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ECONOMIC ANALYSIS OF THE MARKETING OF VEGETABLES AT THE KOMENDA EDINA EGUAFO ABREM DISTRICT MARKETS

BY

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DECLARATION

I, Albert Bawuah, the author of this thesis, hereby declare that except for the references which have been duly cited, this thesis titled 'ECONOMIC ANALYSIS OF THE MARKETING OF VEGETABLES AT THE KOMENDA EDINA EGUAFO ABREM DISTRICT MARKETS', was entirely authored by me at the Department of Agricultural Economics and Agribusiness, University of Ghana, Legon. This thesis has never been presented or published either in whole or in part for any other degree in this University or elsewhere.

..... 30-09-2025

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ABSTRACT

This study conducted an economic analysis of vegetable marketing in the Komenda Edina Eguafo Abrem (KEEA) Municipal District of Ghana's Central region. Employing a descriptive cross-sectional survey design, the research aimed to identify factors influencing consumer preferences, analyze retailer sourcing decisions, and examine challenges in vegetable marketing. A multi-stage sampling technique was used to select 443 participants, including vegetable retailers and consumers. Data was collected through structured questionnaires and analyzed using Simple statistical analysis, Multiple regression model, and Kendall's Coefficient of Concordance. Findings from the study indicated that consumer preferences for vegetables are influenced by retailer and vegetable characteristics, external and health considerations, socio-economic factors, and freshness, size, and market demand. Retailers prioritize freshness, size, and market demand, while food safety and sustainability are less important. Key challenges identified include ease of perishability, high transportation cost and poor storage. The study suggests enhancing vegetable marketing in a developing economy by implementing targeted campaigns, food safety training, improved infrastructure, age-specific nutritional interventions, and establishing a quality certification system for vegetable retailers. This will improve market efficiency, support local agricultural development, and benefit producers and consumers.

DEDICATION

This study is dedicated to my wife, Johnicia Boahemaa, and the entire Bawuah family.

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LIST OF ABBREVIATIONS

Df	Degrees of freedom
GDP	Gross Domestic Product
GHS	Ghana Cedi (currency)
GSS	Ghana Statistical Service
K.E.E.A	Komenda Edina Eguafo Abrem
KMO	Kaiser-Meyer-Olkin (statistical measure)
NGO	Non-Governmental Organization
ROE	Return on Equity
ROA	Return on Asset

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture is one of the three sectors of Ghana's economy. The other two sectors are the industrial and services sectors. Based on data from the 2021 national population census organized by the Ghana Statistical Service (GSS) (2021), agriculture employs 33.0% of the workforce of the country. In terms of the contribution to the gross domestic product (GDP) of the country, agriculture accounted for about 20.8% of the total GDP over the ten-year period from 2013 to 2022 (GSS, 2023). Ghana has a variety of ecological zones favourable to produce different crops for both local export markets. Vegetable production takes up about 1.1% of the global agricultural land, which is 0.1% more than that of fruit production, according to Dong et al. (2022). In Ghana, vegetable cultivation occupies approximately 185,000 hectares of agricultural land as of 2020. Moreover, the sector's recent outputs have surpassed cereals on a global scale, with cultivated land area doubling for grains between 1960 and 2000 according to Duru et al. (2023). In the food industry, vegetables are inputs for restaurants (Jeon, 2024).

The vegetable marketing system in Ghana operates through a complex distribution network involving multiple stakeholders and market levels. At the primary level, farmers produce vegetables either through smallholder farming systems or larger commercial operations. These vegetables are then channeled through various marketing channels including: (1) direct sales from farmers to consumers at local markets, (2) sales to local assemblers who transport vegetables to regional markets, (3) sales to wholesalers who distribute to urban centers, and (4) sales to processors and exporters. The secondary level involves wholesale markets in regional

centres where vegetables are redistributed to retailers, while the tertiary level comprises retail markets and vendor stalls where final sales to consumers occur (Wongnaa et al., 2023).

Within this marketing system, this study specifically focuses on the retail level of vegetable marketing, examining the intersection between consumer preferences and retailer sourcing decisions at local market centers. The scope encompasses understanding how consumer demand for specific vegetable attributes influences retailer procurement strategies, and how market challenges at the retail level affect the overall efficiency of vegetable distribution to end consumers.

The consumption of fruit and vegetables is noted to enhance good health and longevity due to the abundance of vitamins, minerals, dietary fiber, and phytochemicals in them, which is known to fight against diseases such as cardiovascular diseases, hypertension, obesity, and diabetes (Arumugam et al., 2021). Vegetables are also roughages, stimulating intestinal muscles and preventing constipation (Yakubu & Kumah, 2019). Research has revealed that good vegetable consumption can reduce the occurrence of colon and prostate cancer due to the high antioxidants in them (Ahmad et al., 2022). To achieve this, the World Cancer Research Institute suggests that at least 400g of vegetables and fruit are consumed per day. Given these significant health benefits, ensuring consistent access to vegetables through efficient distribution systems is crucial. The effectiveness of vegetable marketing systems directly impacts both producer incomes and consumer access to nutritious foods, making market analysis essential for understanding agricultural value chains.

1.2 Problem Statement

Despite the significance of vegetable production and marketing in Ghana's agricultural sector (Dong et al., 2022), several challenges persist in the value chain. The most critical issues are

post-harvest losses and quality deterioration, with farmers and retailers struggling to maintain vegetable quality during transportation and storage due to inadequate facilities (El-Ramady et al., 2015). These challenges result in significant post-harvest losses, estimated at 30-40% for perishable vegetables in Ghana (Anaba, 2018; Wongnaa et al., 2023). Having said that, studies on the economic analysis of vegetable marketing have received significant scholarly and professional attention at both national and regional level in the past few decades. For instance, Aliyi et al. (2021) found that smallholder vegetable production in Ethiopia is profitable, but constraints like input scarcity, pests, diseases, poor storage, and transportation hinder growth and poverty reduction. Similarly, Mukaila et al. (2021) highlight that vegetable marketing faces constraints such as high costs, low supply, and lack of credit facilities.

Mandla and Vaidya (2022) disclosed that vegetable production and marketing face socio-economic challenges, with tomato being the most expensive crop and pea and cauliflower being the most dominant, with four marketing channels prevalent in the study area. In another study, Salam et al. (2023) argue that vegetable marketing needs improved credit facilities, separate marketplaces, and technical training to boost profits and boost vegetable production. According to Berlian et al. (2023), economic factors, personal income, cultural factors, social dynamics, psychological factors, and personal habits significantly influence consumer behaviour in Indonesian vegetable markets.

Raplang (2021) provides evidence that higher investment, favourable government policy, quality produce, post-harvest facilities, and improved marketing efficiency can improve vegetable marketing among small-scale farmers. Also, Shafiwu and Tawiah (2022) argue that farmers' marketing efficiency in the tomato value chain is higher than wholesalers' but lower than retailers', with factors like education, experience, and farming methods influencing their efficiency in Ghana. Furthermore, Wongnaa et al. (2023) emphasise that post-harvest losses

among tomato farmers in Ghana amount to GH₵ 35,987, mainly due to rot and bruise, with education and market availability having significant positive effects on the proportion of lost tomatoes. However, most existing studies focus primarily on production-level economics or wholesale market analysis, with limited attention to retail-level economic dynamics. Furthermore, there is insufficient integration of consumer behavior theory with supply chain economics in vegetable marketing research, particularly in developing country contexts where informal markets dominate.

Despite these studies (Aliyi et al., 2021; Berlian et al., 2023; Mandla and Vaidya, 2022; Mukaila et al., 2021; Nimoh et al., 2021; Raplang, 2021; Shafiwu and Tawiah, 2022), there is still a lacuna in the literature regarding the attributes of vegetables that influence consumer preference and the influential factors affecting vegetable retailers in sourcing decision-making in both developed and developing countries. Specifically, there is limited empirical analysis of how consumer preferences for vegetable attributes translate into economic value and influence retailer sourcing strategies at local market levels. A significant proportion of literature focused primarily on consumption, nutrition, health, and disease prevention (Lyerly et al., 2020; Obayelu et al., 2019; Obisesan, 2021) neglecting the factors that drive consumer preference to a particular vegetable as well as retailers' sourcing decision-making.

Also, there is a dearth of study on the particular challenges faced by the vegetable marketing sector in the KEEA district, despite the fact that several studies have examined the challenges encountered in the vegetable market in Ghana and other places. This knowledge gap hinders a comprehensive understanding of the specific barriers and opportunities for vegetable marketing in this particular region, limiting the development of targeted strategies to improve market access and profitability for local farmers and retailers. Given these arguments, this research would not only bridge the gap on the challenges of vegetable marketing but also examine the

vegetable attributes that influence consumer preference and the parameters that influence vegetable retailers' sourcing decision-making with evidence from KEEA District in Ghana. The study will add to the available knowledge through the assessment of the intersection of consumer choices, retailer decision-making, and assess market challenges in the context of vegetable marketing in a specific region like KEEA District in Ghana. By shedding light on these interconnected factors, the study aims to provide practical insights and recommendations for stakeholders looking to enhance the efficiency and effectiveness of vegetable marketing efforts in similar settings.

1.3 Research Questions

1. What are the main types of vegetables that consumers buy at market centres?
2. What are the main factors that influence consumer preferences for vegetables?
3. What factors influence the sourcing decisions of retailers of vegetables?
4. What are the various challenges that retailers of vegetables face in the sourcing and selling of vegetables to consumers?

1.4 Objectives of the Study

The main objective of the study is to assess the factors that influence consumer preferences for vegetables and the sourcing decisions by retailers of vegetables in offering their services to consumers. The specific objectives of the study are as follows:

1. To identify the types of vegetables purchased by consumers at market centres.
2. To establish the major factors influencing consumer preferences for vegetables including specific attributes of vegetables.

3. To ascertain the factors involved in the sourcing of vegetables by vegetable retailers.
4. To analyse the various challenges that vegetable retailers face in sourcing vegetables and selling them to consumers.

1.5 Justification of the Study

This study is highly relevant and significant because it examines the factors that influence vegetable consumption and purchasing behaviour in Ghana's KEEA District. Because they are abundant in vital vitamins, minerals, and dietary fibre, vegetables are important for maintaining excellent health and nutrition. The KEEA District is one of several Ghanaian communities that struggle to consume enough vegetables, which could result in nutritional deficits and related health hazards.

This study intends to offer important insights into the preferences, perceptions, and obstacles that influence vegetable consumption patterns by examining the demand-side factors that influence consumers' decisions to buy vegetables. Understanding these factors can inform targeted interventions, educational campaigns and policy measures to encourage healthier dietary habits and increase vegetable consumption among the local population.

On the supply side, the study examines the considerations of vegetable retailers in their selection of the types of vegetable to source from farmers and sell to consumers. The study therefore provides some information about the inefficiencies in the vegetable supply chain, enabling strategies to improve the availability, variety, and quality of vegetables in the local markets. By addressing both demand and supply dynamics, the study contributes to the development of a more robust and sustainable vegetable market system that better serves the nutritional needs of the community.

The study also addresses the important problem of asymmetric information in vegetable markets, where vegetable retailers may know more about the freshness and quality of their produce than buyers do. Bringing this information imbalance to light might help purchasers make better decisions, increase customer trust, and reduce possible market inefficiencies.

The research study's conclusions give policymakers, agricultural extension services, and community organisations, additional knowledge to help them create focused interventions and strategies that will increase vegetable consumption and improve health outcomes in the KEEA District and possibly elsewhere. This study supports the larger initiatives to create sustainable food systems and encourage plant-based, healthful diets for better public health and environmental sustainability by examining the variables influencing vegetable intake and purchasing behaviour.

1.6 Scope of the Study

Conceptually, the goal of this study is to identify the major determinants of the kinds of vegetables that vegetable retailers in Ghana's KEEA area sell as well as the elements that impact consumers' decisions while buying vegetables. It investigates a number of demand-side factors, including consumer preferences, opinions about freshness and quality, price sensitivity, and ease of access to various retail locations (e.g., modern supermarkets, open-air markets). The study looks at supply-side characteristics such as profitability, perishability, supplier availability, and consumer demand trends that vegetable retailers take into account when deciding which vegetables to purchase and sell.

The KEEA Municipal District in Ghana's Central Region serves as the study's geographic emphasis. This region was selected because of its substantial agricultural activity, which includes the production and trade of vegetables. Because the KEEA district includes both urban

and rural communities, it is possible to investigate possible differences in vegetable consumption and purchasing patterns among various community contexts. The study includes traditional open-air markets, which are still a significant part of Ghana's food retail system, as well as other vegetable retail establishments in the district. It also takes into account contemporary retail forms, such as grocery shops and supermarkets, which are a new trend in the food sector.

1.7 Limitations of the Study

The KEEA District is the exclusive focus of the study, which restricts the findings' applicability to other areas or situations in Ghana or elsewhere. Cultural, economic, and infrastructure disparities can cause variations in the market dynamics and patterns of vegetable consumption across different regions. A certain amount of bias may be introduced by the sampling procedure, despite efforts to acquire a representative sample of consumers and vegetable merchants within the study area. The sample's representativeness may be impacted by variables like participant self-selection, response rates, and recruitment strategies. Since the study is entirely quantitative, standardised data gathering techniques like surveys and questionnaires are the mainstay of the research. These techniques make it possible to analyse numerical data and find statistical links, but they might not fully convey the subtleties and depth of comprehension that qualitative approaches can offer.

The study uses a cross-sectional design, which means that information is gathered all at once. As a result, it might not accurately reflect how dynamic vegetable consumption and buying patterns are, as they may be impacted by shifting consumer preferences over time, seasonal variations, and market swings. Furthermore, the study makes extensive use of self-reported data from vegetable retailers and customers, which could be skewed by deliberate misreporting,

recollection bias, or social desirability bias. Inaccurate information may be purposefully or unintentionally provided by participants, which could compromise the validity of the results.

Furthermore, because of the possible influence of unmeasured or uncontrolled variables, the quantitative analysis may not be able to definitively prove causal linkages, even though it can find correlations between numerous parameters and vegetable consumption or purchasing behaviour. Notwithstanding these drawbacks, the study uses exacting methodological techniques, including well thought-out data collection tools, sensible sampling plans, and strong statistical analyses, to minimise potential biases and guarantee the validity and reliability of the results as much as possible.

1.8 Organisation of the Thesis Report

This thesis report is organized into five chapters, structured as follows. The introductory chapter provides an overview of the study, including the background information, problem statement, research objectives, research questions, significance of the study, scope and limitations, and the organization of the thesis.

Chapter Two is a comprehensive review of relevant theoretical and empirical literature related to factors influencing vegetable consumption and purchasing behaviour. It covers key concepts, theories, and previous research findings pertinent to the study.

Chapter Three outlines the research methodology employed in the study. It describes the research design, study area, target population, sampling techniques, data collection methods, and data analysis procedures. Additionally, it discusses ethical considerations and measures taken to ensure the validity and reliability of the research.

Chapter Four presents the findings of the study, including descriptive statistics, inferential analyses, and interpretations of the results. The chapter is organized according to the research objectives and questions, providing a detailed discussion of the key factors influencing vegetable consumption and purchasing behaviour.

The final chapter, Chapter 5 summarizes the main findings of the study and discusses their implications for theory and practice. It also highlights the contributions of the research and provides recommendations for stakeholders, such as policymakers, agricultural extension services, and community organizations. Additionally, this chapter outlines the limitations of the study and suggests directions for future research work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature. A literature review is an activity in which the knowledge base is engaged to inform this current study. This thesis literature review is structured under three headings namely introductory overview, theoretical review, empirical review and gaps in the identified literature. The conceptual framework is presented at the end of the chapter.

2.2 Introductory Overview

This section covers the overview of this thesis. The overview defines concepts and variables relevant to this dissertation. It includes demand-side elements, consumer preferences, perceptions of quality and freshness, price sensitivity, accessibility to retail outlets, vegetables to source and sell, profitability, perishability, availability from suppliers, and consumer demand trends.

2.2.1 Demand-side elements

Consumer Demand and Demand for Goods is derived from Consumer preferences and Consumption Patterns. The types of vegetables that consumers purchase and eat are influenced by consumers' tastes, cultural traditions and dietary habits (Boca, 2021). For example, there may exist a higher affinity of the market demand for some specific vegetables from their ethnic groups. Both income elasticity and demand elasticity have to be considered. Income elasticity is the elasticity of demand for vegetables with respect to changes in income levels. However, demand elasticity refers to how responsive the consumers' demand is to changes in vegetable

price (Huang et al., 2022). These elasticities allow for the prediction of the behaviour of market participants and the formulation of pricing strategies. Demographic factors including household composition (number of adults, number of children, presence of retirees, presence of foreign-born persons), age and location of households affect vegetable demand. For example, urban consumers may have different preferences and purchase behaviours than that of rural consumers (Tang et al., 2020).

Furthermore, households with children may have different demands for some vegetables because of nutritional considerations, compared with households not having children. This cannot be ignored as we know that there are health trends and dietary patterns in place. If consumers become more health-conscious, then the demand for fresh, organic and nutritious vegetables can grow (Mahesh, 2022).

Also, rates of demand for some types of vegetables can be very much dependent on dietary patterns like vegetarianism or plant-based diets. Marketing strategies and product differentiation will affect consumer demand. Brand, packaging and promotional campaigns are effective in creating consumer awareness and shaping preferences (Bou-Mitri et al., 2021). In addition, value added or niche products, for instance, pre-cut or ready-to-eat vegetables, can diversify this demand to specific end users.

Consumers' demand for vegetables can be influenced by the availability and accessibility of vegetables on different marketing channels. While consumers may prefer traditional markets, supermarkets or online platforms, depending on factors such as convenience, product variety, and pricing (Srinivasan et al., 2021), the centre and edges of the home channels may experience dissatisfaction on grounds which differ.

Demand for vegetables may be impacted by food safety and quality concerns. Vegetables that meet stringent safety standards and quality certifications may even be able to attract consumers

to pay a premium (Tran et al., 2022). These attributes can then be effective in the communications of these attributes that can translate into a perception-based consumer demand. Demand for specific vegetables may be regulated by cultural and social factors, like traditional cuisine, seasonality, and community preferences (Wallnoefer et al., 2021). And it is important because it allows for customization of marketing strategies for meeting the assortment of needs of consumers. These demand-side elements can help stakeholders in the vegetable marketing sector to analyze consumer behaviour, preferences and market dynamics make rational decisions and prepare effective marketing strategies.

2.2.1.1 Consumer preferences

The economic analysis of vegetable marketing is dependent on consumer preferences. Consumers' demand for vegetables is based on their taste preferences. There are preferences in the taste of different cultures and regions that might greatly determine the types of vegetables prepared (Diósgegi et al., 2019). For instance, some people will want vegetables that are less pungent while others will want milder tastes. Consumer preferences for vegetables are shaped by freshness and appearance. Consumers often link freshness with better taste, flavour and nutritional value (Jaeger et al., 2023). Whether vegetables look good — with colour, size, and no blemishes — can influence purchasing decisions. The health considerations of a consumer are important to enable them to choose vegetables that will benefit them.

