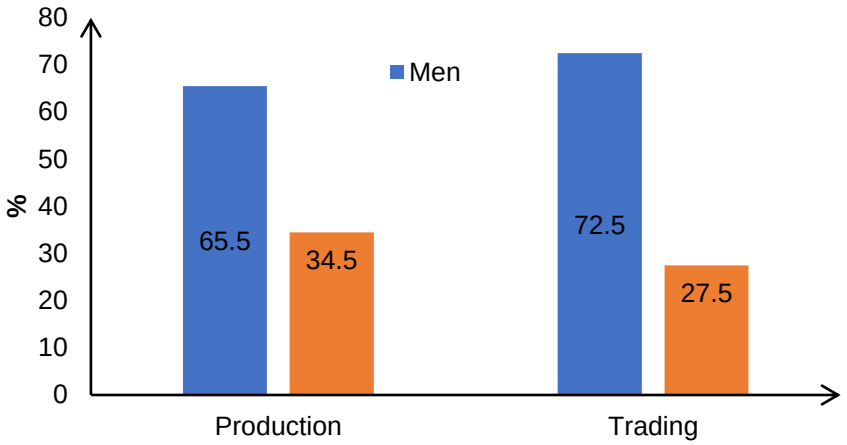

Figure 4.6: Involvement of men and women along the coffee supply chain.

4.5.3 Participation of women and men in household decision making

Coffee farmers make decisions on various socio-economic aspects, such as coffee production and trading, household income and expenditure, farming of other crops, and health issues. The participation of women in decision making among the coffee farming households is high (77%). The results show that women are included in making most of the household decisions. The disaggregated results show that 70% of the coffee farmers make decisions jointly in their households (Figure 4.7). Interestingly, about 7% of women indicate that they make decisions on their own. However, these decisions are mainly on minor household expenditures, such as food for daily consumption, or other household needs. Women are more involved on the decisions about whether to use family planning to space or limit births; their children's education, such as whether to send them to school, where children should be sent; participation in off-farm economic activities, including things such as running a small business; and use of the revenue from the trading of coffee.

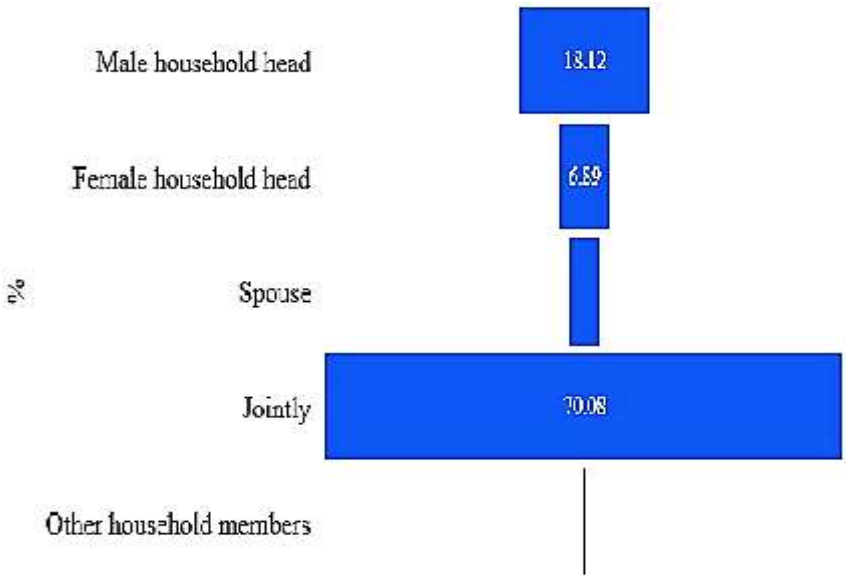

Figure 4.7: Participation of men and women in decision making.

4.5.4 Gender gap in income earned from coffee production and trading

The study found differences in the incomes earned between men and women coffee farmers. Male coffee farmers earn more income than female farmers, by a difference of USD 737.76. The results show a significant difference in the coffee income earned between male and female coffee farmers ($p < 0.05$). Male farmers earned an average income of USD 1172.12 and female farmers earned an average of USD 434.37 (Table 4.2). The intragroup differences are attributed to various factors. The differences in coffee income among women are influenced by their differences in coffee farm sizes, the value of assets owned, level of education, and participation in off-farm income economic activities ($p < 0.05$). Similarly, farm size and access to credit accounts for the differences in coffee income among men farmers. The decomposition of coffee income shows the existence of an income gender gap that is mainly influenced by economies of scale and access to credit, given the fact that the crop is capital intensive.

The decomposition results show that the mean increase in women's coffee income, if they had the same characteristics as men (USD 321.71), accounts for 43.6% of the coffee income gap. This is the proportion of the endowment or the women's structural disadvantage. Furthermore, applying men's coefficients to women's characteristics would change the women's coffee income by USD 418.109. However, the simultaneous effect of the differences in endowment and coefficients is USD −2.062, implying that after controlling for coefficients and women's structural disadvantages/ endowments, the portion of the gap that remains is very small (USD −2.062), suggesting that women are better than men in trade once the structural barriers are eliminated. They need to achieve economies of scale and have access to credit.

The economies of scale are reported in the sense that there are big farms that are owned by men, making the differences in income between men and women coffee farmers high. Other studies in Tanzania have also confirmed the existence of differences in the productivity of men- and women-managed farms. The study by Slavchevska (2015) indicated women farms to be less productive, which might contribute to the low levels of income obtained from these farms. This is highly linked to the ownership of land, which is key in the production of coffee. However, land ownership has multiplier effects on other indicators as well. Land ownership is interrelated with access to credit. Farmers with good land tenure systems can easily access credit.

Table 4.2: Blinder–Oaxaca decomposition of coffee income between women and men farmers

Coffee Income (Y*i*)	Variable	Coef.	Std.Err.	t	*p* > t
Women coffee farmers (*n* = 52)	Farm size	90.453 ***	20.878	4.330	0.000
	Assets	0.028 **	0.012	2.450	0.018
	Access to credit	−113.67	76.964	−0.64	0.524
	Off-farm activities	016.662 **	450.547	2.260	0.029
	Education	−64.613 **	29.044	−2.22	0.031
	Constant	462.397	90.680	1.590	0.119
Men coffee farmers (*n* = 348)	Farm size	267.399 ***	11.197	23.880	0.000
	Assets	−0.007	0.007	−1.10	0.272
	Access to credit	31.627 ***	00.652	2.650	0.008
	Off-farm activities	−283.2	281.927	−1.00	0.316
	Education	12.867	32.804	0.390	0.695
	Constant	−700.06	299.434	−2.34	0.020
Differential (*n* = 400)	Prediction for men coffee farmers	1172.123 ***	150.181	7.800	0.000
	Prediction for women coffee farmers	434.366 ***	107.981	4.020	0.000
	Difference	737.757 ***	184.971	3.990	0.000
Decomposition (*n* = 400)	Endowments	321.710 ***	108.328	2.970	0.003
	Coefficients	418.109 **	193.277	2.160	0.031
	Interaction	−2.062	185.232	−0.01	0.991

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.5.5 Income distribution among men and women coffee farmers

The findings show that 65.8% of the farmers indicate coffee to be their main source of income for improved livelihood. The remaining (34.2%) show that coffee is among the crops in their portfolio, but it is not the main source of income. In addition to coffee, farmers obtain incomes from various sources. The findings indicate that 88.3% of the coffee farmers obtain income from the production of other crops. Furthermore, 47% of the farmers report to have obtained income from livestock production activities. The other income sources, with the proportion of farmers generating income from that source in brackets, are as follows: business (16.5%), off-farm economic activities (11.3%), production of vegetables and fruits (10.8%), remittances (6.8%), and salaries/wages (3.8%). The average annual amount of income from these sources varies from one source to another. The results show that coffee production and

trading generate the highest annual income, with an average of USD 1141.87 per farmer. The second source of income with a high value is found to be businesses that generated an average annual income of USD 1084.54. However, farmers generated an average of less than USD 1000 from other income sources, that is, livestock, vegetable and fruits, other crops, remittances, and off-farm economic activities (Table 4.3).

Income from the production of vegetables and fruits, salaries and wages, off-farm production activities, remittance, and business show a higher level of income inequality than other income sources (Table 4.3). However, the increase in incomes from remittances decreases the Gini coefficient of the total incomes earned by coffee farmers. The findings show that a 1% increase in the income earned from remittance, all else being equal, decreases the Gini coefficient of the total income by 0.006%. The business income, off-farm income, wages and salaries, and income earned through the production of vegetables and fruits shows an increase with an increasing level of inequality among men and women coffee farmers.

The lowest level of inequality is revealed from the production and trading of other crops and coffee. The income earned from coffee and other crops shows the highest level of equality among farmers. The other income source with a low level of inequality is the income earned from livestock production activities, coffee, and other crops, which shows inequality reducing effects to coffee farmers. The results of coffee income show that a 1% increase in the income earned from coffee production and trading, all else being equal, decreases the Gini coefficient of the total income by 0.043%. This implies that coffee production has an inequality reducing effect to coffee farmers, hence being an essential crop for livelihood improvement. Additionally, the Gini correlation between off-farm income and total income is the highest among the income sources (0.832), indicating that the income earned from off-farm activities favors the rich more than any other income source.

Table 4.3: Gini decomposition for income distribution among men and women coffee farmers

Income Source	Annual Amount of Income in (USD)[§]	Share of Income (S_k)	Gini Coefficient (G_k)	Correlation Coefficient (R_k)	Share	% Change
Coffee	1141.87	0.326	0.658	0.656	0.284	−0.043
Livestock	387.48	0.151	0.756	0.514	0.118	−0.033
Vegetable and fruits	289.23	0.018	0.983	0.676	0.024	0.006
Other crops†	573.48	0.306	0.639	0.792	0.311	−0.005
Remittances	157.98	0.011	0.945	0.253	0.005	−0.006
Salaries and wages	703.47	0.034	0.965	0.612	0.040	0.006
Business	1084.54	0.070	0.927	0.635	0.083	0.013
Off-farm income	727.15	0.084	0.960	0.832	0.135	0.051
Total income	2124.802		0.497			

[§] 1 USD = 2305.10 Tanzanian shillings, the average exchange rate for the year 2020 (BOT, 2021).

† This included all other crops grown by the coffee farmer apart from coffee. It included crops such as maize, banana, beans, cassava, rice, sunflower and groundnuts.

4.5.6 Livelihood conditions among men and women coffee farmers

The study examines the livelihood conditions of men and women coffee farmers in terms of food security, housing conditions, and access to utilities, such as water, electricity, and other forms of energy. Most of the coffee farmers involved in the study (54.2%) indicate to have better food availability than other farmers. Many women (75%) indicate to be in a better food availability condition than men (Table 4.4). They use the money obtained for household food needs, as well as other requirements, such as sending children to school. This implies that coffee production and trade positively affect food security, in terms of food availability and food access. Food availability and access have a broad meaning in measuring food security (Wenban-Smith *et al.*, 2016; FAO, 2020a). Food availability implies physical availability, such that there is a reliable and consistent source of quality food, as determined by the

level of food production guaranteed by the availability of, and access to, land, water, labor, biodiversity, technologies, and credit, stock levels, and net trade. The income earned through coffee is used to buy food, hence supporting physical access to food. Physical access to food entails people having sufficient resources to produce and/or purchase food.

The housing conditions of coffee farmers are measured in terms of ownership of the house, availability and type of toilet, and features of the house, such as roofing materials, exterior wall materials, and floor materials. Among the interviewed farmers, 98.8% own a house, while the remaining 1% and 0.2% are living in their relatives' houses and rented houses, respectively. There is no significant difference between men and women coffee farmers in terms of house ownership. The results show that 99.7% of the coffee farmers live in houses with corrugated iron sheets and concrete, while only 0.3% indicated to live in houses with tin roofing materials. Regarding the exterior walls of the houses, 84.8% indicated to have bricks/blocks exterior walls. The house floor status is investigated as well. The results show that 81.5% of the coffee farming households live in houses with cement/tiles floors, while 18.5% have earth floors. Interestingly, all the interviewed farmers (100%) have toilets, where 92.5% use covered and flush toilets, and only 8.5% use an uncovered pit latrine.

The access to electricity, water, and fuel are the key utilities examined among men and women coffee farmers. The results indicate that 58.3% of coffee farming households have access to, and use, electricity. This includes electricity through the national grid, as well as solar power. The findings show that 49.3% of the interviewed coffee farmers use electricity for lighting. The use of firewood for cooking is high among coffee farmers. The findings show that only 4.8% of men and women farmers have diverted away from using firewood as the main fuel for cooking. The majority of the farmers (95.2%) still depend on firewood as the main

fuel for cooking. This means that livelihood improvement is associated with environmental conservation, where farming households avert from using firewood. This is important for environmental conservation, in addition to the key role of coffee farming, where it contributes to carbon sequestration, stabilization of soils, and preservation of biodiversity (CBI, 2021). Additionally, the high proportion (44.3%) of the coffee farmers interviewed use piped water as a main source of water for domestic use.

Table 4.4: Livelihood attribute conditions among men and women coffee farmers.

Livelihood attribute condition	Coffee Farmers (%)		
	Men	Women	Overall
Better food security	56.9	36.54	54.25
Owning house	99.14	96.15	98.75
Corrugated iron sheet house	99.71	100	99.75
Bricks/block exterior wall	84.77	84.62	84.75
Cement/tiles floor	81.03	84.62	81.5
Ownership of toilet	100	100	100
Electricity	55.75	75	58.25
Not using firewood as main source of fuel for cooking	4.31	7.69	4.75
Use of piped water	43.1	51.92	44.25

4.6 Discussion

The study establishes that coffee is an important crop for livelihood improvement, which favours equality among men and women coffee farmers. The crop has an inequality reducing effect. An increase in the income earned from coffee production and trading, all else being equal, decreases the Gini coefficient of the total income. This implies that investing in supporting the coffee supply chain has an impact on poverty reduction. This is because the income earned from coffee favours the poor more than other income sources.

