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THESIS

SHORT FOOD SUPPLY CHAINS; A TOOL FOR BUILDING SUSTAINABLE RURAL ECONOMIES

(CASE STUDY TANO NORTH MUNICIPALITY, GHANA)

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LIST OF ACRONYMS &ABBREVIATIONS

GSS - Ghana Statistical Service

LFS - Local Food System

MOFA - Ministry of Food and Agriculture

SFSC - Short Food Supply Chain

CHAPTER ONE - INTRODUCTION

1.1 Background of the Study

The production and distribution of inputs (seed, animal feed, fertilisers, pesticides), agricultural production (crops, livestock, fisheries, wild foods), primary and secondary processing, packaging, storage, transport, and distribution, marketing and retail, catering, domestic food management, and waste disposal are all included in the concept of food systems. Food systems are important as they include not only the actions that take place along the food chain but also their results and governance (Vermeulen et al. 2012).The growing concern for agriculture activities to cover the increasing demand for food amidst resource scarcity, along with the interest in the quality of consumed food and the ability of poor consumers to cover their minimum dietary requirements, have led researchers and stakeholders to shift their focus to practices that can increase food production and improve food quality without negatively affecting the environment (Evagelos et al. 2020). However, this task is far from easy. The past decade has seen substantial and growing interest in the promotion of local food systems throughout developed and developing economies as it is believed shifting attention to building a resilient local food system has the potential of scouring the economic security of local societies. A "new normal" of consumers demanding fresh local produce has been driven by the belief that local food production systems are more sustainable, healthy, and supportive of local economies has since gain much attention particularly post pandemic era.

The fourth industrial revolution, commonly known as industry 4.0, has led to the adoption and use of various disruptive technologies in many sectors (Food and Agriculture Organization, 2010). Agriculture, being one of the most critical sectors for the sustained growth of most countries, can also significantly benefit from them (Hallegatte & Rozenberg, 2017). The outbreak of the novel Covid 19 pandemic which took the world by storm and caused widespread damage affecting both developed and developing economies have also brought into focus several issues, including food safety and hygiene coupled with global movement restrictions which weakened the traditional global supply chains (AU-IBAR, 2020). Not only has this situation disrupted the usual supply of commodities but has since brought about innovations and a shift to sourcing what we consume

internally. These phenomena resulted in the intensification and springing up of a backyard garden across urban-rural centers all to meet their dietary requirements.

Over the decades the supply of food has evolved as consumer purchasing preference keeps changing. The traditional food supply chain revolves around all stakeholders including intermediary actors by which food products go through before finally ending up on our plates. In this food chain Farm produce move from the harvest field to the farmers or public storage facilities such as silos. Depending on the product in question value addition activities commences through Manufacturing companies which among many activities include sorting, processing, packaging, or directly packing them before handing over the value-added product to a logistics management company for distribution and transportation to the various markets where consumers can purchase this product before finally ending up in the plates of household. It is common for each stage of the value addition process to occur in different locations, and for food products to be transported across long distances, including across borders, for further processing. While this extended food supply chain can provide consumers with access to a wider variety of food products, it can also increase the risk of food contamination, spoilage, and other quality issues. Factors such as improper handling, storage, and transportation can lead to changes in the quality attributes of the produce, resulting in inferior goods.

In current times there have been major advances to redevelop local food systems (LFS) and of which short food supply chains (SFSC) of various types like farmers markets and shops, on-farm direct sales or better known as “farmgate markets”, delivery of schemes including other informal partnerships between producers and consumers not just among developed nation but in developing economies. These new frontier is broadening the scope of discussion for policy decision-makers to rethink their policy approach, innovations and food networks concerning the usual supply of food due to the evolving global supply chain which is prone to eminent shock and disruption resulting in the distancing of food for those it was initially cultivated for and resulting in “disconnecting” producers from consumer. One may say that this disconnection meant many consumers have little or no idea about the origin of what they consume. Again, most food producers operating small scale farms especially in developing countries, mostly suffer a shortfall in the full value of their total output which is mostly in its raw state making larger agribusiness firms, processors, retailers, and other intermediary benefits from the value-added to this food

produce. Products marketed using SFSC coupled with other improved activities are generally seen as a potential avenue to retain the higher share of the added value for the farmer and answer the consumers' skepticism around food safety by providing some form of assurance and traceability whenever they demand such products. According to Environmental and Natural Resources Division, (2012), SFSC and LFS are mentioned as strengthening local economies, improving carbon footprint, adding to food security at the household level and granting access to a wholesome diet, and significantly contributing to the sustainable operation of smallholder farms and businesses. Although rural development policies across various economies focus on initiatives to support local food systems through measures of value-adding, and quality schemes, off-farm diversification, employing smart farming technologies and innovations on farm operations, short food supply chains have become a new thematic area for the development of local economies. As there is great interest in knowing how smallholder farms will be capable of meeting the growing demand for high-quality, traceable foodstuff and on the other side support the local economies and community because of consumers purchasing decision-making is seen at the crossroads of several agricultural policies across the world.

Problem Statement

Despite the adoption of various Smart farming (SF) practices and the development of improved food supply chains, their positive outcomes and how these innovations are currently being used to benefit small-scale farmers, remain unclear, in developing countries particularly Ghana. In Ghana, the high import of food commodities that could be readily produced within the country is too expensive to venture. Again, the persistent hikes in prices of food commodities coupled with high post-harvest loss especially in the off seasons and sometimes in the boom season have significantly increased household spending. This has further raised concern to understand the synergy between ICTs and farm machinery in SF and SFSC for the sustained maximization of agricultural productivity for small-scale farmers and increase the value generation for stakeholders participating in shorter food supply chains schemes and further build consumer confidence in the safety of food they consume.

The aim of the study is to determine the factors motivating both farmers and consumers to participate in a short food supply chain within the study area. Specific research questions objectives are as follows:

Research Objectives

1. Identify the various short-food supply chain schemes in the study area.
2. Determine the motivation for smallholder farms to participate in direct marketing to consumers.
3. Ascertain the consumer's attitude and motivation to directly marketed produce.
4. Ascertain the constraints to participating in short food supply chain.

Significance of Study

The global challenges of sustainability, food security, and nutrition require innovative solutions that increase food production while reducing environmental impact. Smart farming and short food supply chains (SFSCs) are promising alternatives that can improve the value-generating capacity of local food systems and enhance access to high-quality, affordable, and healthy food. However, there is limited empirical evidence on the factors that motivate producers and consumers to participate in SFSCs, especially in developing countries. This study aims to address this gap by investigating the drivers and barriers of SFSC participation among small-scale farmers and consumers in rural and urban areas of Tano North Municipality Ghana. The study will employ a mixed-methods approach, combining surveys, interviews, and participatory observation, to collect data from key stakeholders. The findings will contribute to the literature and policy debate on alternative food supply chains and inform the design and implementation of effective interventions that promote local food markets. Ultimately, this study seeks to enhance the sustainability, resilience, and equity of food systems in Tano North Municipality Ghana and beyond.

CHAPTER TWO - LITERATURE REVIEW

2. Introduction

This chapter is present literature on the Study and is organized as follows. Section 2.2 describes short food supply chains and Local food System, Section 2.3 The Social, Environmental, And Economic Benefits of Short Food Supply Chains. Section

2.1. Short Food Supply Chains and Local Food Systems

Up until now, there has not been a generally accepted definition for "local food" as many uphold that the term is a geographic connotation(centered) that stands for food produced within many miles from where it is sold. The current study canvas local food as food that is distributed directly to consumers through short food supply chains. I must clarify that a short food supply chain in this context does not only connote short distances between the production and consumption of food but more so intermediary actors between producers and consumers. According to a study by Woods et al. (2013) stated that local food systems with short supply chains enable the preservation of farm identities and relationships, as well as the preservation of product value between farms and consumers. In this regard, local food systems and short food supply chains can be said to include two broad types of market transactions for food distribution: direct markets and intermediate markets. Direct markets describe exchanges of food from farmers or producers directly to end consumers or institutional buyers.

2.2.1 Local Food System

Local food systems can be said to have all foods produced, processed, and retailed(sold) within a stipulated (specific) geographical area. This system may include farmers' markets, farm gate sales, community-supported agriculture, and special arrangement such as public procurement schemes which source food products within a particular geographical location(radius).it can be said that foods within the local food system are those with distinct qualities and characteristic and can also be traced to its origin. They normally come in the form of unprocessed or semi-processed foods. There has been an attempt to define where a local setting ends as there are yet to be legally acceptable definitions hence it could mean differently depending on the context it is situated. In

my study the word Local could relate to larger geographical scales with focus on rural and urban settings. For instance, In the case of Ghana where population is the indicator according to Ghana statistical service, (2016) where a community can only be classified as a rural area when its population is below 5000 indirectly suggesting that any population above the stated figure is deemed urban. A study by Council for the Preservation of Rural England, (2002) suggested that supermarket chains operating at national and across borders commonly refer to a whole region or even country as a 'local' considering the evolving nature of contemporary food systems, it becomes even difficult to define 'local' food for simple commodities. For instance, for complex product with several ingredient's this observation could even get more complicated as a product may be cultivated or raised in a location, relocated to a processing facility for value addition which may including packaging before returning to its origin to starts its marketing. This scenario may qualify to be referred to as 'local' food as its production and consumption all happened locally but may have had the product moving across several miles before finally making its way onto the plates of the final consumer. Tacoli, (2017); Tacoli and Agergaard, (2017) suggested in their study that small towns have been recognized as bearing consumption demand and service provision to rural areas and contributing to diversifying the local economy.

2.2.2 Short food supply Chains

It is not easy to define short food supply chains (Kneafsey et al. 2013, Martinez et al. 2010;). Many researchers have adopted the definition of Marsden et al. (2000) of short food supply chain as having the capacity to re-socialize/ re-spatialize food hence making it possible for consumers to make informed decisions based on the value of foods. foods in this context involve the locality or the farms where they were cultivated. Marsden et al. (2000) again highlighted that it doesn't matter how long a product(food) is handled nor the distance it takes for it to be transported although it is important, what is crucial is the arrival of the product to the consumer with details of the features of the product on its package. This he says, "enables the consumer to confidently make connection and association with the place/space of production and potentially the values of the people involved, and the production methods employed". In this way, the product is projected as distinct compared to other products without this feature, and this usually results in the attraction of premium prices and normally becomes scarce on the market largely because it is deemed valuable. Maye & Kirwan, (2010) also stressed 'locality' in an attempt to define SFSC by

upholding that it is a direct relationship between farmers and consumers coupled with higher quality being the key features of a short food supply chain. Jarosz, (2008) Went further to throw more light by stating SFSCs typically involve the use of various marketing channels. This view by Jarosz,(2008) was also shared by (Renting et al., 2003 or Watts et al., 2005). Although most farmers use several marketing channels for direct selling in parallel according to Brown and Miller, (2008), many research findings have identify these three main types of Short food Supply chain as they clearly show the connection between producers of food and consumers (Renting et al., 2003 or Marsden et al., 2000), In their work they identify:

Face to face, which has to do with consumers purchasing directly from food producers/processors which goes to validate and create trust between the consumers and producers through their interaction as the origin of the food is known. Among these types of SFSCs are Purchases at Farmgate, Farmers Market, Roadside sale.

Spatial Proximity has also been identified as another key type of SFSCs. This has encompassed all food produced and retailed/sold in a particular geographic region of production with consumers fully aware of the 'local' attributes of the food at the point of sale. According to Laura Venn et al. (2013) this type may include specialist retailers such as butchers, grocers which normally sell their locally produced foods.

Spatially Extended this category of SFSCs has to do with the making available of information on the origin/place and processes of production to consumers whose geographic region are out of the place of production of the food they consume and have no prior knowledge of that production area. In this type of marketing channel, product information about the distinct area is explained in such a way that it has details about the soils, topography, climate and locally embedded skills and knowledge on how the food product was produced and it is communicated usually on the packages of the product. In the study of Renting et al. (2003) different quality conventions were also identified to be associated with SFSCs. They cited the links with the place of production which has to do with regional/geographic specific specialty foods. They further identified the bioprocesses and consumers' concerns about the environment and food safety. Renting et al, (2003) went on to agree that there may be a blurred distinction between the two spatially expanded groups they identified and that producers actively draw 'hybrid' quality conventions which are centered on both dimensions.

By the mere meaning of the term SFSCs one will agree as one with a minimal intermediary in the case in other definitions Ilbery and (Maye, 2006 or Maréchal, 2008 or Aubry & Chiffoleau, 2009) alluded to these reasoning that the key criterion for short food supply chains has to do with the number of intermediaries between food producers/farmers and consumers which should be one. Indeed, a short Food supply chain differs from direct sales as it can cover systems where the sale to the final consumer is made by a cooperative or a shop / supermarket (Kneafsey et al., 2013).

2.3 The Social, Environmental, And Economic Benefits of Short Food Supply Chains

Several studies have highlighted the social, environmental, and economic benefits associated with local food systems and short food supply chains. The UK's Soil Association in 2001 defined sustainable local food economy as "A system of producing, processing and trading, primarily of sustainable and organic forms of food production, where the physical and economic activity is largely contained and controlled within the locality or region where it was produced, which delivers health, economic, environmental and social benefits to the communities in those areas." We can clearly see from the definition that economic activity is retained locally with several benefits delivered.

Many researchers have explored some of the benefits alluding to short food supply chains over the years within local food systems. (Hendrickson and Heffernan, 2002 or Susan.s. Jia, 2022) campaigned against globalization of food systems to preserve local food practices which they believe will contribute to defending local economies, communities, knowledge, traditions, and the environmental resources. These perspectives by the authors bring to light the influence of global capitalism which affects local foods systems by over empowering stakeholders between food producers and the final consumers ignoring the local origin/ communities from which these food commodities are produced.