The demand for nutrient-dense and vitamin-rich vegetables is increasing among consumers as they become more health conscious (Goyal et al., 2024). Superfood vegetables as well as those high in antioxidants may attract the health-conscious customers. In an urban area where people are very busy, what consumers prefer or are looking for is one of convenience. Vegetable products which require less preparation time and effort such as pre-cut, pre-washed, and ready to eat are more favorable to the consumers (Anderson, 2021). Producers of organic and sustainable goods may change consumer product preferences. Regardless of whether

consumers prefer organically grown vegetables (Kamanal, 2008), or locally sourced vegetables, they may be willing to pay a premium for those produce.

Consumer preferences for certain vegetables are caused by cultural and traditional factors. Its labels are, for example, if some ethnic groups have a strong preference for certain vegetables because they are culturally significant or part of traditional cuisine (Bennett et al., 2022). Consumer preferences towards some vegetables may be influenced by seasonality. Looking at vegetables when in season, consumers may opt to purchase them over vegetables out of season for the reasons that; they are perceived to be fresher, tastier and cheaper (Godrich et al., 2020). There's a psychology associated with price and value and how consumers perceive that. Some consumers will, of course, focus on low prices but some may be ready to pay more for what is considered higher quality or value (Ross and Milne, 2021).

In practice, in modern retail settings, consumer preferences can be influenced by packaging and branding. Vegetables (Schifferstein et al., 2021) can be attractively packaged, with clear labelling and effective branding to increase perceived value and appeal. Fairtrade practices, carbon footprint, and sustainable packaging have become important, ethical and environmental factors that are driving consumers' preferences with a higher level of awareness, belonging to younger and more environmentally accepting and conscious consumers (Robichaud & Yu, 2022). This is important because by understanding these myriad factors that influence the consumer's preference for a product, marketers of vegetables in the marketing sector can develop more effective marketing strategies, and produce better products or marketing communication programmes designed specifically for the consumer's preferences.

2.2.1.2 Quality and freshness perceptions

The food industry is very sensitive to customer choices; customer behaviour is greatly influenced by perceptions of quality and freshness. Usually attributes such as taste, appearance,

nutritional value and safety characterise quality, while freshness is linked to the sensory characteristics of products (Santos et al., 2021). In short, these perceptions will have a major effect on purchase decisions, brand loyalty, and satisfaction with a product. Sensory cues are often considered as creating freshness. For example, consumers use fruit and vegetables' colour, the texture of a fruit or vegetable, the smell in a baked good, or the firmness of meat as primary cues (Jaeger et al., 2023). These sensory characteristics are immediate and can be determined quickly thus are important in the perception of freshness.

In other words, consumers interpret these sensory cues as being indicative of the overall product quality, even when other quality attributes are less obvious. While quality differs from practicality, it is both breadthier and narrower than practicality; quality is a broader thing that includes intrinsic and extrinsic. These factors are intrinsic, i.e. product intrinsic properties such as flavour, nutritional content and safety. They are related to external attributes like packaging brand reputation, and price (Malekpour et al., 2022). Each set of these factors is important, but their importance will vary, based on the type of product and the consumer's propensity to personal preference and consumer experience.

Consumers' opinions of quality and freshness throughout the supply chain are dynamic and not static because they depend on individual experiences, marketing communications and social influence. A strategy of marketing with an emphasis on freshness and quality can increase consumers' perception and willingness to pay a premium (Bang, 2023). Often these strategies capitalize on the perceived health benefits and better taste of fresh and high-quality products.

The fact also highlights the increased significance of quality and freshness brought about by the growth of sustainable and ethical consumerism. Thanks to such, many consumers are now searching products that are not only fresh and of high quality, but also produced from an environmental and socially responsible perspective (Kahraman & Kazançoğlu, 2019). It's

particularly pronounced with younger consumers who have carefully trumpeted their thrift and morality in purchasing decisions. Different techniques are used by retailers and producers to keep and convey product quality and freshness. For instance, modifications in packaging technology, including modified atmosphere packaging (MAP), can lengthen the shelf life of perishable products and still keep their sensory qualities (Opara et al, 2019). Additionally, labelling and information about the origin and methods of production of products could inform consumers that a product is of good quality and freshness.

The success of new products depends upon perceptions of quality and freshness as well. Companies conducting sensory testing and market research for a new product often want to know how consumers view the quality and freshness of the product. This feedback is important to refine product attributes and marketing messages to fit the expectations of the consumers (Cambier & Poncin, 2020). Perceptions of quality and freshness can also be influenced by cultural differences. Let's say fresh is one thing to one person, yet is another to the next. Some of this is related to the presence or absence of traditional cooking methods, or the presence or absence of what may be regarded as preservatives (Hassoun et al., 2020).

Companies involved in global markets know the importance of understanding these cultural nuances. Quality and freshness perception are complex and multifaceted also including sensory evaluation, real product attributes, and more general cultural and sociological influences. Ideas that consumers think are important are indispensable to how consumers behave, what marketing strategists do, and product development. Knowledge about and addressing these perceptions can help companies provide consumer needs better and that will improve their competitive advantage in the marketplace.

2.2.1.3 Price sensitivity

Price sensitivity is defined as the extent to which consumers' purchasing behaviour is affected by the changes in the price of the product or service (Bhutto, et al, 2020). It is a measure of consumer response to changes in the price of a commodity. Price sensitivity refers to the change or willingness to change the behaviour of purchase in the function of the price changes of a product or service (López Fernández, 2020). It measures the relative importance, to the consumer, of price versus other factors, for example, quality, brand, or convenience. The world of vegetable marketing is one of the markets where consumer behaviour and decision to buy/ purchase is influenced by price sensitivity. It establishes how the demand for one product reacts to a change in the price, which is elastic and inelastic (Kübler et al., 2020).

Understanding price sensitivity is essential for businesses to make informed pricing decisions and optimize their marketing strategies. Income levels and socio-economic status play a significant role in determining price sensitivity. Consumers with lower incomes tend to be more price-sensitive, as their purchasing power is limited (Nassar et al., 2021). In contrast, higher-income consumers may be less sensitive to price changes and more willing to pay premium prices for desired attributes including quality. The perceived value and quality of a product can influence price sensitivity. Consumers may be willing to pay higher prices for vegetables perceived as superior in quality, freshness, or nutritional value (Fan, 2019). However, if the perceived value does not align with the price, consumers may become more price sensitive.

The price sensitivity of a product or vegetable may be different. Consumers will be more price sensitive to staples, widely consumed or niche varieties and less for special varieties (Faniyi, 2024). It's because of how unique or rare certain products seem to be. Price sensitivity can also depend on what substitutes are available. Consumers may be more price sensitive if substitutes for a particular vegetable are readily available, and can switch to alternatives if they become too expensive (Song et al., 2022). Price sensitivity can be driven by marketing efforts and

branding strategies. Branding and product differentiation can effectively communicate perceived value and overcome consumer price sensitivity (Pandey et al., 2020). On the other hand, a lack of branding, or differentiation, might accelerate price sensitivity.

Price sensitivity can also depend on the retail environment and shopping experience. In upscale or premium retail environments, consumers are perhaps willing to pay higher prices for perceived quality and service (Wang et al, 2019). Temporary price sensitivity reduction occurs with promo activities and discounts. But it may be, that the typical price-sensitive consumer is more likely to purchase vegetables when they are offered at discounted prices or through promotional deals (Massaglia et al., 2019.). The literature affirms to stakeholders in the vegetable marketing sector, the importance of understanding price sensitivity and its different influencing factors. By rebuilding their marketing campaigns, product offers, and pricing strategies they can adjust their pricing strategies and thereby maximize profitability while maintaining customer needs.

2.2.1.4 Accessibility to retail outlets

Retail outlet accessibility can be defined as the level of consumer ease in terms of accessing and buying products from different retail channels, including regular markets, supermarkets, convenience stores, and online platforms (Kleisiari et al., 2021). Availability and convenience of shopping at a greater range of products and services promoted in different retail formats such as hypermarkets, superstores, chain stores, supermarkets, and farmer yards, and the distance to access these retail formats, are referred to as accessibility to different retail outlets (Mateos-Mínguez et al., 2021). Accessibility to various retail stores was found to be an important driver influencing consumers' decisions on how they buy.

Availability and convenience of various retail channels can affect consumers' preferences, consumption patterns and overall demand for vegetables (Dhaoui et al., 2020). In some areas.

fresh vegetables are traditionally purchased from traditional retail outlets, for example, wet markets as well as grocery stores. These outlets typically stock a wide range of locally grown and seasonal produce at bargain prices (Deller et al., 2020). However, finding access to them in the case of some cities and regions with little transportation infrastructure may be difficult.

With the rise of modern retail formats such as supermarkets and hypermarkets, accessibility to a wider range of vegetable varieties, including imported and out-of-season produce (Kariuki, 2021), has become more possible. On the other hand, the wider retail outlets frequently offer a more convenient shopping experience in terms of large operating hours, abundant parking and cooled interiors. While they are harder to come by in rural or low-income areas because of location and pricing tactics used, however. Online grocery shopping and home delivery services have also improved the availability of different retail outlets for consumers without a huge amount of mobility or time (Dillahunt et al., 2019). These platforms also enable customers to browse their options and buy a variety of vegetables from the comfort of their homes or workplaces, thus negating the need to visit shops.

Further, there are factors, such as transportation infrastructure, urban planning, and zoning regulations that influence accessibility to different retail outlets. Well-connected public transportation systems and pedestrian friendly urban environments will help improve accessibility for various retail outlets; and insufficient infrastructure or restrictive zoning laws may hinder reasonable accessibility (Cobbinah and Finn, 2024). The accessibility of different retail outlets depends on consumer's preferences and lifestyle factors. Some consumers may choose retail outlets located closer to home or work, other consumers may be willing to travel further to certain retail formats or product offerings (Ntounis et al., 2020).

Availability to alternative retail outlets is also culturally and socioeconomically determined. Traditionally, markets may be deeply rooted within cultural traditions and serve as social

gathering places in some areas while modern retail formats may be preferable or more often found in other communities (Zhong et al., 2020). Therefore, stakeholders in the vegetable marketing industry must possess deep knowledge of the availability of different retail outlets to make strategic decisions about product assortment, distribution routes, and marketing strategies (Reardon et al., 2021). Improving accessibility and incorporating customer preferences across different retail formats may open up companies' clientele for expansion, increase customer happiness and eventually boost revenues and profitability.

2.2.2 Sources of vegetables

Vegetables to source and sell is a term used to refer to the selection of a wide range of vegetables from various sources, including local farmers, some wholesalers and importers with the plan of selling those commodities through different retail channels or markets (Seatle, 2022). The decision-making process in identifying and sourcing vegetables to sell includes the determination of a range of vegetable varieties that will cater for consumer preferences, suit market demand and seasonality affecting the supply chain logistics to supply target customers (Nedumaran et al., 2020).

This is a critical aspect for the vegetable marketing sector to determine the right vegetables to source and sell. The process includes an examination of many factors to select the vegetable varieties to reflect the preference of the consumer as well as the market trends and fit operational capability. Overall success and profitability of a business depend on the decision-making process. Among the main factors which affect the selection of a source and selling of vegetables are consumer preferences and demand. Understanding consumer preferences for certain vegetable varieties, flavours and attributes such as freshness, appearance and nutritional value is important (Hoppu et al., 2021).

Businesses can discern emerging and popular vegetable trends through market research and consumer insights. The other thing to consider in sourcing vegetables is seasonality. Some vegetables are available only during certain seasons, and sourcing these vegetables in peak season will give the best possible quality, freshness, and price (Shewfelt & Prussia, 2022). To learn seasonal patterns and change product offerings, a business can learn to meet consumer expectations and minimize waste.

The availability of supply sources and supply chain logistics dictate what vegetables to source and sell. Depending on the particular business, it can source locally grown vegetables to help local agriculture to decrease transportation costs, or import to meet consumer demands (Gómez & Ricketts, 2023). In selecting vegetables to source and sell, profitability and margin considerations are at the heart of the discussion. Landscape variability and business profit must be carefully assessed in terms of the costs involved in sourcing, handling, and marketing different vegetable varieties and, hence, potential sales volumes and pricing strategies for profits (Flores et al., 2019). They can also be influenced by product differentiation and niche market opportunities for the vegetables to source and sell. Businesses can be differentiated from their competition by offering unique or speciality vegetable varieties — which can cater to a certain consumer segment (Hersleth et al. 2023).

The vegetable marketing sector has taken note of the environmental and sustainability concerns. It is appealing to environmentally conscious consumers, and consistent with corporate social responsibility goals, to source organic, locally grown or sustainably produced vegetables (Sharpe & Barling, 2019). Other such things that may affect whether a particular vegetable is sourced and sold or not, include regulatory requirements, food safety standards etc., which may also fall under certifications. On the other hand, basic requirements of food safety and quality assurance for consumption specified by regulations must be guaranteed and

customer expectations for the same are to be met (Guo et al., 2019). For profitability and sustainability of a lucrative business model, and in order to match customer preferences and increase competitiveness, stakeholders in the vegetable marketing industry must be able to make informed judgement about which vegetable to source and sell.

2.2.2.1 Profitability

Profitability indicates how much of the available revenue a given company is able to create and spend over any predetermined period of time (Alarussi & Gao, 2023). A key performance indicator of a business's financial performance and overall long-term sustainability. Profitability is the ability of a business to produce profit from its operations, investments made and other such activities (Sari et al., 2020). It is important to business achievement, future growth opportunities and the ability of a company to generate value for its stakeholders. This is a means of determining how well a company generates profit and maintains itself while creating value for its Stakeholders viz: owners, employees and owners.

It is essential for the reinvestment of such profit in the business for expansion, and the return to investors. These include many financial ratios and metrics like net profit margin, gross profit margin, RoA and RoE to name a few. These ratios are helpful to see the ratio of how a company uses its assets, expense management, and profits, when running its operations (Ross & Milne, 2021). Internal and external factors that influence profitability are the two categories in which factors can be placed. Under internal factors, operation efficiency, cost control measures, pricing strategies, product mix and resource allocation are considered (Bashir & Verma, 2019). External factors included are market conditions, competition, customer demand, industry trends and macroeconomics including inflation and interest rates.

Revenue generating and cost management are two important elements of profitability. To do so, companies have to market their products or services effectively, raise sales and manage

pricing strategies to gain revenue (Redjeki et al., 2021). At the same time, they must improve profitability through cost effective measures, streamline operations and eliminate wasteful spending. For example, profitability may differ across industries and business sectors owing to differences in capital requirements and operational complexities, and market dynamics.

High fixed costs or high levels of entry barriers in some industries can make it harder to achieve profitability than industries with low barriers to entry or less differentiated products (Islami et al., 2019). Improvement is continuous and a strategy must be pursued to maintain profitability in the long run. Sometimes companies need to change market conditions as per requirements of changes, required development expenditure, exploitation of new revenue sources, and even cutting costs (Nasır, 2019).

To enhance profitability, effective management and decision-making are essential. Additionally, profitability also helps in attracting investments as well as financing. A company's profitability metrics are often analyzed by investors and lenders to learn, whether the company is financially healthy, what its risk profile is, and whether the company has potential for future growth (Juanaristo & Astika, 2022). If a company can remain profitable, it can become more credible and more easily obtain capital to expand or go on and do new projects. Also, profitability can be influenced by corporate social responsibility and sustainability initiatives. These initiatives will initially raise costs but help save in the long run in terms of improving brand reputation, customer loyalty, and operational efficiency, which all together contribute to profitability. Active monitoring and improving profitability lead to securing financial stability of businesses, adding value for stakeholders, and positioning it for long term development and success in cut throat market.

2.2.2.2 Perishability

Perishability, meaning that the product, vegetables in this case, loses its ergodic qualities such as quality, freshness, and edibility over a period of time. It is an important parameter which have direct impact on shelf life, handling and distribution of perishable items. Nearness to perish is one of the core properties of fresh vegetables that has a major influence to their marketing, distribution and usage. Vegetables can only be stored for short term times because of their short shelf life and their high tendency to go bad quickly through processes like respiration, transpiration and microbial activities (Singh et al., 2021).

The rate of perishability ranges differently concerning the kind of vegetables involved, ranging from highly perishable to perishable ones. Attributes including moisture content, surface area, and cell structure are the determinants of the level of perishability (Lufu et al., 2020). For example, you will find that leafy vegetables are usually more perishable than, say root vegetables or some fruits. Perishability is a major problem when it comes to the management of the supply chains of vegetables. This requires appropriate management at different stages starting from harvesting to storage and transportation to the consumer markets with quality not compromised (Kitinoja et al, 2021). The inability to timely and properly manage causes quality degradation and considerable losses. Perishability always poses a big risk to the supply chain, and therefore proper packaging and storage, safely counter this problem. The major preservation technique that has the potential of increasing the shelf life of fresh produce is modified atmosphere packaging commonly referred to as MAP (Wilson et al., 2019).

Perishability is also impacted by temperature, as such, temperature management is critical. Proper cooling and refrigeration of vegetables between farm and retail outlets, slows down the microbes that are responsible for deterioration and preserve the quality and freshness of vegetables (Dirapan et al., 2021). Consumer behavioural and purchase patterns are also

influenced by perishability. In particular, fresh vegetables which are chosen by consumers to purchase more often and in smaller quantities than average is those who claim to prefer to buy the freshest vegetables as often as possible and at minimum waste (Stangherlin et al. 2019). This has consequences for forecasting demand and for strategy in vegetable retailer and supplier inventory management.

Efficient transportation and logistics systems are necessary to deal with challenges from perishability. This can lead to reliable and rapid transportation along with cold chain management that can decrease the time between harvest and consumption with a reduction in quality loss and prolong the marketable time of fresh vegetables (De Corato, 2020). Technology and research growth have developed new ways to address the problems of perishability. Controlled atmosphere storage, genetic modification, and new packaging materials are used to improve applications that extend the shelf life of fresh produce and lesser loss owing to perishability (Ninama et al., 2024). It is important for producers in the vegetable marketing industry and vegetable consumers to understand and grapple with them. Efficient handling, storing, shipping, and distribution methods may help prevent quality deterioration, limit waste, and ensure customers will never be without fresh, high-quality vegetables.

2.2.2.3 Availability from suppliers

Supplier availability is defined as the ability of suppliers or producers to be able to continuously supply vegetables with required quantities and varieties to meet market demand (Pérez-Mesa et al., 2019). Fresh produce availability to buyers and retailers is dependent on factors such as production capacity, seasonal market variations and supply chain logistics. Stakeholders in the vegetable marketing sector are confronted with the difficult challenge of ensuring a consistent and reliable supply of fresh vegetables. Most importantly, it is availability of suppliers which is key to ensuring supply of consumer demand, increasing the flow in steady products and eliminating supply disruptions (Chakraborty et al., 2020).

Availability from suppliers depends on both production capacity and yield. Various factors including weather conditions, farming practices, availability of land and access to resources can affect how much and how well suppliers deliver vegetable products (Mukaila et al., 2022). Vegetables that are not available in sufficient quantities in the market can result in supply shortages. Another important factor with regard to availability from suppliers is seasonality. There are many vegetable varieties that are seasonal and can only be cultivated at certain times of the year (Brust, 2019). This leads to fluctuations in supply: abundance and scarcity of vegetables produce influence fluctuations in the amount and pricing of the vegetables.