It has been found that coffee production and trade contribute to livelihood improvement, in terms of food security, housing conditions, and access to utilities such as water, electricity, and other forms of energy, among men and women coffee farmers.

The average household income of USD 2124.8 is higher than the Tanzania basic needs poverty line, as well as the food poverty line. The Tanzania food poverty line is USD 14.9 per adult equivalent per month, and the basic needs poverty line is USD 21.8 (URT, 2019). Given the fact that the average household size for coffee farming households is six people, this translates the poverty line to USD 1073.3 and USD 1568.5 per household annually. It should be noted that the food poverty line means that the total spending is used to meet food needs. The basic needs poverty line is inclusive of food and non-food requirements (NBS, 2021). This means that men and women farming households are above the food poverty line, as well as the basic needs poverty line. This is an indicator that they have a high ability to obtain income, as well as to access various economic opportunities.

However, men dominate both in production and trading of coffee. The study establishes that women face more hurdles than men in ensuring coffee is sold through the AMCOS. This is in agreement with previous studies, such as Bergman Lodin *et al.* (2019), which linked the low participation of women with mobility challenges, and the difficulties they experience in accessing agricultural inputs and services compared to men. The low involvement of women in production and trading results in an inability to take control of the proceeds from the coffee in their households.

The participation of women in decision making is expected to act as an empowerment that would enhance their involvement in the coffee supply chain. The participation of women in household decision making is essential to spur involvement in production and trading activities, access, and control of benefits. There is a high participation of women in household decision making. However, the ability of women to make decisions on the production and trading of coffee on their own is found to be low among coffee farming households. This implies that there is low control and access of women in productive assets that would empower them to make

decisions. This is augmented by culture, the stereotype that women cannot make decisions in the presence of men, gender norms, and insufficient knowledge resources, as similarly reported in other countries by other studies, such as Iradukunda *et al.* (2019) and Filho *et al.* (2021). Empowering women to have access and control of key resources will enhance their ability to make decisions along the coffee supply chain.

The study confirms the existence of the gender gap in the income earned from coffee production and trading. The crop is capital intensive, and the economies of scale are the key drivers of gendered coffee income differences. The differences in farm sizes that are attributed to the economies of scale among men and women farmers, and the access to credit, drive the gendered imbalance. This means that women are disadvantaged in terms of ownership and access to land. The land is predominantly owned by men, thus it becomes difficult for women to make investment decisions, especially on perennial crops, such as coffee. Access to credit, which would support the management of the coffee farms and enhance the trading of coffee, is also limited among women.

Access and control of resources and other socio-economic characteristics among women collectively represent the structural disadvantages of women. The study has indicated that female structural disadvantage accounts for about 44% of the gap. Thus, an empowerment that would enable easy access and control of resources, such as land and access to credit, can eliminate the existing gender gap. The study has confirmed that women can be better than men in trade, after compensating for historical and social disadvantages. Efforts to achieve inclusive finance should be exercised. The problem of credit being inaccessible also affects many women farmers in developing countries. The study by Hill and Vigneri (2014) found a similar situation in coffee farmers in Uganda. Additionally, the study by Korinek *et al.* (2021) indicated that women's enterprises are less financed. The reasons are always

aligned to the access and control of resources. It is evident that land ownership status is correlated with access to credit. Farmers with titled land ownership can easily access credit. Therefore, empowering women to have access and control of land will also contribute to inclusive finance among women as well as men coffee farmers.

4.7 Conclusion

Coffee is an important crop with an inequality reducing effect, contributing to livelihood improvement among men and women coffee farmers. It is evident that investing in supporting the coffee supply chain has an impact on poverty reduction, as the income earned from coffee favours the poor more than other income sources. Nevertheless, there is gender imbalance from the ownership and control of resources to the participation of men and women in coffee production and trading. Men dominate the production and trading of coffee. Women have low control over the proceeds coming from coffee. The study also affirms the existence of the gender gap in the income earned from coffee production and trading. The crop is capital intensive, and the economies of scale are the key drivers of gendered coffee income differences.

Empowerment for equal access to land and credit will contribute to bridging the existing gender gap in coffee production and trading. Production and trade policies should also be gender-responsive, by providing opportunities to offer trade facilitation services to increase the participation of women in coffee supply chain activities and control of their benefits of participation. Additionally, developing and disseminating new coffee production technologies that will reduce discrimination, by offering new opportunities and making coffee an inclusive supply chain, remains imperative. These efforts will ensure that the distribution of income gains from coffee equally favours both men and women in developing countries, achieving gender equality and livelihood improvement.

Nevertheless, further research is required to ascertain how social, cultural, and behavioural constraints, and gender-based violence, such as denial of resources, services, and opportunities in developing countries, limit the participation of women, and the generation of benefits from the production and trading of global supply chains, such as coffee. Gender-based determinants of the profitability of coffee production should also be explored further.

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References

Ahmed, A., Dompreh, E. and Gasparatos, A. (2019). Human wellbeing outcomes of involvement in industrial crop production: Evidence from sugarcane, oil palm and jatropha sites in Ghana. *PLoS One* 14(4): e0215433.

Ahmed, G. (2012). Krugman Trade Theory and Developing Economies. *China-USA Business Review* 11(12): 1557 – 1564.

Bergman Lodin, J., Tegbaru, A., Bullock, R., Degrande, A., Nkengla, L. W. and Gaya, H. I. (2019). Gendered mobilities and immobilities: Women's and men's capacities for agricultural innovation in Kenya and Nigeria. *Gender, Place and Culture* 2019: 1 – 25.

BOT (2021). *Annual Report 2020/21*. Bank of Tanzania, Dodoma. 255pp.

CBI (2021). Exporting sustainable coffee to Europe. centre for the promotion of imports from developing countries [https://www. cbi.eu/market-information/ coffee/sustainable-coffee] site visited on 25/3/2021.

Ciuriak, D., Lapham, B., Wolfe, R., Collins-Williams, T., and Curtis, J. (2015). Firms in international trade: Trade policy implications of the New new trade theory. *Global Policy,* 6(2): 130-140.

Danso-Abbeam, G., Baiyegunhi, L. J. and Ojo, T. O. (2020). Gender differentials in technical efficiency of Ghanaian cocoa farms. *Heliyon* 6(5): e04012.

Dollar, D. R., Inomata, S., Degain, C., Meng, B., Wang, Z., Ahmad, N., Primi, A., Escaith, H., Engel, J. and Taglioni, D. (2017). Analytical frameworks for global value chains: An overview. In: Global *Value Chain Development Measuring And Analyzing The Impact of Gvcs on Economic Development*. (Edited by Inomata, S.). World Bank, Washington DC, USA. pp. 15 – 35.

FAO (2020a). Food security indicators data. [http://www.fao.org/ economic/ess/ess-fs/ess-fadata/en/#.Xd3cxegzbDc] site visited on 12/6/2021.

FAO (2020b). Production quantity data. [http://www.fao.org/ faostat/en/#data/QC] site visited on 26/6/2021.

Filho, W. L., Brandli, L., Azul, A. M. and Wall, T. (2021). *Gender Equality.* Springer International Publishing, Switzerland. 1305pp.

Glazebrook, T. and Opoku, E. (2020). Gender and sustainability: learning from women's farming in Africa. *Sustainability* 12(24): 10483.

Hill, R. V. and Vigneri, M. (2014). Mainstreaming gender sensitivity in cash crop market supply chains. In: *Gender in Agriculture*. (Edited by). Springer, USA. pp. 315 – 341.

ICO (2021). Coffee production report. [http://www.ico.org/ prices/pr-prices.pdf] site visited on 26/3/2021.

Iradukunda, F., Bullock, R., Rietveld, A. and van Schagen, B. (2019). Understanding gender roles and practices in the household and on the farm: Implications for banana disease management innovation processes in Burundi. *Outlook on Agriculture* 48(1): 37 – 47.

ITC (2021). Trade statistics for international business development. [https://wwwTra demap.org/] site visited on 26/6/2021.

Jann, B. (2008). A Stata implementation of the Blinder-Oaxaca decomposition. *Stata Journal* 8(4): 453 – 479.

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change* 30(3): 435 – 464.

Korinek, J., Moïsé, E. and Tange, J. (2021). Trade and *Gender: A Framework of Analysis.* OECD Publishing, Paris. 87pp.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics* 9(4): 469 – 479.

Leach, M. (2015). *Gender Equality and Sustainable Development: Pathways to Sustainability*. Taylor and Francis, Routledge, New York. 228pp.

Lerman, R. I. and Yitzhaki, S. (1984). A note on the calculation and interpretation of the Gini index. *Economics Letters* 15(4): 363 – 368.

Marwa, N.; (2019). *Unlocking Coffee Production in Tanzania: What Does the Future Holds?* Policy Brief No.7. Tanzania Agricultural Development Bank.

NBS (2017). *2016/17 Annual Agricultural Sample Survey Report.* National Bureau of Statistics, Dar es Salaam, Tanzania. 99pp.

NBS (2021). *2020 Tanzania in Figures.* National Bureau of Statistics, Dodoma. 110pp.

OEC (2021). Product trade data. Observatory of economic complexity. [https://oec.world/en/profile/hs92/coffee? Redirect =true] site visited on 26/6/2021.

Quisumbing, A. R., Meinzen-Dick, R., Raney, T. L., Croppenstedt, A., Behrman, J. A. and Peterman, A. (2014). Closing the knowledge gap on gender in agriculture. In: *Gender in Agriculture*. Springer, USA. pp. 3 – 27.

Rubin, D., Boonabaana, B. and Manfre, C. (2019). Building an inclusive agriculture: strengthening gender equality in agricultural value chains. *Annual Trends and Outlook Report: Gender Equality in Rural Africa: from Commitments to Outcomes.* International Food Policy Research Institute, Washington DC. pp. 83 – 96.

Sharaunga, S., Mudhara, M. and Bogale, A. (2019). Conceptualisation and measurement of women's empowerment revisited. *Journal of Human Development and Capabilities* 20(1): 1 – 25.

Slavchevska, V. (2015). Gender differences in agricultural productivity: the case of Tanzania. *Agricultural Economics* 46(3): 335 – 355.

TCB (2021). Tanzania coffee industry profile. Tanzania coffee board. [https://www.Coffeeboard. or.tz/tzcoffee_%20profile.php] site visited on 26/6/2021.

Thurlow, J., Randriamamonjy, J. and Benson, T. (2018). *Identifying Priority Value Chains in Tanzania.* International Food Policy Research Institute, Washington DC. 20pp.

URT (2019). *2017-2018 Household Budget Survey. Key Indicators Report*. National Bureau of Statistics and Ministry of Finance and Economic Planning Poverty Eradication Division, Tanzania Mainland, Dodoma, Tanzania. 42pp.

Van Kerm, P. (2020). Stata module to compute generalized gini and concentration coefficients, Gini correlations and fractional ranks. [https://EconPapers.repec.org/RePEc:boc:bocode:s458778] site visited on 23/6/2021.

Wenban-Smith, H., Fasse, A. and Grote, U. (2016). Food security in Tanzania: the challenge of rapid urbanisation. *Food Security* 8(5): 973 – 984.

World Bank and World Trade Organization (2020). *Women and Trade: The Role of Trade in Promoting Gender Equality*. World Bank, Washington DC. 207pp.

Yamane, T. (1967). *Statistics: An Introductory Analysis; Second Edition*. Harper and Row, New York. 919pp.

CHAPTER FIVE

5.0 General Discussion

This study has used coffee and sugar GVCs in Tanzania to assess the impact of certification policy, which is one of the GVCs' trade policies, the trade policies landscape of the country (trade governance), and the role played by GVCs in ensuring the delivery of social, economic, and environmental benefits. The study has indicated that trade governance is essential in ensuring the delivery of benefits to all participants in the trade. The study confirms that governance affects the sugar trade, with the magnitude of its effects being felt differently between farmers and traders. The findings show further that abrupt trade policy change significantly ($p<0.05$) reduces sugar trade by almost half (47.7%) and lowers the overall level of efforts to invest within the sugar supply chain.

These findings are in line with the previous studies such as Gereffi and Fernandez-Stark (2016), Kumari and Bharti (2021), and Ababakr (2022) that indicate that governance is the critical component in ensuring that the GVCs trade policies are efficiently implemented and can quickly deliver sustainability outcomes where trade participants can realise socio-economic and environmental benefits. This means that the findings have shown the relevance of the role of governance in shaping the way trade policies should be implemented. The findings have further shown that trade policy predictability is essential to ensure that trade participants confidently do forward contracting and investments. It was also clear from the studies by North (1994) and Williamson (2005) that abrupt change in trade policies is in the efficient implementation of trade policies. Unlike other studies such as Dehshiri *et al.* (2013), Gani and Scrimgeour (2016), and Adedoyin *et al.* (2020) that showed a positive relationship between trade and governance, implying that institutional quality is vital in enhancing trade and affecting trade participants, this study has shown that governance affects trade and trade participants differently. Traders are more affected by poor

governance than farmers. This implies that the effect of the trade policy landscape of the country should be considered differently among the key actors involved in the trading of the GVC commodities.