Saltmarsh et al., (2011) used the capital assets framework (see Figure 1) deduced from the sustainable livelihood approach to back qualitative and quantitative assessment of the impacts of local food systems across five different assets.

Human capital: generating greater employment opportunities at the local level, encouraging skills transfer and training.

Financial capital: supporting local services and suppliers and increased retention of money within the local economy.

Physical capital: supporting local shops and markets.

Social capital: improving diet and health through increased access to nutritious food; increasing social contact between people; increasing understanding of the links between food, environment, and health; increasing opportunity for community involvement; making greater use of co-operation between businesses.

Natural capital: encouraging farmers to adopt more environmentally friendly production systems; generating fewer 'food miles'; enhancing the viability of traditional farming systems that benefit the environment; conservation of air, soil, and water, including reduced pollution and waste.

Figure 1: Capital asset framework

Source: Foundation for Local Food Initiatives (2003)

Balazs et.al, (2013) Argued in their study that to capture the significance of social relationship which are part of food chains researchers tried to rely on indicators of social impact of LFS/SFSCs and resort to use of concepts like trust, social Embeddedness which is believed to not be a robust indicator. They went on to identify critical social benefits that can be accrued from the LFS/SFSCs.

1. Social interaction, trust, social embeddedness: Sinnreich, (2007) study Polish Farmers' Markets, found that the building of relationships between consumer and producer is 'essential' and provides a 'unique experience'. It went on to say that explaining product features to the consumer is easier and many people (especially older people) prefer to talk to someone who knows something about the product. for instance, a study by Smithers et al. (2008) on 15 Farmer's Markets in Canada, found that customers typically wish to support, preferably local, farming and farmers/producers. On the other hand, producers were not particularly valued by consumers, who indicated a preference for a more traditional and passive role (Murphy, 2011). Again Kirwan, (2004) found in his research of producer and consumer motivations for attending Farmers' Markets, that the social benefits were often seen as a "welcomed by-product rather than a primary motivation".

2. High sense of Community: there have been case studies in different countries to explore the community's relationship and the growing and eating of food. A study by Hayden and Buck, (2012), on CSAs for instance which explored 'social concerns' in New York demonstrated through the open and sympathetic nature of members towards the farmer's personal struggles. DeLind, (2011) through his research determined the market in terms of 'community'; as place-building and improving of relationships around neighborhood-based, food-related activities. Chiffoleau, (2009) study of farmers' markets and box schemes in southern France talked about 'relationships' and found that, "alternative supply chains can renew ties between producers by decoupling political relations and through the embeddedness of sales activity in technical and friendship relations, both of which favor co-operation towards innovation." Just as several researchers identify the crucial role of trusting social relationships which build a sense of community association with LFS/SFSCs, other case studies discussed the possibility for short food supply chains to add on to social inclusion. Hardesty et al. (2014), argued that LFS/SFSCs allows producers to build direct, personal relationships with their supply chain partners and buyers. Dawn Thilmany et al. (2020) in their study stated that community networks enable local farms/smallholder farms to leverage and find inputs, including labor, secure new buyers and this further escalate word of mouth and social promotion of food products.

Environmental benefits of LFS/SFSCs

It may be sketchy to establish the environmental benefit be it negative or in the stern of its positivity recent study the further raises the skepticism surrounding the environmental impact of short food supply chain. Mancini et al. (2019) suggested in their study that trading smaller quantities across shorter distance and proximity may equally have negative impacts on the sustainability of the environment. In as much as there exist some negative impact s suggested, this impact could be insignificant to the benefit associated to short food supply chains (Bloemhof & Soysal, 2017). Poponi et al., (2021) highlighted the bio-district which is a concept of SFSC goes a long way to preserve the landscapes, resources, and biodiversity of the locality where the demand for environmentally friendly products. This, they say encourages better management and control of critical factors such a supply, marketing, customer relations and selling price decision which are all link to the economic benefits.

Economic benefits of LFS/SFSCs

Researchers over the years sort to determine the economic benefit accrued to the locality and participants in LFS/SFSCs and many suggested that LFS/SFSCs con contribute to the development of rural and its entire regeneration. The famous work of Du Puis and Goodman, (2005) stated that SFSCs can be "seen as new sources of value added which can be retained locally and can act as a catalyst for rural economic regeneration and dynamism." He went on to solidify his suggestions by stating "LFS/SFSCs are able to valorize those qualifiers of 'the local' and its socio-ecological attributes—terroir, traditional knowledge, landrace species, for example—that can be translated into higher prices." (Renting et al. 2003 or Pearson et al. 2011) suggested in their study that LFS/SFSCs can reverse the decline of rural services and the depletion in food and farming physical infrastructure. Balazs et.al. (2013) suggested that it is believed that shortening the number of links in the supply chain results in increased local sales, increased demand for local services, and increased labour markets. Other studies also suggested that LFS/SFSCs for instance farmers market may result in attracting shoppers/consumers into location/communities they would not necessarily visit, and this results in increased trade for local business.

Several studies stated the direct benefit especially on the income of smallholder farms participating directly in alternative supply chains. Pearson et al. (2011) suggested in their study that producers are able to add a price premium when selling through SFSCs and benefit from a larger share of his study that SFSCs create an opportunity for growers to diversify and add value to their produce that would not usually be marketed.

2.3.2 Consumers motivation for the participation in short food Supply

Pokorná, Pilař and Balcarová, (2015), in their study reiterated how important it is to explore and understand consumers' perceptions of the various short food supply chain schemes and their purchasing behavior and decision making when it comes to the development of a short food supply chains especially for farmers making the effort to explore these distribution channels for their produce. Consumers who make the conscious decision to purchase their stable food from famers exploring these channels of distributing their produce tend to satisfy their current interest for nutrition, health, well-being, and on the long run turn to support local farmers (Cassia et al., 2012 or Onianwa et al., 2005 or Smith and Sharp, 2008 or Cassia et al, 2012) argued in their studies

that most consumers aim at social issues as part their values in their purchasing decision making. Issues relating to supporting local producers, strengthening the local food system coupled with other ethical or green values. Consumers tend to concentrate more on the benefit they stand to accrue from buying premium goods from their first point of contact as they demand food with a high added value (Pokorná, Pilař & Balcarová, 2015). They went on to argue that function factors concentrating on fresh, safe, healthy, organic, and locally grown products aligned with the consumers' personal interests.

2.4. Ghana and Agriculture

Ghana is a country located in West Africa, with a total land area of approximately 238,533 square kilometers. It is bordered by Côte d'Ivoire to the west, Burkina Faso to the north, Togo to the east, and the Gulf of Guinea to the south. Ghana has a population of over 31 million people GSS, (2022) and is known for its rich culture, vibrant music scene, and diverse wildlife. Agriculture is the backbone of the Ghanaian economy, employing over half of the country's workforce Food and Agriculture Organization, (2021) and contributing to over 20% of the country's Gross Domestic Product (GDP). The sector is dominated by smallholder farmers who rely mainly on rain-fed agriculture for their production. The country has a diverse range of crops, including staples like maize, rice, cassava, and yam, which are the main sources of food for Ghanaians GSS, (2019) In addition, Ghana is a major producer of cash crops like cocoa, oil palm, and rubber. Cocoa is the country's main agricultural export, with Ghana being the world's second-largest cocoa producer after Ivory Coast (ICCO, 2021). Other crops grown in Ghana include fruits and vegetables, such as pineapples, mangoes, tomatoes, and peppers. The livestock sector is also significant, with poultry, cattle, sheep, and goats being raised for meat and dairy production.

Despite the enormous potential of Ghana's agricultural sector, it faces several challenges, including limited access to credit, inadequate irrigation systems, post-harvest losses, and climate change (AfDB, 2019). To address these challenges, the government and other stakeholders have implemented various policies and programs aimed at modernizing the sector and promoting sustainable agriculture. Some of these policies include the Planting for Food and Jobs program, the One Village, One Dam initiative, and the Climate-Smart Agriculture program. These programs aim to improve access to credit and technology, develop irrigation systems, reduce post-harvest

losses, and promote climate-smart agriculture practices to enhance productivity and increase the income of farmers.

2.4.1 Food Consumption Trend in Ghana

Despite the growing popularity of Western foods, traditional Ghanaian staples like cassava, yam, plantain, and maize remain popular. These foods are often used to make popular dishes like fufu, banku, and kenkey. Like in many other countries, busy lifestyles and changing cultural norms have led to an increased demand for convenience foods in Ghana (Osei-Kwasi et al. 2019). This has led to the growth of fast-food chains, ready-to-eat meals, and processed foods. As Ghana's economy has grown over the past few decades, many Ghanaians have seen an increase in their disposable incomes. This has led to changes in dietary habits, with many people incorporating more meat, dairy, and processed foods into their diets. The rise in non-communicable diseases like obesity and diabetes has led to a greater emphasis on healthy eating in Ghana (Bosu et al. 2016). Many Ghanaians are now looking for healthier food options, and there has been a growing demand for organic and locally grown foods (Asare et al. 2019). As more Ghanaians move from rural areas to cities, there has been a shift in food consumption patterns. Urban dwellers tend to eat more processed foods and fast foods, while those in rural areas often rely on traditional staples and homegrown produce (Mensah et al. 2018).

2.4.2 Food Supply Chain in Situation in Ghana

The greater part of household food consumption in developing countries comes from domestic sources with supplementary imports. Hanna karg et al, (2014). Developed nations over the year have relied on a more globalized food supply chains and this phenomenon is gradually crippling into developing nation as the situation has been changing with the sprawl urban development which is impacting the food systems in their areas. The increasing demand for food is influencing how the globalized market should function with consumers dieting shifting towards more processed foods. Most urban areas consume what they do not grow on their own hence their dependence on their cash income to enable them purchase food exposing them to price volatility. Since Ghana’s attainment of middle-income status there have been additional pressure for food system to deliver variety of foods with the required quality standard.it is expected that most food consumption pattern will change from depending rather on carbohydrate (such as yam cocoyam,

cassava) which are mostly inferior to a more superior protein which include consuming more animal and dairy products as well consuming more fruits and vegetables.

The concept of short food supply chains with strong linkages between rural and urban areas and local production has the capability to curb food related issues like inadequate nutrition, volatiles food prices, food loss and food wastages.

2.4.3 The linkages and the periodic market system of rural -urban places of Ghana

Generally, almost all the staple food demand among those living in rural and urban areas are met by its rural hinterlands either sold directly to the traditional market centers or through distribution channels to the city through a traditional hierarchical system of periodic small-town. Hanna Karg et al. (2017) in their study on how food reaches urban centers in two west African countries urban areas namely Tamale (Ghana) and Ouagadougou (Burkina Faso) and illustrated how unprocessed food flows through both urban centers who share boarders with each other.

The first pointed out to how all produce coming in from the rural and peri-urban areas are assembled at the village markets, before transporting it to the urban market of Tamela and this is the same practice in Ouagadougou as all produce are transported via public transport from an assembly market in nearby villages to the urban market. In terms of Food flows into both urban areas: Hanna Karg et al. (2017) stated that in the case of tamale transportation by road is the only entry point for all incoming and outgoing produce but in the case of Ouagadougou only few selected crops such as rice was transported via railway from Cote d'Ivoire, but all other produce is transported by road to the urban areas. They further observed that almost all high value processed food is imported by plane. Tamale for instance relies on Takoradi and Tema port who both have direct access to overseas imports while in Ouagadougou they depend on Francophone neighboring countries for imports from oversea.

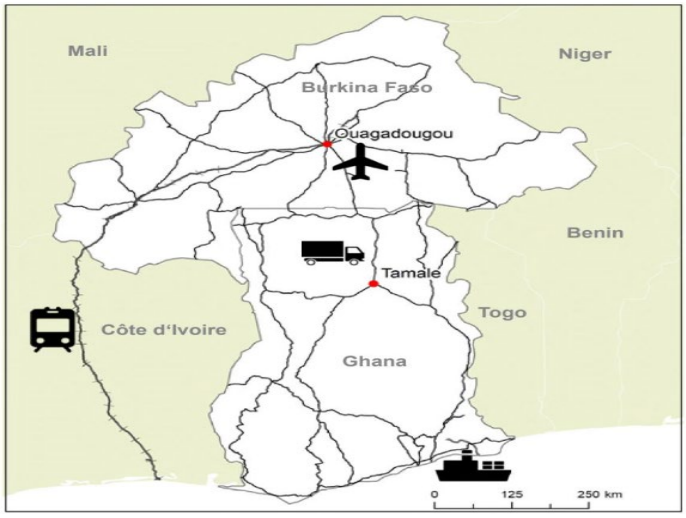

Figure 2: Transport Channels leading to Tamale -Ghana and Ouagadougou -Burkina Faso
Source: Krag et al. (2017)

2.4.4 Agricultural markets towards rural-urban transformation

Within the Ghanaian economy several drivers have promote the development of small towns and its associated rural changes. Tacoli, (2017) in his study stated that apart from the demand for temporary agricultural labour that has long been the driving force to attract migrants to small towns, the opportunity to process and trade agricultural goods can send signals of demand to rural production areas, raising rural income provided the goods are to be marketed. Although the development of small towns and rural areas are tied to agricultural production, emphasis is laid to how they connect with the nature of the agricultural value chains and the commodities been traded. Tacoli and Agergaard (2017), Further explained the importance of value addition to commodities occurring through locally based processing and packaging facilities which may result in the retaining of the gains from these value additions to the local centers. Also, agricultural produce that connects to both local and international markets through aggregation centers in rural areas where local people are hired can attract investment, growth, and development. Overtime periodic markets are being examined away from purely spatial analyses to incorporate networked models of flows of goods and of interpersonal relations. With focus on traders who can be crucial actors in developing the marketing systems and chatter new markets for rural areas (Porter et al. 2007).

CHAPTER THREE - MATERIAL AND METHODOLOGY

3. Introduction

The methodological framework is presented in this chapter. Section 3.1 describes the aim of the study, research questions and the hypothesis. Section 3.2 describes the study area, target population, sample size, sampling technique, types, and sources of data. Section 3.3 describes the methods of data analysis.