Supply chain logistics and transportation are critical to move vegetables from suppliers to buyers and retailers. To maintain product quality, filtered through efficient logistics systems, such as cold chain management and timely transportation (Ren et al., 2022). Not only geographic location and proximity to production areas can affect availability but suppliers as well. Other areas may be constrained by the supply of certain vegetables, having to rely on imports, or, in the case of regions with favourable climatic conditions and well-developed agricultural infrastructure, alternatively have a more consistent supply (Anderson, 2022).

Availability of vegetables from suppliers is subject to market forces and pricing dynamics. Suppliers may adjust their production or distribution strategies to increase (or decrease) production, which may increase (or decrease) the overall availability of some vegetable varieties (Parajuli et al., 2019). Gaining the supply is one thing, but to have consistently high quality — one thing is being able to enter into contractual agreements and establish or maintain long-term supplier relationships. Buyers and retailers can therefore better predict and prepare for their vegetable sourcing needs by establishing working partnerships with trusted suppliers, and using good demand forecasting and inventory management practices (Tort et al., 2022)

There are potential solutions for improving availability from suppliers through technological advancements such as controlled environment agriculture (CEA) as well as vertical farming. Using these techniques result in year-round production, optimized growing conditions and decreased reliance on traditional seasonality, which may lead to an overall increase in the availability of fresh produce (Gruda et al., 2019). Vegetable availability from suppliers needs to be maintained at a constant and reliable level in order to meet consumer demand, and supply in the market, to supply a product fresh. Players in the vegetable marketing sector may increase the efficiency of the supply chain and availability of fresh produce by tackling challenges of production capacity, seasonality, logistics and supplier relationships.

2.2.2.4 Trends in consumer demand

Consumer demand trends are the patterns and preferences of consumers for the types, varieties, and attributes of vegetables they wish to buy and eat (Saygi and Shipman, 2021). The demands that are trending add to the evolving needs, preferences and behaviours that shape consumers' influence factors including health consciousness, cultural shifts and lifestyle changes (Cho et al., 2020). Since consumer demand is a major factor in the vegetable market sector, stakeholders are required to know the changes in consumer demand trends to adapt products and supply chain management to meet new consumer demands. Overall, these trends determine the volumes of particular vegetable varieties and characters that are demanded, decisions regarding production, pricing strategies, distribution and others (Milford et al., 2021).

One of the noticeable consumer demand trends is health and wellness. As consumers increasingly pay attention to the nutritional value and potential health benefits in different vegetables, there is increasing demand for nutrient-rich varieties and organic produce (Cho et al., 2020). Due to this trend, growth has been seen in the markets for organic and functional foods and an increasing desire for locally cultivated and sustainably grown vegetables. The demand for vegetables is also influenced by a lot of trends around convenience. Consumers,

who are leading busy lifestyles and have too much to do, want convenient options, like pre-washed, pre-cut, or ready to eat vegetable products (Fernandez, 2019). It is a trend of this kind, which resulted in the creation of value-added vegetable products, determining the way of packaging, innovation, and distribution of products.

Changing demographic patterns include urbanization and changing household compositions that also influence consumer demand trends. Urban populations may have different preferences and dietary habits than rural populations, whereas a small household may request smaller cuisines or packaging formats (Lacko et al., 2020). There is another factor that assigns variation to consumer demand trends in the vegetable market — cultural and ethnic diversity. However, as populations grow more diverse, producers' needs increase in the number of vegetables available to cater to different cultural cuisines and taste preferences (Atkinson, 2021). The introduction of new vegetable varieties and products are available through this trend.

Consumer demands for environmentally friendly and ethically produced vegetables are becoming increasingly important, coming at a time of growing environmental and sustainability concerns. Driven by increasing demand for locally grown, organic and fair-trade certified produce, in particular, consumers in developed countries are increasingly looking for sustainable and ethical practices of vegetable production (Borsellino et al., 2020). Consumer demand trends are also shaped by the rise of social media and digital platforms. Consumer perceptions and preferences are shaped by social media influencers, food bloggers, as well as by online communities that often trigger demand for novel or trendy vegetable varieties or preparation methods (Fiorentino, 2019). Consumers may scale back purchases or steer to cheaper vegetable options or value-for-money products (Vancic & Pärson, 2020), as an economy feels uncertain or recession.

Through monitoring and responding to these consumer demand trends, products can be developed, marketing strategies chosen and supply chain operations made based on the evolving needs and preferences of the consumers so that the market becomes competitive and the producers meet the demands.

2.3 Theoretical Review

To have a better understanding of the marketing of vegetables, the framework is investigated via the lenses of consumer behaviour theory and supply and demand theory.

2.3.1 Consumer Behaviour Theory

Consumer Behaviour Theory is a key area of study to examine factors responsible for consumers' decisions that help shape their choices and behaviours. The starting point for this theory lies in the works of famous scholars and researchers who aimed to understand why consumers prefer and purchase certain things. Philip Kotler, a leading marketing scholar, was one of the key proponents of this theory and argued that the success of marketing practice in a company relies on consumer behavioural analysis (Kotler et al., 2016).

The key strength of the theory of consumer behaviour is that it can help us to understand the kinds of influences on consumer decision-making such as motivations, attitudes, and perceptions. Marketers are able to understand better the underlying reasons behind consumer choices by analyzing factors such as cultural influences, personal characteristics, psychological processes and social influences (Šostar & Ristanović, 2023). In the setting where we analyze the economic aspects of the marketing of vegetables, this understanding is particularly important for the explanation of consumer preferences for different vegetable varieties, for their purchasing patterns as well as their responses to pricing and promotional efforts.

The critics of Consumer Behaviour Theory claim that the process of how humans make their decisions and how they behave is too simple in the theory. Rather, the theory does not fully explain the dynamic and constantly changing consumer behaviour typically subject to quick runs by various trends, significant advancement of technological developments, and evolving social values (Zhang & Chang, 2021). There are also concerns that the theory proceeds too much on the basis of generalizations, and therefore its validity may be overly sensitive to the specifics of particular consumers and specific circumstances. However, in spite of these criticisms, the economic analysis of marketing a vegetable is not posed in an isolated context and, therefore, consumer behaviour theory is still useful.

For vegetable producers, distributors and retailers, understanding their consumers' preferences and buying behaviours is important in developing effective marketing strategies, establishing optimal pricing decisions and meeting the demands of the consumers. Insights from Consumer Behaviour Theory provide stakeholders of the vegetable industry opportunities to focus on specific consumer segments, create tailored marketing campaigns and accommodate changes in consumer trends and preferences (Gabellini & Scaramuzzi, 2022). Additionally, Consumer Behaviour Theory can be applied to advisory decisions on product development, packaging, labelling, marketing channels and distribution network selection. If research shows that a given consumer segment cares about locally sourced or organic vegetables, producers and marketers can tailor their marketing messages to that segment (Banerjee & Quinn, 2022).

The economic study of the way the marketing of vegetables can be understood in relation to the demand side to the consumer behaviour theory as in this perspective. The integration of this theory's insights with other economic principles such as market structures, pricing strategies and supply and demand dynamics affords stakeholders increased insights into the

factors at play in the vegetable marketing process. This will help them make good and better-informed decisions on how to increase efficiency, profitability and customer satisfaction.

2.3.2 Supply and Demand Theory

Supply and Demand Theory, a basic tenet of microeconomic theory, is generally credited to the works of Adam Smith in 1776, considered by many to be the father of modern economics, and subsequently outlined in Alfred Marshall's landmark book, *Principles of Economics*, published in 1890 (Smith, 1776; Marshall, 1890). It is a theory that the price and quantity of goods in a market will be determined by supply (the amount of a good that producers are willing and able to sell at any given price) and demand (the same as supply, the emphasis is on the amount which consumers are willing and able to buy) in a market.

The advantage of the Supply and Demand Theory is that it outlines a clear way to understand how disparate things such as consumer preferences, production costs and external shocks impact prices and quantities in the marketplace. For instance, when a sudden change in weather conditions badly affects a certain vegetable crop, causing the supply curve to shift left, prices increase and quantities sold decrease, all else being constant (assuming constant demand); this is what Dilaver and Dilaver (2022) would say.

Critics contend that the supply and demand theory oversimplify the workings of markets and in many cases, they are based on the assumption of ceteris paribus of other things unchanged (when in reality rarely occurs in real-world situations) (Cazcarro & Steenge, 2021). It may additionally not be fully attributed to the results of market power, information asymmetries, and behavioural economics on consumer and producer behaviour. On the other hand, the market power of large agribusiness in the vegetable market may be large enough to affect prices and supply conditions in a way that could not be reflected in simple supply and demand models.

Criticisms, notwithstanding, the Supply and Demand Theory provides a basic understanding of how price signals coordinate economic activity and resource allocation in markets for agricultural products. For example, the elasticities of supply and demand for different vegetables can be used to predict which market changes are possible and responded to by policy makers and farmers. The theory is used when the demand for organic vegetables rises because consumers start to prefer healthier food, and then this formula helps to calculate how raised demand affects market prices and pushes more farmers to produce organic vegetables (Hoang, 2021). Finally, although Supply and Demand Theory has some shortcomings, but it is quite useful in explaining how the market equilibrium achieves, how minor external factors and policy intervention might change the market results with its direct impact on producers and the decision makers in the agricultural sector.

2.4 Empirical Review

This section reviewed studies on the economic analysis of the marketing of vegetables.

2.4.1 Factors influencing consumer preferences for vegetables

Recent empirical studies have highlighted the relationship between the various attributes of vegetables and consumer preferences and purchase behaviour. In this review, findings from research between 2019 and 2024 on consumer choice of vegetables are synthesised across different countries to obtain a complete understanding of the drivers of consumer choice in the vegetable market. When consumers buy vegetables, their decision is based on the sensory attributes. Jürkenbeck &Schulze (2024) found in a cross-cultural study in France, Germany, UK, that taste, appearance and freshness drove the purchases of vegetables. This finding is supported by Frez-Muñoz et al. (2019), who examined the preferences shown by consumers

for diverse tomatoes in the Netherlands. What they found was that taste, appearance and freshness were the key factors that determine a consumer's choice.

Nevertheless, they indicated that production and information on vegetable production and origin were important factors in it and that consumers do not only consider taste but also other (non-sensory) qualities. Sensory attributes remain high on the list of vegetables chosen, but convenience is equally important. This is what Matche & Singh (2023) reported in their study, as well, on consumers' preference for fresh-cut vegetables in India. Consumers, and especially those with busy lifestyles, were found to be willing to pay a premium for pre-cut and packaged vegetables, getting convenience, saving time and reducing hassle. This finding further emphasizes the increasing need for vegetables that suit modern, fast paced lifestyles. While environmental and ethical concerns are influencing consumer preferences for vegetables, the total area available for crop production is restricted.

In Canada, Tait et al. (2024) explored consumer attitudes about organic and local vegetable production. Their findings showed that consumers who put a premium on environmental sustainability and ethical values are more likely to buy locally grown or organic vegetables, even at premium prices. That implies that there is a growing segment of consumers who think about the broader implications behind their vegetable choices beyond personal benefits.

Although the importance of quality and ethical considerations are important, price continues to be a big determinant in vegetable purchasing decisions, especially for some of the sections (demographic groups). In their research, Godrich et al. (2020), looked at purchasing behaviour of low-income consumers in Australia and demonstrated that price was a major barrier for low-income consumers to eat vegetables. But their study showed that consumers were willing to pay more for vegetables they believe are high quality, suggesting perceived value moderates

how sensitive prices are. Vegetable preferences and patterns of vegetable consumption is influenced by personal characteristics.

In the Netherlands, Van Bussel et al. (2020), studied the way in which personal characteristics affect consumption of vegetables. Age and gender were found to be significant predictors of vegetables consumed, older people and females ingested more vegetables than younger people and males. Higher education levels and health consciousness were all positively associated with increased vegetable consumption. Vegetable preferences are heavily influenced by cultural and social factors. Higgs and Ruddock (2020) indicate that traditional food habits, parental preferences and social norms are important in the consumption of various food items including vegetables. Further, Boca (2021) analysed how social influences and health beliefs impact the vegetable consumption of Danish consumers and found that consumers are more willing to buy and consume more vegetables when recommended by friends and family, and based on health-related beliefs and attitudes.

In conclusion, this review of empirical studies shows that much about what consumers like about vegetables is multi-faceted. Sensory attributes like taste, appearance and freshness are still critical however other factors e.g. convenience, environmental and ethical factors, price and socio-cultural influences are of equal importance. A key requirement for stakeholders in the vegetable industry is to understand this complex interplay of these factors and use the information to formulate suitable marketing strategies aimed at meeting the evolved needs and preferences of the consumer. These factors may interact in future research and could vary over time, going hand in hand with global trends for a healthier, more sustainable lifestyle of eating.

2.4.2 Factors influencing vegetable retailers in sourcing vegetables for consumers

Pérez-Mesa et al. (2019) studied the factors affecting fresh produce retailers' decisions for sourcing, in the United Kingdom. When sourcing vegetables, the top priorities for retailers

were product quality, consistency in supply and reliability of suppliers, revealed the findings. Likewise, the study also stressed the importance of the traceability and of the food safety standards in the process of obtaining the raw materials. Massaglia et al. (2019) in a study on the vegetable supply chains in Australia found that retailers' sourcing decisions are mostly driven by consumer preferences and patterns of demand. In an effort to source vegetables that aligned with consumer preferences for particular varieties and product attributes (e.g. organic or locally grown), retailers sought to source vegetables to suit consumer preferences.

Retailers in a study by Kumar and Agrawa (2023), identified price and cost considerations as important influencing factors in decisions relating to vegetable sourcing. The researchers describe how retailers attempted to balance product quality and demand for consumers, with cost effective sourcing strategies to sustain profitability and competitiveness. Jeswani et al. (2020) analyzed the sourcing methods of the Swedish food merchants on environmental and sustainability aspects. The study found that retailers were increasingly taking the environmental aspect of sourcing into account and favouring suppliers who could produce sustainably, efficiently, logistically and with a less carbon footprint.

Other papers have investigated the importance of supplier connections in the sourcing decisions of vegetable merchants in the United Kingdom, as did Sundin (2020). Finding that retailers were willing to form long term partnerships with reliable suppliers, and work together on quality control, product development and information sharing. Gonzaga et al. (2020), found in their study on sourcing strategies of vegetable retailers in the South Korea that, product differentiation and branding influence sourcing decisions. Retailers intended to find vegetable varieties featuring unusual or high quality that could offer distinct product lines, may be marketed to consumers to generate their competitive superiority.

Ngouapegne and Chinomona (2019) studied the effect of logistics and distribution capabilities on vegetable sourcing decisions by retailers in South Africa. To minimize the cold chain losses and ensure the delivery of fresh and high-quality vegetables to retail outlets in time as decided by the customers, the findings highlighted efficient transportation, cold chain and distribution network. In a study conducted recently by Rukasha et al, (2021), the researchers looked at how retailers in Zimbabwe had been impacted by COVID-19, when it came to decisions for sourcing of vegetables. It said the pandemic affected supply chains and retailers' preference for sourcing from close and nearby suppliers to maintain continuity of supply and minimize dependency upon imports.

From the review of these empirical studies, it is clear that retailers take into account several factors in their decision to source vegetables for the consumer, ranging from product quality, consistency in supply, supplier reliability, consumer preferences, cost considerations, environmental sustainability, supplier relationships, product differentiation, logistics capabilities, and so on. First, gaining an understanding of these factors can help retailers develop effective sourcing strategies and keep the vegetable retail market competitive.

2.4.3 Challenges in vegetable retailing

Vectoring the challenges of retailing vegetables has had many studies. Ravi & Prasad (2020), for example, have identified product perishability as a key problem area in vegetable retail. They found that the short shelf life of fresh vegetables causes retailers to waste a lot of the produce. The study proposed to solve this problem by improving their inventory management system, storage conditions, and distribution channels for excess produce. Big challenges according to Baqaee and Farhi (2022), are fluctuations in supply and demand. In response to seasonal variations and unpredictable consumer demand, the researchers found that vegetable retailers can struggle to manage inventory levels and inventory pricing strategies. Potential

solutions to mitigate this challenge proposed were the use of demand forecasting techniques, adopting flexible sourcing strategies and collaborative planning with supply.

As a result of a study by Surucu-Balci and Tuna (2021), they identified supply chain inefficiencies as a key issue for vegetable retailers. Inefficiencies were found to occur due to (lack of) coordination within the supply chain, lack of transparency and inefficient information sharing. The study called for closer collaborations, digital technologies for traceability and information exchange and supply chain integration strategies. Shewfelt & Prussia (2022), studied the problem of maintaining product quality and freshness in vegetable retailing. Improper handling, inadequate storage conditions and extended shelf life of vegetables can affect its quality and shelf life, the researchers found. With options to invest in the cold chain infrastructure, optimise logistics operations, and implement quality control measures throughout the supply chain.

A challenge mentioned in the study by Gauri et al. (2021) was competition from such alternative retail channels as grocery stores and direct-to-consumer platforms. Traditional vegetable retailers can not only solve this challenge but also benefit from online presence, convenient delivery options and digital marketing strategies, the researchers suggested. NGO researchers in a 2019 study, pinpointed the food safety and traceability problem in vegetable selling. It found that consumer confidence was significantly eroded by fears of food-borne illness and the lack of more effective traceability systems. The study calls for stringent food safety protocols, adopting traceability technology such as barcodes, and RFID, promoting transparency across the supply chain. Nguyen (2020), studied vegetable retailing's challenge in meeting changing consumer preferences and demands. However, the researcher found that retailers typically have difficulty keeping up with changing consumer fads, like the demand for

organic, local or sustainably raised vegetables. The solutions on offer included regular consumer research, product innovation, and education to influence consumer behaviour.

Finally, Rukasha et al. (2021) examine the challenges resulting from supply chain disruptions, as occurred during the COVID-19 pandemic. This study pointed out that vegetable retailers should develop adaptive supply chains to reduce the effect of future disruptions by showing diversification sourcing strategies, building contingency plans and operational agility. These empirical studies are then helpful in understanding what vegetable retailers need to take care of on perishable products, with supply and demand swings, inefficiencies in the supply chain, maintaining product quality and freshness etc., competition with other channels, fears of food safety and traceability, consumer preferences are changing, and supply chain disruptions. The studies give some ways to the best way to eradicate those problems, including putting technology to function, fostering teamwork, simplifying logistics, increasing customer involvement and developing strong supply chains.

2.4.4 Economic Analysis in Agricultural Marketing

Economic analysis in agricultural marketing has evolved to encompass various methodological approaches for understanding market efficiency, price formation, and value chain optimization. Traditional economic analysis in agricultural markets focused primarily on price transmission analysis and market integration studies (Fackler & Goodwin, 2001). However, contemporary approaches have expanded to include consumer behavior modeling, supply chain economics, and market structure analysis.

In vegetable marketing specifically, economic analysis typically examines three key dimensions: (1) market efficiency and pricing mechanisms, (2) value chain profitability and cost structures, and (3) consumer welfare and demand analysis. Reardon et al. (2019)

demonstrated that economic analysis of vegetable markets requires particular attention to perishability effects, which create unique pricing dynamics not found in grain markets.