The predictability of trade policies is essential and should be enhanced through transparency and accountability in GVC trade policy administration. Transparency and accountability were also found by Fukuyama (2016) to similarly improve the policy practices in many of the global value chains. This can be supported through information communication technology (ICT), as it was found by Wang and Choi (2019), which is critical in enhancing transparency in GVCs policy administration. This is due to the growing digital technologies in the trade sector in many countries, including Tanzania.

The findings have revealed that the GVCs certification trade policy does not offer socio-economic benefits but contributes significantly to environmental conservation. The study has shown that the critical environmental conservation practices include the use of the mulching method for increasing water porosity, water retention capacity, and stability; planting trees, use of contours; construction of water streams and terracing; intercropping coffee with trees and other beneficial plants; water resources conservation; and proper use of agrochemicals.

The impact of GVC certification policies in many countries is mixed. In some countries, as shown in studies such as Kattel (2017) and Minten *et al.* (2018), it is generally positive but small. However, many studies in developing countries, including those by Junior *et al.* (2016) and Jena *et al.* (2017), found that the impact of certification on household incomes is insignificant. Furthermore, studies by Makita and Tsuruta (2017) and Pyk and Hatab (2018) showed that certifications rarely deliver sustainability dimensions that meet socio-economic and environmental benefits. Thus, these studies are all in

line with the current findings that have found certification to not contribute significantly to livelihood improvements through increased incomes. This is because the yield gains and price advantages that are expected to be realised from certification schemes fail to reach the farmers. The problem of premiums capture is not only in Tanzania. The study by Minten *et al.* (2018) also found that the price premiums rarely reach coffee farmers in Ethiopia. However, certification remains critical in accessing niche markets and gaining other non-monetary benefits among coffee farmers. The study by Ssebunya *et al.* (2019) in Uganda also showed certification to improve farming systems. This is in line with the current findings that have shown certification to improve environmental conservation, which is associated with reforms in farming practices.

The study has also indicated that participation in trade is essential for the inclusive socio-economic benefits of trade participants. It has indicated that GVCs trade contributes positively to livelihood improvement and gender equity due to its income inequality-reducing effects. It has been found that coffee production and trade contribute to livelihood improvement in terms of food security, housing conditions, and access to utilities such as water, electricity, and other forms of energy. The contribution to livelihood improvement is also implied by the findings that showed a household income of USD 2124.8, which is higher than the Tanzania basic needs poverty line, as well as the food poverty line as indicated by URT (2019) and (NBS, 2021).

These findings differ from the findings of previous studies due to their multidimensional well-being measurement. However, it remains consistent with previous studies such as Danso-Abbeam *et al.* (2020) and Glazebrook and Opoku (2020) as it has shown that supporting access to resources and trade facilitations increases the level of participation and can equally offer increased income and employment opportunities supporting livelihood improvements and gender equity, especially addressing the female participants' structural disadvantage, which accounts for about 44% of the gap.

CHAPTER SIX

6.0 General Conclusions and Recommendations

6.1 Conclusions

This study has used coffee and sugar GVCs in Tanzania to assess the impact of certification policy, which is one of the GVC's trade policies, the trade policies landscape of the country (trade governance), and the role played by GVCs in ensuring the delivery of social, economic, and environmental benefits. The study has applied a mixed method approach utilising data collected from randomly sampled 400 coffee farmers and 375 randomly selected sugar supply chain actors in Tanzania. It has thus applied the endogenous switching regression (ESR) model to ascertain the impact of the coffee certification policy. Exploratory (factor analysis) and confirmatory (weighted least square regression) models are applied to evaluate the level of trade governance in Tanzania and ascertain its effects on the sugar trade. The Oaxaca–Blinder decomposition and Gini coefficient models also evaluate coffee income distribution and how general coffee production and trade contribute to gender equity and livelihood improvement.

The study has indicated that trade governance is essential in ensuring the delivery of benefits to all participants in the trade. The study confirms that governance affects the sugar trade, with the magnitude of its effects being felt differently between farmers and traders. The findings show further that abrupt trade policy change significantly ($p<0.05$) reduces sugar trade by almost half (47.7%) and lowers the overall level of efforts to invest within the sugar supply chain. Thus, within the governance framework, the study has further shown the importance of making trade policies predictable to ensure that the trade participants can have the confidence to invest and carry out other trade operations.

The study shows further that the evaluated GVCs certification trade policy does not offer socio-economic benefits but contributes

significantly to environmental conservation. The study has shown that the critical environmental conservation practices include the use of the mulching method for increasing water porosity, water retention capacity, and stability; planting trees, use of contours; construction of water streams and terracing; intercropping coffee with trees and other beneficial plants; water resources conservation; and proper use of agrochemicals. However, the study has shown it is still factual that Certification is increasingly becoming necessary for accessing coffee export markets and practising environmental conservation, especially at this time when many farmers in developing countries strive to achieve agricultural transformation.

The study has also indicated that participation in trade is essential for the inclusive socio-economic benefits of trade participants. It has indicated that GVCs trade contributes positively to livelihood improvement and gender equity due to its income inequality-reducing effects. It has been found that coffee production and trade contribute to livelihood improvement in terms of food security, housing conditions, and access to utilities such as water, electricity, and other forms of energy. The study further shows that to increase participation in trade, it's essential to address the female farmers' structural disadvantage, which accounted for about 44% of the gap. This will increase equal participation and trade, raising social and economic benefits.

6.2 Recommendations

This study has shown that certification does not optimally deliver social, economic, and environmental benefits to trade participants and that participation in trade is essential for inclusive socioeconomic benefits. The study confirms further that good trade governance, especially the predictability of trade policies, is essential for achieving optimal trade policies. Thus, based on these findings, this study recommends the government to ensure that trade policies are stable and predictable for increasing trade and allowing forward contracting and investments. It is also essential for

all the stakeholders, especially the ministries, departments and agencies, to create awareness of institutions and organisations managing the GVCs by encouraging transparency in trade policy administration and practices. Transparency can be increased by availing trade information using different media through industry-based organisations, which are supply chain actors' collective actions within GVCs.

The certification policy should be implemented by easing the transmission of price premiums to coffee farmers for an increased supply of sustainably grown coffee, improving coffee farmers' livelihood and helping attain environmental sustainability goals within the coffee supply chain. This must be supported by awareness creation and the creation of certification services that are accessible and cost-effective to coffee farmers. The farmers must be organised in groups to reduce the unit cost of certification. The government should also establish a certification policy which will ensure delivery of the service and offer opportunities for capacity building so that the audits, which take a significant part of the certification costs, are done by local experts.

To maximise socioeconomic benefits from trade, its essential for the trade participants to fully participate in GVCs trade. Participation can be increased by addressing any barriers within the supply chain. Participation should be supported through empowerment for equal access to land and credit. Investment in improved coffee production technologies should ensure increased participation of men and women within the GVC. Production and trade policies should also be gender-responsive by providing opportunities to offer trade facilitation services to increase the participation of women in coffee supply chain activities and control their benefits of participation. This will eventually lead to improved livelihoods through increased food security, better housing conditions, and access to utilities such as water, electricity, and other forms of energy.

6.3 Contribution of the Study to Knowledge

This study has contributed to the empirical knowledge gap and policy practices in Tanzania and other developing countries. The empirical contribution is through measuring how GVCs trade policies can simultaneously deliver social, economic, and environmental benefits to trade participants. The study has measured the impact of one of the GVCs' trade policies, certification, which is one of the global rules that ensure GVCs' trade is sustainable, delivering socio-economic and environmental benefits to trade participants. The ways to increase the level of participation in trade to increase the realisation of GVCs trade benefits are determined. Additionally, most studies on trade governance have not attempted to measure trade governance using cross-sectional survey data. This study has filled this knowledge gap using GVC-specific cross-sectional survey data and indicators that reflect the critical dynamics within the GVC.

The suggested policy options that can optimise the impact of trade policies on livelihoods and environmental conservation in Tanzania contribute to policy. These policy levers will enhance trade policy in the country, support sector growth and environmental improvement, and enhance certification policy implementation. Additionally, the policy options suggested in this study can increase the ability of the supporting organisations to offer incentives that will increase participation in GVCs trade by stimulating trade and investments. As a result, both the country and individual trade participants can significantly benefit from GVCs trade.

6.4 Areas for Further Research

This study focuses on one GVC trade policy, certification. However, it's important to note that GVCs trade policies include national legislation, unilateral agreements; bilateral and regional agreements; and multilateral agreements and may include instruments of trade such as tariffs, export subsidies, import quota, voluntary export restraint (limitation on the quantity of export), local content requirement and regulations such as the European Union

deforestation-free supply chains). Thus, this study recommends a further study on other GVCs policies to widen the scope of the impact of GVCs trade policies. The sample used in measuring the impact of certification is 400; thus, increasing the sample size can allow disaggregation of the certification schemes, such as fairtrade, organic, 4C, Rainforest Alliance/UTZ certified, and CAFE practices looking at their individual impacts on livelihood and nature conservation.

Furthermore, a similar study can be conducted but using a different measure of livelihood beyond household income. The study can measure the impact using disposable or net incomes. Additionally, further research is required to ascertain how social, cultural, and behavioural constraints and gender-based violence, such as the denial of resources, services, and opportunities in developing countries, limit women's participation and the generation of benefits from the production and trading of GVCs, such as coffee.

The study has also provided the importance of trade governance in shaping how countries should implement trade policies. However, trade governance has only been measured using farmers' and traders' data. Further research can be conducted to include all the categories of sugar supply chain actors, including consumers (households and industrial consumers) and input suppliers and service providers in the sector. Further research can also be done to assess trade policy coherence, a key component of trade governance and an essential issue in the efficient implementation of trade policies.

References

Ababakr, A. (2022). Global trade governance and WTO: Beyond the model of the club. *Asian Social Science* 18 (2): 1 - 32.

Adedoyin, F. F., Bello, A. A., Abubakar, I. F. and Agabo, T. J. (2020). How does governance factors influence the trade impact of migration and capital flows in the EU? *Journal of Public Affairs* 2020: e2207.

Ahmed, G. (2012). Krugman Trade Theory and Developing Economies. *China-USA Business Review* 11(12): 1557 – 1564.

Andreoni, A., Mushi, D. and Therkildsen, O. (2020). *The Political Economy of 'Scarcity'in East Africa: A Case Study of Sugar Production, Smuggling and Trade in Tanzania.* Working Paper No. 31. Institute for Innnovation and Pulic Purpose Univerity Coolege, London. 55pp.

Balogh, J. M. and Jámbor, A. (2020). The environmental impacts of agricultural trade: A systematic literature review. *Sustainability* 12(3): 11 – 52.

Barrientos, S. (2019). *Gender and Work in Global Value Chains: Capturing the Gains*? Cambridge University Press, USA. 336pp.

Brennan, L. and Rakhmatullin, R. (2017). Transnationalizing Smart Specialization Strategy. In: Advances in the Theory and Practice of Smart Specialization.(Edited by RADOSEVIC, S., CURAJ, A., GHEORGHIU, R., ANDREESCU, L. and WADE, I.).Elsevier Inc.,11. pp.249-268.

Chang, J., Symes, W. S., Lim, F. and Carrasco, L. R. (2016). International trade causes large net economic losses in tropical countries via the destruction of ecosystem services. *Ambio* 45(4): 387 – 397.

Ciuriak, D., Lapham, B., Wolfe, R., Collins-Williams, T. and Curtis, J. (2015). Firms in international trade: Trade policy implications of the New new trade theory. *Global Policy* 6(2): 130 – 140.

Conde, C., Heinrigs, P. and O'Sullivan, A. (2015). Tapping the potential of global value chains for Africa. *Europe* 57(9): 71 – 85.

Danso-Abbeam, G., Baiyegunhi, L. J. and Ojo, T.O. (2020). Gender differentials in technical efficiency of Ghanaian cocoa farms. *Heliyon* 6(5): e04012.

Dasandi, N., Hudson, D. and Pegram, T. (2015). Governance and institutions. In: *Thinking Beyond Sectors for Sustainable Development.* (Edited by waage, J. and Yap, C.). Ubiquity Press, London. 110pp.

De, P.; (2010). Does governance matter for enhancing trade? Empirical evidence from Asia. East Asian Bureau of Economic Research [www.ris.org.in] site visited on 15/11/2021.

Dehshiri, H. M., Renani, H. S. and Mirfatah, M. (2013). Analysis the impact of good governance on the non-oil export of oil exporting countries. *Journal of Economic Policy and Research* 8(1): 1 – 10.

Diao, X. and Kennedy, A. (2016). Economywide impact of maize export bans on agricultural growth and household welfare in Tanzania: A Dynamic Computable General Equilibrium Model Analysis. *Development Policy Review* 34(1): 101 – 134.

Dixit, A. K. and Stiglitz, J. E. (1977). Monopolistic competition and optimum product diversity. *The American Economic Review* 67(3): 297 – 308.

Dollar, D. R., Inomata, S., Degain, C., Meng, B., Wang, Z., Ahmad, N., Primi, A., Escaith, H., Engel, J. and Taglioni, D. (2017). Analytical frameworks for global value chains: An overview. In: *Global Value Chain Development Report 2017: Measuring and Analyzing The Impact of Gvcs on Economic Development*. (Edited by Inomata, S.), World Bank, Washington DC, USA, pp. 15 – 35.

Fukuyama, F. (2016). Governance: What Do We Know, and How Do We Know It? *Annual Review of Political Science* 19(1): 89 – 105.

Gani, A. and Scrimgeour, F. (2016). New Zealand's trade with Asia and the role of good governance. *International Review of Economics and Finance* 42: 36 – 53.