3.1 Aims, research questions and hypotheses of the study.

The aim of the study is to determine the factors motivating both farmers and consumers to participate in a short food supply chain within the study area.

Research Questions

1. What are the various short-food supply chain schemes existing in the study area?
2. What are the factors affecting the decision to adopt SFSCs (direct marketing)?
3. What are the factors motivating consumers to participate in directly marketed produce?
4. What constraints are hindering farmers and consumers from participating in SFSC's?

Hypothesis Development

Brunori et al. (2012) highlighted networking skills, other researchers suggested managerial abilities Bauman et al. (2017), and a strong knowledge of the market as key contributing factors to thriving in a short food supply chain scheme. Lans et al. (2016) in their study shared more light on social factors, Pindado et al. (2018) highlighted the entrepreneurial style and competencies require for farmers to be ready and responsive to the dynamic nature of our current economic environment. Theriault et al. (2017); Lawrence and Ganguli, (2016) in their study suggested with evidence that the socio-demographic characteristics of farmers contribute to their operation efficiencies and greatly influence their decision- making abilities. In the case of this study, we focused on these competences and relationships as these demographic characteristic have the tendency to influence both farmers and consumers decision making abilities to either participate

in short food supply chains scheme or not hence the following hypothesis for producers of food (farmers) and Consumers were designed to be tested and after our analysis of the field responses we hope to either accept or reject these claims.

For Producers(farmers)

H1: Farmers concern to connect directly with consumers Has a positive relationship to influence their decision to sell through short food supply chains.

H2: Farmers concern to increase profitability has a positive relationship to participate in short food supply chain.

H3: Farmers' concern to promote sustainability has a positive relationship to influence their decision to participate in a Short Food supply Chain.

H4. Farmers' concern to control the sale and distribution of their produce has a positive relationship to influence their decision to participate in short food supply chains.

H5: Farmers Use of ICT device in their operation has a negative relationship to influence their decision to participation in a short food supply chain.

For Consumers:

H1: Consumers age has a positive relationship to their choice to purchase their commodities from a short food supply chain.

H2: Consumers level of education has a positive relationship to influence their decision to purchase from a short food supply chain Scheme.

H3: Consumers' level of income has a positive relationship to Influence their choice to purchase their goods from short food supply chains schemes.

H4. Consumers relationship with farmers has a Negative influence on how much their willing to pay for their goods.

3.2 Introduction to the study settings and location

The study was conducted among farmers and consumers in the Ahafo Region of Ghana specifically, Tano North Municipal District with Adrobaa, Susuanso as the selected communities. Tano North Municipality was selected for the study because is among the municipalities in the country where agriculture form the backbone of the economy employing two thirds (67.1%) of the active work force which serves as the main source of income and household food supply for the people living in the municipality (GSS,2016).

3.2.1 Ghana

Ghana is a country located in the west of Africa with its capital Accra. To the south it adjoins the Gulf and Guinea and the Atlantic Ocean and shares borders with Ivory coast to the west, Burkina Faso to the north and Togo to the east. It has a total land area of about 239 thousand square Kilometers. The climate is tropical warm and comparatively dry along the southeast coast; hot and humid in southwest; hot and dry in north. Its terrain is mostly low plains with dissected plateau in south central area with about 190m mean elevation. Ghana has a total population of 32.8 million (GSS,2020). English is the official language but there are other main languages that is widely spoken across the sixteen regions of the country which include Dagaare, Dagbanli, Dangme, Ewe, Frafra, Ga, Gonja, Nzema, Twi, Fante. Gold, Cocoa and More recently Oil form the backbone of the Ghanaian economy, and these has aided the economic boom it continuously experiences. Its total Gross domestic Product is 77.59 billion dollars (world bank, 2021) with an annual GDP Growth Rate of 5.4%. Agriculture lands account for about 69% of the total land area of the country. Arable lands constitute 20.7%, permanent crops 11.9%, permanent Pasture 36.5%, forest 21.3% others 9.7% (Mofa, 2016).

Figure 3: Map of Ghana with the Sixteen regions

Source: Ghana Statistical Service, (2018)

3.2.2 Tano North Municipal Assembly

It is one of the six districts in the in the Ahafo Region of Ghana with its administrative capital Duayaw-Nkwantaw. The district is richly endowed with human and natural resources namely touristic sites, precious mineral deposits, rich Forest reserves and timber species, rich soil and good climatic condition these features of the municipality speaks for their natural Biodiversity and scientific values. The increase in the total population of the then Brong - Ahafo region and its accompanying development and expansion in infrastructure saw the splitting of the region into Bono and Ahafo for which Tano North Municipality became part of the Ahafo. Originally the district was curved out of the Tano district in 2004 through the local Government Act 1993(Act 462) The municipality shares boundaries at north- east to Offinso North District and Ahafo Ano North to the south which are all in the Ashanti Region. To the East it shares boundaries with Tano south and on the west with Sunyani municipality which is the regional capital of the Bono Region which is 308 Kilometers (191 miles) away from the administrative capital of Ghana. The

Municipality lies between Latitudes 70 degrees 00′ N and 70 degrees 25′N and Longitudes 20 degrees 03′ W and 20 degrees 15′ W.

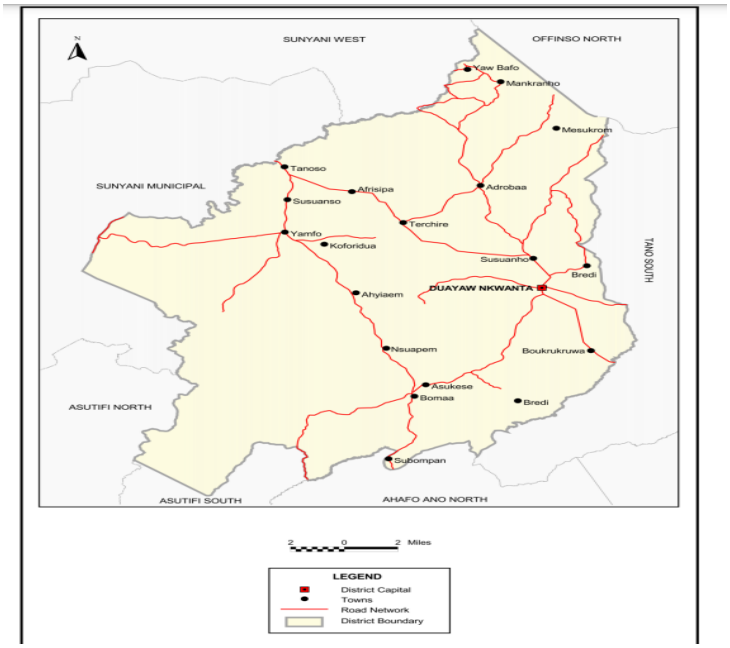

Figure 4: Map of Tano North Municipality

Source: Ghana Statistical Service, (2018)

The municipality occupies about 1.8 percent of the total land area of the of the Ahafo region totaling 837.4 square Kilometers Tano North Municipal Assembly, (2023). The topography of the municipal is undulating gently rising from a height of about 270m to a peak of around 760m.the area is also well drained due to the Tana River and its numerous tributaries including subri which flows from the North-east to the South- West.

The municipality falls with the semi-equatorial Climatic zones hence it experiences double maxima Rainfall regime that between April- June and September- November with a mean annual rainfall between 125cm and 180 cm and an average temperature ranging from 26 degrees Celsius (mainly in August) and 30 degrees Celsius (in March) (Ghana Metrological Agency,2018). Humidity in the area is generally high and ranges between 75 percent to 89 percent during the rainy season and about 72 percent in the dry seasons. Two main vegetation can be observed within the area. The two types are the Moist semi-Deciduous Forest and Guinea Savanna. Both can be found around the southern and south-eastern and the northern and northwestern parts respectively (Tano North Municipal Asembly, 2010)

The area is dominant in forest ochrosols soil type considered to be fertile and suitable for the cultivation of a wide range of arable crops such as cocoa, coffee, oil palm, plantain, maize, citrus and vegetables.

Demographic Characteristics

Tano north Municipality has a population of 92,742 giving a population density of 95.5 percent persons per square kilometer of which males constitute the majority with 50.4 percent (46,753) and females making up of 49.6 percent (45,989). It can be observed according to Ghana statistical service, (2021) that almost equal proportions of the population live in both rural and Urban areas within the municipality. The sex ratio of males per 100 females is 98.1 indicating more females than males. Variation among the age group is very eminent in the area as more male could be observed than females in the age group 0-19 years, whereas females turn to be more among the age group 45-54. The total age dependency ratio for the area is 81.3 indicating that for every 10 persons in the productive age of 15-64 years which constitute (55.2%) of the population have about eight people in the dependent age group 0-16 to support. The dependency ratios are almost the same in both urban and rural areas which is 75.8 and 87.1 respectively (Ghana statistical service,2010). The average household size among urban and rural settlements within the municipality is 3.9 and 4.7 respectively. The area has a high percentage of the population having some form of education with only 19.7 percent with no educational background. The figure 5 below shows that a higher number of three quarters (76.9%) of the population are literate and only 23.1 percent are non-literate. The proportion of literate males (82.1%) is higher than female (71.9%).

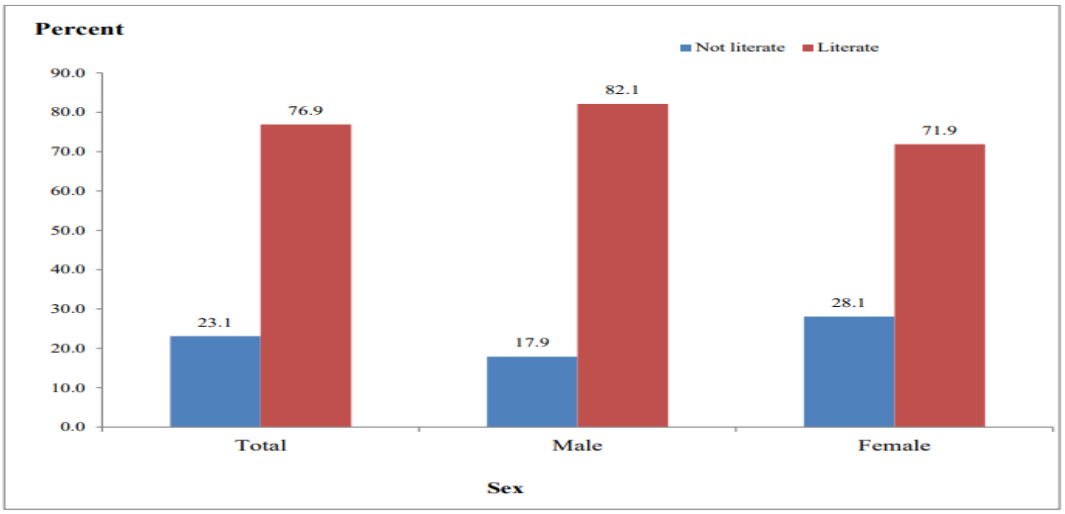

Figure 5: Tano north population of 11 years and older by sex and literacy status (%)

Source: Ghana Statistical Service, 2016

Figure 6 represent the school attendance within the municipality from the ages 3 years and older from three-time standpoint that is those age groups who never attended school, those that had some form of school experience in the past and the current education experience across the municipality. From the figure below in the case of males about 15.5 percent has never had any school experience, about 39 percent of the male population in the municipality had some school attending experience and about 46 percent are currently attending school.in the case of females in the municipality about 40 percent are currently attending school and experiencing some form of education, about 24 percent never had any experience attending school and about 37 percent of females of the municipality had school attending experience in the past .

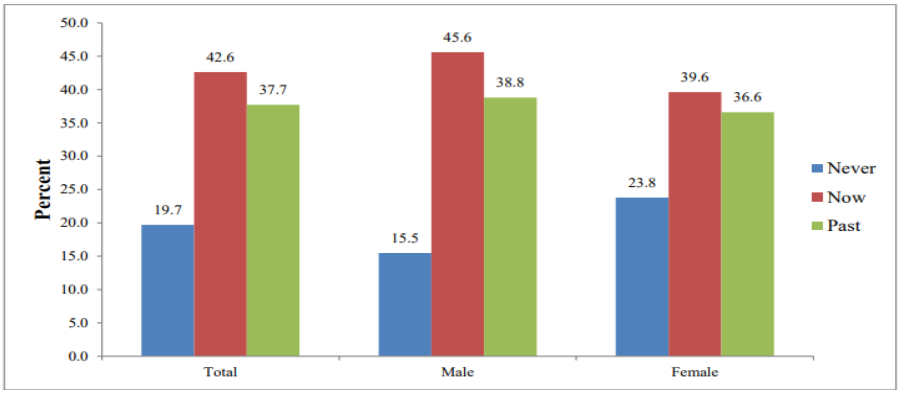

Figure 6: Tano north municipality Population of 3 years and older by school attendance and sex (%) *Source: Ghana Statistical Service, (2016)*

Economic Activity in Tano North Municipality

Tano North municipality's proportion of the population economically active stands at 74.1 percent with only 25.9 percent do not engage in any form of economic activity GSS,(2016) of which 95 percent are employed with only 4.7 percent unemployed. The constitution of male to female who are economically active is almost the same with 754.8 percent and 73.4 percent respectively. The dominant occupation within the municipality is skilled agriculture, forestry and fishery which makes up about two-thirds (65.4%) of the population. With males more likely than females to be engaged in this sector. In terms of industry apart from agriculture, about 9 percent are into wholesale and retail activities and 6.1 percent can be found working in the construction sector. Males (18.9%) are more likely than female (4.6%) to be engaged in wholesale and retail trade which is generally believed to be female venture sector.