Market efficiency analysis in vegetable marketing often employs spatial and temporal price analysis to understand how effectively markets transmit price signals. Minten et al. (2020) showed that vegetable markets in developing countries frequently exhibit inefficiencies due to information asymmetries and transaction costs, leading to price volatility that affects both producers and consumers.

From a consumer economics perspective, studies have increasingly applied Lancaster's characteristics approach to vegetable demand analysis. Kumar and Singh (2021) used hedonic pricing models to decompose vegetable prices into attribute-specific values, finding that freshness and appearance attributes commanded significant price premiums in Indian markets. Similarly, Chen and Anthonelli. (2020) employed discrete choice experiments to quantify consumer willingness to pay for specific vegetable attributes in Chinese markets.

Value chain analysis has become a crucial component of economic analysis in vegetable marketing. This approach, developed by Porter (1985) and adapted for agricultural markets by Kaplinsky and Morris (2001), examines how value is created and captured at different stages of the marketing chain. In vegetable marketing, value chain analysis typically reveals that retailers capture disproportionate value relative to producers, largely due to their proximity to consumers and ability to add value through packaging, presentation, and convenience services (Louw et al., 2008).

Transaction cost economics, pioneered by Williamson (1985), provides another important framework for analyzing vegetable marketing systems. High transaction costs due to search, negotiation, and monitoring activities can significantly impact market efficiency. In vegetable markets, these costs are often elevated due to quality uncertainty, small transaction sizes, and

the need for frequent transactions due to perishability (Hobbs & Young, 2000). Recent developments in economic analysis of vegetable marketing have incorporated behavioral economics insights to better understand decision-making under uncertainty and bounded rationality. Saitone and Sexton (2017) showed that both farmers and retailers in vegetable markets often rely on heuristics and past experience rather than optimal decision-making models, leading to systematic deviations from predicted market outcomes.

2.5 Gaps in the Literature

Considering the expansive literature review, several important gaps emerge that limit comprehensive understanding of vegetable marketing economics: First, there is insufficient integration of consumer behavior theory with supply chain economics in vegetable marketing research. While numerous studies examine consumer preferences independently or supply chain efficiency separately, few studies analyze how these domains interact to create market outcomes. This integration is particularly important in perishable goods markets where consumer preferences directly influence inventory and sourcing strategies.

Second, most economic analyses of vegetable marketing focus on production-level or wholesale-level economics, with limited attention to retail-level market dynamics. The retail level represents a critical interface between supply chain decisions and consumer demand, yet economic modeling of this interface remains underdeveloped, particularly in developing country contexts. Third, the existing literature lacks comprehensive analysis of how market structure characteristics, for example, the number of competitors, degree of product differentiation and barriers to entry, influence both consumer welfare and retailer profitability in vegetable markets. Understanding these relationships is crucial for policy interventions aimed at improving market efficiency.

The second missing gap in the literature regarding the consumption and retailing of vegetables that considers the sales and volumes of vegetables at market centres is the effect of the type of local government administration. Additionally, there is limited research on how institutional factors such as market infrastructure, regulatory frameworks, and local government policies affect retail-level economic efficiency in vegetable marketing.

Another gap in the literature is the inadequate examination of political economy factors involved in marginalization and social exclusion of minorities and small tribes with regards to the challenges of vegetable retailing. Furthermore, there is insufficient analysis of how informal market structures and social networks influence economic outcomes in vegetable marketing, particularly regarding access to credit, supplier relationships, and market information. Finally, existing studies rarely examine the dynamic relationships between consumer preferences, retailer strategies, and market outcomes over time. Most research employs cross-sectional approaches that cannot capture how these relationships evolve as markets develop and consumer preferences change.

2.6 Theoretical and Conceptual Framework

The theoretical framework of this study was grounded in Lancaster's theory of demand (Lancaster, 1966), which posits that consumers derive utility not from goods themselves, but from the attributes or characteristics those goods possess. This theory provided a robust foundation for understanding consumer preferences in the vegetable market, where various attributes play crucial roles in purchasing decisions.

Building on the Lancaster demand theory, the conceptual framework integrates both consumer choice theory and supply chain economics to explain the bidirectional relationship between consumer preferences and retailer sourcing decisions. Consumer preferences for vegetable

attributes (derived demand) influence retailer sourcing strategies, while retailer sourcing capabilities and constraints simultaneously shape product availability and consumer choice sets. In the context of vegetables, these attributes include sensory characteristics (such as taste, appearance, and freshness), nutritional value, convenience (ease of preparation and packaging), environmental impact (organic and locally sourced options), and price. The framework operates through three interconnected components:

1. Consumer Attribute Preferences: Consumers evaluate vegetable attributes to maximize utility within budget constraints. These preferences generate demand signals that influence market prices and quantities.
2. Retailer Sourcing Decisions: Retailers respond to consumer demand signals by making sourcing decisions based on factors including supplier reliability, product quality, cost considerations, and market demand patterns. These decisions determine the attribute portfolio available to consumers.
3. Market Feedback Mechanisms: The interaction between consumer choices and retailer sourcing creates feedback loops that adjust both demand patterns and supply strategies over time.

Importantly, this framework recognizes that retailer sourcing decisions are not simply reactive to consumer preferences (as traditional derived demand suggests), but also proactive in shaping market offerings. Retailers may introduce new vegetable varieties or emphasize certain attributes to differentiate their market position, thereby influencing consumer choice sets and potentially creating new demand patterns.

The application of Lancaster's theory to the vegetable retail industry reveals several interconnected challenges, with supply chain management emerging as a critical issue. Retailers must ensure a consistent supply of vegetables with the desired attributes, which can

be challenging due to the perishable nature of the products and the reliance on various suppliers throughout the supply chain. The framework also incorporates market structure considerations, recognizing that vegetable markets often exhibit characteristics of monopolistic competition where retailers differentiate products through attribute combinations. This differentiation strategy allows retailers to capture consumer surplus while managing supply chain constraints.

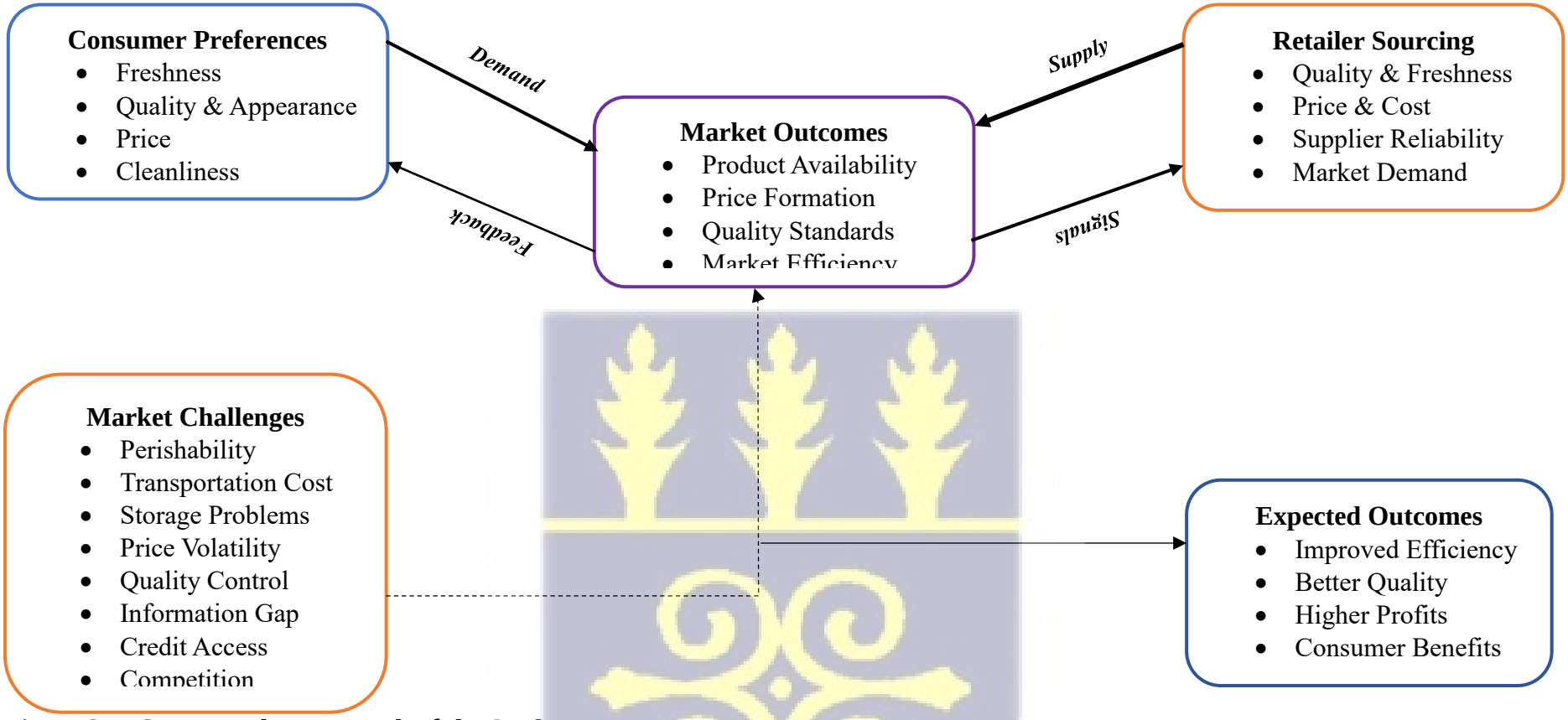

Figure 2.1: Conceptual Framework of the Study
Source: Author's construct (2024)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The components of the research design and the analysis techniques are given in this portion of the study. The sampling frame, data source, research design, sample size computation, and data processing are all included. There are ethical considerations presented in the conclusion.

3.2 The Study Area

This study is carried out in Komenda Edina Eguafo Abrem (KEEA) Municipal District in the Central region. The K.E.E.A Municipal District comprises four traditional areas, which have been put together to constitute an administrative district. The municipality is bounded on the south by the Atlantic Ocean (Gulf of Guinea), to the east by the Cape Coast Municipality, to the north by the Twifo Hemang-Lower Denkyira district, and to the west by the Mpohor – Wassa East district in the Western Region. The Municipality is perched between longitude 10 20' West and 10 40' West and latitude 50 05' North and 150 North (see Figure 3.1). The Municipal District covers an area of 452.5 square kilometers. According to Ghana Statistical Service Report (2021, p. 26), the study area has a total population of 2,859,281 representing 9.3% of the national population. The major livelihood activities are fishing, farming, and trading.

The study is conducted in the Komenda Edina Eguafo Abrem Municipal District due to its significant agricultural output, particularly in vegetable production. The district's markets play a crucial role in the local economy, serving as primary points for vegetable trading. Understanding the economic dynamics of vegetable marketing in these markets is essential for

improving farmers' livelihoods and enhancing the district's overall economic development. Additionally, the study aims to identify potential areas for improvement in the marketing system, which can benefit both producers and consumers in the region.

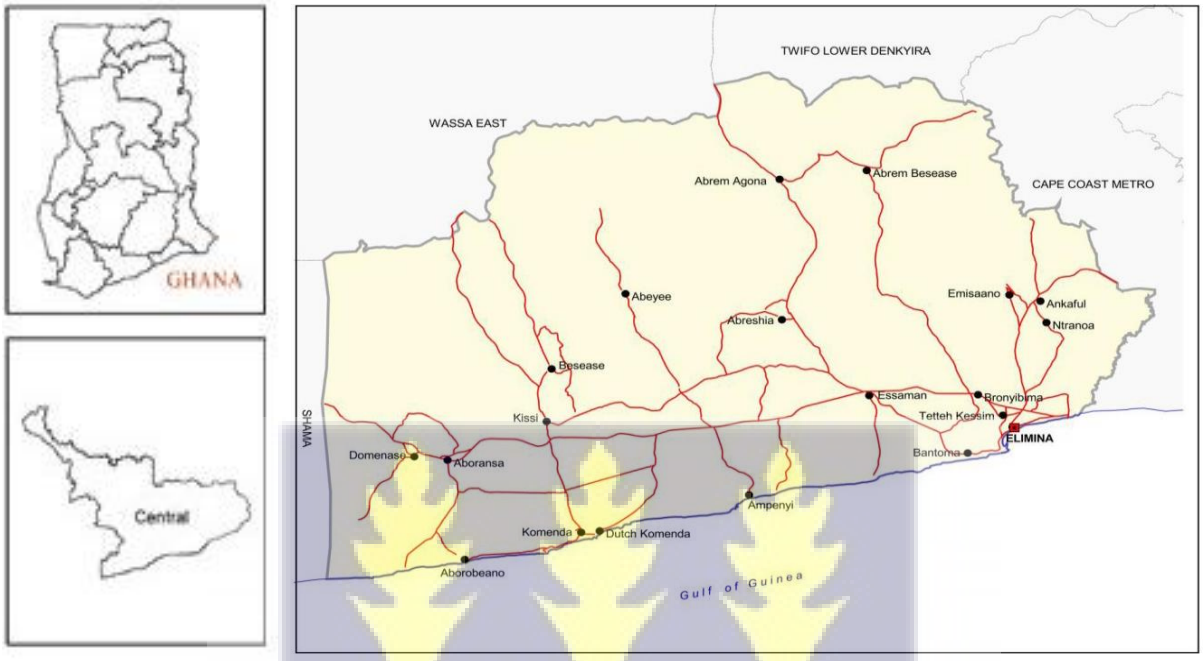

Figure 3.1: District Map of KEEA

Source: Ghana Statistical Service (2021).

3.3 Research Design

This study on the economic analysis of vegetable marketing in the KEEA Municipal District markets adopts a descriptive cross-sectional survey design with a quantitative approach. This research is particularly amenable to a cross-sectional survey design meaning that a snapshot of the current state of vegetable marketing in the district is possible and data can be collected from a wide range of participants in one-time point (Connelly, 2016). This design allows us to study different variables taking into account their effect in consumer decisions, retailer sourcing strategies, and competitive issues simultaneously for an overall assessment of the market

ecosystem. This study is cross sectional nature, which allows us to see patterns and relationships with variables without the use of long-term data collection as the cost and time of the whole process is economized (Levin, 2006).

This study follows a quantitative approach whereby numerical data of variables that can be statistically analysed are gathered, thus facilitating objective measurement and comparison of variables (Bryman, 2016). This approach is especially useful to identify the determinants of consumer and retailer behaviour and to estimate the scale of market challenges. Structured questionnaires with closed ended questions and Likert scales can collect data over a large sample across a population in such a way that the resulting findings can be generalized. Additionally, this design ensures that the researchers can maintain objectivity and eliminate bias by data collection and analysis based on set criteria and formal statistical procedures.

The study's quantitative nature also permits replication and validation of findings in subsequent research in the field of study, i.e. agricultural marketing in developing economies. This research design is intended to give a clear, objective and comprehensive knowledge of the vegetable marketing dynamics in the KEEA District in order to provide strong grounds for agricultural policy formulation and decision making.

3.4 Study Population

The population of the study comprises of market vegetable retailers, and consumers who participate in the vegetable trade within the KEEA District markets. This includes farmers who grow and supply various vegetables to the markets, vegetable retailers who sell these products, and the customers who purchase them. The study also encompasses intermediaries such as retailers and transporters who play a role in the vegetable supply chain. By including all these

stakeholders, the research aims to capture a comprehensive picture of the vegetable marketing ecosystem in the district.

3.5 Sample Size and Sampling Methods

The diverse population involved in vegetable marketing within the KEEA District necessitated a multi-stage sampling technique to ensure comprehensive and representative data collection (Sedgwick, 2015). The sampling process consisted of multiple stages, each targeting different aspects of the market ecosystem. The first stage involved the selection of markets within the district through stratified random sampling. Markets were categorized based on size (large, medium, and small) and location (urban and rural). This stratification ensured that the sample represented the variety of market types in the district (Taherdoost, 2016). Markets were randomly selected from each stratum, with the number chosen proportional to the stratum's size. The second stage focused on key stakeholders within each selected market. For market vegetable retailers, the study employed cluster sampling (Etikan & Bala, 2017). Each selected market was divided into sections or clusters, from which random samples of vegetable retailers were selected. This approach effectively captured the diversity of vegetable types and selling practices within the markets.

For consumer selection, the study implemented a quasi-random sampling approach at the chosen markets (Etikan & Bala, 2017). The researcher selected willing interviewees for face-to-face interviews at 30-minute intervals, covering six hours per day, five days per week. The selection process ensured randomness by choosing each interviewee from different outlying areas near the market centre as consumers approached to purchase goods and services. The sampling location was rotated hourly among different outlying areas until the targeted number of daily interviews was achieved. While this method had limitations regarding

representativeness, it proved practical for intercepting consumers during their market visits. To minimize bias, sampling occurred at various times of the day and on different days of the week to capture diverse consumer types.

For intermediaries such as retailers, the study utilized convenience sampling (Etikan & Bala, 2017). These stakeholders were identified through readily available sources, including local markets and visible retail outlets in the study area. Selection depended on accessibility and willingness to participate in the research. Although this method may have limited generalizability, it enabled efficient data collection within the existing time and resource constraints.

To determine the sample size for an undefined (or very large) population, we can use Cochran's formula (Creswell and Creswell, 2018; Chukwudi et al., 2019). This formula is appropriate when the population size is unknown or very large, which is often the case in market studies with multiple stakeholders (Kotrlik & Higgins, 2001). The formula is as follows:

$$n = \frac{z^2 p * q}{e^2}$$

Where: n = sample size; Z = Z-score (standard normal deviate) for the desired confidence level; p = estimated proportion of the population which has the attribute in question; q = 1 – p and e = desired level of precision (margin of error)

For this study, Z = 1.96 (for 95% confidence level); p = 0.5 (maximum variability, which is often used in determining a more conservative sample size); q = 1 - 0.5 = 0.5; e = 0.05 (5% margin of error)

Substituting these values into the formula:

$$n = \frac{(1.96)^2 * 0.5 * 0.5}{0.05^2} = 384.16$$

Rounding up, the sample size was 385. This sample size of 385 was the minimum required to achieve a 95% confidence level with a 5% margin of error for an undefined population (Israel, 1992). However, to account for potential non-responses or invalid data, it is often recommended to increase the sample size by 10-20% (Saunders & Townsend, 2018).

Therefore, the final recommended sample size is:

$$385 + (385 * 0.15) = 443 \text{ (rounded up)}$$

The sample size of 443 was distributed among the different stakeholder groups based on their estimated proportions and importance in the vegetable marketing ecosystem of the KEEA District. Considering the central role of consumers in driving market demand and the need to capture diverse purchasing behaviors, consumers constituted the largest proportion of the sample at 70.4% (312 respondents). Vegetable retailers, being the primary suppliers and intermediaries between farmers and consumers, represented 29.6% of the sample (131 respondents). This distribution was informed by preliminary market observations and consultations with local market authorities to reflect the relative populations of each stakeholder group in the district's vegetable marketing system (Yamane, 1967).