Gereffi, G. and Fernandez-Stark, K. (2016). *Global Value Chain Analysis: A Primer* (Second Edition). Center on Globalization, Governance and Competitiveness, Durham, North Carolina, USA. 41pp.

Gerish, D. (2005). Gender Theory. In: Palgrave Advances in the Crusades. (Edited by Nicholson, H. J.). Palgrave Macmillan UK, London130-147.

Glazebrook, T. and Opoku, E. (2020). Gender and Sustainability: Learning from Women's Farming in Africa. *Sustainability* 12(24): 10483.

Hernández, V. and Pedersen, T. (2017). Global value chain configuration: A review and research agenda. *Business Research Quarterly* 20(2): 137 – 150.

ICO (2018). Gender Equality in the Coffee Sector: An insight report from the International Coffee Organization,The United Kingdom. 45pp.

ITC/FiBL and IISD (2021). *The State of Sustainable Markets 2021*. International Trade Centre The Research Institute of Organic Agriculture and the International Institute for Sustainable Development [https://digital.intracen.org/state-sustainable-markets-2021/state-of-sustainable-markets-2021/] site visited on 15/10/2021.

Jena, P. R., Stellmacher, T. and Grote, U. (2017). Can coffee certification schemes increase incomes of smallholder farmers? Evidence from Jinotega, Nicaragua. *Environment, Development and Sustainability* 19(1): 45 – 66.

Jones, L., Demirkaya, M. and Bethmann, E. (2019). Global value chain analysis: concepts and approaches. *Journal of International Commonication Economic* 2019: 1-29.

Jun, W., Mahmood, H. and Zakaria, M. (2020). Impact of trade openness on environment in China. *Journal of Business Economics and Management* 21(4): 1185-1202.

Junior, R.M., Franks, D.M. and Ali, S.H. (2016). Sustainability certification schemes: evaluating their effectiveness and adaptability. *Corporate Governance* 16(3): 579 – 592.

Kattel, R. (2017). Impacts of group organic certification of coffee on socio-economic and environmental sustainability in Nepal. *Journal of Agriculture and Forestry University* 1(2017): 49 – 60.

Kowalski, P., Gonzalez, J. L., Ragoussis, A. and Ugarte, C. (2016). *Participation of developing countries in Global Value Chains: Implications for Trade and Trade-related Policies*. OECD Trade Policy Papers No. 179.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of international Economics* 9(4): 469 – 479.

Krugman, P. R., Obstfeld, M. and Melitz, M. (2018). *International Economics: Theory and Policy*. Pearson Education Limited. United Kingdom. 808pp.

Kumari, M. and Bharti, N. (2021). Linkages between trade facilitation and governance: Relevance for post-COVID-19 trade strategy. *Millennial Asia* 12(2): 162 – 189.

Lentijo, G. M. and Hostetler, M. (2011). *Evaluating Certified Coffee Programs*. The Institute of Food and Agricultural Sciences, University of Florida. Florida, USA. 6pp.

Lenzen, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L. and Geschke, A. (2012). International trade drives biodiversity threats in developing nations. *Nature* 486(7401): 109 – 112.

Makita, R. and Tsuruta, T. (2017). *Fair Trade and Organic Initiatives in Asian Agriculture: The Hidden Realities*: Routledge Studies in Development Economics. Taylor and Francis. New York, USA. 160pp.

McWilliam, S. E., Kim, J. K., Mudambi, R. and Nielsen, B. B. (2020). Global value chain governance: Intersections with

international business. *Journal of World Business* 55(4): 101067.

Meier, C., Sampson, G., Larrea, C., Schlatter, B., Voora, V., Dang, D., Bermudez, S., Wozniak, J. and Willer, H. (2020). *The State of Sustainable Markets 2020: Statistics and Emerging Trends.* International Trade Centre, Geneva. 84pp.

Minten, B., Dereje, M., Engida, E. and Tamru, S. (2018). Tracking the quality premium of certified coffee: Evidence from Ethiopia. *World Development* 101(2018): 119 – 132.

Morin, J.-F., Dür, A. and Lechner, L. (2018). Mapping the trade and environment nexus: Insights from a new data set. *Global Environmental Politics* 18(1): 122 – 139.

Mubinovna, R. F. and Nutfulloevna, N. G. (2020). The importance of trade policy in the economic development of the country. *Economics* 44(1): 27 – 28.

NBS (2021). 2020 Tanzania in Figures. National Bureau of Statistics (NBS); United Republic of Tanzania [https://www.nbs.go.tz/index.php/en/tanzania-in-figures] Site visited on 20th November 2021.

North, D. C. (1994). Economic performance through time. *The American Economic Review* 84(3): 359 – 368.

OECD (2020). *Global Value Chains in Agriculture and Food: A Synthesis of OECD Analysis*. Organisation for Economic Co-operation and Development,Paris. 26pp.

OECD (2021). How are trade and environmental sustainability compatible? Organisation for Economic Co-operation and Development. [https://www. Oecd.org/trade/topics/trade-and-the-environment/] Site visited on 15th January 2022.

Pyk, F. and Hatab, A., Assem (2018). Fairtrade and sustainability: motivations for fairtrade certification among smallholder coffee growers in Tanzania. *Sustainability* 10(5): 1551.

Rosen, M. A. and Kishawy, H. A. (2012). Sustainable manufacturing and design: Concepts, practices and needs. *Sustainability* 4(2): 154 – 174.

Ruben, R. and Fort, R. (2012). The impact of fair trade certification for coffee farmers in Peru. *World Development* 40(3): 570 – 582.

Said-Allsopp, M. and Tallontire, A. (2015). Pathways to empowerment?: dynamics of women's participation in Global Value Chains. *Journal of Cleaner Production* 107: 114 – 121.

Schleifer, P. and Sun, Y. (2020). Reviewing the impact of sustainability certification on food security in developing countries. *Global Food Security* 24 (2020): 100337.

Scott, W. R. (2014). *Institutions and Organizations: Ideas, Interests, and Identities* (Fourth Edition). Sage Publications. Thousand Oaks, California. 360pp.

Siitonen, L. (2016). Theorising politics behind policy coherence for development. *The European Journal of Development Research* 28 (1): 1-12.

Ssebunya, B.R., Schader, C., Baumgart, L., Landert, J., Altenbuchner, C., Schmid, E. and Stolze, M. (2019). Sustainability performance of certified and non-certified smallholder coffee farms in Uganda. *Ecological Economics* 156: 35 – 47.

Sulle, E. and Dancer, H. (2019). Gender, politics and sugarcane commercialisation in Tanzania. *The Journal of Peasant Studies* 1 – 20.

Thurlow, J., Randriamamonjy, J. and Benson, T. (2018). *Identifying Priority Value Chains in Tanzania*. Michigan State University and International Food Policy Research Institute, Washington DC. 20pp.

Trienekens, J. and van Dijk, M. P. (2012). *Global Value Chains: Linking Local Producers From Developing Countries To International Markets*. Amsterdam University Press, Amsterdam. 281pp.

URT (2019). *2017-2018 Household Budget Survey. Key Indicators Report*. National Bureau of Statistics and Ministry of

Finance and Economic Planning-Poverty Eradication Division [Tanzania Mainland]. Dodoma, Tanzania. 42pp.

Van Rijsbergen, B., Elbers, W., Ruben, R. and Njuguna, S. N. (2016). The ambivalent impact of coffee certification on farmers' welfare: a matched panel approach for cooperatives in Central Kenya. *World Development* 77(2016): 277 – 292.

Wang, M. L. and Choi, C. H. (2019). How information and communication technology affect international trade: A comparative analysis of BRICS countries. *Information Technology for Development* 25(3): 455 – 474.

Williamson, O. E. (1996). *The Mechanisms of Governance.* Oxford University Press, New York. 448pp.

Williamson, O. E. (2005). The economics of governance*. American Economic Review* 95(2): 1 – 18.

World Bank and World Trade Organization (2020). *Women and Trade: The Role of Trade in Promoting Gender Equality*. World Bank, Washington DC. 207pp.

APPENDICES

Appendix 1: Coffee Farmers Survey Questionnaire

Trade Policies and Economic Impacts-Coffee

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3 Introduction

1.1 We are part of a team of researchers from Sokoine University of Agriculture (SUA) implementing a research on trade policies and economic impacts in the coffee supply chain. This survey is planned for studying coffee production and trade and its impact on people and nature. The study contributes to ensuring that coffee production and trade become a driver of positive change to maximize environmental, economic and social impacts, especially at this time when Tanzania strives for agricultural transformation while nurturing industrialization.

You have been selected as among the key actors of the coffee supply chain to participate in this study. I recognize the value of your time and your participation is highly appreciated. Your responses will be kept CONFIDENTIAL and will be analyzed jointly with other respondents. If you decide NOT to take part in the survey, you can change your mind at any time and leave the survey.

1.2 Do you agree to take part in the survey? 1=Yes; 2=No
1.3 Please take the photo of the consent form to indicate that the respondent consented
1.4 Date of the interview
[*Date/Month /Year*]
1.5 Questionnaire Code Number/ Unique ID of the respondent

[The first letter shall represent the district; the second letter shall represent the village followed by subsequent numbers that shall be two digits based on the sampling sequence per village]
1.6 GPS: Please make sure that you are outside the door to the respondent's farm/homestead/working place. Please remain outside while the device gets a GPS reading

1.7 Interviewer name

1.8 Region

1=Ruvuma; 2=Kagera; 3=Kilimanjaro; 4=Songwe

1.9 District_____

1=Mbinga DC; 2=Songea; 3=Muleba; 4=Karagwe; 5=Mbozi; 6=Ileje; 7=Moshi DC; 8=Songea

1.10 Ward_____

1.11 Village_____

4 Socio-economic characteristics

Interviewer: Now ask the respondent about his/her specific characteristics. Remember, we are asking only the respondent and not the entire household. The respondent should be the person who makes most of the coffee farm decisions at the household.

4.28Respondent's name_____Start with the first name then other names

4.29Respondent's mobile number_____

2.3 Sex of the respondent? 1=Male; 2 =Female_____

2.4 How old are you, in years? _____

2.5 What is your current marital status? _____

1 Single
2 Married
3 Divorced/separated
4 Widowed

2.6 What is the highest level of education reached?

0	None	8	Primary 7	16	College 1
1	pre school	9	Primary 8	17	College 2
2	Primary 1	10	Secondary 1	18	College 3
3	Primary 2	11	Secondary 2	19	College 4
4	Primary 3	12	Secondary 3	20	University 1
5	Primary 4	13	Secondary 4	21	University 2
6	Primary 5	14	Secondary 5	22	University 3
7	Primary 6	15	Secondary 6	23	University 4 & above

2.7 What is your primary occupation?

1	Not working	4	Business-trade/services
2	Crop farming	5	Wage employment in the primary sector
3	Livestock production	6	Government employment
		- 888	Other specify

2.8 What is your relationship with the head of the household?

_____

1	Head	8	Son/Daughter in law
2	Spouse	9	Grandchild
3	Own child	10	Other relative
4	Step child	11	Unrelated
5	Parent	12	Brother/sister in law
6	Brother/sister	13	Parent in law
7	Nephew/Niece	14	Worker

2.9 What is the type of this household_____

1 Male adult headed household
2 Female adult headed household
3 Male child headed household
4 Female child headed household

2.10 In total how many people live in this household (household members)? [including the respondent]

2.11 Total size of the household farming farm(s) in acres

2.12 Total size of the household coffee farm(s) in acres

2.13 Nature of coffee land ownership_____

1	Own land	5	Given by friends and relatives
2	Inherited	6	Renting only
3	Given by government	7	Renting and partly own land
4	Given by association	- 88	others (specify)

2.14 What influenced you to engage in coffee production activities?

_____

1=Inherited the coffee farm; 2= Access to credit/agricultural financing;

3=Association membership; 4=Availability of suitable land for coffee; 5=Access to agricultural fairs or farmer field days; 6=Access to markets; 7=Good producer prices-888=Other reason (Please specify)

2.15 Years in coffee production activities_____

2.16 Has there been any change to your coffee area/number of plants planted in the past five years? _____1=Yes; 2=No

2.17 What is the change to the coffee area planted? _____

1=Increased area of coffee planted; 2=Decreased area of coffee planted

3=Increased number of coffee trees planted; 2=Decreased number of coffee trees planted

2.18 What has influenced the change of coffee area planted?

_____

2.19 Are you a member of any organization? _____1=Yes; 2=No

2.20 In how many organisations do you have membership?

_____

2.21 Specify which organization(s) you are a member?

_____

1	Agricultural / livestock/ fisheries producer's group (including marketing groups such as AMCOS)
2	Credit or microfinance group (including SACCOS/merry-go-rounds/Village Saving and Lending Associations-VSLAs)
3	Mutual help or insurance group (including burial societies)
4	Civic groups (improving community) or charitable group (helping others)
5	Trade and business association
6	Religious group
7	Water users' group
8	Forest users' group
-888	Other specify

2.22 Do you have a savings/bank account (including cooperatives, VICOBA, ROSCAS etc.) _____

1=Yes; 2=No

2.23 In which saving/banking institutions do you have account with?
_____

1	Commercial bank	4	Groups such as ROSCAs
2	SACCOs	5	Village banking (VICOBA)
3	Microfinance	6	Phone Banking

2.24 Did you access credit in the past 12 months? _____1=Yes; 2=No
2.25 Did you get access to extension services last season (2019/2020) such as a visit by extension agent on coffee production?
_____
1=Yes; 2=No
2.25 How many times on average did you receive advice from extension agents on coffee production over the past 12 months? _____