Agriculture Activity in Tano North Municipality

In the municipality about 76.9 percent of households are into some form agriculture activities with only about 23.1 percent found in non-agricultural engagement with rural household (89.4%) predominantly into agriculture. GSS, (2016) this is indicated in figure 7 below.

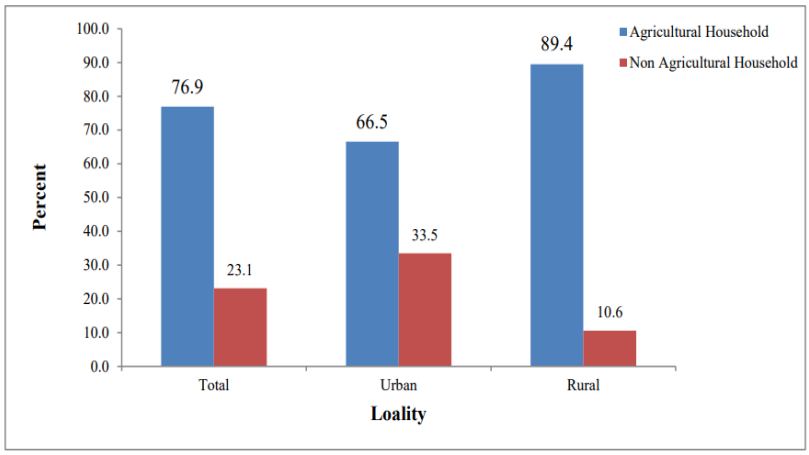

Figure 7: Agricultural and non-agricultural households by locality in Tano North (%)
Source: Ghana Statistical Service, (2016)

Although several households engage in multiple farming activities, Crop farming, which constitutes 97.8 percent of total household is dominant in the municipality (see table 1). 33.7 percent also engage in livestock rearing with the remaining farming activity namely tree planting

and fish farming making up less than 5 percent among total household in the area. (Ghana Statistical Service, 2010)

Table 1: Tano North Municipality Households in agriculture (%)

Type of activity	Total		Urban		Rural	
	Number	Percent	Number	Percent	Number	Percent
Total Households	18,478	100.0	10,113	100.0	8,365	100.0
Households engaged in Agriculture	14,208	76.9	6,726	66.5	7,482	89.4
Crop Farming	13,898	97.8	6,569	97.7	7,329	98.0
Tree Planting	488	3.4	147	2.2	341	4.6
Livestock Rearing	4,790	33.7	1,469	21.8	3,321	44.4
Fish Farming	38	0.3	24	0.4	14	0.2

Source: Ghana Statistical Service, (2010)

Market Center Organization in Tano North Municipality

Marketing centers within the municipality takes a different approach to its organization as compared to the big cities in the country for instance in Accra, Kumasi, Takoradi, Sunyani, Ho, tamale whose market centers are always accessed easily and booming with daily trading activities, Tano north uses a market day periodic schedule, and the following days can be identified within the municipality.

Duayaw-Nkwanta (capital) - Fridays

Yamfo - Sundays

Adrobaa - Tuesdays

Bomaa – Tuesdays

This arrangement is necessary although this market day system is not new to many parts of the country but due to the proximity of the Municipality to Sunyani and Bechem where trading activities boom. This situation has caused many inhabitants to travel to these towns during their market days than the ones closer to them as they stand to choose from the range of commodities that will be assembled in these markets. For instance, inhabitants of the town Bomaa would prefer to go to Tepa than Duayaw-Nkwanta due to cost and proximity making market days in the municipality not vibrant (Ministry of Finance, 2022).

Information Communication Technology use in Tano North Municipality

With the essential role ICT plays in our daily life in recent years it is imperative to live without in current years. Within this area two fifth (43.6%) of the population of aged 12 year and older own a mobile device with a higher proportion among males (49.1%).in terms of using internet facility at home, internet café or directly connected to mobile device the proportion of the population aged 12 years and older in the municipality is only 2.6 percent. This is indicated in table 2 below.

Table 2: Population 12 years and older by mobile phone ownership, internet facility usage and sex (%)

	Population 12 years and older		Population having mobile phone		Population using internet facility	
Sex	Number	Percent	Number	Percent	Number	Percent
Total	53,930	100.0	23,491	43.6	1,412	2.6
Male	26,259	48.7	12,899	49.1	976	3.7
Female	27,671	51.3	10,592	38.3	436	1.6

Source: Ghana Statistical Service, (2010)

The proportion of household owning desktop or laptops computers constitute only 3.4 percent of the population (Ghana Statistical Service, 2010) with male headed homes (3.8%) more likely than female headed homes (2.7%) to own either desktop or laptop computers. See Table 3

Table 3: Households having desktop/laptop computers and sex of head (%).

	Number of households		Households having desktop/laptop computers	
Sex	Number	Percent	Number	Percent
Total	18,478	100.0	635	3.4
Male	12,101	65.5	465	3.8
Female	6,377	34.5	170	2.7

Source: Ghana Statistical Service, (2016)

3.2.3 Presentation of research sample
Quantitative Research Methods

The study adopted Quantitative research method which is associated with numerical analysis of data collected through.
questionnaires. Typically, it emphasizes the statistical and mathematical measurements of the collected data by using statistical techniques (Saunders et al. 2012). Using this research method enables the researcher to present the data generated in the form of graphs and numerical. Quantitative research method involves the use of a questionnaire where variables can be controlled to bring about standardized data (Saunders et al. 2012). The standardized data can then be interpreted in terms of number values. Data under the quantitative methods is subjected to showing hypothesized relationships between different variables (MacMillan and Schumacher, 2010).

Sampling method

Sampling is the strategy of selecting the elements in a population to obtain information needed to complete the study (Loseke, 2013). Considering that this study is quantitative, a non- random sampling was necessitated to be employed. The study made use of mixed sampling techniques during the conducting of our primary research. The simple random sampling technique was employed alongside and a non-probability sampling technique, convenience sampling and purposive sampling technique were employed for the purposes of our studies. The simple random sampling and according to Galzar et al. (2022) it is favorable in homogeneous and uniformly selected populations giving all the individuals have an equal opportunity to participate in the study where the selection process is entirely based on luck. Best and Kahn (2016), suggested that although simple random sampling is a cumbersome and rarely used procedure in research design, it is asserted that this sampling method is efficient when the population is homogeneous and the list of the population intended for the study is readily available (Cohen et al. 2018; Barreiro & Albandoz, 2001). Sharma, (2017) emphasizes the unbiased and impartial selection method the simple random comes with and when cautiously designed, the sample can be representative of the whole population. A Convenience sampling which is also known as Haphazard Sampling or Accidental Sampling) is a type of non-probability or non-random sampling where members of the target population that meet certain practical criteria, such as easy accessibility, geographical

proximity, availability at a given time, or the willingness to participate are included for the purpose of the study Etikan et al. (2015). A purposive sampling technique allows for units of a certain population to be selected based on a specific purpose that will assist in the achievement of the aims and objectives of the study. The selection of these members of the population is usually based on the pre-knowledge of the participants by the researcher Bryan, (2012) the purposive sampling technique was mostly employed for farmers (Producers). This makes it easier for the researcher to obtain the information sought by been deliberate with the choice of participants based on the quality each respondent possess (Tongco, 2007). In this study, we are employed multistage approach of sampling as it is very crucial and most fitting in the case of our target population which is quite large to randomised within the study area for consumers who all have an equal chance to be selected. In the case of farmers since the sampling was targeted at the population of farmers who have registered with the extension division of the Department of Food and agriculture in the municipality numbering four hundred and thirty-five (435), we used both simple random technique and a mix of Convenience and Purposive sampling techniques which gave a non-bias selection of the respondent provided, they are registered with extension services within the Tano North Municipality.

Sampling Size

Yamane formula (1967) was used to estimate the sample size for farmers within Tano North Municipality.

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

n = ?

Where,

N= Total number of registered farmers within the Tano North Municipality.

e = margin of error 5%

n = **207**

Two Hundred and Seven farmers were selected for the purpose of the study.

Consumers on the other hand were conveniently selected as the population was very large making it difficult to randomised. for the purpose of the study a projected sample size of two hundred and fifty (250) respondents is to help as answer consumer motivation to participate in short food supply chains within the municipality.

Sampling technique

As stated, the study made use of a multistage sampling technique to select respondents. For farmers, these two communities Adrobaa, and Susuanso were purposively selected since within these communities a fair distribution of farms on all scales (small-medium and larger farm establishments) could be easily reached. Secondly a simple random sampling was employed by the extension agents to select Two hundred and Seven (207) smallholder farms across these areas in the municipality relying on the list of registered farmers numbering about four hundred and thirty-five (435) with the office of food and agriculture in the municipality. Table 4 below illustrate how the respondents were selected.

Table 4: Community and the number of respondents selected.

Community	farmers	Sample size
Abrobaa	97	(97/185) * 207 = 109
Susuanso	88	(88/185) * 207 = 98
	185	207

Source: Own research and edition, (2023)

3.4 Presentation of research methods

Data Collection

Questionnaires:

The study relied on the design of questionnaires based on literature review and the research objectives to conduct the survey across the study area.it was an all-inclusive questionnaire employing both structured and a semi-structured question. Open and closed ended question were enclosed in the design. Two separate questionnaires were designed for both stakeholders of interest of our study. That is farmers and consumers. Close-ended question was used in circumstances clearly defined and clear answers could be expected and open-ended question were included in instances where we sort to better understand the respondent opinion on a subject matter and to

allow respondents enjoy freedom to express themselves. Firstly, the farmers questionnaire had three section the first part sort to gather the farmers Demographic characteristic namely age, gender, education background information, household members, farming experience, fam size etc in the study area. The subsection solicited farmers response on their use of smart technologies in their farming operation and the final section solicited farmers responses to their motivation in participating in short food supply chain scheme and the barrier hindering their use if there is any. On the other hand, a similar approach was used in designing consumers questionnaires. The first section solicited responses on the demographic characteristic of consumers including their age, gender, level of education, employment status, household members, income level. The Subsection was designed to capture consumers motivation and behavioural purchasing decision making regarding short food supply chain schemes. Employing these approaches gave as the opportunity for instance the case of farmers where we relied on the services of extension agents to probe further questions and answers appeared inconclusive. However, to control the responses, the study standardized questions. For example, the numbers of open-ended questions were kept low to engage respondents' interest ultimately imposing minimal respondent burden.

Source of Data

Data Sources are generally classified as primary and secondary data sources. Primary sources of data provide first-hand information on the issue at hand. A secondary source of data on the other hand provides information collected by someone else for another primary purpose. Essentially, this data already exists and is readily available to as such that it does not have to be collected by the researcher. For the Purposes of our study, we collected data from the primary source which was the study area. This was necessary because first-hand information was sought from the targeted population.

Primary data collection

This study used the primary data collection source. This data was collected by the researcher from people/subjects affected by the issue that is being investigated. Primary data is collected as the original source, firstly in the form of a survey or personal interview. Emphasizing that the data has not been published yet and is in its rawer and more authentic form. For this study, the primary data was collected through a survey. To execute this, an online questionnaire link was distributed

to smallholder farmers through extension Agents within the study area and consumers exploring my personnel networks and encouraging referrals using distribution platforms such as WhatsApp's groups platforms within the study area who were willing to participate in the research through emails (the exact questionnaire see Appendix 2.) Details of the questionnaires were explained to farmers before they undertake the completion of the questionnaire so that they understand how to approach questionnaires and what is expected from them. The services of the extension agent were extremely helpful during this process as the research was remotely away from the study area.

Secondary Data Collection

Secondary data source equally played a key role in this study. Data sourced from this level was readily available and archived data by other researchers. For this study, the secondary data collection was conducted by collecting information from a diverse source of documents or electronically stored information such as government reports, census, and national statistical databases as well as university repositories. Soliciting Data from this source was essential for our study as it aided to gather information to enable our theoretical foundation for the research topic of this study. Moreso, the use of secondary data collection allowed a good basis to generate new and further research into identified phenomena.

Population/Unit of Analysis

Kumar, (2018) explains a unit of analysis as the entity that a researcher wishes to say something about in the end of their study such that it is considered the focus of the study. Considering the objectives of this study, the unit of analysis is in the form of a targeted population. A population is a group of individuals who have the same or common defining characteristics that the research identifies and study. In this research, two sets of population were selected to participate in the collation of the data. Farmers / Producers who are stakeholders directly involved in the cultivation and production consumers food commodities. The other key stakeholder for this study is the consumers who purchases food commodities from farmers/producers directly or indirectly.

Data analysis

The study used both descriptive analysis and quantitative analysis. Descriptive analysis was used to provide details of the profiles of the respondents, those being, the personal information such as age, gender, level of education and occupation status. Furthermore, the use of this type of this analysis is to give a comprehensive picture of the makeup of the data, allowing further analyses to be undertaken. The quantitative analysis will be performed in the form of the Statistical Program for the Social Sciences (SPSS). The SPSS computer program is available for the use of computing data, turning it from raw into information that decisions in the form of statistics can be drawn from. The nature of the statistical analyses comprising of descriptive analysis, means, correlations and coefficients will assist in the robust reporting and visualization of the data collected from our sample population. The analysis will be presented in the form of tables, graphs, and percentages.

Kendall's Coefficient of Concordance

Constraints to farmers and Consumers Participating in Short food supply chains was identified and ranked using the mean ranking approach of Kendall's Coefficient of Concordance. Kendall's coefficient of concordance is a measure of the agreement among several judges who are evaluating a given set of items.

Kendell's

Where,

T = total weight score

m = number of constraints

n = number of respondents Anang, (2011).

CHAPTER FOUR - RESULTS AND DISCUSSION

4.Introduction

This chapter present findings from the primary research on both Farmers and Consumers in Tano North Municipality in Ghana. The chapter is divided into Three sections. The first section presents findings on the Socio demographic characteristics of both producers and consumers within the study area. The second section presents findings on both farmers and consumers' motivation to participate in a short food supply chain scheme within the study area. The third section presents findings on the constraints to both farmers and consumers opting to participate in a short food supply chain Scheme.