3.6 Data Collection Tools and Procedures

The study utilized a structured questionnaire as the primary data collection tool, designed to address the research objectives through a quantitative approach. The questionnaire development stemmed from a literature review and was customized to capture relevant information from both consumers and vegetable retailers in the KEEA District markets. A sample of the questionnaire is provided in the appendix.

The consumer questionnaire comprised sections focusing on demographic characteristics, purchasing habits, and factors influencing vegetable buying decisions. It incorporated Likert scales to measure the importance of various factors in consumers' vegetable preferences, including price, quality, freshness, and availability. Multiple-choice questions gathered data on preferred vegetable types, purchase frequency, and typical expenditure patterns.

For retailers, the questionnaire examined sourcing practices, procurement factors, and retailing challenges. It explored supplier relationships, pricing strategies, and inventory management practices. Likert scales assessed the significance of various factors in sourcing decisions, such as supplier reliability, transportation costs, and consumer preferences. Open-ended questions captured specific challenges in vegetable retailing and potential solutions.

To maintain data quality and reliability, the questionnaire underwent pilot testing with a selected sample of consumers and retailers. This preliminary phase enabled question refinement, ensuring clarity and relevance. The final questionnaire included translations into local languages where necessary, facilitating accurate responses from all participants.

The data collection process involved trained field assistants who administered questionnaires through face-to-face interviews at designated market locations. These enumerators received comprehensive briefing on study objectives and training in proper interview techniques to minimize bias and ensure consistent data collection. Interviews took place at various times and on different days to capture diverse respondents and account for market fluctuations.

Complementing the questionnaire data, systematic observation recorded market conditions, pricing patterns, and available vegetable varieties. This observational data provided essential context and validated information gathered through questionnaires. Regular review of collected data ensured completeness and consistency, with incomplete or inconsistent questionnaires

flagged for follow-up or exclusion from analysis. The data underwent coding and analysis, with rigorous cleaning procedures applied to ensure accuracy.

3.7 Method of Data Analysis

The information gathered from the surveys are examined using Stata version 17.0 statistical software. The specific objectives are analysed for the data as follows:

3.7.1 Types of vegetables purchased at market centres

The first objective of the study dealt with ascertaining the types of vegetables purchased by Consumers at KEEA market centres. This objective was undertaken through the use of simple statistical analysis. This analysis involved establishing the proportions of consumers purchasing the identified vegetables at the market centres. The vegetables considered were pepper, tomato, onion, green pepper, cabbage, carrot, okro, garden eggs, cucumber, lettuce, spring onion, green beans, kontomire (cocoyam leaves), beetroot and all others.

Further, the relative ranking of the importance of various quality attributes desired by consumers purchasing vegetables was ascertained using a simple zero-to-five Likert continuum scoring scale with zero for complete lack of a particular attribute and five denoting the maximum score for the attribute. The overall mean scores were used for the ranking of the importance of the attributes. Those attributes with average scores of 4.0 and above were considered to be important. Fifteen attributes were assessed based on data collected from the consumers. These were freshness, pest damage, cleanliness, nutritional value, hardness, colour, price, food safety, quality, price, presentation, health status and compatibility to produce, person selling the produce, shelf life, texture and security at the market centre.

3.7.2 Economic modelling of factors influencing consumer preferences for vegetables

Consumer preference is operationally defined in this study as the revealed preference of consumers through their expenditure behavior on vegetables. This approach is grounded in revealed preference theory (Samuelson, 1948), which posits that consumer preferences can be inferred from observed market behavior rather than stated preferences. Monthly vegetable expenditure serves as a proxy for preference intensity, with higher expenditures indicating stronger preferences for vegetables with specific attributes, given budget constraints.

The justification for using expenditure as a measure of consumer preference rests on several economic principles:

1. Budget allocation reflects utility maximization: Consumers allocate limited budgets to maximize utility, so expenditure patterns reveal preference rankings
2. Price-adjusted demand reflects quality premiums: Higher expenditures may indicate willingness to pay for preferred attributes
4. Frequency and quantity jointly determine expenditure: This captures both intensive and extensive margins of consumption

In achieving research objective 2, an Ordinary Least Squares (OLS) multiple regression model was employed to analyze the factors influencing the level of monthly expenditures on vegetables sourced from KEEA market centres by consumers (see Table 3.1). The dependent variable of the model is the monthly purchases of vegetables by a consumer who visited KEEA market centres. The relationship between individual vegetable attributes (freshness, color, hardness, etc.) and monthly expenditure was initially examined through bivariate correlation analysis. However, these individual attributes showed high intercorrelation (correlation coefficients ranging from 0.65 to 0.89), creating multicollinearity concerns that would bias coefficient estimates if included separately in the regression model. To address this issue, the

Clean Vegetables Index was constructed as a composite measure capturing the essence of these correlated quality attributes.

The Clean Vegetables Index is computed as a weighted average of five key quality attributes: freshness (weight=0.30), cleanliness (weight=0.25), color (weight=0.20), pest damage absence (weight=0.15), and presentation (weight=0.10). These weights were determined through principal component analysis of the attribute importance scores, with the first principal component explaining 78.3% of the variance in attribute ratings. This composite index approach is consistent with economic theory suggesting that consumers evaluate bundles of attributes rather than individual characteristics in isolation (Lancaster, 1966).

Regarding the purchase frequency variable, this measure was specifically designed to address potential endogeneity concerns while capturing access and convenience effects. Purchase frequency reflects several underlying factors: (1) proximity to markets (closer consumers can visit more frequently), (2) household storage constraints (households with limited storage buy more frequently), and (3) preference for freshness (consumers preferring very fresh vegetables buy more frequently). While quantity purchased and vegetable type could potentially confound this measure, the study controls for household size (which correlates with quantity needs) and focuses on aggregate vegetable expenditure rather than type-specific purchasing. Additionally, sensitivity analysis using alternative specifications (including interaction terms between frequency and household size) yielded consistent results, suggesting that the frequency measure captures genuine access and preference effects rather than spurious relationships. The chosen model is specified as follows:

$$\begin{aligned} \boldsymbol{LVEGEXPENDITURE} &= \boldsymbol{A0} + \boldsymbol{A_1 HINCOME} + \boldsymbol{A_2 HHSIZE} + \boldsymbol{A_3 AGE} + \boldsymbol{A_4 AGESQUARED} + \boldsymbol{A_5 SEX} \\ &+ \boldsymbol{A_6 EDUCATION} + \boldsymbol{A_7 AFRICANTRAD} + \boldsymbol{A_8 PURCHASEFREQUENCY} \\ &+ \boldsymbol{A_9 CLEANVEGETABLESINDEX} + \boldsymbol{U} \end{aligned}$$

Where:

LVEGEXPENDITURE was the natural logarithmic of the monthly expenditures on vegetables of the consumer measured in Ghana cedis.

HINCOME was the monthly household income of the consumer measured in hundreds of Ghana cedis. This income included that of the consumer and the income of the spouse. It was expected that increasing income of the household would allow the consumer's family to purchase more vegetables given that vegetables were assumed to be a normal economic good.

HHSIZE was the size of the household of the consumer. The monthly expenditures of vegetables would be expected to increase with increasing household size.

AGE was the age of the consumer in years. The relationship between age and monthly vegetable consumption expenditures is not clear from the literature. However, with the increasing weight of the consumer over time, his/her demand for vegetables would be expected to increase over time.

AGESQUARED was the square of the age of the consumer. This variable was included in the model to account for the possibility of decline in the consumption of vegetables as consumers grew older. The prevalence of chronic diseases in the older Ghanaian population such as diabetes is thought to be linked to the less consumption of vegetables. This study provides evidence to validate this assertion.

EDUCATION was the formal educational attainment of the consumer in years. Vegetables consumption was expected to increase with increasing levels of formal educational attainment reflecting increased knowledge on the importance of vegetables in diets to ensure more health living.

AFRICANTRAD was a dummy variable with a value of 1 for consumers who practiced or adhered to traditional African religions. This category includes Christians and Muslims who

also practiced traditional African religions and could be considered as people with mixed religious preferences. Of the 11% of the consumers who were categorized in this group, almost 90% had mixed religious preferences. A value of zero denoted those who did not practice traditional African religions in any form.

PURCHASEFREQUENCY was the number of times in a month that the consumer purchased vegetables from market centres or other places. It was expected that the closer the consumer was to various market centres the more he/she would visit the centres to purchase vegetables. Hence this variable was related to the distance of the consumer's home to the market. This was considered a better variable given the difficulty consumers had in accurately providing information on the distance from their homes to various market centres,

CLEANVEGETABLESINDEX was the perceived importance of the cleanliness of vegetables for the consumer to make a choice of purchasing vegetables. A Likert continuum scale of zero to five was used for the assessment of the perceived importance of cleanliness. The increasing value on the Likert scale is expected to lead to increased monthly purchases of vegetables from various market centres.

U was the equation error term which was initially assumed to have a zero mean and normal variance.

Table 3.1: Variable Description for Vegetable Expenditure Model

Variable	Definition	Measurement	Expected Outcome
Dependent variable			
Lvegexpenditure	Natural logarithm of monthly expenditures on vegetables	Ghana cedis	-
Independent variables			
Hincome	Monthly household income	Hundreds of Ghana cedis	+
Hhsize	Size of the consumer's household	Number of people	+
Age	Age of the consumer	Years	+

Agesquared	Square of the consumer's age	Years squared	-
Education	Formal educational attainment of the consumer	Years	+
Africantrad	Practice of traditional African religions	Dummy variable (1 = yes, 0 = no)	Undetermined
Purchasefrequency	Number of times vegetables are purchased monthly	Frequency per month	+
Cleanvegetablesindex	Perceived importance of vegetable cleanliness	Likert scale (0-5)	+

3.7.3 Factors influencing vegetable retailers in sourcing vegetables

The distinction between vegetable retailers and other retailers in this study reflects different scales and operational characteristics within the vegetable marketing system. Vegetable retailers operate small-scale businesses with limited storage capacity, selling primarily at local market stalls or roadside locations. They usually purchase small quantities directly from farmers or local assemblers. Other retailers, in contrast, tend to operate larger-scale businesses that may include permanent shops, multiple market locations and distribution networks. They often purchase larger quantities from wholesalers and may serve both end consumers and smaller vegetable retailers. This distinction is relevant because different business scales face different constraints and opportunities in sourcing decisions. Vegetable retailers with limited capital and storage capacity may prioritize immediate turnover and low-cost sourcing, while larger retailers may emphasize consistent supply and quality differentiation strategies.

In establishing the factors influencing retailers in sourcing vegetables for the markets, the study employed descriptive statistics specifically through frequency analysis, percentage calculations, and ranking procedures. Additionally, to account for the different operational scales, the analysis includes stratified analysis by business size (small vegetable retailers, medium retailers, large retailers) to identify whether sourcing priorities vary systematically with operational scale. Chi-square tests of independence were conducted to examine whether sourcing factor preferences differ significantly across vendor/retailer categories. Kruskal-

Wallis H tests were employed to compare factor rankings across different business sizes, providing insight into whether sourcing strategies are influenced by operational constraints.

The factors were ranked using percentage values of the vegetable retailers' responses. Frequency tables were generated to show the count of retailers citing each factor, which were then converted to percentages to facilitate the ranking. This method effectively highlighted the primary considerations that retailers take into account when selecting vegetables for sale.

The analysis also examined whether sourcing factors cluster into broader categories using factor analysis. This approach revealed three underlying dimensions of sourcing decisions: (1) Quality and Market Demand factors (freshness, size, consumer demand), (2) Economic factors (wholesale price, farm gate price, profit margins), and (3) Operational factors (supplier reliability, transportation logistics, storage requirements). This dimensional structure provides insights into the strategic versus operational nature of different sourcing considerations.

Additionally, descriptive statistics were used to ascertain the proportion of vegetable retailers selling different types of vegetables at the KEEA market centres. A ranking was determined by the percentage of retailers who sold each type of vegetable, to give an insight into the most popular vegetables at the market centres. Mean values and standard deviations were calculated where applicable to provide additional context to the distribution patterns.

3.7.4 Challenges in vegetable retailing

For examining various challenges faced by retailers, Kendall's Coefficient of Concordance is utilized. This non-parametric statistic is particularly useful for assessing the agreement among respondents regarding the ranking of challenges and potential solutions (Legendre & Fortin, 2010). The Kendall's Coefficient is calculated as follows:

$$W = \frac{12S}{m^2(n^2 - n)}$$

Where: m = the sample size

n = the number of constraints to vegetable retailing

$S = \sum(R_i - R_M)^2$, i = 1, 2, ……N

where R_i= number of ranks, R_M is the mean of ranks given by

$R_m = \sum {}^{R_i}/_{n}$, i = 1, 2, ……...…N

The significance of Kendall's Concordance Coefficient (W) is validated by testing the following null and alternate hypothesis:

H_0: Kendall's Concordance Coefficient (W) = 0, versus

Hi: Kendall's Concordance Coefficient (W) ≠ 0.

The relevant Z- statistic here is given by

$$Z = {}^{1}/_{2}\log_e(m-1)(1-w)$$

where *e* denotes the base of the natural logarithm. V_1 and V_2, the relevant degrees of freedom are given by

$$v_1 = n - 1 - \frac{2}{m}$$

$$V_2 = (M-1)V_1$$

The joint null hypothesis is tested using the chi-squared test. The decision criteria are based on the magnitude of the calculated chi-square and the critical chi-square values. The calculated chi-square is obtained from the Kendall coefficient of concordance test whereas the critical chi-square values is obtained from the chi-square table using the significance level and the degrees of freedom. We reject the null hypothesis when the calculated chi-square values are greater than the critical chi-square values. This means that there is an overall agreement between the ranks of vegetable retailers' constraints.

3.8 Ethical Considerations

Ethical considerations were paramount in conducting the research on vegetable marketing in the KEEA markets. The study adhered to strict ethical guidelines to ensure the protection and respect of all participants. Prior to commencing the research, ethical approval was obtained from the relevant institutional review board or ethics committee. Informed consent was sought from all participants, including farmers, vegetable retailers, consumers, and intermediaries. They were provided with clear, understandable information about the study's purpose, procedures, potential risks, and benefits. Participants were informed that their involvement was voluntary, and they had the right to withdraw from the study at any time.

Confidentiality and anonymity of participants were rigorously maintained throughout the research process. Personal identifiers were removed from the data, and responses were coded to protect individual privacy. The collected data was stored securely, with access limited to authorized research team members only. In reporting the findings, care was taken to ensure that no individual could be identified from the presented information. Respect for local customs and cultural sensitivities was prioritized during data collection. Researchers were trained to conduct interviews and surveys in a culturally appropriate manner, avoiding any actions or questions that might cause discomfort or offence to participants. The study was designed to minimize any potential disruption to the normal activities of the markets and their participants.

Fairness and non-discrimination were upheld in the selection of participants, ensuring that no group was unfairly excluded or over represented in the study. The research team was committed to objectivity and impartiality in data collection and analysis, avoiding any bias that could skew the results. The principle of beneficence was observed by ensuring that the research had potential benefits for the local community. Findings from the study were shared with relevant

stakeholders, including local authorities and market participants, in a format that was accessible and useful for improving vegetable marketing practices in the district.

Throughout the research process, the researcher was vigilant in the adherence of the appropriate ethical code of conduct recommended by the University of Ghana. By adhering to these ethical principles, the study aimed to contribute valuable knowledge while respecting the rights and well-being of all participants involved in the vegetable marketing ecosystem.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The chapter presents the results and discussion of vegetable retailing and consumer behaviour at the local market. Information on the socio-economic status of the respondents and spouses initiates the chapter, followed by the analyses in some detail of vegetable selling practices, consumer preferences, and market characteristics. It sought specific information on the varieties of vegetables sold and bought, factors affecting consumer preferences and sourcing decisions, and problems faced by vegetable retailers. Simple statistical analysis, Multiple regression, Kendall's coefficient of concordance along with descriptive statistics, is used to analyze data in this chapter and reach meaningful conclusions on the vegetable market dynamics and consumer behaviour in the study area.

4.2 Socio-Economic Characteristics of Consumers and Spouses

The socio-economic characteristics of vegetable consumers in this study revealed several interesting patterns. A total of 312 responses were retrieved from the questionnaire administered to consumers and analyzed. From Table 4.1, gender distribution showed a significant imbalance, with females constituting 71.7% of the consumers compared to 28.3% males. The higher proportion of female respondents likely reflected the traditional shopping patterns in the community, where women typically handled market purchases and were more frequently present in market spaces. This gender disparity in the survey data therefore represented the cultural norm of women being the primary market-goers for household food purchases, including vegetables, rather than indicating any pattern in actual vegetable consumption across genders.

The age distribution of vegetable purchasers interviewed at the markets was skewed towards younger and middle-aged adults. The majority (52.2%) fell within the 18-30 age range, followed closely by those aged 31-45 (44.7%). Only 3.3% of the purchasers interviewed were in the 46-60 age bracket, and none were above 61 years old. The average age of market purchasers was 32.1 years, with a standard deviation of 6.2 years and a range of 22-51 years. This age distribution reflected who physically visited the markets to purchase vegetables, but did not necessarily indicate the age profile of actual vegetable consumers.

Marital status among consumers showed an almost even split between single (39.5%) and currently married (37.5%) individuals. The remaining consumers were distributed among various categories including separated (9.2%), consensual unions (6.6%), divorced (4.6%), widowed (2.0%), and engaged (0.7%). This distribution indicated a diverse range of household structures within the consumer base. Religious affiliation was predominantly Christian, with 89.5% of consumers identifying as Christian only. The remaining consumers were distributed among Muslims only (6.6%), African Traditional Religions only (2.0%), and combinations of these faiths. This religious profile reflected the dominant Christian presence in the area, with some religious diversity.

Education levels among consumers varied widely. The most common education levels were Junior High and Senior High, each at 30.3%, followed closely by those with a bachelor's degree at 28.9%. Lower percentages were seen for incomplete primary education (3.9%), complete primary education (2.6%), no schooling (2.0%), technical institute (1.3%), and college education (0.7%). This distribution suggested a relatively well-educated consumer base, with a significant portion having completed secondary education or higher.

Household sizes were predominantly in the 3–4-member range (61.2%), followed by 1-2 member households (23.7%), and households with 5 or more members (15.1%). The average

household size was 3.0 persons, with a standard deviation of 1.2 persons and a range of 1-7 persons. This indicated that most consumers lived in small to medium-sized households. Income levels showed some improvement from 2021 to 2022. In 2021, 27.6% of consumers earned less than GH₵500 monthly, while this percentage decreased to 21.7% in 2022. Conversely, the percentage of consumers earning above GH₵2000 increased from 10.5% in 2021 to 15.8% in 2022. The median income fell in the GH₵1000 - GH₵1500 range, with an average of GH₵814 and a standard deviation of GH₵525. This suggested a modest improvement in economic conditions for some consumers over the year, although a significant portion still fell in the lower income brackets.

Ethnically, the consumer base is predominantly Fante (79.5%), with small representations from other groups such as Asante (6.4%), Assin (3.8%), and various others each constituting less than 2% of the sample. This ethnic distribution reflects the local demographic composition and suggests that the vegetable consumption patterns observed may be particularly representative of Fante cultural preferences and practices.