2.26 Is coffee production your main source of income?
_____1=Yes; 2=No

2.27 Which other key crops are the main sources of your income? [Mention three main crops] _____

2.28 What is the proportion (%) contribution of coffee to the total income earned from crop farming activities? _____
2.29 Did you obtain income from the following activities last year (in the past 12 months)?_____
1=Coffee income; 2=Livestock income; 3=Vegetable and fruits; 4=Other crops; 5=Remittances; 6=Salaries/wages; 7=Business (e.g shop, kiosks, etc.); 8=Other off-farm income
2.30 Indicate the annual amount of income obtained in TZS through doing the above activities in 2.29._____

3. Economics of Coffee Production

3.1 For each of the statements below, please indicate the extent of your agreement or disagreement regarding **coffee production and trade** by placing a tick in the appropriate box. The responses are as follows 1=Strongly disagree; 2=Disagree; 3=Undecided/neutral; 4=Agree; 5=Strongly agree

No	Statement	1=Strongly disagree	2= Disagree	3= Undecided/ Neutral	4=Agree	5=Strongly agree
3.1.1	Productivity of coffee has increased over the past five years					
3.1.2	It is easy to access production inputs required in the coffee production activities					
3.1.3	The area under coffee production has increased over the past five years					
3.1.4	It is easy to access coffee markets					
3.1.5	There are currently better coffee prices					
3.1.6	It is easy to access niche export coffee markets					
3.1.7	Certifications such as Global GAP, organic etc. are easy to obtain					
3.1.8	My coffee meets the international standards					

3.1.9	I am aware of all good agricultural practices necessary to ensure production of high-quality coffee					
3.1.10	Existing government regulations/restrictions are major obstacles to coffee trade					

3.2 Which of the following niche export markets are you currently enjoying? _____

1=Fair trade; 2=Organic; 3=Rainforest alliance; 4=None; -888=Other [Please specify]

3.3 What are the key challenges facing you in accessing niche markets? _____

3.4 What was the level of productivity (Quantity harvested) in kgs/acre last season? _____

3.5 What was the level of productivity (Quantity harvested) in kgs/tree last season?

_____

3.6 Do you intercrop coffee with other crops? _____1=Yes; 2=No

3.7 What are the other crops you intercrop with coffee? _____

3.8 What is the cost you paid for fertilizer per acre used in the coffee farm? (TZS/ acre) _____

3.9 What is the cost you paid for agro-chemicals per acre? (TZS/ acre) (Indicate the type of the agro-chemical used and the amount of money spent) _____

3.10 What is the cost you paid for irrigation water per acre? (TZS/ acre) _____

3.11 Coffee farm activities last year.

Hint: *Ask questions on coffee Production and Labour involved last year; including family labour, paid labour and associated wages. We ONLY require TYPICAL/AVERAGE estimates for each activity undertaken during the coffee production cycle. Please be accurate as much as possible.*

Activity	Days worked (man-days)	Hours worked in a day	Number of labour used		Wage rate paid per day
			Family labour	Hired labour	
1. Weeding/mulching					
2. Pruning					
3.13 Fertilizer application					
Agro-chemicals application					
2. Security services					
3. Harvesting					
Post-harvest management					
5. Transport					

3.19 What is the quantity of land you used in the production of coffee **in acres** last season (Quantity of land harvested)? _____

3.20 How did you obtain the land you used in the production of coffee last season?

1	Purchased	5	Borrowed-in
2	Received as gift or inheritance	6	Just walked in
3	Rented-in for fixed payments	-888	Other specify
4	Sharecropped-in		

3.20 If rented-in for fixed payments, what is the annual rental cost in TZS?

_____

3.21 Did you incur any crop loss after harvest? _____1=Yes; 2=No

3.22 What is the quantity of coffee in kgs that was LOST?

_____

3.23 What is the quantity of coffee in kgs that was HARVESTED last season? _____

3.24 What was the selling price of coffee in TZS/kg last season?

_____

3.25 Where did you sell your coffee last season?

_____

1=AMCOS; 2=Middlemen; 3=Local villagers/neighbours; 4=Cottage processors; 5=Other processing companies

3.26 What were the constraints in selling your coffee last season? _____

1	Lack of transport means	4	Shortage of fund
2	Poor market prices	5	Extreme weather conditions
3	Poor road network	6	Non-membership in AMCOS
		888	Other specify

1. What is the distance in kilometer (KM) to the nearest improved coffee seedling/seed seller?

   _____

1.11 What is the distance in kilometer (KM) to the nearest fertilizer seller?

_____

1.12 What is the distance in kilometer (KM) to the nearest agro-chemicals seller? _____

1.13 What is the distance in kilometer (KM) to the buyer of coffee?

_____

1.14 What type of road is available for travel to the coffee's buyer?

_____

1= All weather road; 2=Seasonal road; 3=Tarmac; -888=Other specify (Please type) _____

1.15 What is the distance in kilometer (KM) to the nearest bio-stimulant seller? _____

1.16 What type of road is available for travel to buy agricultural inputs?

_____

1= All weather road; 2=Seasonal road; 3=Tarmac; -888=Other specify (Plea

_____

3.34 What are the main constraints in your coffee production activities?

_____

1 Lack of suitable coffee varieties
2 Non-availability of improved agricultural technologies other than s
3 Inadequate extension support
4 High production costs
5 Shortage of labour

6 Farmers-Pastoralists conflicts
7 Lack of reliable markets
8 Plant diseases
9 Soil fertility challenges
10 Weather variability and seasonality
-888 Other [Please type]

3.35 What is your opinion on what should be done to improve production, productivity, trade and marketing of coffee?

_____
_____

4. Social and environmental impacts

4.1 What is the male daily wage in coffee production activities (TZS/man-day) _____

4.2 What is the female daily wage in coffee production activities (TZS/man-day) _____

4.3 Did you hire labour during the last farming season (2019/2020)?1=Yes; 2=No_____

4.3.1 Did you hire labour of below 18 years of age? _____1=Yes; 2=No

4.3.2 Are there practices of engaging labour of below 18 years in the coffee production activities? _____

4.4 How many labour on average did you hire during the last farming season (2019/2020)? Hint: Equivalent of adult labour – converted to mandays (1 manday = 1 adult working for 8 hours). _____

4.5 What is the current average level of your household income in Tsh/month_____

4.6 For each of the statements below, please indicate the extent of your agreement or disagreement regarding **coffee and food security** by placing a tick in the appropriate box.

The responses are as follows

1=Strongly disagree; 2=Disagree; 3=Undecided/neutral; 4=Agree; 5=Strongly agree

No	Statement	1=Strongly disagree	2= Disagree	3= Undecided/ Neutral	4=Agree	5=Strongly agree
4.6.1	Coffee production affects negatively household food security					
4.6.2	In the past 12 months, there were instances when there was **NO food** to eat of any kind in the household because of lack of resources to get food					
4.6.3	The status of food availability is better for coffee farmers than other farmers not engaged in coffee production					
4.6.4	In the past [12 months], it happened where one of the					

	household members went to sleep at night hungry because there was no enough food					
4.6.5	In the past [12 months], it happened where a household member spent a whole day and night without eating anything at all because there was no enough food					

4.7 Do you use electricity in your household? _____1=Yes; 2=No

4.8 What are the assets that you currently own?

Asset		Number of items currently owned	Current value per unit (Tsh)	Total value (Tsh)	Asset		Number of items currently owned	Current value per unit (Tsh)	Total value (Tsh)
ITEM	**4.8**	**4.8.2**	**4.8.**	**4.8**	**ITEM**	**4.8**	**4.8.2**	**4.8.**	**4.8**
Animal	2				phone	3			
Battery	4				piggery	5			
Beehiv	6				Planter	7			
Bicycle	8				ploughs	9			
Boom	10				poultry	11			
Borehol	12				power	13			
Car	14				Radio	15			
Cart	16				Ridger	17			
Chaff	18				Sewing	19			
Comput	20				Sheller	21			
Cow	22				solar	23			
Crush	24				spray	25			
Donkey	26				Stores	27			
Fridge	28				Tractor	29			
Gas	30				Trailer	31			
Genera	32				Truck	33			
Grinder	34				TV	35			
Hamme	36				Water	37			
Harrow	38				water	39			
Houses	40				water	41			
Irrigatio	42				water	43			
Jagger	44				weighin	45			
Landlin	46				Well	47			
Motorc	48				wheel	49			
Pestle	50				zero-	51			
Oxen	52				Other	-			

4.9 What is the roofing material of the main house?

_____

1	corrugated iron sheets	5	grass
2	Tiles	6	*makuti*
3	Concrete	7	tin-*madebe*
4	asbestos sheets (including decra)	-888	other (specify)

4.10 What is the exterior wall material of the main house?

_____

1	Stone	6	wood only
2	brick/block	7	corrugated iron sheets
3	mud/wood	8	grass/straw
4	mud/cement	9	Tin
5	mud only	-888	other (specify)

4.11 What is the floor material of the main house?

_____

1	Cement
2	Tiles
3	Wood
4	Earth
-888	other (specify)

4.12 What is the mode of ownership of the main house?

1	owner occupied
2	employer provided
3	Rented
4	relative's (owned by relative)

4.13 What type of toilet do you use? _____

1	flush toilet	4	uncovered pit latrine
2	VIP latrine	5	Bucket
3	covered pit latrine	6	None
		-888	other (specify)

4.14 What is the main source of water for domestic use?

_____

1	Pond	9	piped into house/dwelling
2	dam/sand-dam	10	piped into compound
3	Lake	11	Piped outside compound
4	stream/river	12	water kiosk
5	unprotected spring	13	water tankers

6	protected spring	14	roof catchment
7	Well	15	water hawkers/cart/bicycle
8	Borehole	-888	other (specify)

4.15 What is your main cooking fuel? _____

1	Electricity
2	Kerosene
3	Firewood
4	Liquefied Petroleum Gas (LPG)
5	Charcoal
6	Biogas
7	solar power
-888	other (specify)

4.16 What is your main lighting fuel? _____

1	Electricity	6	Liquefied Petroleum Gas (LPG)
2	Pressure lamp	7	solar energy
3	tin lamp (paraffin)	8	Biogas
4	lantern (paraffin)	9	Candles
5	Woodfuel	10	dry cells
		-888	other (specify)

4.17 For each of the statements below, please indicate the extent of your agreement or disagreement regarding **coffee and the environment/nature** by placing a tick in the appropriate box. The responses are as follows

1=Strongly disagree; 2=Disagree; 3=Undecided/neutral; 4=Agree; 5=Strongly agree

No	Statement	1=Strongly disagree	2= Disagree	3= Undecided/ Neutral	4=Agree	5=Strongly agree
4.17.1	I am aware of the environmental effects associated with coffee production					

4.17.2	I know sustainable production practices for coffee that conserve the environment, general biodiversity and ecosystem					
4.17.3	I practice sustainable production practices for coffee that conserve the environment, general biodiversity and ecosystem					
4.17.4	There are a lot of barriers to practice sustainable coffee production/trade in this area					
4.17.5	I use various measures to minimize environmental effects associated with coffee production					

_____

4.18 What measures are you using to minimize environmental effects associated with coffee production?

_____

4.19 Has the Novel Coronavirus (COVID 19) pandemic affected the coffee sub-sector including your coffee production activities?

_____

4.20 What has been the effects of the Novel Coronavirus (COVID 19) pandemic on the coffee sub-sector?

_____

5. Gender Dimensions in the Coffee Sub Sector

5.1 Did this household make decisions on the followings?

1 Selection of crops to grow
2 Allocation of land to crops
3 Sells of coffee
4 Selection of coffee variety to plant
5 Use of production (amount of harvest saved for household consumption, sold, stored, used as animal feed, etc.)
6 Crop planting/sowing activities: This would include method of sowing, timing, land preparation.
7 Household labor (family members working in the field, when family who from the family works in the field and when they work)
8 Food crop farming: These are crops that are grown primarily for household food consumption
9 Cash crop farming: These are crops that are grown primarily for sale in the market
10 Non-farm economic activities: This would include things like running a small business, self-employment, buy-and-sell
11 Wage and salary employment: This could be work that is paid for in cash or in-kind, including both agriculture and other wage work
12 Major household expenditures (such as a buying a bicycle, land, motorbike)
13 Minor household expenditures (such as food for daily consumption or other household needs
14 Children education (e.g. whether to send them to school, where should children go to school)
15 Whether or not to use family planning to space or limit births

1 Use of the revenue from sales of coffee
6

1.1 Who made those decisions in 6.1?
1=Female household head
2=Male household head
3=Spouse
4=Jointly
5=Another household member
6=Other non-household members

5.3 In coffee production, are there activities that are specific for men and women? _____1=Yes; 2=No

5.4 In coffee production, what activities are specific for women?
_____

5.5 In coffee production, what activities are specific for men?
_____

5.6 What is the percentage of men involved in coffee production?
_____

5.7 What is the percentage of women involved in coffee production?
_____

5.8 What is the percentage of men involved in coffee marketing?
_____

5.9 What is the percentage of women involved in coffee marketing?
_____

6. Household Shocks and Coping Mechanisms

6.1 Over the past two years, was your household **affected** by any of the following (shocks) events? **1=Yes 2=No**	6.2 If **Yes**, which were the **three** most significant shocks events in terms of the severity of damages incurred? ***(Use codes below to rank the shocks)*** *1=Most severe* *2=Severe* *3= Less severe*	***For each of the three most significant shocks***,	
		6.3 How was your household affected by [***shock event***]? 1=*Income loss* *2= Asset loss* *3=Both* *4=Neither*	***(If 6.3<=3)*** 6.4 What ***3 main measures*** did your household do in response to [***shock event***] in attemps to regain your former welfare level? ***(List in the order of importance)***

Shock event/source	**6.1**	**6.2**	**6.3**	**6.4.1**	**6.4.2**	**6.4.3**
Too much rain	**1**					
Too little rain	**2**					
Wildlife destruction	**3**					
Destruction of property by domestic animals	**4**					
Fire/Arson	**5**					
Floods	6					
Theft/Hijacking/Robbery/burglary/assault	7					
Frost	8					
Destruction of property by Lightning	9					
Crop disease or crop pests	10					
Livestock Pest or Diseases	11					
Extreme temperature	12					
Large fall in sale prices for crops	13					
Large rise in price of food	14					
Large rise in agricultural input prices	15					
Ethnic Conflicts/Political unrest	16					

Response to Shocks	
1=Relied on own-savings *2=Received unconditional help from relatives/friends* *3=Received unconditional help*	*5=Employed household members took on more employment* *6=Unemployed adult household members had to find work* *7=Obtained credit*

from government *4=Changed eating patterns* *(relied on less preferred* *Food options, reduced the* *Proportion or number of* *Meals per day, or household* *Members skipped days of* *Eating, etc.)*	*8=Sold agricultural assets* *9=Sold durable assets* *10=Sold land/building* *11=Sold crop stock* *12=Sold livestock* *13=Engaged in spiritual efforts (prayer, sacrifices, diviner consultations)* *14=Did NOTHING* *15=Other (specify)*

END OF THE SURVEY
(Interviewer: Kindly thank the respondent)

Appendix 2: Coffee actors' key informants' interview checklist

1. Introduction

We are part of a team of researchers from Sokoine University of Agriculture (SUA) implementing a research on trade policies and economic impacts in the coffee supply chain. This field work is planned for studying coffee production and trade and its impact on people and nature. The study contributes to ensuring that coffee production and trade become a driver of positive change to maximize environmental, economic and social impacts, especially at this time when Tanzania strives for agricultural transformation while nurturing industrialization.