4.1 Descriptive Analysis

Farmers:

A total of 136 smallholder farmers were interviewed in the Tano North municipality and their demographic Profiles are presented. The various socio demographic characteristics presented include the Gender, Age, level of education, household size, years of farming experience of respondents.

Gender

Most of the respondents interviewed were males which accounts for 64% whiles 36% were Females (see figure 8). This result is consistent with the study of Owusu and Anifor, (2013), Adams, (2015) and Bannor et al. (2019) that agriculture activities in Ghana is dominated by males. Anaafo, (2015) Dapaah. O et al. (2019) attributed male dominance in the sector to the land tenure system practices within the country. This results further contradict United Nation's food and Agriculture organization report which claims that agriculture around the world is spearheaded by females Aphiwe, (2022). Wong, (2014) highlighted gender stereotyping which normally exist particularly in rural areas where men are seen as worthy for a profession in agriculture considering the tediousness coupled with their nature as being assertive, thorough, and focused on material

success, with women on the other hand seen as more concerned with quality of life for their loved ones due to their modest and tender nature.

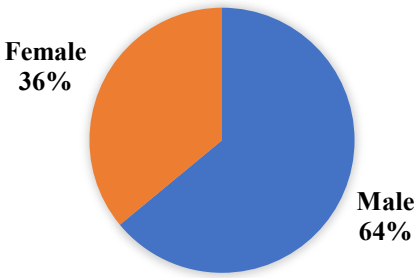

Figure 8: Farmers Gender Distribution in percent (%)

Source: own research and edition, 2023

Age

The age distribution of respondents in the municipality is indicated in figure 9 below where the ages were categorized as follows; Below 18, 19-35, 36-45, 46-60 and above 60 years. From the descriptive analysis only 1.5 percent (%) of the respondents fall within the age group below 18, 10.3percent (%) fall within the age group 19-35, about 28.7 percent (%) fall within the age group 36-45, about 38.2 percent (%) of the respondents fall within the age 46-60 forming the dominant age group actively engaged in farming in the municipality and about 21.3 percent (%) fall within the age group above 60 (see figure 9). Clearly it can be observed within the municipality there is low youth participation and the dominance of the aged in agriculture activities. Ghana classified the age group 15-35 as youthful into its national youth policy as adopted from Africa Youth Charter. With governments Flagship policy initiative themed, Planting for Food and Jobs which seeks to modernize agriculture in the country and entice the youth into agriculture Ministry of Food and Agriculture, (2018) but this policy initiative by the government of day might require more effort to achieve its objectives considering the outcome of the result which suggest otherwise. Dapaah. O et al. (2019), Further suggested in their study that the youth in Ghana are not showing interest in agriculture as they deem it nonlucrative compared to other economic activities such as

illegal mining whose returns on investment are quicker compared to agriculture activities which is clouded in uncertainties coupled with how long it takes to yield returns on investment.

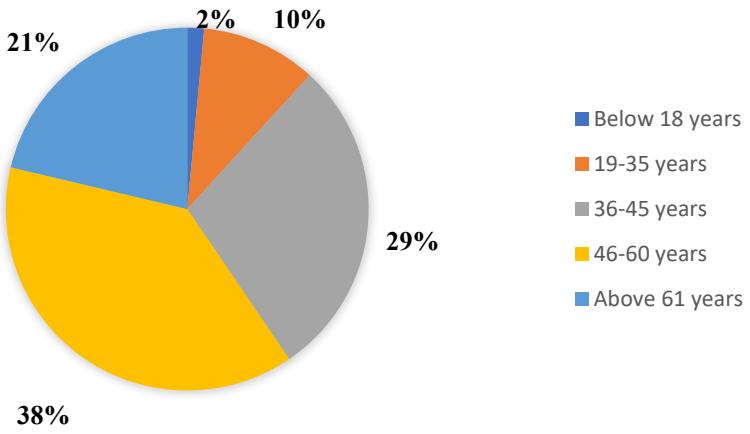

Figure 9: Farmers age distribution

Source: Own research and edition, 2023

Formal Education

From the 136 responses collated from farmers interviewed in the municipality about 13 percent had no formal education (See figure 10), 24 percent had basic/primary education, 15 percent had junior high school experience, 27 percent of the respondents have had senior high school experience and about 24 percent have tertiary education. Tertiary education here includes bachelors, masters, and Doctorate and all college professional education. The result is consistent with (Ghana Statistical Service, 2010) that Tano north municipality has high percentage of its population educated with only 19.7 percent without any prior educational experience. Although the result seems to suggest that most farmers within the municipality could read and write this could only be true for all the respondents with educational experience beyond junior high schools. As majority as during the administering of the google form most farmers who had some form below junior high school relied on the translation of extension agent services we engaged. For the greater majority who had education beyond junior high school up to the tertiary level gives a clear indication that gradually the educated in the country are venturing into agriculture which contradict Ghana statistical services, 2016 which held that the educated people in Ghana are reluctant to

venture into agriculture. Again, the high education level observed among farmers in the municipality give an extra edge to the adoption of new technologies as it contributes immensely to the understanding of newer approaches to farm practices and the environmental implications of certain conventional practices (Bannor et al. 2019)

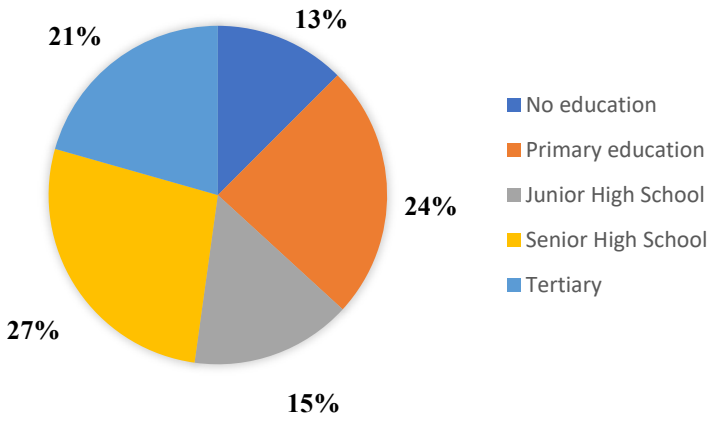

Figure 10: Farmer's education background distribution

Source: Own research and edition, 2023

Household Size

From the 136 survey results of the respondents on the average, the household size with members within the municipality ranges between three (3) and Six (6) (See figure 11) which constitute about 48 percent, which is consistent with the average household size among urban and rural settlement in the study area which is 3.9 and 4.7 respectively (Ghana statistical Service, 2010). A higher percentage of about 41 percent could be observed among farmers within the municipality within the 6-8 household size range. for the other household size range only about 6 percent and about 7 percent of the household size range of 1-2 and above 9 were observed in the municipality.

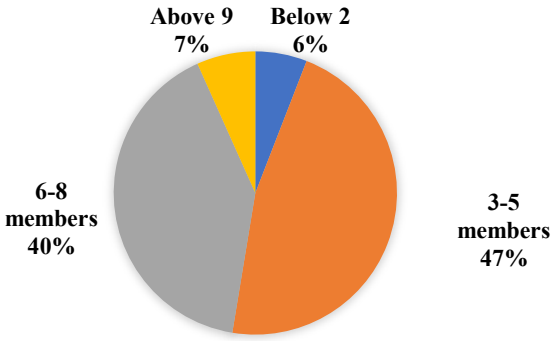

Figure 11: Farmers distribution in terms of household size with kids

Source: own research and edition, 2023

Farm size

The result from the 136 respondents indicates that most farmers within the municipality have an average farm size between 4-7 acres (see figure 12) which constitutes about 57 percent with only about 6 percent of the respondent whose currently have farm size is above 12 acres fully under cultivation. 13 percent operate a farm size of 8- 11 acres while about 24 percent of farmers operate a farm size below 3 acres. The result confirms and add to the discussion that agriculture sector in Ghana is predominantly on a small scale with most farms operating under 2 hectares (Dianne dormer,2022; John a Nyarko,2022)

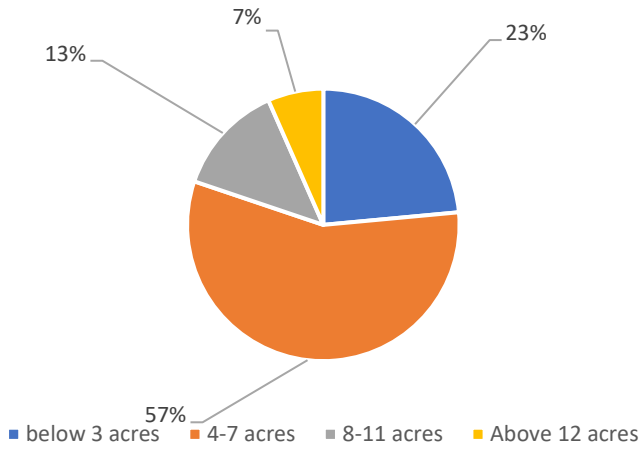

Figure 12: Farmers Distribution in terms of Farm Size in acres

Source: own research and edition, 2023

Farmers Years of Experience

The majority of farmer within the study area have been farmers over 20 years as this constitute 39 percent of the respondent interview (see figure 13), 26 percent of the farmers had 6-10 years farming experience with about 17 percent of the total respondent with farming experience below 5 years.

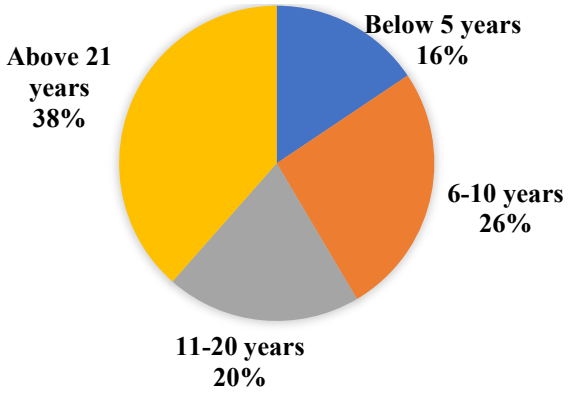

Figure 13: Farmers Distribution in terms of years of farming experience

Sources: own research and edition, 2023

Consumers

A total of 140 consumers was interviewed in the Tano North municipality and their demographic Profiles was analyzed**.** The various socio demographic characteristics presented include the Gender, Age, level of education, household size, employment status, Monthly income.

Gender

Many respondents interviewed during the survey were females which constitute about 54 percent with their male counterparts constituting 46 percent of the total study population of 140. This result is illustrated in figure 14 below.

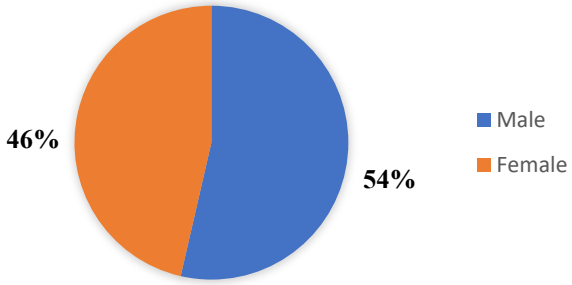

Figure 14: Consumer distribution in terms of their gender (%)

Source: own research and edition, 2023

Age

The age group for the 140-survey respondent is equally illustrated in table 8. The result show that most of the respondent fall within the age group 19-29 years (see figure 15) which constitute 34%,29 percent of the respondent fall within the age group 30-39 years, about 19 percent fall within 40-59 years, about 14 percent of the respondent were aged above 60 years. Only 2 percent of the total respondents were under the age of 18. The result from the study area is illustrated below

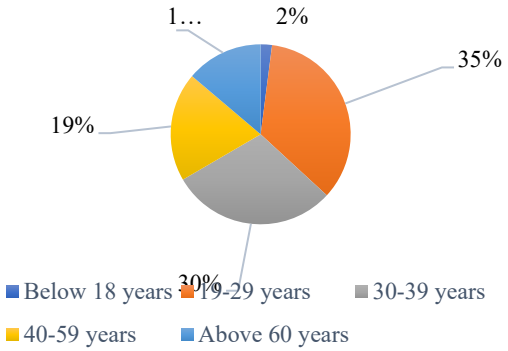

Figure 15: Consumer distribution in terms of their age (%)

Source: own research and edition,2023

Formal education

Most of the respondents interviewed from the study area had tertiary educational qualification as this group made up of about 81 percent of the total number of respondents. Apart from this large number, 19 percent of the respondents who responded to the survey had senior high school education experience (see figure 16). Although the survey included educational levels below senior high school such as (junior high school, basic/primary high school, and no education) there were no such respondent observed in our analysis. This result is not surprising as the municipality is one of the few municipalities with a very high literacy rate as observed in the country population census (Ghana Statistical Service, 2010) This result is illustrated in figure 16.

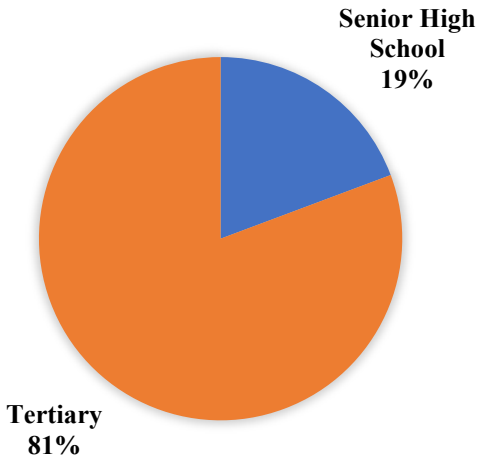

Figure 16: Consumer distribution in terms of their formal education (%)

Source: own research and edition, 2023

Employment status

Most of the responses from the survey in the municipality indicated that they are full-time employees, which constitute 42 percent of the total respondents(see figure 17). For the rest of the respondents, 20 percent were students, about 19 percent self-employed, only 5% were working on a part-time basis and 12 percent were retired. The result is illustrated in figure 17.