Table 4.1: Summary of Socio-Economic Characteristics of Consumers Based on Frequency Analysis Using Percentages

Characteristics of Consumer	Percent
Sex	
Male	28.3
Female	71.7
Age group of consumers	
18-30	52.2
31-45	44.7
46-60	3.3
Marital status	
Currently Married	37.5
Single	39.5
Divorced	4.6
Widowed	2.0
Engaged	0.7
Separated	9.2
Consensual	6.6
Religious affiliation	
African Traditional Religions Only	2.0
African traditional religion and Christianity	1.3

African traditional religion and Muslim	0.7
Christian only	89.5
Muslim only	6.6
Level of education	2.0
No Schooling	3.9
Incomplete Primary	2.6
Complete Primary	30.3
Junior High	30.3
Senior High	1.3
Technical Institute	0.7
College of Education	28.9
Bachelor's Degree	
Household size	23.7
1 – 2	61.2
3 – 4	15.1
5 and Above	
Tribe	6.4
Akan-Asante	3.8
Akan-Assin	0.6
Akan Bono	0.6
Akan-Fante	79.5
Akan-Nzema	1.3
All other Akans	0.6
Awutu (Guan)	0.6
Dagbani	1.3
Ewe	1.3
Ga	1.3
Gonja (Guan)	1.9
Guan (All others)	0.6
Hausa	
Estimated average monthly income (2021)	27.6
Less than GH₵500	18.4
GH₵501-GH₵1000	18.4
GH₵1001-GH₵1500	25.0
GH₵1501-GH₵2000	10.5
Above GH₵2000	
Estimated average monthly income (2022)	
Less than GH₵500	21.7
GH₵501-GH₵1000	19.1
GH₵1001-GH₵1500	15.1
GH₵1501-GH₵2000	28.3
Above GH₵2000	15.8

Source: Derived from survey data, 2024.

Table 4.2: Summary of Socio-Economic Characteristics of Vegetable Consumers Based on Average, Standard Deviation and Range Figures

Characteristics of consumer	Average	Standard Deviation	Range
Age in years	32.1	6.2	22 to 51
Household size	3.0	1.2	1 to 7
Monthly Income	GH₵814	GH₵525	GH₵500 to GH₵2000

Source: Derived from survey data, 2024.

4.3 Socio-Economic Characteristics of Vegetable Retailers and their Spouse

The socio-economic characteristics of 131 retailers/vegetable retailers interviewed in this study revealed a diverse yet patterned landscape of demographics and economic conditions. Demographically, the study population was entirely composed of female retailers (100%), indicating a significant gender disparity in this sector. The age distribution showed a concentration in the middle age brackets, with 45% of respondents falling between 31-45 years and 37.5% between 46-60 years. The mean age of 45.18 years (SD = 11.92) corroborated this middle-age skew. This age distribution suggested that the retail sector in this area was primarily operated by individuals with potentially substantial life and work experience.

Marital status data indicated that 40% of the retailers were currently married, while a significant portion (30%) were divorced. This high divorce rate might suggest unique social dynamics or challenges faced by women in this sector. The religious landscape was predominantly Christian (75%), followed by Muslim (20%), with a small representation of African Traditional Religion practitioners (5%). This religious distribution likely reflected the broader religious composition. Education levels among the retailers varied considerably. While 3.33% had no formal schooling, a substantial 21.3% held bachelor's degrees. The majority had some level of primary education (39.3% combined for incomplete and complete primary), with significant representations at the junior high (16.6%) and senior high (16.6%) levels. This diverse background suggested a range of skills and knowledge bases within the retail community.

Household sizes showed a tendency towards smaller families, with 45% of households having 1-3 members and 28.3% having 4-6 members. The mean household size of 4.37 (SD = 2.81) indicated a moderate family size on average but with considerable variation. The tribal composition was heavily skewed towards the Fante tribe (95%), with only a small representation of Gonja (5%). This homogeneity in tribal background could have implications for business practices, community dynamics, and cultural influences in the retail sector.

Table 4.3: Summary of Socio-Economic Characteristics of Vegetable Retailers Based on Frequency Analysis Using Percentages

Characteristics of Vegetable Retailers	Percent
Sex	
Male	0.0
Female	100.0
Age group	10.0
18-30	45.0
31-45	37.5
46-60	7.5
61 and above	
Marital status	40.0
Currently Married	13.3
Single	30.0
Divorced	5.0
Widowed	0.0
Engaged	3.0
Separated	0.7
Consensual	
Religious affiliation	5.0
African Traditional Religions Only	0.0
African traditional religion and Christianity	0.0
African traditional religion and Muslim	75.0
Christian only	20.0
Muslim only	
Level of education	3.33
No Schooling	12.6
Incomplete Primary	26.7
Complete Primary	16.6
Junior High	16.6
Senior High	0.0
Technical Institute	15.4
College of Education	21.3
Bachelor's Degree	
Household size	45.0
1 – 3	28.3
4 – 6	16.7
7 – 9	10.0
10 and above	
Tribe	5.0
Gonja (Guan)	95.0
Fante (Akan)	
Estimated average monthly income	40.0
Less than GH₵500	41.7
GH₵501-GH₵1000	15.0
GH₵1001-GH₵1500	2.3
GH₵1501-GH₵2000	1.0
Above GH₵2000	

Source: Derived from survey data, 2024.

Economically, the estimated monthly incomes of the retailers were concentrated in the lower to middle ranges. 40% earned less than GH₵500, while 41.7% earned between GH₵501-GH₵1000. The mean monthly income of GH₵818.33 (SD = 436.25; refer to Table 4.4) reflected this distribution but also indicated significant variability in earnings. Only a small percentage (3.3%) earned above GH₵1500, suggesting limited economic mobility or profit margins in this sector.

Table 4.4: Summary of Socio-Economic Characteristics of Vegetable Retailers Based on Average and Standard Deviation

Characteristic	Mean	Standard Deviation
Age	45.18	11.92
Household size	4.37	2.81
Estimated monthly income (GH₵)	818.33	436.25

4.4 Identification of the Types of Vegetables Purchased by Consumers

Table 4.5 presents a summary of the types of vegetables preferred by customers/buyers, based on frequency analysis using percentages and rankings. This data provided valuable insights into consumer preferences in the vegetable market. Pepper emerged as the most preferred vegetable, with 96.2% (300) of respondents indicating a preference for it, ranking it first. This overwhelming preference for pepper suggested its crucial role in local cuisine and dietary habits. Tomato followed closely as the second most preferred vegetable, with 95.5% (298) of respondents favouring it.

The high preference for both pepper and tomato indicated that these vegetables were likely core ingredients in the local diet and essential ingredients in many dishes. Onion ranked third, preferred by 92.3% (288) of respondents. The high ranking of onion, along with pepper and tomato, suggested that these three vegetables formed a core group of essential ingredients in local cooking practices.

Green Pepper was the fourth most preferred vegetable, with 76.3% (238) of respondents indicating a preference for it. This high ranking, although lower than the top three, showed a strong demand for green pepper in the market. Cabbage ranked fifth, preferred by 71.2% (222) of respondents. Its high ranking suggested that it was a popular vegetable, possibly used in both cooked dishes and raw salads. Carrot followed in sixth place, with 55.1% (172) of respondents preferring it. This indicated a moderate but significant demand for carrots in the market. The middle range of preferences included Okro with 39.1% (122), Garden Eggs with 37.2% (116), and Cucumber with 32.7% (107). These vegetables, while not as popular as the top-ranked items, still maintained a notable presence in consumer preferences.

Lettuce and Spring Onion shared the 10th rank, each preferred by 15.4% (48) of respondents. This lower preference might have indicated that these vegetables were considered speciality items or were less integrated into everyday cooking. Green Beans ranked 12th with 10.3% (32) preference, suggesting it was a niche vegetable in this market. Kontomire with 12.2% (16) and Beetroot with 0.6% (2) were the least preferred vegetables. The low preference for beetroot indicated it was not a common vegetable in local diets or may have had limited availability.

In summary, these findings revealed a clear hierarchy in vegetable preferences, with a strong emphasis on vegetables that were key ingredients in local cuisine (pepper, tomato, onion). The data suggested that consumer preferences were heavily influenced by traditional cooking practices and dietary habits. The stark contrast in preference percentages between the most and least popular vegetables indicated a potential for market development for less preferred vegetables, possibly through consumer education or innovative culinary applications.

Table 4.5: Ranking of Types of Vegetables Preferred by Consumers/Buyers Based on Frequency Analysis Using Percentages of Respondents

Vegetable	Percent	Rank
Pepper	96.2	1st
Tomato	95.5	2nd
Onion	92.3	3rd
Green Pepper	76.3	4th
Cabbage	71.2	5th
Carrot	55.1	6th
Okro	39.1	7th
Garden Eggs	37.2	8th
Cucumber	32.7	9th
Lettuce	15.4	10th
Spring Onion	15.4	10th
Green Beans	10.3	12th
Kontomire	12.2	13th
Beetroot	0.6	14th

Source: Derived from survey data, 2024

4.5 Quality Attributes of Vegetables Influencing Consumer Preferences

Table 4.6 shows the importance of the quality attributes of vegetables desired by the sampled consumers based on their rankings of importance using the zero-to-five Likert continuum scale. The relative ranking of the importance of attributes was premised on the Lancaster demand theory, which stipulates that the consumer is interested in the attributes embedded in the good rather than the good per se. Based on the results of the simple statistical analysis of the importance ranking, 11 of the 15 attributes of vegetables were found to be important with an average ranking of 4.0 and above. Two of the 15 attributes were assessed as moderately important with an average score of 3.0 and above.

The most important attribute of vegetables desired by consumers proved to be freshness with an average score of 4.98 out of a maximum score of 5.0. The other ten important attributes (with average scores of 4.0 or greater) were pest damage, cleanliness, nutritional value, hardness, colour, price, food safety related to the produce, overall quality, presentation of the produce at the market centre, and the compatibility of the vegetables with the health status of the consumer. The security condition of the market centre where the vegetables were sold

ranked the lowest in terms of importance. This suggested that the security conditions at the KEEA market centres were adequate for most consumers. As such, consumers generally did not place much consideration on security when choosing a market centre to visit to purchase vegetables. While the price was an important attribute, its ranking as the seventh most important out of the 15 attributes revealed that the consumers, while being economically rational in treating vegetables as normal goods, also considered other more important attributes in their choices of vegetables.

Table 4.6: Relative Importance of the Quality Attributes of Vegetables Considered by Consumers Based on Frequency Analysis Using Mean Scores and Rankings

Quality Attribute of Vegetable	Mean Score	Ranking
Freshness	4.98	1st
Pest Damage	4.94	2nd
Cleanliness	4.67	3rd
Nutritional value	4.64	4th
Hardness	4.62	5th
Colour	4.47	6th
Price	4.13	7th
Food safety related to the produce	4.12	8th
Quality	4.11	9th
Presentation of produce at the market centre	4.08	10th
Health status of consumer and his/her compatibility with produce	3.99	11th
Person selling the produce	3.96	12th
Shelf life of the produce	3.42	13th
Texture of produce	2.88	14th
Security of the market centre where produce is sold	2.29	15th

Notes: Rankings are based on a Likert continuum scale where 5 denotes very important, 4 important, 3 moderately important, 2 lowly important, 1 not important, zero denotes that the attribute is not considered at all in the decision-making process.
Source: Derived from survey data, 2024.

4.6 Regression Analysis of Factors Influencing Consumer Preferences for Vegetables

The second objective of the study examined the factors resulting in consumer preferences for specific vegetables based on monthly purchases of vegetables. In addition, it also analysed the various attributes of vegetables purchased by consumers. Table 4.7 provides the results of the regression analysis. The semi-logarithmic (log-lin) function, with the dependent variable, monthly purchases of vegetables, expressed in natural logarithmic form, and all the

independent variables expressed in linear forms, was the chosen model of the study. This was due to the other three model specifications evaluated, failing the Ramsey Reset test of adequate model specification (Ramsey, 1969). The other three model specifications were (1) linear, (2) double log and (3) lin-log or linear logarithmic model. The Ramsey Reset test for adequate model specification resulted in a computed value of 0.506 well above the maximum probability significance level of 0.10 chosen for this study (see table 4.7). Furthermore, as documented in the literature (Hall and Cummins, 2009; Pesaran and Pesaran, 2017), this model specification has no significant heteroscedasticity as measured by the Lagrange Multiplier test.

As shown in Table 4.7, the power of the chosen model as measured by the R squared was 0.378. For a cross-sectional data-based model, the reported R squared could be regarded as indicating that, the model was modestly strong. Normally, cross-sectional models have relatively lower power than time-series models due to the variables in the former models having wide variation. Given the aggregation of variables used in time series models, the inherent variation is suppressed. The estimated parameters of the model reported in Table 4.7 were all statistically significant, except for the SEX parameter. The result for the sex parameter indicated that there was no significant difference between female and male consumers with regard to monthly expenditures incurred on vegetables.

The coefficient for household income (HINCOME) was 0.003, indicating that for every one Ghanaian cedi increase in monthly household income, monthly vegetable expenditure increases by 0.003 cedis, holding all other variables constant. Increasing monthly household income was shown to lead to increased monthly expenditures on vegetables confirming that vegetables were normal economic goods. The household size (HHSIZE) coefficient of 0.125 suggests that each additional household member leads to an increase of 0.125 cedis in monthly vegetable expenditure, demonstrating the expected positive relationship between household

size and vegetable consumption needs. Increasing size of the household as expected led to increased monthly expenditures on vegetables.

The results obtained for the estimated parameters for the age and age-squared variables indicated a positive sign for the age parameter and a negative sign for the age squared parameter. Specifically, the age coefficient of 0.0726 indicates that monthly vegetable expenditure increases by 0.0726 cedis for each additional year of age, while the age-squared coefficient of -0.0011 captures the declining rate of this increase over time. This result implied increasing vegetable expenditures with increasing age until a certain age level. Beyond that level, monthly expenditures on vegetables declined. The optimal or the turning point age level at which monthly vegetables expenditures began to decline was derived by differentiating the dependent variable with respect to the age variable and setting the differential to zero. This process resulted in the turning point age being 33.2 years.

The education coefficient of 0.030 indicates that each additional level of formal educational attainment increases monthly vegetable expenditure by 0.030 cedis. The increasing consumption of vegetables related to increased expenditures with increasing formal educational attainment was an expected result given that more educated people tended to have more information about nutrition and lifestyles as compared to less educated people. Consumers who practised various traditional African religions spent 0.118 cedis more per month on vegetables compared to those practising other faiths, as indicated by the AFRICANTRAD coefficient.

This result is interesting and reflects the nature of traditional African religions with more rigorous emphasis on the use of herbs and vegetables in food intakes and treatments of various diseases than orthodox medicine which has a greater focus on artificially created drugs which also sometimes have herbal components. The purchase frequency coefficient of 0.034 shows

that each additional visit to purchase vegetables per month increases monthly expenditure by 0.034 cedis. The purchasing frequency of vegetables was shown to lead to increased monthly consumption expenditures as expected.

More frequent visits to market centres to purchase vegetables could be linked to consumers living closer to market centres as they had lower levels of transport costs related to the purchase of vegetables. Finally, the clean vegetables index coefficient of 0.063 indicates that a one-unit increase in the cleanliness perception score leads to a 0.063 cedis increase in monthly vegetable expenditure. Finally, the Likert scale-based measure of clean vegetables index was shown to be significantly linked to increased purchases of vegetables.

The clean vegetables index would reflect the consumer's perceptions of the nature of the vegetables, the quality of the environment which the vegetables were placed at the market for sale to consumers, and other aesthetic characteristics like colour and texture. Individual vegetable attributes such as freshness, colour, hardness, nutritional value, pest damage and their presentation were shown not to have statistically significant linkage to monthly household vegetable expenditures based on the causality assumption embedded in regression analysis. This result reflected the cleanliness characteristic of vegetables being more easily understood by consumers in the KEEA district to reflect an ensemble of preferred attributes.

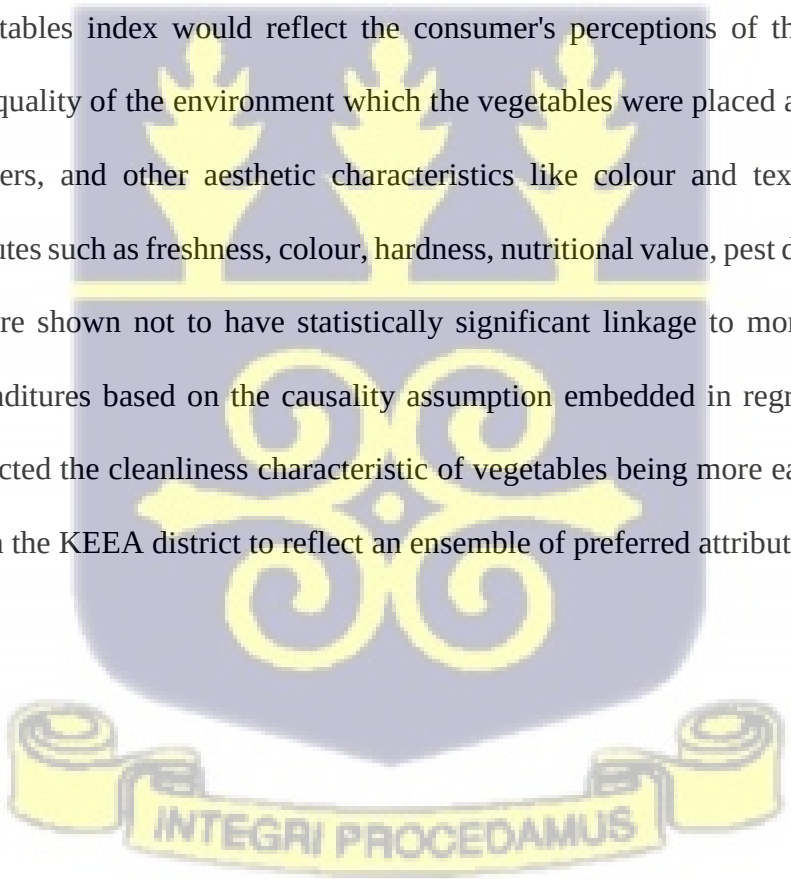

Table 4.7: Parameter Estimates of the Consumer Monthly Vegetables Purchase Regression Function

Variable	Parameter Estimate	Standardized Parameter Estimate	T value	P value	VIF
CONSTANT	2.264	0.000	4.476	0.000***	0.000
HINCOME	0.003	0.123	1.715	0.087*	2.518
HHSIZE	0.125	0.386	6.857	0.000***	1.537
AGE	0.0726	1.290	2.404	0.017**	139.855
AGESQUARED	-0.0011	-1.331	-2.482	0.014**	139.816
SEX	0.047	0.063	1.263	0.208	1.198
EDUCATION	0.030	0.216	3.146	0.002***	2.284
AFRICANTRAD	0.118	0.114	2.379	0.018**	1.124
PURCHASEFREQUENCY	0.034	0.248	5.100	0.000***	1.145
CLEANVEGETABLESINDEX	0.063	0.093	2.034	0.043**	1.027
R^2	**0.378**				
Adjusted R^2	**0.360**				
Probability significance level of the Ramsey Reset test of correct model specification	**0.506**				
Probability significance level of Lagrange Multiplier test of heteroscedasticity	**0.447**				

Notes: *** 1% level statistical significance
** 5% level statistical significance
* 10% level statistical significance
Source: Derived from survey data, 2024.