You have been selected as among the key actors of the coffee supply chain to participate in this study. I recognize the value of your time and your participation is highly appreciated. Your responses will be kept CONFIDENTIAL and will be analyzed jointly with other respondents. If you decide NOT to take part in the study, you can change your mind at any time and leave the sstudy.

Do you agree to take part in the study_____1=Yes; 2=No

Category of the coffee supply chain actor_____

1= Exporters; 2=Auction administrators; 3=AMCOs; 4=Coffee estates; 5=Tanzania Coffee Board (TCB); 6=Tanzania Coffee Research Institute (TaCRI); 7=Cooperative unions; 8=Coffee blenders; 9=Coffee processors; Input supply companies

Discussion Questions

1. Name of the organization and contact details_____
2. Name, position in the organization and contact details of the person you are interviewing_____

3. What are the main interventions (programs/projects) in the coffee subsector that you know in this area?
   _____

4. What are the levels of coffee productivity in the district?
   _____

5. What is the coffee farming system? Do the farmers intercrop coffee? What crops are intercropped with coffee? What are the main reasons of doing intercropping?
   _____

6. What are the costs per acre of establishing a new coffee farm in the area? _____

7. What are the costs per acre of managing an existing coffee farm in the area? _____

8. Is it feasible to expand coffee production in the area? How can expansion be done, through land expansion or coffee intensification?
   _____

9. What are the existing coffee trading arrangements in the area? (direct export, selling through AMCOS, selling through private buyers etc.)
   _____

10. What are the coffee export market requirements? (specific private standards, safety, niche markets etc.)
    _____

11. What are the shortcomings of the existing coffee trading arrangement(s) in the area?
    _____

12. What is the proportion (%) of farmers who are the members of AMCOS? What are the regulations implemented in the AMCOS? What are the challenges affecting the AMCOS?
    _____

13. What are the deductions (charges, taxes, levies, contributions) implemented by different organizations during the sale of coffee?
    _____

14. Do you know any coffee trade agreements that Tanzania is benefiting during exportation of coffee? What are those trade agreements?
    _____

15. How does coffee production and trade impact the livelihood of people?
    _____

16. Do farmers and other coffee supply chain actors practice sustainable trade and production practices for coffee that conserve the environment, general biodiversity and ecosystem? What are those practices? _____

17. What measures are used to minimize environmental effects associated with coffee production?
    _____

18. What are the main social and economic shocks in the area? How are the effects minimized? What are the coping strategies?
    _____

19. Are there coffee supply chain actors that have been certified with various certifications such as Global GAP, organic, fair trade, rainforest alliance, Utz certified etc? What are the challenges associated with getting certified (barriers to certifications)?
    _____

20. What are the key challenges of the coffee sub-sector?
    _____

21. How is the coffee value/supply chain linked? (input supply and services-production-aggregation-processing-trading)
    _____

22. What are the organizations responsible with regulating or supporting the coffee sub-sector including its trade that you know?
    _____

23. Which rules/regulations are affecting coffee trading/production activities? Give details

    _____

24. Did COVID19 affect the coffee subsector in Tanzania? How was the sector affected? What are the coping mechanisms?_____

25. What is your opinion on what should be done to improve coffee production and trade in Tanzania?

    _____

Appendix 3: Sugar supply chain actors survey questionnaire

Impact of Trade Policies on Sugar Subsector in Tanzania-Traders

1. Introduction

1.1 We are part of a team of researchers from Sokoine University of Agriculture (SUA) implementing a Research Survey to Track the Impact of Trade Policies on Sugar Subsector in Tanzania. This survey is planned for determining the impact of trade policies on driving trade and investments in the sugar subsector. The study will ascertain the kind of trade policies needed for driving and achieving investments and trade, and how existing trade policies are affecting the sugar subsector. This is important for ensuring that sugar trade and investments become a driver of positive change to maximize economic and social impacts, especially at this time when Tanzania strives for agricultural transformation while nurturing industrialization.

You have been selected as among the key actors of the sugar supply chain to participate in this study. I recognize the value of your time and your participation is highly appreciated. Your responses will be kept CONFIDENTIAL and will be analyzed jointly with other respondents. If you decide NOT to take part

in the survey, you can change your mind at any time and leave the survey.

1.2 Do you agree to take part in the survey? 1=Yes; 2=No

1.3 Enumerator's Name: _____ 1=Enumerator 1 2=Enumerator 3 4=Enumerator 4 5=Enumerator 5 6=Enumerator 7 8=Enumerator 8 9=Enumerator 9	1.4. Date of the Interview [*Date/Month /Year*] _____ ____	1.5 Questionnaire Code Number/ The unique ID of the respondent_____ _____ [*The first letter shall represent the region; the second letter shall represent the district followed by subsequent numbers that shall be two digits based on the sampling sequence]*

1.6. Region: _____ _ 1=Morogoro; 2=Dar es Salaam; 3=Tanga; 4=Kilimanjaro; 5=Kagera; 6=Mwanza	1.7. District _____
1.8 Ward_____	1.9 Street_____ _____
1.10 Geopoint_____ [*Interviewer: Please make sure that you are outside the door to the respondent's /homestead/working place. Please remain outside while the device gets a GPS reading*]	
1.11. Type of respondent _____ 1=Wholesaler; 2=Retailer; 3=Exporter; 4=Importer; 5=Super-Agent/stockiest 1.12. Name of respondent _____ [*Interviewer: Start with the first name then other names*]	
1.13. Position of the respondent in the business/trade:_____ _____ _____	1.14. Sex of the respondent: _____ ____ 1=Male; 0=Female
1.15. Education of the respondent (Years)_____ Codes No. 1.15.	

-9=None 0=pre-school 1=Primary 1 2=Primary 2 3=Primary 3 4=Primary 4 5=Primary 5 6=Primary 6 7=Primary 7	11=Secondary 1 12=Secondary 2 13=Secondary 3 14=Secondary 4 15=Secondary 5 16=Secondary 6 17= college 1 18=college 2	19= college 3 20= college 4 21=university 1 22=university 2 23=university 3 24=university 4 & above

Section 2: Enterprise Information

4.1 Name of business entity_____

4.2 Type of business ownership: _____1=sole proprietorship; 2=Partnership; 3=Limited company; 4=Other specify: _____

4.3 Gender of the owner: _____

1=Male; 0=Female; 3=Both (Owned jointly by male and female)

4.4 Age of the owner (s) in years: _____

2.5 Years in sugar trading activities: _____

2.6 Education level of the owner(s) (Years of schooling) (Use codes No. 1.15): _____

1. What are end markets for the sugar product you are dealing with?

_____

1= Domestic consumers
2=Institutional buyers such as schools, hospitals, military etc
3=Export market
4=Hotels and restaurants
-88=Other specify

2. Type of the trading arrangement at the end market_____

_____1=Written contract;
2=Verbal agreement; 3=Spot markets; 4=other specify

3. How often do you review the trading agreement?
_____
1=biannually; 2=Annually; 3=Anytime whenever need arises; 4=Other
specify_____
_____

4. Do you know any private sector organization?
_____1=Yes; 0=No

5. Are you a member of any private sector organization?
_____1=Yes; 0=No

   1. If yes, what is the name (s) of the organization(s)?
      _____
      _____
      _____
      _____
      _____
   2. How long have you been a member?
      _____Years
   3. Do you pay membership fee? How much do you pay? _____
   4. What services are offered by the private sector organization that you are a memberof?_____
      _____
      _____
      _____
      _____

6. Yearly sugar business turnover_____-
_____1=Less than or equal to 5 million; 2=Above 5 million but below 200 million; 3=Above 200 million to 800 million; 4=Above 800 million 5=Prefer not to disclose

7. Annual quantity of sugar traded in tones_____

8. Where do you source sugar?
_____

1=Wholesalers; 2=Super agents; 3=Sugar producing companies; 4=Importers; 5=Other specify

9. What is the origin of sugar that you sale? _____

1=Kilombero Sugar Company
2=Mtibwa Sugar Company
3=Kagera Sugar Company
4=Tanganyika Plantations Company (TPC)
5=Manyara Sugar Company Limited
6=Imported
7=Other (Specify)

10. In which form of the product/sugar do you trade?
_____
1=50kg sugar packed bags; 2=Various from 1-5kg sugar packed bags 3= Specific volume such as from 1 tonne and above; 4=Other specify

11. What proportional of sugar trade does it make your total trading profile?
_____
_____%

Section 3: Organizations and institutions

1.1 Are you aware of any organizations responsible with regulating or supporting the sugar industry including sugar trade?
_____1=Yes; 0=No

1.2 Mention the organizations responsible with regulating or supporting the sugar subsector including sugar trade, that you know:

Name of the organization	Key area regulated/supported within the sugar subsector

1.3 Are you aware of any rules, standards, laws, regulations guiding sugar trade?
_____1=Yes; 0=No

1.4 Mention the rules, standards, laws, regulations and standards that you know which are used in regulating sugar subsector?

Name of the institution (rule, law, regulation, standards etc)	Category of the institutions
Codes for category of institutions 1=Rules/regulations; 2=Safety, quality and standards; 3=Local government authorities' bylaws; 4=Preferential agreements; 5=Other specify	

1.5 Which rules/regulations are affecting your sugar trading/production activities? Give details or mention them

Name of the institution (rule, law, regulation, standards etc)	Category of the institutions (Use codes)
Codes for category of institutions 1=Rules/regulations; 2=Safety, quality and standards; 3=Local government authorities' bylaws; 4=Preferential agreements; 5=Other specify	

1.6 How do you rate the situation of contract enforcement and protection of property rights in the country?
_____%

1.7 Had you experienced any breach of contract/trading agreement?
_____1=Yes; 0=No

1.8 How did you solve the situation?_____
_____
_____
_____

1.9 Did you get satisfaction with the way government agencies/organizations on how helped you in solving the situation?
_____

1.10 What are the key challenges facing your activities in the sugar subsector?_____
_____
_____
_____

Section 4: Trade Policies Implementation

6.2 Do you know any sugar export market requirement?
_____
_____1=Yes; 0=No

6.3 Mention the sugar export market requirements you know

Type	**Name of the requirement**
Export documentation requirements	
Specific private standards	
Safety standards	
Niche market requirements (fair traded? Organic?)	