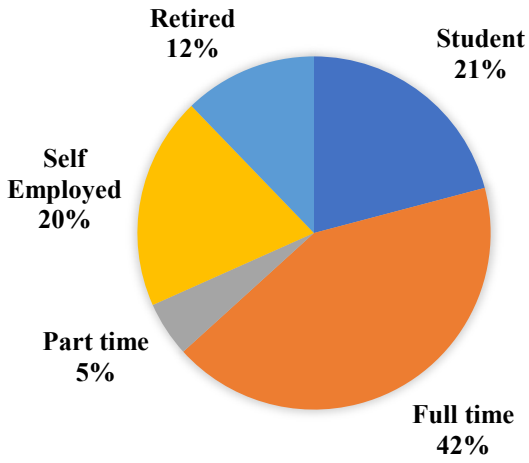

Figure 17: Consumer distribution in terms of their Employment Status ((%)

Source: own research and edition, 2023

Household size with children

From the results most respondents have a household size with children of 3-5 which all together make up 55 percent of the respondence interviewed. this result is consistent with (Ghana Statistical Service, 2010) population and housing census who reported that the average household size among urban and rural settlement in the study area stand at is 3.9 and 4.7 (see figure 18). for the remaining household size result from the respondent's 24 percent have household size of 6-8 and about 20 percent have 1-2 household members. This result is illustrated in Figure 18 below.

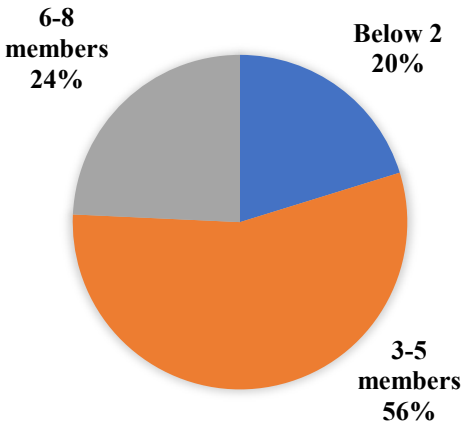

Figure 18: Consumer distribution in terms of their Household Size (%)

Source: own research and edition,2023

Monthly income

The result from the survey responses shows that most people living in the municipality earned between 2000- 4000 Ghana cedis monthly as income(see figure 19) which is equivalent to (154-309) euros using the current exchange rate of one Euros = thirteen Ghana cedis. This number constitutes about 40 percent of the respondents interviewed. Also, about 36 percent of respondent indicated earning below 2000 Ghana cedis monthly.17 percent earn between 4000- 6000 Ghana Cedis and Only 8 percent earn above 6000 Ghana cedis. This result seems to contradict Ghana's living wage per month which stated that on the average individuals living with families earn an average income 1720 Ghana cedis and for individual living alone earn an average of 900 Ghana Cedis per month (Trading Economics, 2018). Figure 19 illustrates the income profile of the respondents.

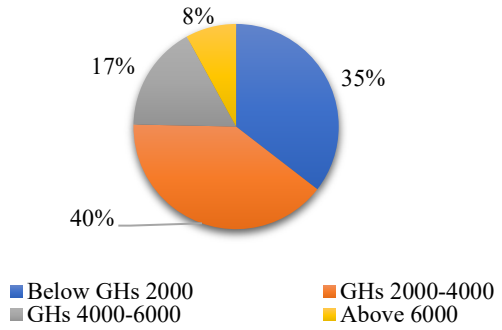

Figure 19: Consumer distribution of in terms of monthly income (%)

Source: own research and edition, 2023

Short food supply chains scheme Producers(farmers) within the Tano north municipality participate.

From the analysis of the study, farmers' cooperative, community supported agriculture programs, farmers markets, sale at farm gate, direct to consumers, online sales were identified as key channels explored by farmers to trade their produce for cash with consumers within the study area. From the analysis, farmers always use Direct-to-consumer scheme as alternate sale channel instead of the traditional channel which involve two or more actors namely middlemen, wholesalers (see

table 5). The percentage of farmers who used this channel constituted 55.8 percent of the respondents. Producers argued further that the use of these channels gives them the greater control of the distribution and sales of their produce. Hence, they turn to gain the full benefit from the final sale to consumers. Sales at farm gate came second as the used alternative food supply chain in the study area constituting 52 percent of the respondents, sales through farmers market were the third used SFSC within the Tano north municipality which constituted 39 percent of the respondents. The use of farmers' cooperative, which sometimes are occasionally used by registered members of such association constituted about 34 percent of respondents within the study area, this channel together with community supported agriculture programs and sales through online channel were not used by farmers as channel for selling their produce within the study. These channels constitute 58 percent, 85 percent, and 86 percent respectively of farmers within the study area. Table 5 summarizes the findings from the analysis.

Table 5: Short food supply schemes within Tano North Municipality

Short Food Supply Chain	**Always**		**Used**		**Occasionally**		**Not used**	
	F(n)	Percentage	F(n)=	Percentage	F(n)=	Percentage	F(n)=	Percentage
Direct-to-consumer	77	55.8	51	37	6	4.3	2	1.4
Sales at farm gate	24	17.4	72	52.2	14	10.1	26	18.8
farmers market	4	2.9	54	39.1	27	19.6	51	37
farmers' cooperative	-		8	5.8	48	34.8	80	58
community supported agriculture programs	-		2	1.4	16	11.6	118	85.5
Online sales channel	-		-		19	13.8	117	84.8

Source: Own research and edition, 2023

Farmers Motivation for Participating in Short Food Supply Chain Within the Tano North Municipality

Farmers motivation for participating in each of the identified SFSC within the study area was analyzed and the results are summarized in figure 20.

Farmers who were motivated and subsequently chose farmers' cooperative as alternative food chain made the decision based on the increase in profitability they stand to gain. Although 34 percent alluded to this reason it was not enough motivation for the majority(see figure 20), which

made up of 59 percent of the respondents interviewed. These among many reasons were core why it was the least participated channel for the sale farmers(producer) produce within the municipality.

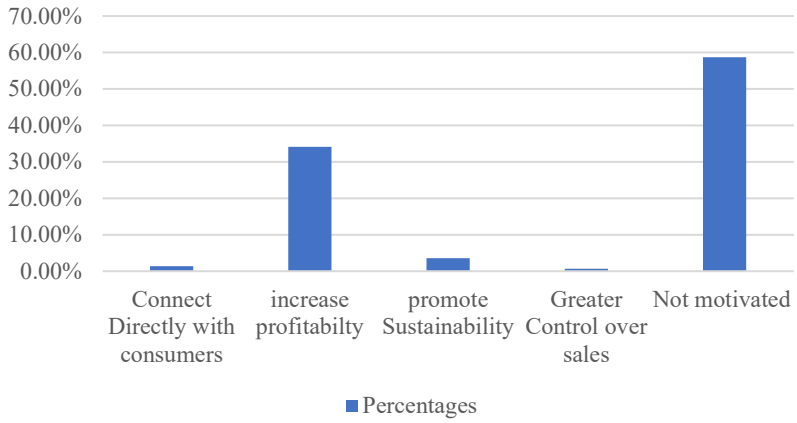

Figure 20: Farmers Motivation to participate in Farmers' cooperative.

Source: Own research and edition, 2023.

Similarly, results on motivations for farmers opting to participate in farmers market which is the third most explored short food supply chain within the study area, highlighted the benefit they accrue by participating in this channel which include increase Profitability, Greater control over sale, connect directly with consumers (see figure 21). This reason constituted 37 percent ,31 percent and 27 percent of the respondents from the survey respectively. A higher number of respondents, about 22 percent, were not motivated although the benefit they stand to accrue goes beyond the financial gains to social benefit including stronger relation with consumers of their products. The result from the analysis is summarized and presented below.

Figure 21: Farmers Motivation to participate in farmers' market (%).

Source: Own research and edition, 2023

Farmers who participated in direct to consumers for the sale of their produce were motivated based on increase profitability, connecting directly with consumers, greater control over sale and to promote sustainability (see figure 22). They constituted 37 percent,35 percent,33 percent and 28 percent of the respondents interviewed respectively decided to explore these alternative channels of food supply with only 3 percent not interested in participating in this channel. This result further explains why it is the most used short food supply chain channel by farmers within the municipality. The observation from the analysis is presented in figure 22.

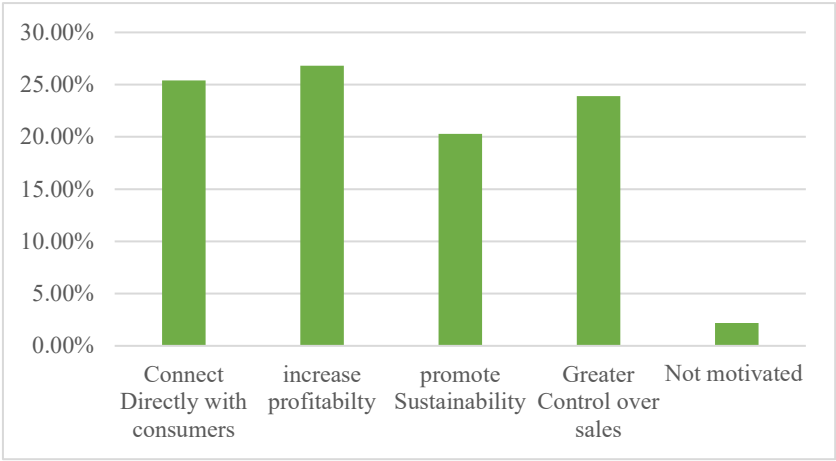

Figure 22: Farmers Motivation to participate in Direct to Consumers (%)

Source: Own research and edition,2023

Farmers motivation for participating in sales at farmgate in the study area from the results of our analysis was largely to connect directly with consumers, promote sustainability, increase profitability, and Greater control (see figure 23) with each constituting 29 percent, about 28 percent, about 20 percent and 17 percent of the farmers interviewed with only 4 percent of the farmers not motivated to explore sale of their harvest at the farm gate.

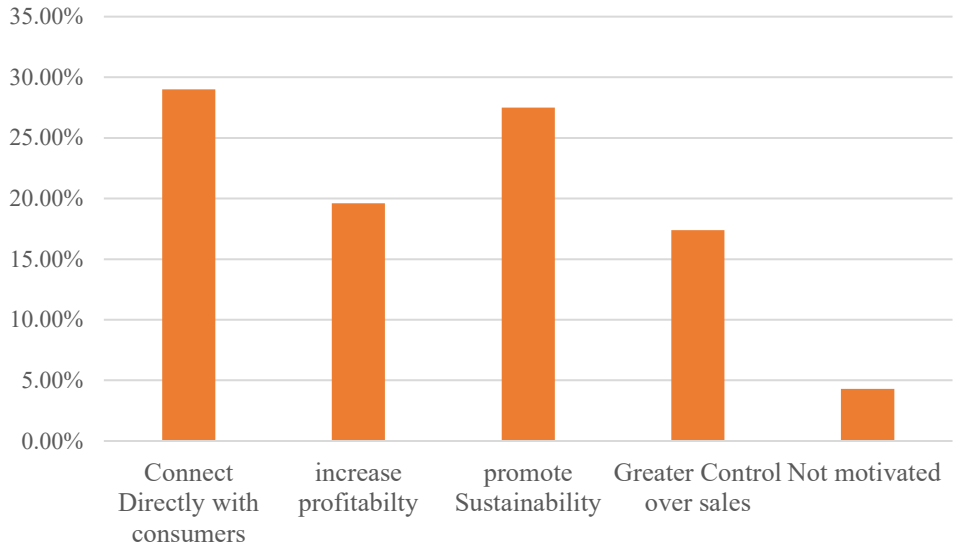

Figure 23: Farmers Motivation to participate in sale at Farm Gate (%)

Source: Own research and edition, 2023

How farmers access market information within the study area

The result from the analysis shows that most farmers access information regarding market performance including consumers food commodities demand, quantity to supply unto the market, price fluctuation through word of mouth from other farmers(see table 6), this medium constitute about 28 percent of the farmers interviewed within the municipality. A greater number of about 24 percent equally access their market information needs through market queens who determine the entire performance of the market, again about 24 percent explore mainstream media which includes television broadcasting networks and radio to get up to speed with market expectations. 12 percent farmers within the study area also indicated the use of social media platforms including

Facebook, to access some market information but its use is minimal. Farmers equally engage the services of an extension agents in the quest to access their market information need with only 10 percent of the total farmers interviewed explore this source. The least source explored in getting first-hand information regarding market expectation for their farm produce was farmer Based Association with only less than 2 percent of making use of these source. Result from the analysis is summarized in table 6 below.

Table 6: Farmers sources for accessing Marketing Information in Tano North municipality(%)

	Frequency	Percentage (%)
Market Queens	33	23.9
Farmer Based Association	2	1.4
Word of Mouth	38	27.5
Extension Services	14	10.1
Radio/Television networks	33	23.9
Social Media (Facebook)	16	11.6
Total	136	98.6

Source: own research and edition, 2023

Farmers level of Satisfaction from the Participation in a short food supply scheme in Tano north Municipality

Farmers were asked to rank their level of satisfaction on the scale of very satisfied, satisfied and dissatisfied after selling their produce from harvest directly to consumers. The result from the descriptive analysis suggests that most farmers, which constitute about 56 percent rank their level of satisfaction as “satisfied” from selling directly to consumers (see figure 24). About 22 percent express their dissatisfaction after selling directly to consumers. Figure 24 summarizes the result on farmers level satisfaction from participating in “Direct to consumers” scheme.