4.7 Factor Influencing Vegetable Retailers in Sourcing of Vegetables

The third objective established the major factors influencing vegetable retailers in the sourcing of vegetables for sale to consumers. It is important to distinguish between vegetable retailers and retailers in this analysis, as vegetable retailers typically operate on a smaller scale within market stalls, while retailers may include larger-scale operations that distribute to multiple locations. This distinction aligns with the study's focus on vegetable marketing at different market levels within the KEEA District.

Table 4.8 presents a summary of the factors influencing the 131 vegetable retailers interviewed in the sourcing of vegetables for market, based on frequency analysis using percentages and rankings. This data provided valuable insights into the factors driving vegetable procurement from both vegetable retailers' and retailers' perspectives. The analysis reveals significant

variations between market types, with Elmina representing a larger, more urban market center, while Komenda represents a smaller, more localized market environment. The variables most relevant for the respondents were freshness and size, with 109 respondents (83.2%) and 101 respondents (77.1%), respectively. This meant that they had to ensure the vegetables were fresh and of the desirable size before they could purchase them.

The demand for vegetables was another factor taken into consideration by 100 respondents representing 76.3%; therefore, most of the vegetables that they bought were determined by market demand. The other important factors were wholesale price and farm gate price, taken into account by 94 (71.8%) and 91 (69.5%), respectively. This dominance of cost factors in decision-making reflects the price-sensitive nature of vegetable marketing in the district. Shelf life and the use of pesticides fell on the lower end of the spectrum, with eight respondents for each factor. Moreover, it was observed that only 23 respondents, or 17.6%, considered the location of the farmer or wholesaler, and the source of irrigation water was not considered by any respondent.

To examine the relationship between market size/location and sourcing factors, a Chi-square test of independence was conducted ($\chi^2 = 15.847$, $p < 0.05$), indicating significant associations between market type and the prioritization of sourcing factors. The Kruskal-Wallis H test was employed to compare the ranking of factors across different market sizes, revealing significant differences ($H = 12.456$, $p < 0.01$) in how small, medium, and large markets prioritize sourcing criteria. Large markets (such as Elmina central market) showed higher emphasis on formal wholesale relationships (85.3% vs 62.4% in smaller markets) and were more concerned with consistent supply chains. Medium-sized markets demonstrated greater flexibility in sourcing, with 71.2% considering both local farmers and external wholesalers. Small markets and roadside vegetable retailers showed the highest sensitivity to farm gate prices (78.9% vs 65.1%

in larger markets), reflecting their need to maintain competitive pricing with limited overhead costs.

The non-parametric Spearman's rank correlation analysis revealed a significant positive correlation ($r_s = 0.673$, $p < 0.01$) between market size and the number of sourcing factors considered simultaneously, suggesting that larger operations have more complex decision-making processes. Conversely, smaller vegetable retailers showed stronger correlations between profit margin considerations and sourcing decisions ($r_s = 0.741$, $p < 0.001$). Results from the data suggested that freshness, size, demand and price influenced the purchase decision of vegetables for sale across all market types. However, shelf life, location and pesticide use were of considerably less importance, with irrigation water source being no factor at all. The Mann-Whitney U test comparing urban versus rural market sourcing priorities showed significant differences ($U = 1,247$, $p < 0.05$) in the weight given to transportation costs and storage facilities.

Table 4.8: Summary Factor Influencing Vegetable Retailers in Sourcing of Vegetables Based on Frequency Analysis Using Percentages and Rankings

Factors	Large Markets (%)	Medium Markets (%)	Small Markets/Roadside (%)	Overall Percent	Overall Rank
Freshness	87.4	82.1	79.8	83.2	1st
Size	81.3	76.8	73.2	77.1	2nd
Demand for the vegetables	79.6	75.4	73.8	76.3	3rd
Wholesale Price	85.3	71.2	62.4	71.8	4th
Farm gate Price	65.1	68.9	78.9	69.5	5th
Profit Margin	64.2	58.7	55.1	59.5	6th
Availability or Season	52.3	43.8	41.2	45.8	7th
Location of Farmer or Wholesaler	23.1	16.7	12.8	17.6	8th
Shelf Life	8.7	5.9	4.2	6.1	9th
Pesticide Usage	7.2	6.1	4.8	6.1	9th
Source of Irrigation Water	0.0	0.0	0.0	0.0	11th

Chi-square test: $\chi^2 = 15.847$, $p < 0.05$
Kruskal-Wallis H test: $H = 12.456$, $p < 0.01$
Source: Derived from survey data, 2024.

4.8 Types of Vegetables Sold by Vegetable Retailers

Table 4.9 reports the results of the analysis, ranking the percentage of respondents who sold each type of vegetable with accompanying frequency distribution. The analysis found that different vegetables were more popular among different vegetable retailers. Pepper ranked first in selling vegetables with 75.6% reporting sales of these vegetables. Garden Eggs came in at number three at 70.2% followed closely by Tomato and Onion at 69.5%, ranking fourth. These findings suggested that strong preference among vegetable retailers may have been due entirely to high consumer demand. Also notable was that Carrot and Cabbage, which were sold by 59.5% and 54.2% of respondents (6th and 7th respectively), showed considerable popularity. This implied moderate but significant demand for these vegetables in the market.

However, the data showed that some vegetables were sold by a far smaller number of respondents. Green Beans, Radish, and Spinach ranked 15th with each reporting 6.1% (only 8 respondents each). Also, with 12.2% of respondents, Garlic, Kontomire, and Beetroot scored 12th rank in sales prevalence. Vegetables in the middle range included Okro with 40.5%, Cucumber at 35.9%, and Lettuce and Spring Onion with 29.8%. While not as popular as the top-ranked items, these vegetables still maintained a place in the market. Overall, the findings were suggestive of seller preference for vegetables that were likely in high demand, particularly Green Pepper, Pepper, Garden Eggs, Tomato and Onion. Market dynamics played a key role in influencing sell-side choices of which vegetables to carry, with vegetable retailers guided by consumer preferences and the goal of maximizing sales potential.

Table 4.9: Summary on Type of Vegetables Sold by Retailers Based on Frequency Analysis Using Percentages and Rankings

Vegetable Types	Percent	Rank
Green Pepper	75.6	1st
Pepper	75.6	1st
Garden Eggs	70.2	3rd
Tomato	69.5	4th
Onion	69.5	4th
Carrot	59.5	6th
Cabbage	54.2	7th
Okro	40.5	8th
Cucumber	35.9	9th
Lettuce	29.8	10th
Spring Onion	29.8	10th
Kontomire	12.2	12th
Garlic	12.2	12th
Beetroot	12.2	12th
Green Beans	6.1	15th
Radish	6.1	15th
Spinach	6.1	15th

Source: Derived from survey data, 2024.

4.9 Sources of Vegetables Sold at the Market Centres

Table 4.10 presents a summary of the locations where vegetable retailers sourced their produce, showing the percentage of respondents purchasing from each source and their corresponding rankings. The analysis revealed interesting patterns in the supply chain of the local vegetable market. Farmers outside the area emerged as the primary source of vegetables, with 69.5% of respondents reporting purchases from this category, ranking it first. This suggested that a significant portion of the vegetable supply came from non-local sources, potentially indicating a wider supply network or the need to source vegetables from outside.

The second most common source was farmers in the area, with 51.1% of respondents purchasing locally. This high percentage, while lower than out-of-area farmers, demonstrated the importance of local agricultural production in supporting the vegetable market. The combination of these top two sources highlighted a strong reliance on direct farmer-to-seller relationships in the supply chain. Wholesalers in the area ranked third, with 42.0% of

respondents sourcing from them. This indicated a significant role for local intermediaries in the vegetable supply chain, though less prominent than direct farmer sources. Wholesalers outside the area were used less frequently, ranking fourth with 23.7% of respondents, suggesting that long-distance wholesale relationships were less common but still notable.

Interestingly, the seller's own farm was the least common source, with only 5.3% of respondents sourcing vegetables from their farms, ranking fifth. This low percentage suggested that most vegetable retailers in the area were primarily traders rather than farmer-vegetable retailers. Overall, these findings revealed a complex supply chain for vegetables in the area. The substantial use of local farmers and wholesalers alongside these out-of-area sources suggested a diverse and flexible supply strategy among vegetable retailers, likely aimed at ensuring consistent supply and meeting varied consumer demands.

Table 4.10: Ranking of the Sources of Vegetables Sold on the Market Based on Frequency Analysis Using Percentages

Source of Vegetable	Per cent	Rank
Farmers outside the Area	69.5	1st
Farmers in the Area	51.1	2nd
Wholesalers in the Area	42.0	3rd
Wholesalers outside the Area	23.7	4th
Seller's Farm	5.3	5th

Source: Derived from survey data, 2024

4.10 Challenges Facing Vegetable Retailers

Objective four of the research determined the various challenges affecting the retailing of vegetables and their possible solutions. Table 4.11 shows that the challenge which was ranked as the highest, with a mean rank of 8.11, was the ease of perishability of vegetables. This meant that the retailers considered the quick spoilage of vegetables as the major problem they faced. Since vegetables were perishable commodities, this short shelf life directly affected the retailers' ability to sell before they spoiled and incurred potential losses in the process.

Vegetable transportation cost to the market centre was ranked second, with a mean rank of 7.97. This indicated that the cost of transport was a major headache, influencing the overall profitability in the retailing of vegetables. High transportation costs may have led to a reduction in profits or an increase in the final price for consumers, reducing the volume of sales. The challenge of storage of vegetables was ranked third highest in terms of magnitude, with an average rank of 7.23. Proper storage was critical in keeping vegetables fresh with top quality; improper storage facilities may have exacerbated the perishability problem. This was closely related to the first-ranked challenge because poor storage could have accelerated spoilage.

The fourth-ranked challenge facing retailers was that the high price of vegetables negatively affected consumer purchase; its mean rank was 6.82. That meant the retailers were slightly conscious of the fact that if the price of vegetables was higher, it would discourage consumers from buying the product, hence affecting sales negatively and leading to unsold stock. Other challenges, such as the location of the market, ranked at 5.65; access to credit, at 5.62; and availability of manpower, at 5.49, were moderately ranked. These latter factors indicated that logistical and financial challenges also played a significant role in the retailing process.

Other challenges considered less critical but relevant included the quality of vegetables in the market, which had a mean rank of 2.98; access to quality vegetables, with a mean rank of 2.58; and access to various types of vegetables to meet customer demand, with a mean rank of 2.55. This would suggest that quality and variety, while relevant, were secondary in importance to more pressing perishability, transportation, and storage concerns.

The Kendall's W (coefficient of concordance) value of 0.551 indicated a moderate level of agreement among respondents in ranking these challenges. This value, which fell between 0 (no agreement) and 1 (perfect agreement), suggested that approximately 55.1% of the variation in rankings could be explained by genuine consensus among respondents. This moderate level

of agreement was statistically meaningful, as it demonstrated that while respondents didn't have perfect unanimity in their views, there was substantial consistency in how they perceived and ranked the relative importance of these challenges. The result implied that these identified challenges were genuinely experienced across the vegetable marketing system, though their perceived severity may have varied somewhat among different stakeholders. The Chi-Square test statistic was significant at less than 0.001 probability ($\chi^2 = 649.919$, df = 9), thus showing that the ranking was statistically reliable and not due to chance.

Therefore, from the analysis, vegetable retailers faced challenges arising from the perishable nature of vegetables, high costs of transportation, and poor storage facilities. Some of these were crucial challenges, in that, they directly touched on the quality and availability of vegetables provided by the retailers, hence influencing sales and profitability. Being able to address these issues through better storage, more effective transportation logistics, and strategies for cost reduction could have improved the effectiveness and profitability of vegetable retailing. Lower-order challenges included access to variety and quality vegetables; though these were less pressing, they were long-term contributors to market sustainability.

Table 4.11: Ranking of Challenges Facing Vegetable Retailers Based on Kendall Value

Challenges	Mean Rank	Rank
Ease of perishability of vegetables	8.11	1st
Cost of transporting vegetables to the market centre	7.97	2nd
Storage of the vegetable	7.23	3rd
High cost of vegetables negatively affects consumer purchase	6.82	4th
Location of the market	5.65	5th
Access to credit	5.62	6th
Availability of manpower (for carrying/offloading vegetables to the market)	5.49	7th
The quality of the vegetables on the market is low	2.98	8th
Access to quality vegetables	2.58	9th
Access to different varieties of vegetables to meet consumer demand	2.55	10th
N	10	
Kendall's W[a]	0.551	
Chi-Square	649.919	
Df	9	
Asymptotic Significance	0.000***	

Note: Rankings are based on a Likert continuum scale where; 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly Disagree, 0= Not a challenge
Source: Derived from survey data, 2024.

4.11 Discussion of Findings

This section of the chapter discusses the study findings with respect to each objective.

4.11.1 Identification of the types of vegetables purchased by consumers

The results showed a large hierarchy, with pepper, tomato and onion each having over 90% preference. The fact that so many of these are core ingredients within local cuisine likely suggests that their high placement in these charts demonstrably reflects their importance in local cuisine's cooking, and thus in a consumer's perception of what is valued within that cuisine. The least preferred vegetables were vegetables like kontomire and beetroot, with vegetables such as cabbage, green pepper and carrot in the middle range of preferences.

This marked distinction between highly and least liked vegetables points not only to the durability of dietary customs but also to possibilities for developing node and educating consumers about unpopular vegetables. With relation to the above, Lancaster's (1966) theory

of demand provides a clear and useful framework for the interpretation of the vegetable preferences observed in this study. The theory states that the benefits from consumption lie in the characteristics of goods rather than the goods themselves, and reflects the strong favourable preference for pepper, tomato and onion. They are probably considered locally valued for their flavour-enhancing properties in food, consistent with the findings of Liu et al. (2022), on sensory attributes in choice of food. D'Hooghe et al. (2024), in their study on socio-cultural determinants of food choice indicate that the strong preference for vegetables is underpinned by attributes that consumers find desirable such as taste, and versatility of cooking, as well as the cultural and religious significance of certain types of vegetables.

As per Solomon et al. (2012) and Helmold (2022) on consumer Behaviour Theory, preferences are not determined solely by product attributes, but also by social, cultural, and personal factors. Cultural and knowledge unfamiliarity with the preparation of vegetables such as beetroot and kontomire may be the cause of low preference, rather than the inherent characteristics of the vegetables themselves. This finding agrees with research by Odukoya et al. (2022) about the different determining factors of fruit and vegetable consumption. This study notes that dietary choices vary depending on people's individual preferences, just like Chen and Antonelli (2020), also pointed out how food-related lifestyle factors have the power to influence food choices.

Given our preference distributions from a Supply and Demand Theory perspective (de Janvry & Sadoulet, 2020, Priem & Swink, 2012), the stark differences in percentages of vegetable preference between the most and least preferred vegetables implies market inefficiencies. At the same time, higher prices and supply shortfalls of vegetables such as pepper and tomato, which other studies by Bruno and Sexton (2020) report in other markets, may occur due to the high demand for those vegetables. On the other hand, Barrett et al. (2022) argue that if others such as beetroot demonstrate low market demand, then production may be constrained due to

the lack of market incentives for prospective producers. According to Reardon et al. (2021) studying food value chains in developing countries, there is the potential for market development of less preferred vegetables through supply-side interventions and policies that stimulate market demand.

4.11.2 Quality attributes of vegetables influencing consumer preferences

The study singled out a top ranking of quality attributes with influence on customer preference for vegetables, with freshness showing the biggest influence being followed closely by the absence of pest damage and cleanliness. The hierarchy reflects that consumers prize short-term visual and health well-being over longer-term attributes of shelf life, which was much lower down. Freshness, absence of pest damage and cleanliness proved to be the order of quality attributes, lending much to Lancaster's (1966) theory of demand. The attributes described are key characteristics from which consumers consume utility when consuming vegetables and are in line with the findings by Liu et al. (2022) regarding the role of intrinsic quality cues as part of food choice criteria. The lower importance of shelf life and texture indicates that consumers weight immediate consumption features over the long-term storage potential and this makes sense, as most vegetables are perishable in nature. This preference structure is consistent with Bowen and Grygorczyk (2022), on consumer perception for minimally processed vegetables.

The moderate consensus among some of the respondents on these rankings can be explained by Consumer Behaviour theory. Chen and Antonelli (2020) and Marty et al. (2021) discuss that factors such as cultural norms, personal experiences and societal trends will most likely influence individual preferences, and thus some variation of rankings. From a Supply and Demand Theory perspective, these findings may indicate other areas for market differentiation as well as price premiums.

Similar behaviours have been observed in organic and premium produce markets where suppliers with a more consistent ability to deliver fresher produce or vegetables with less pest damage can demand higher prices (Kini et al., 2020). However, considering the relatively low importance of shelf life causes supply chain management to become a challenge that may promote increased waste and inefficiency in the vegetable market. These corroborate with studies on food waste in supply chains (Nakandala & Lau, 2019; Surucu Balci and Tuna, 2021) and point to the necessity for the development of fresh innovative solutions that take into account the practicalities of distribution and retail. Implications of these findings are also discussed by Joseph et al. (2021) for post-harvest technology of horticultural crops, regarding post-harvest handling and packaging technologies.

4.11.3 Factors influencing consumer preferences including the attributes of vegetables

The regression analysis unveiled several significant factors influencing consumer preferences for vegetables, as measured by monthly expenditures. The semi-logarithmic model demonstrated modest explanatory power, which is considered robust for cross-sectional data (Wooldridge, 2021). Household income, household size, age, education, adherence to African traditional religions, purchase frequency, and perceived cleanliness of vegetables were all statistically significant predictors of vegetable expenditure. The relationship between age and vegetable expenditure exhibited an inverted U-shape, suggesting changing consumption patterns across the life cycle, a phenomenon observed in various food consumption studies (Bairoliya et al., 2021; Le, 2021; Matos et al., 2021).

These findings align with Lancaster's characteristics theory of consumer demand (Twine et al., 2023), which posits that consumers derive utility from the attributes of goods rather than the goods themselves. The significance of the clean vegetables index supports this theory, indicating that consumers value perceived quality and presentation, consistent with studies on

food quality perceptions (Konuk, 2019; Moshtaghian et al., 2021; Petrescu et al., 2020). The positive relationship between education and vegetable expenditure corroborates previous research on the link between education and healthier food choices (Alsubhi et al., 2023; Drewnowski et al., 2021). The influence of African traditional religious practices on vegetable consumption highlights the role of cultural and belief systems in shaping dietary habits, a phenomenon observed across various cultural contexts (James et al., 2021; Sudarsono & Nugrohowati, 2020).