6.4 What is the source of sugar trade information you get? Select all applicable
1=Ministries and other government agencies_____
2=Private sector organizations such as TPSF_____
3=Private sector industry-based organizations such as sugar growers' association_____
4=Other specify_____

6.5 Which media do you use to get trade related information? Select all applicable
1=Radio_____
2=TV_____
3=Phone_____
4=Newspaper_____
5=Face to face with fellow traders/producers_____

6=Websites/internet_____
7=Other specify_____

6.6 How often do you visit some websites to get trade related information? _____
1=Very often
2=Often
3=Rarely/Not often
4=Sometime/At one time
5=Not at all

6.7 Does smuggling of sugar exist? 1=Yes; 2=No

6.8 How do sugar smuggling affect your business?
_____

6.9 In which months do you experience challenges in sugar stock acquisition for your business?-
_____
_____

Section 5: Governance Practices

a. How many certificates are you supposed to have so as to engage in trading of sugar? Mention them.

b. Have you encountered a situation where you had to make bribes connected with your imports/exports or sugar stock acquisition? _____1=Yes; 0=No
How many times has that happened in the past 12 months?
_____
_____

c. Was there any instance where the production, export or import policy was abruptly changed and affected your trading?
_____ 1=Yes; 0=No

d. What was the policy change and how long did it take to be effective?
_____
_____
_____

e. Which media was used to get information on the policy change? Select all applicable

1=Ministry/government agency website_____

2=Newspapers_____

3=Radio/Television_____

4=Face to face with fellow traders/producers_____

5=Phone call/SMS_____

6=Other specify_____

f. Outline the requirements involved in sugar trade

Category of trade requirements	Type of regulation/compliance	Organization responsible	Average time taken to obtain (days)	Cost for compliance	Time for payment (Monthly? Annually?)
Codes: Category of trade requirements 1=Formal such as taxes, tariffs, licences; 2=Quality and safety such as inspection fees 3=Informal such as bribes					

g. For each of the statements below, please indicate the extent of your agreement or disagreement by placing a tick in the appropriate box. The responses are as follows

1=Strongly disagree; 2=Disagree; 3=Undecided/neutral; 4=Agree; 5=Strongly agree

No	**Statement**	**1=Strongly disagree**	**2= Disagree**	**3= Undecided/ Neutral**	**4=Agree**	**5= Strongly agree**
3	Government agencies supply information necessary to plan for the future sugar markets					
4	There is involvement in public					

No	Statement	1=Strongly disagree	2= Disagree	3= Undecided/ Neutral	4=Agree	5= Strongly agree
	consultations, public forums and trade advisory committee					
5	I feel that the sugar sector is over-regulated					
6	It is common for government officials to admit when makes mistakes affecting sugar trade					
7	It takes much time to conform to different registrations and certificates for sugar trading activities					
8	Existing government regulations/restrictions are major obstacles to sugar trade activities such as exporting					
9	Existing documentation processes for licensing sugar import or export are easy and the documents are easy to obtain					
10	There are ad hoc sugar price controls in the market					

No	Statement	1=Strongly disagree	2= Disagree	3= Undecided/ Neutral	4=Agree	5= Strongly agree
11	It is common to make bribes for easing imports/exports or acquiring sugar stock					
12	Our legal systems ensure protection of property rights and private transaction such that it is easy to manage legal contractual agreements in the sugar sector					

5.8 Interviewer, provide any comment regarding the interview and the trader/respondent.

END OF THE SURVEY
(Interviewer: Kindly thank the respondent)

Impact of Trade Policies on Sugar Subsector in Tanzania-Farmers

Introduction

1.1 We are part of a team of researchers from Sokoine University of Agriculture (SUA) implementing a Research Survey to Track the Impact of Trade Policies on Sugar Subsector in Tanzania.

This survey is planned for determining the impact of trade policies on driving trade and investments in the sugar subsector. The study will ascertain the kind of trade policies needed for driving and achieving investments and trade, and how existing trade policies are affecting the sugar subsector. This is important for ensuring that sugar trade and investments become a driver of positive change to maximize economic and social impacts, especially at this time when Tanzania strives for agricultural transformation while nurturing industrialization. You have been selected as among the key actors of the sugar supply chain to participate in this study.

I recognize the value of your time and your participation is highly appreciated. Your responses will be kept CONFIDENTIAL and will be analyzed jointly with other respondents. If you decide NOT to take part in the survey, you can change your mind at any time and leave the survey.

1.2 Do you agree to take part in the survey? 1=Yes; 2=No

1.3 Date of the interview
[*Date/Month /Year*]
1.4 Questionnaire Code Number/ Unique ID of the respondent
[The first letter shall represent the district; the second letter shall represent the village followed by subsequent numbers that shall be two digits based on the sampling sequence per village]
1.5 GPS: Please make sure that you are outside the door to the respondent's farm/homestead/working place. Please remain outside while the device gets a GPS reading
1.6 Interviewer name
1.7 Region
1=Morogoro; 2=Dar es Salaam; 3=Tanga; 4=Kilimanjaro; 5=Kagera; 6=Mwanza

1.8 District
1.9 Ward
1.10 Village

5 Socio-economic characteristics

Interviewer: Now ask the respondent about his/her specific characteristics. Remember, we are asking only the respondent and not the entire household. The respondent should be the person who makes most of the sugarcane farm decisions at the household.

1. Type of respondent
   - 1 small scale out-grower
   - 2 independent grower
   - -888 Other (Please specify)
2. Respondent's name

Start with the first name then other names

3. Respondent's mobile number

2.4 Sex of the respondent? 1=Male; 2 =Female

2.5 How old are you, in years?

2.6 What is your current marital status? _____

- 1 Single
- 2 Married
- 3 Divorced/separated
- 4 Widowed

2.7 What is the highest level of education reached?

0	None	8	Primary 7	16	College 1
1	pre school	9	Primary 8	17	College 2
2	Primary 1	10	Secondary 1	18	College 3
3	Primary 2	11	Secondary 2	19	College 4
4	Primary 3	12	Secondary 3	20	University 1
5	Primary 4	13	Secondary 4	21	University 2
6	Primary 5	14	Secondary 5	22	University 3
7	Primary 6	15	Secondary 6	23	University 4 & above

2.8 What is your primary occupation?

1	Not working	4	Business-trade/services
2	Crop farming	5	Wage employment in the primary sector
3	Livestock production	6	Government employment
		-888	Other specify

2.9 What is your relationship with the head of the household? _____

1	Head	8	Son/Daughter in law
2	Spouse	9	Grandchild
3	Own child	10	Other relative
4	Step child	11	Unrelated
5	Parent	12	Brother/sister in law
6	Brother/sister	13	Parent in law
7	Nephew/Niece	14	Worker

2.10 What is the type of this household_____

1 Male adult headed household
2 Female adult headed household
3 Male child headed household
4 Female child headed household

2.11 In total how many people live in this household (household members)? [including the respondent]

2.12 Total size of the household farming farm(s) in acres

2.13 Total size of the household sugarcane farm(s) in acres

2.14 Nature of sugarcane land ownership_____

1	Own land	5	Given by friends and relatives
2	Inherited	6	Renting only
3	Given by government	7	Renting and partly own land
4	Given by association	-8	others (specify)

2.15 Years in sugarcane production activities_____

2.16 What influenced you to engage in sugarcane production activities?

_____

1	Inheritance	5	Access to credit/agricultural financing

2	Association membership	6	Availability of suitable land for sugarcane
3	Purchase and supply contracts with Sugar producing companies	7	Access to agricultural fairs or farmer field days
		-8	
4	Access to markets	8	Other reason (Please specify)

2.17 Are you a member of any organization? _____1=Yes; 2=No

2.18 In how many organisations do you have membership?

_____

2.19 Specify which organization(s) you are a member?

_____

1	Agricultural / livestock/ fisheries producer's group (including marketing groups such as AMCOS)
2	Credit or microfinance group (including SACCOS/merry-go-rounds/Village Saving and Lending Associations-VSLAs)
3	Mutual help or insurance group (including burial societies)
4	Civic groups (improving community) or charitable group (helping others)
5	Trade and business association
6	Religious group
7	Water users' group
8	Forest users' group
-888	Other specify

2.20 Do you have a savings/bank account (including cooperatives, VICOBA, ROSCAS etc.) _____

1=Yes; 2=No

2.21 In which saving/banking institutions do you have account with?

_____

1	Commercial bank	4	Groups such as ROSCAs
2	SACCOs	5	Village banking (VICOBA)

3 Microfinance 6 Phone Banking

2.22 Did you access credit in the past 12 months? _____1=Yes; 2=No

2.23 Did you get access to extension services last season (2019/2020) such as a visit by extension agent on sugarcane production? _____ 1=Yes; 2=No

2.24 How many times on average did you receive advice from extension agents on sugarcane production? _____

2.25 Is sugarcane production your main source of income? _____1=Yes; 2=No

2.26 Which other key crops are the main sources of your income? [Mention three main crops] _____

2.27 What is the proportion (%) contribution of sugarcane to the total income earned from crop farming activities? _____

3. Economics of Sugarcane Production

3.1 What was the level of productivity (Quantity harvested) in tonnes/acre last season? _____

3.2 What was the cost you paid for the planting materials per acre? (TZS/ acre) _____

3.3 What is the cost you paid for fertilizer per acre? (TZS/ acre) _____

3.4 What is the cost you paid for agro-chemicals per acre? (TZS/ acre) _____

3.5 What is the cost you paid for irrigation water per acre? (TZS/ acre) _____

3.6 Did you rent the sugarcane land during the last agricultural season? 1=Yes; 2=No_____

3.7 What was the average rental cost of sugarcane land for farming during the last agricultural season (TZS/acre)? _____

3.8 What were the costs of your land preparation activity (Total cost in TZS per acre) _____

3.9 What were the costs of your Crop establishment/planting activity (Total cost in TZS per acre) _____

3.10 What were the costs of your weeding activity (Total cost in TZS per acre) _____
3.11 What were the costs of your fertilizer application activity (Total cost in TZS per acre) _____
3.12 What were the costs of your agro-chemicals application activity (Total cost in TZS per acre) _____
3.13 What were the costs of your thinning activity (Total cost in TZS per acre) _____
3.14 What were the costs of your animal scaring/security activity (Total cost in TZS per acre) _____
3.15 What were the costs of your sugarcane burning activity (Total cost in TZS per acre) _____
3.16 What were the costs of your harvesting activity (Total cost in TZS per acre) _____
3.17 What were the costs of your transporting activity (Total cost in TZS per acre) _____

3.18 What is the quantity of land you used in the production of sugarcane in acres last season? _____

3.19 How did you obtain the land you used in the production of sugarcane last season?

1	Purchased	5	Borrowed-in
2	Received as gift or inheritance	6	Just walked in
3	Rented-in for fixed payments	88	Other specify
4	Sharecropped-in		

3.21 If rented-in for fixed payments, what was the rental cost per acre? _____
3.22 Has there been any change to your sugarcane area planted in the past five years? _____1=Yes; 2=No
3.23 What is the change to the sugarcane area planted? _____

1 Increased area of sugarcane planted
2 Decreased area of sugarcane planted

3.24 What has influenced the change of sugarcane area planted?_____

_____

3.25 What is the production calendar of sugarcane (In which months do you
harvest)?_____

_____

3.26 Did you incur any crop loss after harvest? _____1=Yes; 2=No

3.27 What was the cause of the loss after harvest?

_____

3.29 What is the quantity of sugarcane in tonnes that was LOST?

_____

3.30 What is the quantity of sugarcane in tonnes that was HARVESTED last season? _____

3.31 What was the selling price of sugarcane in TZS/tonne last season?

_____

3.32 Did you face any constraints in selling your sugarcane last season?

_____

3.33 What were the constraints in selling your sugarcane last season?

_____

1	Lack of transport means	4	Sugar production companies breach of Cane Supply Agreement (CSA)
2	Poor market prices	5	Extreme weather conditions
3	Poor road network	6	Non-membership in AMCOS
		888	Other specify

3.35 Do you have any binding arrangement with the sugarcane buyer? 1=Yes; 2=No_____

3.36 What type of contract? _____

1 Own formal (Written contract)
2 Formal (Written contract) through the AMCOS
3 Informal

3.37 How often do you review the Cane Supply Agreement (CSA)?_____

1	Biannually	3	Anytime whenever need arises
2	Annually	4	No any contract review is conducted

3.38 What are the main constraints in your sugarcane production activities?
_____

1	Lack of suitable sugarcane varieties
2	Nonavailability of improved agricultural technologies
3	Inadequate extension support
4	High production costs
5	Shortage of labour
6	Farmers-Pastoralists conflicts
7	Lack of reliable markets
8	Plant diseases
9	Soil fertility challenges
10	Weather variabilities
-888	Other [Please type]

3.40 What is your opinion on what should be done to improve production, productivity, trade and marketing of sugar/sugarcane?
_____
_____

4. Governance and policies

4.1 Are you aware of any organizations responsible with regulating or supporting the sugar industry including sugar trade?
_____1=Yes; 2=No

4.2 Mention the organizations responsible with regulating or supporting the sugar subsector including sugar trade, that you know_____
_____

4.3 Are you aware of any rules, standards, laws, regulations guiding sugar trade? 1=Yes; 2=No_____

4.4 Name any rules, standards, laws, regulations guiding sugar trade that you know _____

4.5 Which rules/regulations are affecting your sugar trading/production activities? Give details or mention them_____

4.6 How do you rate the situation of contract enforcement and protection of property rights in the country (in %)_____

4.7 Had you experienced any breach of contract/trading/Cane Supply Agreement-CSA? _____

4.8 How did you solve the situation in 4.7 above?

_____

4.9 Did you get satisfaction with the way government agencies/organizations on how helped you in solving the situation?
1=Yes;
2=No_____

4.10 What is the source of sugar production or trade information you get?

_____

1 Ministries and other government agencies
2 Private sector organizations such as TPSF
3 Private sector industry-based organizations such as traders or sugar growers' association and AMCOS
4 Sugar production companies
5 Extension agents
6 I don't know the source

4.11 Which media do you use to get sugar trade/production related information? _____

1 Radio
2 Television
3 Mobile phones
4 Newspapers
5 Other print media such as leaflets and booklets
6 Websites/internet
7 Social media platforms
8 Face to face with fellow farmers

4.12 Does smuggling of sugar exist? _____1=Yes; 2=No

4.13 How do sugar smuggling affect your production activities?

_____

4.14 Have you encountered a situation where you had to make bribes connected with selling of your sugarcane?

_____

4.15 How many times has a situation where you had to make bribes connected with selling of your sugarcane happened in the past 12 months? _____

4.16 Was there any instance where the production, trade, export or import policy was abruptly changed and affected your production?
_____1=Yes; 2=No

4.17 What was the policy change and how long did it take to be effective? _____

4.18 Which media was used to get information on the policy change?

_____

1	Radio	5	Other print media such as leaflets and booklets
2	Television	6	Websites/internet
3	Mobile phones	7	Social media platforms
4	Newspapers	8	Face to face with fellow farmers