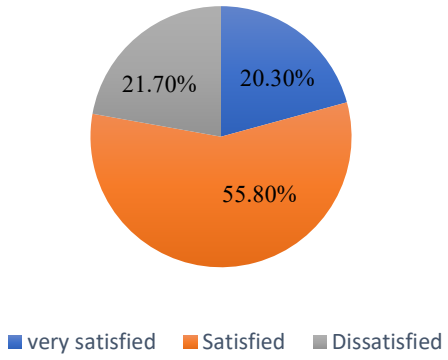

Figure 24: Farmers' level of satisfaction from selling directly to consumers (%)

Source: own research and edition, 2023.

The study went on to assess the level of farmers' satisfaction from selling directly to consumers across their farming years of experience. Table 7 below summarizes the findings.

Table 7: Farmers satisfaction level selling directly to consumers across their years of experience as farmers (%)

Years of experience		Frequency	Percentage (%)
Below 5 years	very satisfied	4	19
	Satisfied	10	47.6
	Dissatisfied	6	28.6
	Total	21	
6-10 years	very satisfied	3	8.6
	Satisfied	23	65.7
	Dissatisfied	9	25.7
	Total	35	
11-20 years	very satisfied	7	25.9
	Satisfied	15	55.6
	Dissatisfied	5	18.5
	Total	27	
Above 21years	very satisfied	14	26.4
	Satisfied	29	54.7
	Dissatisfied	10	18.9
	Total	53	
Total		135	98.6

Source: own research and edition, 2023

Farmers Barriers to the use of smart technology in their farming operation

From the survey we tried to ascertain the various constraints impending farmers use of mobile devices such as smart phones, laptops, desktop computers to execute farm operations considering the high literacy rate as reported by the Ghana statistical services from its last population and housing census of the municipality using the Kendell's coefficients of concordance to ascertain the degree to which it hinders farmers use of these improve technological devices.

The analysis from the study revealed lack of technical skills, Cost, limited access to internet and reluctant to adopt newer technology are the most crucial barriers to farmers use of smart technological devices in their farm operation as they ranked first, second, third and fourth respectively. Table 8 summarizes the constraints according to their severity to the respondents.

Table 8: Barriers to farmers to the use of smart technological device in farms operation

Barriers	Mean Rank	Rank
lack of technical skills	2.11	1st
Cost	2.32	2nd
limited access to internet	2.48	3rd
Reluctant to adopt technology	3.10	4th

Kendall's W[a]=0.347, Chi-Square=141.566, df=3, Asymp. Sig.

Source: own research and edition, 2023

Consumers Purchasing Directly from Farmers

Consumers participation in short food Supply scheme in the study area was analyzed among the genders of respondents. The results from the analysis reveal no significant difference with regards to the purchasing of food stuff exploring short food supply chain scheme among the genders(see table 9). The only observed differences across genders was the percentage of the respondents who do use any of the short food supply chain scheme to meet their daily household foodstuff needs through purchases. In this regard, about 31 percent were males and 35 percent females. With the rest of the respondents across gender either they purchase their household foodstuff occasionally or frequently using some form of SFSC scheme. Table 9 summarizes the observations from the results of the analysis.

Table 9: Consumers participation in "Direct from Farmers sales in (%)

Gender		Frequency	Percentage (%)
Male	Not at all	20	30.8
	Occasionally	27	41.5
	Frequently	18	27.7
	Total	65	100
Female	Not at all	26	34.7
	Occasionally	30	40
	Frequently	19	25.3
	Total	75	100
Total		**140**	**100**

Source: own research and edition, (2023)

The study further sort to understand how consumers across different monthly income levels participate in short food supply chains schemes. From the results of the analysis, out of 138 responses from consumers within Tano north municipality we observed the greater majority oof consumers who fall between the income group GHs 2000-4000 seems to meet their household food consumption through purchases from short food supply chain scheme notably directly on a more frequent basis compared to the other monthly income groups as their responses constitute about 45 percent of the respondents who frequently purchase from SFSC scheme. Table 10 summarizes the observations from the analysis of the result.

Table 10: Consumers participation in "Direct from Farmers sale across monthly income groups (%)

Monthly Income		Frequency	Percentage (%)
Below GHs 2000	Not at all	22	44.9
	Occasionally	21	42.9
	Frequently	6	12.2
	Total	49	100
GHs 2000-4000	Not at all	15	27.3
	Occasionally	23	41.8
	Frequently	17	30.9
	Total	55	100
GHs 4000-6000	Not at all	4	17.4
	Occasionally	8	34.8
	Frequently	11	47.8
	Total	23	100
Above 6000	Not at all	3	27.3
	Occasionally	5	45.5
	Frequently	3	27.3
	Total	11	100
Total		**138**	**100**

Source: own research and edition, 2023

Short food supply Schemes Consumers make purchase for their household Foodstuffs.

Consumers responses were analyzed to ascertain the various avenues explored in purchasing their household foodstuffs particularly vegetables and Grains which are the most basic food needs of every household in the study area and in the entire country as most family in other to feed their families and loved ones will have to rely on this food items to make a complete meal course within a day. A total of 140 responses were analyzed.

Vegetables

In the case of vegetables, the study observed how consumers meet this foodstuff need across household size with kids through the various selling avenues they purchase this food item in the study areas. The result from our analysis shows that consumers across the study area meet their vegetable need by buying them from traditional markets, petty traders, Farm gate sales, and supermarkets(see table 11) which constitute 46 percent, 25 percent, 17 percent, and 10 percent respectively of the total responses of 79 from consumers belonging to the household size of 3-5. The result from the observation is presented in Table 11

Table 11: Consumers short food supply chain purchases across household size with kids in (%)

Household Size with Kids		Frequency	Percentage (%)	Std. Deviation
Below 2	Farm Gate sale	8	28.6	
	Petty Traders	8	28.6	
	Traditional Market	9	32.1	1.00462
	Super Market	3	10.7	
	Total	28	100	
3-5	Farm Gate sale	13	16.5	
	Petty Traders	20	25.3	
	Traditional Market	36	45.6	0.96985
	Super Market	8	10.1	
	Shopping Mall	2	2.5	
	Total	79	100	
6-8	Farm Gate sale	2	6.1	
	Petty Traders	8	24.2	
	Traditional Market	16	48.5	0.94748
	Super Market	5	15.2	
	Shopping Mall	2	6.1	
	Total	33	100	
Total		**140**		

Sources: own research and edition, 2023

Similarly, the study analyzed vegetable purchases across various market's avenue within the study across the various monthly income groups of respondents. From our analysis it was observed that consumers belonging to the monthly income earning of GHs 2000-4000 purchase the greater part of their daily household vegetable needs from traditional markets(see table 12) as this constitute 55 percent of the 55 responses of consumers falling within this income category. Only about 11 percent buy vegetables directly from the point of production in this case farm gate. The result from the observations is summarized and presented in table 12.

Table 12: Consumers short food supply chain purchases across monthly income level (%)

Monthly Income		Frequency	Percentage (%)	Std. Deviation
Below GHs 2000	Farm Gate sale	15	30.6	
	Petty Traders	16	32.7	
	Traditional Market	14	28.6	0.95743
	Super Market	4	8.2	
	Total	49	100	
GHs 2000-4000	Farm Gate sale	6	10.9	
	Petty Traders	11	20	
	Traditional Market	30	54.5	0.88646
	Super Market	7	12.7	
	Shopping Mall	1	1.8	
	Total	55	100	
GHs 4000-6000	Petty Traders	6	26.1	
	Traditional Market	12	52.2	
	Super Market	3	13	0.87792
	Shopping Mall	2	8.7	
	Total	23	100	
Above GHs 6000	Farm Gate sale	1	9.1	
	Petty Traders	2	18.2	1.09545
	Traditional Market	5	45.5	
	Super Market	2	18.2	
	Shopping Mall	1	9.1	
	Total	11	100	

Sources: own research and edition, 2023

Grains

In the case of grains purchase across monthly income earning groups within the study area by consumers, results from the analysis suggest that the least sources considered by consumers are farm gate sale, supermarkets, shopping malls as the percentage constituting the total response is minimal across the monthly income groups within the study area (see table 13). The most common sources used for grain purchases are traditional markets as this avenue was mostly explored across the income groups. Similarly buying from petty traders also looks very common from our observation. The results from our analysis are summarized in the table 13.

Table 13: Consumers short food supply chain purchases across monthly income level in (%)

Monthly Income		Frequency	Percentage (%)	Std. Deviation
Below GHs 2000	Farm Gate sale	4	8.2	
	Petty Traders	24	49	
	Traditional Market	19	38.8	0.70167
	Super Market	2	4.1	
	Total	49	100	
GHs 2000-4000	Farm Gate sale	2	3.6	
	Petty Traders	12	21.8	
	Traditional Market	29	52.7	0.80319
	Super Market	11	20	
	Shopping Mall	1	1.8	
	Total	55	100	
GHs 4000-6000	Petty Traders	4	17.4	
	Traditional Market	11	47.8	
	Super Market	7	30.4	0.79524
	Shopping Mall	1	4.3	
	Total	23	100	
Above GHs 6000	Petty Traders	2	18.2	
	Traditional Market	7	63.6	0.63246
	Super Market	2	18.2	
	Total	11	100	

Sources: own research and edition, 2023

Consumers Motivation for Purchasing from a short food supply scheme across household size in the Tano North Municipality

The motivation for consumers deciding to meet their household food consumption exploring purchases through short food supply schemes within the study was analyzed among household size with kids. From the analysis a total of 118 consumers confirmed buying from some form of SFSC which 28 of respondents have household size below 2(see table 14), 79 fall between 3-5 with kids and with only 11 respondents confirming having household members between 6-8. It was observed that across these household sizes those with members between 3-5 had more motivation to purchase their household foodstuff directly from farmers. The result show that about 35 percent decided to purchase food stuff directly from farmers to ensure freshness of foodstuff, 28 percent made the decision to support local farmes,23 percent of them seeks to connect directly with farmers within the Tano north municipality with only 14 percent whose purchase from some form of SFSC do that to promote agriculture sustainability. Table 14 summarizes the results from the analysis.

Table 14:Motivation to purchase from short food supply scheme across household size in (%)

Household size with kids		Frequency	Percentage (%)
Below 2	To connect directly with farmers.	9	32.1
	To support local farmers	8	28.6
	To ensure freshness of Foodstuff	8	28.6
	To promote agriculture sustainability	3	10.7
	Total	28	100
3-5	To connect directly with farmers.	18	22.8
	To support local farmers	22	27.8
	To ensure freshness of Foodstuff	28	35.4
	To promote agriculture sustainability	11	13.9
	Total	79	100
6-8	To connect directly with farmers.	2	6.1
	To support local farmers	9	27.3
	To ensure freshness of Foodstuff	17	51.5
	To promote agriculture sustainability	5	15.2
	Total	11	100
Total		**118**	

Source: own research and edition, 2023

Factors consumers consider before deciding to purchase from a short food supply chain Scheme.

The study went on to ascertain the factors based on the level of Education of consumer that influence their final decision after resolving with their motivation to connect directly with farmers, support local farmers, to ensure freshness of Foodstuff they buy and to promote agriculture sustainability. Consumers had the options Price, Quality, Proximity to source to choose from. A total of 139 responses were collected. 27 had senior high school education level and 112 respondents had tertiary level of education(see table 15). This result from the analysis seems to suggest that quality which constitute 63 percent is the most important factor for consumers particularly those with tertiary educational background as compared to senior high school responds who prioritize price constituting 48 percent as their key factor they consider before finally deciding to meet their household food stuff needs. The least factor considered by consumers across both educational levels was proximity to sources as only 33 percent of consumers with senior high school education and 9.7 percent of consumers with tertiary education will decide to meet their household foodstuff need based on the factor. Table 15 summarizes the observations from the analysis.

Table 15: Factors considered across the educational levels of consumers prior to SFSC purchase in (%)

Level of Education		Frequency	Percentage (%)	Std. Deviation
Senior high school	Price	13	48.1	
	Quality	5	18.5	.907
	Proximity to source	9	33.3	
	Total	27	100	
Tertiary	Price	26	23	
	Quality	71	62.8	
	Proximity to source	11	9.7	.688
	Social and environmental impact	4	3.5	
	Total	112	99.1	
Total		**139**		

Source: own research and edition, 2023

The study further went on to ascertain how consumers across the different employment status within the municipality are being influenced by price, quality, proximity to source as factors considered before finally deciding to explore purchase from a short food supply chain. The result of 139 responses from the analysis shows that most consumers working on full-time employment Status, which constitutes 58 responses, will consider quality before deciding to purchase from SFSC(see table 16). Their responses constitute 64 percent of the total responses from full-time employment status. Table 16 summarizes the observations from the analysis.

Table 16: factors considered across employment status of consumers prior to SFSC (%)

Employment Status		Frequency	Percentage (%)	Std. Deviation
Students	Price	10	34.5	
	Quality	14	48.3	
	Proximity to source	1	3.4	.981
	Social and environmental impact	4	13.8	
	Total	29	100	
Fulltime	Price	15	25.4	
	Quality	38	64.4	.566
	Proximity to source	5	8.5	
	Total	58	98.3	
Part time	Price	2	25	
	Quality	3	37.5	.835
	Proximity to source	3	37.5	
	Total	8	100	
Self-employed	Price	9	33.3	
	Quality	11	40.7	.781
	Proximity to source	7	25.9	
	Total	27	100	
Retired	Price	3	17.6	
	Quality	10	58.8	.659
	Proximity to source	4	23.5	
	Total	17	100	
Total		**139**		

Source: own research and edition, 2023

How consumers relationship with farmers affects the price of Produce

The study observed how consumers relationship with farmers may affect prices at which they finally pay for farmers produce across the level of monthly income of consumers in the study area. From 115 responses from consumers monthly income levels the results show that consumers earning below GHs 2000 and GHs 2000-4000 agree that occasionally their relationship with farmers go a long way to affect how much they finally pay for the produces been offered by farmers (see table 17). Out of 48 responses of consumers earning Below GHs 2000 and 41 Responses from consumers earning GHs 2000-4000 monthly, 47 percent and 44 percent agreed to these reasoning respectively. Table 17 summarizes the observation from the study area.