4.19 For each of the statements below, please indicate the extent of your agreement or disagreement by placing a tick in the appropriate box. The responses are as follows
1=Strongly disagree; 2=Disagree; 3=Undecided/neutral; 4=Agree; 5=Strongly agree

No	**Statement**	**1=Strongly disagree**	**2= Disagree**	**3= Undecided/ Neutral**	**4=Agree**	**5=Strongly agree**
13	Government agencies supply information necessary to plan for the future sugar markets					
14	There is involvement in public consultations, public forums and trade advisory committee					
15	I feel that the sugar sector is over-regulated					
16	It is common for government officials to admit					

	when makes mistakes affecting sugar trade					
17	It takes much time to conform to different registrations and certificates for sugar trading activities					
18	Existing government regulations/restrictions are major obstacles to sugar trade activities such as exporting					
19	Existing documentation processes for licensing sugar import or export are easy and the documents are easy to obtain					
20	There are ad hoc sugar price controls in the market					
21	It is common to make bribes for easing imports/exports or acquiring sugar stock					

22	Our legal systems ensure protection of property rights and private transaction such that it is easy to manage legal contractual agreements in the sugar sector					

5. Social and environmental impacts

5.1 What is the male daily wage in sugar production activities (TZS/man-day) _____

5.2 What is the female daily wage in sugar production activities (TZS/man-day) _____

5.3 Did you hire labour during the last farming season (2019/2020)?1=Yes; 2=No_____

5.3.1 Did you hire labour of below 18 years of age? _____1=Yes; 2=No

5.3.2 Are there practices of engaging labour of below 18 years in the sugar production activities? _____

5.4 How many labour on average did you hire during the last farming season (2019/2020)? _____

5.5 Does sugarcane production affect negatively your household food security?_____1=Yes; 2=No

5.6 How is your household food security affected?_____

5.7 Interviewer: Please ask about food availability in the household in the past 12 months

5.7.1 In the past 12 months, were there instances when there was **NO food** to eat of any kind in your household because of lack of resources to get food? _____ 1=Yes; 2=No

5.7.2 How often did this happen in the past [12 months]?_____

1 Rarely (1–2 times)

2 Sometimes (3–10 times)

3 Often (more than 10 times)

5.7.3 In the past [12 months], did you or any household member go to sleep at night hungry because there was no enough food? _____1=Yes; 2=No

5.7.4 How often did this happen in the past [12 months]?

_____

1 Rarely (1–2 times)

2 Sometimes (3–10 times)

3 Often (more than 10 times)

5.7.5 In the past [12 months], did you or any household member go a whole day and night without eating anything at all because there was no enough food? _____1=Yes; 2=No

5.7.6 How often did this happen in the past [12 months]?

1 Rarely (1–2 times)

2 Sometimes (3–10 times)

3 Often (more than 10 times)

5.7.6 What is the current average level of your household income in Tsh/month_____

5.8 Do you use electricity in your household? _____1=Yes; 2=No

5.9 What are the assets that you are currently owning?

Asset		Number of items currently owned	Current value per unit (Tsh)	Total value (Tsh)	Asset		Number of items currently owned	Current value per unit (Tsh)	Total value (Tsh)
ITEM	**5.9**	**5.9.2**	**5.9.3**	**5.9**	**ITEM**	**5.9**	**5.9.2**	**5.9.3**	**5.9**
Animal	53				phone	54			
Battery	55				piggery	56			
Beehiv	57				Planter	58			
Bicycle	59				plough	60			

Boom	61				poultry	62			
Boreho	63				power	64			
Car	65				Radio	66			
Cart	67				Ridger	68			
Chaff	69				Sewing	70			
Compu	71				Sheller	72			
Cow	73				solar	74			
Crush	75				spray	76			
Donke	77				Stores	78			
Fridge	79				Tractor	80			
Gas	81				Trailer	82			
Gener	83				Truck	84			
Grinde	85				TV	86			
Hamm	87				Water	88			
Harrow	89				water	90			
House	91				water	92			
Irrigati	93				water	94			
Jagger	95				weighi	96			
Landlin	97				Well	98			
Motorc	99				wheel	100			
Pestle	101				zero-	102			
Oxen	103				Other	-			

5.10 What is the roofing material of the main house?

_____

1	corrugated iron sheets	5	grass
2	tiles	6	*makuti*
3	concrete	7	tin-*madebe*
4	asbestos sheets (including decra)	-888	other (specify)

5.11 What is the exterior wall material of the main house?

_____

1	stone	6	wood only
2	brick/block	7	corrugated iron sheets
3	mud/wood	8	grass/straw
4	mud/cement	9	tin
5	mud only	-888	other (specify)

5.12 What is the floor material of the main house?

_____

1	Cement
2	Tiles
3	Wood
4	Earth
-888	other (specify)

5.13 What is the mode of ownership of the main house?

1	owner occupied
2	employer provided
3	rented
4	relative's (owned by relative)

5.14 What type of toilet do you use? _____

1	flush toilet	4	uncovered pit latrine
2	VIP latrine	5	bucket
3	covered pit latrine	6	none
		-888	other (specify)

5.15 What is the main source of water for domestic use?

_____

1	pond	9	piped into house/dwelling
2	dam/sand-dam	10	piped into compound
3	lake	11	Piped outside compound
4	stream/river	12	water kiosk
5	unprotected spring	13	water tankers
6	protected spring	14	roof catchment
7	well	15	water hawkers/cart/bicycle
8	borehole	-888	other (specify)

5.16 What is the main source of water for irrigation? _____

0	Does not irrigate	7	well
1	pond	8	borehole
2	dam/sand-dam	9	Piped
3	lake	10	water tankers
4	stream/river	11	roof catchment
5	unprotected spring	12	water hawkers/cart/bicycle

6	protected spring	-888	other (specify)

5.17 What is your main cooking fuel? _____

1	electricity
2	kerosene
3	firewood
4	Liquefied Petroleum Gas (LPG)
5	charcoal
6	biogas
7	solar power
-888	other (specify)

5.18 What is your main lighting fuel? _____

1	electricity	6	Liquefied Petroleum Gas (LPG)
2	Pressure lamp	7	solar energy
3	tin lamp (paraffin)	8	biogas
4	lantern (paraffin)	9	candles
5	woodfuel	10	dry cells
		-888	other (specify)

5.19 Do you know any environmental effects associated with sugarcane production? _____1=Yes; 2=No

5.20 Mention any environmental effects associated with sugarcane production that you know? _____

5.21 What measures are you using to minimize environmental effects associated with sugarcane production?

_____

5.22 Has the Novel Coronavirus (COVID 19) pandemic affected the sugar sub-sector including your sugarcane production activities?

_____

5.23 What has been the effects of the Novel Coronavirus (COVID 19) pandemic on the sugar sub-sector including your sugarcane production activities? _____

6. Gender dimensions in the sugar sub sector

6.1 Did this household make decisions on the followings?

1 Selection of crops to grow

2 Allocation of land to crops

3 Sells of sugarcane

4 Selection of sugarcane variety to plant

5 Use of production (amount of harvest saved for household consumption, sold, stored, used as animal feed, etc.)

6 Crop planting/sowing activities: This would include method of sowing, timing, land preparation.

7 Household labor (family members working in the field, when family who from the family works in the field and when they work)

8 Food crop farming: These are crops that are grown primarily for household food consumption

9 Cash crop farming: These are crops that are grown primarily for sale in the market

10 Non-farm economic activities: This would include things like running a small business, self-employment, buy-and-sell

11 Wage and salary employment: This could be work that is paid for in cash or in-kind, including both agriculture and other wage work

12 Major household expenditures (such as a buying a bicycle, land, motorbike)

13 Minor household expenditures (such as food for daily consumption or other household needs

14 Children education (e.g. whether to send them to school, where should children go to school)

15 Whether or not to use family planning to space or limit births

16 Use of the revenue from sales of sugarcane

3.14 Who made those decisions in 6.1?

1=Female household head

2=Male household head

3=Spouse

4=Jointly

5=Another household member

6=Other non-household members

6.3 In sugar cane production, are there activities that are specific for men and women? _____1=Yes; 2=No

6.4 In sugarcane production, what activities are specific for women?
_____

6.5 In sugarcane production, what activities are specific for men?
_____

6.6 What is the percentage of men involved in sugarcane production?
_____

6.7 What is the percentage of women involved in sugarcane production?
_____

6.8 What is the percentage of men involved in sugarcane marketing?
_____

6.9 What is the percentage of women involved in sugarcane marketing?
_____

6.10 Interviewer, provide any comment regarding the interview and the farmer/respondent_____

END OF THE SURVEY
(Interviewer: Kindly thank the respondent)

Appendix 4: Sugar supply chain actors' key informants' checklist

Impact of Trade Policies on Sugar Subsector in Tanzania-Key Informants Checklist

1. INTRODUCTION

1.1 We are part of a team of researchers from Sokoine University of Agriculture (SUA) implementing a Research Survey to Track the Impact of Trade Policies on Sugar Subsector in Tanzania. This survey is planned for determining the impact of trade policies on driving trade and investments in the sugar subsector. The study will ascertain the kind of trade policies needed for driving and achieving investments and trade, and how existing trade policies are affecting the sugar subsector. This is important for ensuring that sugar trade and investments become a driver of positive change to maximize economic and social impacts, especially at this time when Tanzania strives for agricultural transformation while nurturing industrialization.

You have been selected as among the key actors of the sugar supply chain to participate in this study.I recognize the value of your time and your participation is highly appreciated. Your responses will be kept CONFIDENTIAL and will be analyzed jointly with other respondents. If you decide NOT to take part

in the survey, you can change your mind at any time and leave the survey.

1.2 Do you agree to take part in the survey? 1=Yes; 2=No

Discussion Questions

1. Respondent's name and position in the organization_____

1.4 Respondent's contact details_____

2. For how many years have you been working in this organization? _____

3. When was this organization established? _____

1.7 What are the main activities of this private sector industry-based organization?

_____
_____

1. How many members does the association have and how membership is obtained?
   _____
   _____

2. What is the production calendar of sugar in Tanzania?
   _____

3. What are the key challenges of the sugar sub-sector?
   _____

How is the sugar value/supply chain linked? (input supply and services-production-aggregation-processing-trading) and the end-to-end supply chain that is factory/producer-distributor/agents-wholesalers-retailers-consumers?_____
_____

4. What are the organizations responsible with regulating or supporting the sugar sub-sector including its trade, that you know?

Name of the organization	Key area regulated/supported within the sugar subsector

1. Mention the rules, standards, laws, and regulations that you know which are used in regulating the sugar subsector?

Name of the institution (rules, laws, regulation, standards etc.)	Category of the institutions
Codes for category of institutions 1=Rules/regulations; 2=Safety, quality and standards; 3=Local government authorities' bylaws; 4=Preferential agreements; 5=Other specify	

2. Which rules/regulations are affecting sugar trading/production activities? Give details or mention them
3. What are the key products produced by the sugar manufacturing companies?
   _____ (sugar, molasses, ethanol, electricity etc)

4. Does smuggling of sugar exist? How does it happen?
   _____

5. Is Tanzania a high cost producer of sugar or there is dumping during importation?
   _____

6. What proportion (%) of the quantity of sugar produced domestically is sold to industrial consumers?
   _____

7. How is the import quota for gap sugar determined?
   _____

8. How is industrial sugar imported?
   _____

9. Do our trade policies affect the levels of domestic price of sugar? _____

10. What are the contributions of the sugar sub-sector to national development?
_____

11. What model of sugar production do you recommend to be suitable for Tanzania (mega estates, independent growers, small scale out-growers,
mixed)_____

12. What are the environmental effects are associated with sugar production and how are being minimized by Tanzania sugar producers? (land, water, ecosystem, greenhouses gases emissions etc)

13. What are the ongoing investments in the sugar sub-sector? In which areas is investment happening (land expansion, new technologies, varieties etc)?
_____

14. What is your opinion on what should be done to improve sugar production and trade in Tanzania?
_____

END OF THE SURVEY
(Interviewer: Kindly thank the respondent)

Kuhusu Tasnifu Hii

Utafiti huu unatumia minyororo ya thamani ya kimataifa ya mazao ya kilimo (GVCs) ya kahawa na sukari nchini Tanzania kutathmini athari za sera ya uthibitishaji, ambayo ni moja ya sera za biashara za GVCs, mazingira ya sera za biashara za nchi (utawala wa biashara), na umuhimu wa GVCs katika kuhakikisha utoaji wa faida za kijamii, kiuchumi, na mazingira. Utafiti huu unatumia takwimu zilizokusanywa kutoka kwa wakulima wa kahawa 400 na wadau wa sukari 375. Utafiti huu umeonyesha kuwa utawala wa biashara ni muhimu katika kuhakikisha utoaji wa faida kwa washiriki wote katika biashara. Utafiti huu unathibitisha kuwa utawala unaathiri biashara ya sukari kwa kiwango tofauti kati ya wakulima na wafanyabiashara. Utafiti unaonyesha zaidi kwamba sera ya biashara ya uthibitishaji wa GVCs haitoi faida za kijamii na kiuchumi lakini inachangia kwa kiasi kikubwa katika uhifadhi wa mazingira. Zaidi ya hayo, biashara ya GVCs inachangia kwa kiasi kikubwa katika kuboresha maisha na usawa wa kijinsia. Utafiti huu unapendekeza kuhakikisha sera za biashara ni thabiti na zinazotabirika. Sera ya uthibitishaji wa kahawa inapaswa kutekelezwa kwa kurahisisha unufaikaji wa malipo ya bei kwa wakulima na ushiriki katika biashara unahimizwa.