Table 17: How consumers' relationship across income levels with farmers affect prices of Foodstuff (%)

Monthly Income		Frequency	Percentage (%)	Std. Deviation
Below GHs 2000	Yes, always	12	24.5	.000
	Yes, occasionally.	23	46,9	
	I am not sure.	8	16.3	
	No never	5	10.2	
	Total	48	98	
GHs 2000-4000	Yes, always	9	16.4	.914
	Yes, occasionally.	24	43.6	
	I am not sure.	6	10.9	
	No never	2	3.6	
	Total	41	74.5	
GHs 4000- 6000	Yes, always	7	30.4	.758
	Yes, occasionally.	5	21.7	
	I am not sure.	3	13	
	No never	2	8.7	
	Total	17	73.9	
Above GHs 6000	Yes, always	3	27	.928
	Yes, occasionally.	5	45.5	
	No never	1	9.1	
	Total	9	81.8	
Total		**115**		

Source: own research and edition, 2023

Consumers accessing market information within the study area.

Consumers were asked to identify the medium used to access market information from a list of predetermined information sources in the study area. The analysis was observed on 140 responses across household size to ascertain how each group access information regarding market performance before deciding to go ahead to purchase. The result from the analysis seems to suggest that among household size 3-5 whom all together 79 responses were collected explore Word of mouth, Local Advertisement, mainstream media, and social media to meet their market information need in the study. Table 18 presents the results from the analysis.

Table 18: Market information Sources used by consumers across employment status (%)

Household size with kids		Frequency	Percentage (%)	Std. Deviation
Below 2	Online searches	5	17.9	
	Word of mouth	5	17.9	
	Local Advertisement	8	28.6	
	Community information Center	2	7.1	1.73967
	Mainstream Media	3	10.7	
	Social Media (Facebook)	5	17.9	
	Total	28	100	
3-5	Online search	9	11.4	
	Word of mouth	23	29.1	
	Local Advertisement	15	19	1.68936
	Community information Center	6	7.6	
	Mainstream Media	13	16.5	
	Social Media (Facebook)	13	16.5	
	Total	79	100	
6-8	Online searches	1	3	
	Word of mouth	11	33.3	
	Local Advertisement	8	24.2	1.54356
	Community information Center	1	3	
	Mainstream Media	8	24.2	
	Social Media (Facebook)	4	12.1	
	Total	33	100	
Total		**140**		

Source: own research and edition, (2023)

Constraints to farmers Participation in Short food Supply Chains

Similarly, constraints to farmers participating in short food supply schemes in the municipality were analyzed and ranked using Kendall's coefficient of Concordance and from the analysis logistics and transportation cost, difficulty in marketing produce, competition with other farmer and the lack of customer where the key reasons most farmers within the municipality are reluctant in participating fully in short food supply chain. These constraints were ranked as First, Second, third and fourth based on their severity. Table 19 summarizes the constraints according to their severity to the respondents.

Table 19: Challenges hindering Farmers' participation in Short Food Supply schemes.

Constraints	Mean Rank	Rank
Logistics and transportation Cost	2.13	1st
Difficulty in marketing produce	2.22	2nd
Competition with other farmers	2.31	3rd
Lack of Customer	3.35	4th

Kendall's W[a]=0.505, Chi-Square=206,179 df=3, Asymp. Sig.o.

Source: own research and edition, 2023

Constraints to Consumers Participating in Short food supply chains.

Consumers responses on challenges hindering their active participation in SFSC schemes with farmers within the study area. Their responses were analyzed using Kendell's coefficients of concordance to ascertain the degree to which it affects their decision to participate.

Results from the analysis show producers are not reliable, cost of produce most times expensive, and Distance from point of sales were ranked as the critical reasons for not fully procuring most of their food commodities from these sources respectively. They are ranked as first, second and third respectively.

Table 20 summarizes the constraints according to their severity to the respondents.

Table 20: Constraint faced by consumer Participating in Short food supply Chains.

Constraints	Mean Rank	Rank
Producers are not reliable	2.13	1st
Cost of produce most times expensive	2.22	2nd
Distance from point of sale	2.31	3rd

Kendall's W[a]=0.030, Chi-Square=8.3832 df=2, Asymp. Sig.0.015

Source: own research and edition, 2023

CHAPTER FIVE - CONCLUSIONS AND RECOMMENDATIONS

5. Introduction

This chapter further presents conclusions and policy recommendation based on the findings of the study.

The study found that both farmers and consumers in the area demonstrated a strong understanding of traditional marketing channels within short food supply chains. Specifically, small-scale farms in the study area are actively utilizing short food supply chains as their primary marketing channel due to the benefits of strong social capital. Consumers, who purchase most of their daily household foodstuff, also recognize the benefits of short food supply chains for their nutrition, health, and well-being, and often choose to support local farmers as part of their social values. However, the study found that consumers placed less emphasis on the environmental benefits of SFSC when making purchasing decisions.

The study recommends the following policy direction:

1. Priority should be given to providing regular education and sensitization to farmers on the importance of using smart technological devices such as mobile devices to access production and market information. To build farmers' technical knowledge and capacity in using and benefiting from these devices, the extension service division should prioritize including an educational toolkit in its programs and field visits, providing training on their efficient use.

2. Policy makers should consider improving internet services in the study area to enable farmers to access reliable and stable internet connections, which has been a hindrance for them in accessing information. This will require investing in infrastructure and working with telecommunication companies to improve connectivity.

3. Both farmers and consumers need more education and public awareness about the social, environmental, and economic benefits associated with short food supply chains. This can be achieved through targeted public awareness campaigns, including seminars and workshops, to educate them on the benefits of buying and selling locally

6. Summary

In recent years alternative food chains better known as short food supply chain have received tremendous attention from academics, researchers, governments, and Policymakers across the globe. The past decade has seen substantial and growing interest in the promotion of local food systems throughout developed and developing economies as it is believed shifting attention to building a resilient local food system has the potential of scouring the economic security of local societies. A "new normal" of consumers demanding fresh local produce has been driven by the belief that local food production systems are more sustainable, healthy, and supportive of local economies has since gain much attention particularly post pandemic era. The main objective of the study is to investigate the and understand the synergy between ICTs and farm machinery in SF and SFSC for the sustained maximization of agricultural productivity for small-scale farmers and increase the value generation for stakeholders participating in shorter food supply chains schemes and further build consumer confidence in the safety of food they consume. Specifically investigated various short food supply chains scheme within the Tano north municipality, determine the factors motivating both farmers and consumers to participate in a short food supply chain within the study area, Ascertain the constraints hindering farmers and consumers from participating in short food supply Chain. The research employed primary data obtained from 136 farmers and 140 consumers using structured questionnaire. Descriptive statistics such as mean, percentages and frequency tables were employed for the descriptive analysis whiles Kendell's coefficient of concordance was used to identify and rank constraints to farmers and consumers participating on short food supply chain schemes.

The results from the study identified Direct-to-consumer, Sales at farm gate, farmers market, farmers' cooperative, community supported agriculture programs and online sales as the main short food supply chain Schemes with direct to consumers been the most used scheme within the municipality accounting for about 55.8 percent of farmers within the municipality frequently participating as this channel has proving to be the most sustainable scheme to ensure assured increase in profitability, connecting directly with consumers, greater control over sale and to promote sustainability. community supported agriculture programs and sales through online channel were not used by farmers as channel for selling their produce. Farmers motivation was assessed for participating in each of these SFSC scheme and the result from the resulted suggested

that for all farmers participating in sales at farm gate, connecting directly with consumers was important as these foster and deepen their personal relationship with consumers resulting in building on their social capital. In the case of farmers market, farmers selling using this SFSC scheme opted for it due to the high profit they stand to realized and the social capital ie connecting directly with consumers to deepen their personal relationships. For farmers rarely exploring farmers cooperatives they on do so due to the increased profit they stand to gain. This reasoning attest to the fact that most producers although may produce the same crop yet when it comes to deciding which marketing channel to sell their produce turn to relay on the personal interest which gives the highest utility in terms of profit and social capital. Access to Information today is crucial in every sphere of life. Farmers accessing the right information regarding their farm production operations and market expectations goes a long way to inform their decision making as to the best channel of sales to explore for the maximum returns from their harvest making the source from which they access this market information very crucial. Results from our study revealed that farmers are still yet to tap fully into the use of improved information communication technologies although most farmers use and own smart technological devices such as smart phones, they rather turn to access most of their market information needs from market queens who are the gate keepers of most traditional markets across the municipality. Although this is one of the most reliable information sources for most farmers there is a higher information distortion which could jeopardize farmers' chances on the market. Most farmers ranked the lack of technical knowledge and skills needed to explore the use of smart technologies and the high cost involved in owning one as the key barriers to the use of smart technology in both farm and market information needs with results from the Kendall's coefficient of concordance. We further observed that farmers across the study area seem content with their participation in short food supply chain schemes in the municipality as these constitute about 56 percent of the total respondents interviewed. In terms of farmers satisfaction based on their farming years of experience, farmers having 20 years and above experience as farmers seems more satisfied opting to sell through short food supply scheme within the study area.

Consumers on the other hand within the income group GHs 2000-4000 seems to meet their household food consumption through purchases directly from farmers on a more frequent basis compared to the other monthly income groups as their responses constitute about 45 percent of the respondents. The study further observed the various marketing outlets consumer purchase of

vegetables and grains and from the results shows that consumer turn to buy their vegetables from traditional markets, petty traders, Farm gate sales, and supermarkets with the most consumers who explore these outlets have household size between 3-5. In the case of vegetable purchase across monthly income level in the study area consumers earning GHs 2000-4000 purchase the greater part of their daily household vegetable need from traditional markets. Similarly for Grain purchases, most consumers turn to use the traditional market as their major source of purchases with the least sources considered by consumers in the study area been farm gate sale, supermarkets, shopping malls. Most consumers with household size with kids of 3-5 are more motivated to purchase their household foodstuff needs directly from farmers made the decision to ensure freshness of foodstuffs to meet the nutritional needs of their loved ones with the least motivation for Purchasing directly from farmers as a marketing channel was to promote sustainability. Furthermore, results after analysis across the educational background of consumers based on factors considered by before deciding on purchases after resolving with their motivation to connect directly with farmers, support local farmers, to ensure freshness of Foodstuff they buy and to promote agriculture sustainability indicated that for those with tertiary level of education, quality was the key factor influencing final purchasing decision, for those with senior high education price was consider most critical whiles the least consider factor was proximity to source.

The results from the constraints from the Kendell's coefficient of concordance revealed in the case of farmers logistics and transportation cost, difficulty in marketing produce and competition with other farmer were ranked first , second and third respectively as the most critical issues hindering their full participation short food supply chains in the study area.in the case of consumers producers not reliable, the cost of food stuff turns to be expensive and the distance from the point of sale were equally ranked in terms of its severity as first, second and third challenges hindering their full participation in short food supply chains within the study area.

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I want to further extend my appreciation to my family at home, the extension service of Tano north municipality who played key role in getting the surveys across to farmers in the municipality.

DEDICATION

I dedicate this work to my parents in whom I draw motivation each time the going gets tough. To my lovely sister and husband, brother and wife and colleagues and friends who were instrumental in connecting me to key stakeholders throughout this work and believing in me.

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Appendices

Appendix 1 – Declaration

STUDENT DECLARATION

I Boame Nusienyo Yao Charles a student of the Szent István Campus of the Hungarian University of Agriculture and Life Science, at the MSc Course of Rural Development Engineering declare that the present Thesis is my own work and I have used the cited and quoted literature in accordance with the relevant legal and ethical rules. I understand that the one-page-summary of my thesis will be uploaded on the website of the Campus/Institute/Course and my Thesis will be available at the Host Department/Institute and in the repository of the University in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: yes no*

Date: 09/05/2023

Student

SUPERVISOR'S DECLARATION

As primary supervisor of the author of this thesis, I hereby declare that review of the thesis was done thoroughly; student was informed and guided on the method of citing literature sources in the dissertation, attention was drawn on the importance of using literature data in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: yes no *

Approval of thesis for oral defense on Final Examination: approved not approved *

Date: Gödöllő 2023 05. month 09 day

Signature

Appendix 2

ABSTRACT OF THESIS

Thesis Title: **Short Food Supply Chains; A Tool for Building Sustainable Rural Economies**

(Case Study Tano North Municipality Ghana)

Author: Boame Nusienyo Yao Charles

Course, level of education: MSc. Rural Development Engineering

Host Department/Institute: Institute of Rural development and Sustainable Economy

Primary Thesis Advisor: Dr hibil Krisztian Ritter, Associate Professor.

Department of Rural and Regional Development / Institute of Rural Development and Sustainable Economy

Food systems are important as they include not only the actions that take place along the food chain but also their results and governance. In current times there have been major advances to redevelop local food systems (LFS) and of which short food supply chains (SFSC) of various types like farmers markets and shops, on-farm direct sales or better known as “farmgate markets”, delivery of schemes including other informal partnerships between producers and consumers are focal on the discussion table. This study aimed to examine the factors motivating farmers and consumers to participate in short food supply chains and the constraints hindering their full participation, using Tano north municipality as a case study. Specifically, to achieve this objective, a questionnaire was developed and administered to farmers and consumers in the municipality, using a combination of close-ended and open-ended questions. The study sample size was 136 farmers and 140 consumers, and the data analysis methods included descriptive statistics, means, and Kendall's coefficient of concordance, performed using the statistical program for social sciences (SPSS). The findings showed that small-scale farms in the study area actively utilized short food supply chains as their primary marketing channel, driven by the benefits of strong social capital. Consumers who purchased most of their daily household foodstuff also recognized the benefits of short food supply chains for their nutrition, health, and well-being and often chose to support local farmers as part of their social values.

Keywords: Local food system, Short Food Supply Chain