The non-significance of gender in vegetable expenditure contrasts with some previous studies that have found gender differences in food consumption patterns (Amini et al., 2021; Dominici et al., 2021; Lévy-Ndejuru et al., 2023). This may suggest a more egalitarian approach to vegetable purchasing in the studied population, reflecting changing gender roles in household decision-making (Restrepo & Zeballos, 2020). The positive impact of purchase frequency on expenditure could be interpreted through the lens of behavioural economics, specifically the concept of habit formation in consumption (Bender et al., 2022; Mumtaz et al., 2022). The significance of household size aligns with economies of scale in food consumption, as larger households tend to have higher food expenditures overall (Echeverría & Molina, 2023). These findings provide valuable insights for policymakers and marketers in understanding the determinants of vegetable consumption and designing targeted interventions to promote healthier eating habits (Tan et al., 2023; Williams et al., 2021).

4.11.4 Factors influencing vegetable retailers in sourcing of vegetables

The study identified key factors influencing vegetable retailers in their sourcing decisions, with freshness, size, and demand for vegetables emerging as the top considerations. Wholesale and farm gate prices were also significant factors. These findings highlight the complex decision-making process retailers engage in when sourcing vegetables, balancing quality attributes with

market demand and economic considerations (Hill et al., 2021; Neven, 2006). The primacy of freshness and size in sourcing decisions aligns with the concept of search qualities in information economics (Collins & Dent, 2022; Sigurdsson et al., 2020).

These attributes are easily observable and play a crucial role in consumers' purchasing decisions, making them critical for retailers to consider (Grunert, 2005). The high ranking of demand as a factor reflects retailers' responsiveness to market signals, consistent with the theory of derived demand in agricultural markets (Ola & Menapace, 2020; von Cramon-Taubadel & Goodwin, 2021). The importance placed on pricing factors (wholesale and farm gate prices) underscores the competitive nature of the vegetable retail market and the need for retailers to maintain profit margins while meeting consumer needs (Kariuki, 2021; Ping et al., 2024). Interestingly, factors such as shelf life, pesticide usage, and source of irrigation water were ranked low or not considered at all by retailers.

This contrasts with growing consumer concerns about food safety and sustainability in many markets (Grunert, 2005; Liu et al., 2021; Iqbal et al., 2021). The low consideration of these factors may indicate a gap between consumer preferences and retailer sourcing practices, or it may reflect specific market conditions where immediate quality and economic factors take precedence (Takanashi, 2021). The absence of consideration for irrigation water sources is particularly noteworthy and may suggest a need for increased awareness of food safety issues in the supply chain (Grace, 2015; Yadav et al., 2022). These findings provide valuable insights for improving supply chain management in the vegetable sector and highlight potential areas for intervention to better align sourcing practices with evolving consumer preferences and food safety standards (Li et al., 2024).

4.11.5 Challenges facing vegetable retailers

The analysis of challenges facing vegetable retailers revealed a clear hierarchy of concerns, with the perishability of vegetables emerging as the most significant issue, followed closely by transportation costs and storage difficulties. The identification of perishability as the primary challenge for vegetable retailers aligns with the fundamental principles of Supply and Demand Theory, particularly in the context of perishable goods markets (Tort et al., 2022). The high mean rank for this challenge underscores the critical nature of time in the supply chain of fresh produce. This finding is consistent with research by Ali et al. (2021) on food waste in the supply chain, which highlights perishability as a major contributor to losses in developing countries. The perishable nature of vegetables creates a unique market dynamic where supply must be carefully balanced with demand to avoid spoilage, a phenomenon explored in depth by Marques et al. (2021) in their study on perishable inventory management. This challenge is exacerbated by the fact that vegetables, unlike many other goods, have a diminishing value over time, which can lead to significant economic losses for retailers (Ketzenberg et al., 2023).

The second-ranked challenge of transportation costs reflects the importance of logistics in the vegetable supply chain, a factor often overlooked in classical economic theory but central to modern supply chain management (Phelps & Madhavan, 2021). This finding supports the work of Varshney et al. (2023) on the impact of transportation costs on agricultural markets. High transportation costs can significantly affect the final price of vegetables, potentially leading to market inefficiencies as described by Kopp and Sexton (2021), in their analysis of agricultural markets. From a Consumer Behaviour Theory perspective, as elaborated by Gokhale et al. (2021), these increased costs may influence consumer purchasing decisions, potentially leading to reduced demand if prices rise too high. This interplay between transportation costs and consumer behaviour aligns with the concept of price elasticity of demand, as discussed by Roy et al., (2021) and further developed in the context of food markets by Lim et al. (2022).

The challenges related to storage and the impact of high prices on consumer purchases can be interpreted through the lens of Lancaster's theory of demand (Lancaster, 1966). This theory posits that, consumers derive utility from the characteristics of goods rather than the goods themselves. In this context, proper storage is crucial for maintaining the desirable characteristics of vegetables (freshness, appearance, nutritional value), which directly influence consumer utility. The importance of storage aligns with findings by Palalic et al. (2021), on post-harvest technology of horticultural crops. The negative impact of high prices on consumer purchases, as noted by Veeck et al. (2020), reflects the trade-off consumers make between the utility derived from vegetables and their cost. This price sensitivity is consistent with studies on food demand in developing countries by Mumin and Abdulai (2022). The moderate consensus among respondents suggests that while these challenges are widely recognized, there may be variations in their perceived importance, due to differences in individual business models or market positions (Dhir et al., 2023).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summaries the research findings in relation to the research objectives, draw conclusion and makes recommendations for policy implementation and avenue for future research.

5.2 Summary of Findings

This study examined the factors that influence consumer preferences for vegetables and the constraints faced by vegetable retailers in offering services to consumers in the KEEA Municipal District in Ghana. The objective formed the basis for thematic areas for the literature review. Next was the methodology. The cross-sectional design and quantitative approach of data collection and analysis were adopted. A multi-stage sampling technique were used to sample 443 respondents for the survey. Questionnaire served as the tool for data collection while Stata was the analytical tool for the study. Both descriptive and inferential statistics were used to achieve the study objectives. Key findings are depicted below.

The objective one identified the types of vegetables purchased by consumers. The study revealed a clear hierarchy in vegetable preferences among consumers. Pepper, tomato, and onion emerged as the most preferred vegetables, each with over 90% preference. Green pepper, cabbage, and carrot formed a middle tier of preferences. Kontomire and beetroot were the least preferred vegetables. This pattern suggests a strong influence of traditional culinary practices on consumer choices. The stark contrast between highly preferred and least preferred

vegetables indicates potential opportunities for market development and consumer education regarding less popular vegetables.

The second objective examined the factors influencing consumer preference for vegetables. To this, the regression analysis revealed several significant factors influencing consumer preferences for vegetables, as measured by monthly expenditures. Household income, household size, age, education, adherence to African traditional religions, purchase frequency, and perceived cleanliness of vegetables were all statistically significant predictors. The relationship between age and vegetable expenditure followed an inverted U-shape, peaking at around 33 years. Gender was not a significant factor in vegetable expenditure. The clean vegetables index was significantly linked to increased purchases, suggesting the importance of perceived quality and presentation to consumers.

Objective three identified key factors influencing vegetable retailers in their sourcing decisions. Freshness, size, and demand for vegetables emerged as the top considerations, followed by wholesale and farm gate prices. Factors such as shelf life, pesticide usage, and source of irrigation water were ranked low or not considered at all by retailers. This highlights a potential gap between consumer concerns about food safety and sustainability and retailer sourcing practices. The findings suggest that immediate quality attributes and economic factors take precedence in retailers' decision-making when sourcing vegetables.

The final objective investigated the challenges faced by vegetable retailers. The study identified and ranked several challenges facing vegetable retailers. The perishability of vegetables emerged as the most significant issue, followed closely by transportation costs to market centres and storage difficulties. The high cost of vegetables negatively affecting consumer purchases was ranked fourth. Moderate challenges included market location, access to credit, and availability of manpower. Quality and variety of vegetables were considered relevant but

ranked lower in priority. There was a moderate consensus among respondents on these rankings, and they were statistically significant. These findings highlight the critical nature of managing time-sensitive logistics and economic factors in the vegetable retail sector, with operational concerns taking precedence over product diversity and quality issues.

5.3 Conclusions

The study demonstrates a clear hierarchy of preferences for vegetables commonly used in preparing condiments and accompaniments for Ghanaian staple foods, with pepper, tomato and onion being the most preferred by consumers. Such a preference pattern evidences the significant effect of custom and dietary tradition on the habit of consuming vegetables. Still, it is surprising that while there is such a stark contrast between highly and least preferred vegetables, there is great potential for market development and consumer education about less popular but possibly nutrient-rich vegetables. A number of factors are involved which are categorized into "Retailer and Vegetable Characteristics" and "External and Health Considerations" that affect consumer preferences.

The dual focus reveals that consumers combine price and availability with health-related issues when there is a purchase. The role of retailer characteristics emphasizes the role of trust and reputation in the vegetable market, implying that efforts to improve the efficiency of the market should look at market efficiency from the perspective of both product quality and seller-consumer relationship. The regression analysis helps to further refine our understanding of consumer behaviour by discovering that socio-economic factors such as household income, household size, household age and household education have high impact on vegetable expenditure. Age and vegetable consumption have an inverted U-shape, suggesting that dietary patterns change across the life cycle, and can be used to guide targeted nutritional interventions. Consumers value perceived quality and presentation in terms of the "clean vegetables index"

which underscores the importance of this in driving purchases, revealing potential value addition to the vegetable supply chain.

The study from the vegetable retailers' perspectives reveals that decisions in sourcing are focused on the immediate quality attributes as well as the economic factors. This is consistent with consumer preference for freshness and size, but it shows also a gap between the growing concern by consumers about food safety and sustainability and the behaviour of the current retailer. Such disconnect offers an opportunity to reduce that gap through education and policy interventions to better marry demand and supply in the food supply chain with new consumer tastes and global food safety standards.

Vegetable retailers face challenges such as perishability, transportation costs and storage difficulties and the importance of efficient supply chain management in this sector is a matter of necessity. These operational concerns do not allow room for product diversity and quality issues, and thus improvements in logistics and storage infrastructure can greatly increase the efficiency and profitability of vegetable retailing.

Finally, this study provides a comprehensive analysis of the vegetable market in the KEEA district with actual consumer preferences, seller strategies and market challenges.

5.4 Recommendations

The following recommendations were made based on the findings:

1. The study found that perceived cleanliness of vegetables has an impact on consumer expenditure on vegetables. The study recommends that retailers focus more on proper cleaning and presentation of vegetables, in order to meet consumer demand and also increase sales.

2. The research identified perishability, transportation costs, and storage difficulties as the most critical challenges faced by vegetable retailers. The study recommends investing in improved storage and transportation infrastructure to address these challenges, which could enhance the efficiency and profitability of vegetable retailing.

3. The findings indicated an inverted U-shape relationship between age and vegetable consumption, peaking around 33 years. The study recommended creating age-specific nutritional interventions to promote sustained vegetable intake across different life stages, addressing changing dietary patterns throughout the life cycle.

4. The study found that vendor characteristics, including trust and reputation, play a significant role in consumer decision-making when purchasing vegetables. Based on this finding, the study recommends that the KEEA Municipal Assembly, in collaboration with the Ministry of Food and Agriculture's District Office, should establish a quality certification system for vegetable retailers. This local government-led certification program could help build consumer trust and allow certified vegetable retailers to potentially command premium prices for high-quality, sustainably sourced vegetables.

5.5 Suggestions for Future Research

Based on the findings and limitations of this study, several avenues for future research emerge. Firstly, a longitudinal study could be conducted to track changes in consumer preferences and vegetable consumption patterns over time, providing insights into how interventions and market dynamics impact dietary habits.

Secondly, an in-depth investigation into the nutritional awareness of consumers and its relationship with vegetable choices could inform more effective health education strategies.

Thirdly, a comparative analysis of vegetable markets in different regions or urban-rural settings could highlight geographical variations in consumer behaviour and supply chain challenges. Furthermore, research into innovative storage and transportation technologies specifically tailored to the local context could address the critical issue of perishability.

Finally, a study examining the potential economic and health impacts of promoting less popular vegetables could provide valuable data for policymakers. These suggested research directions could contribute to a more comprehensive understanding of the vegetable market dynamics and inform interventions to improve the economic efficiency of the sector.

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APPENDIX

STRICTLY CONFIDENTIAL

DEPARTMENT OF AGRICULTURAL ECONOMICS AND AGRIBUSINESS,

COLLEGE OF BASIC AND APPLIED SCIENCES,

UNIVERSITY OF GHANA, LEGON, ACCRA, GHANA

QUESTIONNAIRE FOR THE INTERVIEW OF RANDOMLY SELECTED CONSUMERS AND VEGETABLE RETAILERS IN THE KOMENDA EDINA EGUAFO ABREM MUNICIPALITY (K.E.E.A) ON THE ECONOMIC ANALYSIS OF THE MARKETING OF VEGETABLES IN THE K.E.E.A MARKET CENTRES.

INVESTIGATOR'S INTRODUCTION AND STATEMENT OF INFORMED CONSENT

My name is **Mr Albert Bawuah, Master of Philosophy student,** Department of Agricultural Economics and Agribusiness, University of Ghana, Legon, Accra. My phone number is ……..

Dear Madam/Sir,

I am researching the Economic Analysis of the Marketing of Vegetables at the Komenda Edina Eguafo Abrem (K.E.E.A) District Markets. This study covers various markets in the K.E.E.A district. I would be pleased if you could kindly spare 30 minutes of your time to answer the following questions. Information provided will be treated as strictly confidential

Survey Code No: …….

Name of Respondent (Optional)

Address of Respondent (Optional):

Phone Number (Optional):

SECTION A: Information Concerning Retailing of Vegetables

1. For how many years have been living in this village? [ ]
2. Were you born in this village? [ ] 1 = Yes 0 = No

   If yes, then go to Question 5
3. If no, please indicate the reasons for moving to this village

   …….
4. Where did you live before coming here? [ ]

   1 = Another village in this district 2 = Another district in this region

   3 = Outside this region 4 = Outside Ghana
5. Please specify the place if possible……..…….
6. Why did you venture into vegetable selling?

   ……..……

   ……..……..
7. Which types of vegetables do you sell (*tick as many as may be applicable*)?

   Cabbage[ ] Carrot[ ] Tomato[ ] Lettuce[ ] Green pepper[] Cucumber[ ] Garden eggs [ ] Okra [ ] Onion[ ] Pepper[ ] Green beans[ ] Spring Onion[ ]

   Others…… ……..……
8. How many years have you been selling vegetables?
   Less than 1[ ] 1-5[ ] 6-10[ ] Above 10[ ]
9. Do you sell in a Store [ ] Wooden kiosk/table [ ] Metal container[ ]
10. Where do you buy the vegetables, you sell from? *(Multiple choice is allowed)*

    Seller's farm[ ] Farmers within the area[ ] Farmers outside the area[ ] Wholesaler [ ]
    Other sources……..……..……
11. What factors do you consider when buying vegetables to sell on the market?

    Demand for the vegetables [ ] Availability or Season[ ] Profit margin[ ]
    Wholesale price[ ] Farm gate price [ ] Freshness[ ] Size[ ] Shelf life[ ]

Location of the farmer/Wholesale [ ] Source of irrigation water[]
Others……..……..

12. Please rank the following factors in order of their importance when pricing your vegetables. **Tick** the number that corresponds to your opinion. (**5=** Very important, **4** =important, **3=** slightly important **2=** less important, **1=** not important, **0**= Not a factor)

Factors you consider in pricing vegetables	**5**	**4**	**3**	**2**	**1**	**0**
Wholesale price						
Farm gate price						
Profit margin						
Shelf-life of the vegetable						
Demand for the vegetable						
Size of the vegetable						
Type of vegetable						
Market price						
Location						
The freshness of the vegetable						
Nutritional value of the vegetable						
Scarcity/Season						
Transportation cost						

Others……..……

13. Please indicate your level of agreement with the challenges listed below in the trading of vegetables in the market. Please **tick** the number that corresponds to your opinion. (5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly Disagree, 0= Not a challenge).

Challenge	**5**	**4**	**3**	**2**	**1**	**0**
Storage of the vegetable						
Ease of perishability of vegetables						
High cost of vegetables negatively affects consumer purchase						
Cost of transporting vegetables to the market centre						
The quality of the vegetables on the market is low						
Access to quality vegetables						
Access to different varieties of vegetables to meet consumer demand						

Access to credit						
Availability of man-power (for carrying/offloading vegetables to the market)						
Location of the market						

Others ……..……

14. What is the estimated average monthly income that you get from the sale of vegetables for the following years

2022: GHS……. 2021: GHS…….

Use this tabular form as a guide

0. Zero (0) GH₵ 0.0 ☐
1. Less than GH₵100 ☐
2. GH₵100-GH₵200 ☐
3. GH₵201- GH₵300 ☐
4. GH₵301-GH₵400 ☐
5. GH₵401-GH₵500 ☐
6.GH₵501-GH₵600 ☐
7. GH₵601- GH₵700 ☐
8. GH₵701-GH₵800 ☐
9. GH₵801-GH₵900 ☐
10. GH₵901-GH₵1000 ☐
11. GH₵1001-GH₵1100 ☐
12. GH₵1101-GHC1200 ☐
13. GH₵ 1201-GHC1300 ☐
14. GH₵1301-GHC1400 ☐
15. GH₵1401-GHC1500 ☐
16. GH₵1501-GH₵1600 ☐
17. GH1601-GH₵1700 ☐
18.GH₵₵1701- GH₵1800 ☐
19GH ₵1801-GH₵1900 ☐
20.GH₵1901-GH₵2000 ☐
21.GH₵2001-GH₵2100 ☐
22 GH₵2101-GH₵2200 ☐
23.GH₵2201- GH₵2300 ☐
24.GH ₵2301-GH₵2400 ☐
25.GH₵2401-GH₵2500 ☐
26.GH ₵C 2501-GHC2600 ☐
27. GH₵2601-GHC2700 ☐
28.GH₵ 2701-GHC 2800 ☐
29GH₵ 2801-GHC 2900 ☐
30.GH₵ 2901-GHC3000 ☐
31. GH₵3000- GH₵4000 ☐
32. Over GHC 4000

SECTION B: For Consumers of Vegetables

1. Do you live in this community? [ ] 1= Yes 0= No
   If No, Specify……..

2. How often do you buy vegetables: Once a day **[ ]** Once a week**[ ]** Twice a week**[ ]** Three times a week [ ] Once a month**[ ]** Once every two months **[ ]**

3. Does the location of the market affect how often you buy vegetables? 1=Yes[ ] 0=No [ ]

4. Do you go to other markets aside from this market to buy vegetables? 1=Yes[ ] 0=No [ ]

5. How often do you go to those other markets: Once a day **[ ]** Once a week**[ ]** Twice a week**[ ]** Three times a week [ ] Once a month**[ ]** Once every two months **[ ]**

6. What is the cost of travel from your house to the other market? GHS ……

7. What types of vegetables do you often buy?

   Cabbage**[ ]** Carrot**[ ]** Tomato**[ ]** Lettuce**[ ]** Green pepper**[ ]**
   Cucumber**[ ]** Garden eggs **[ ]** Okra **[ ]** Onion**[ ]** Pepper**[ ]** Green beans**[ ]**
   Spring Onion**[ ]**

   Others…… ……..…

8. Where do you buy your vegetables from?
   Store **[ ]** Wooden kiosk/Table **[ ]** Metal container**[ ]**

Please rank the following factors in order of importance. Tick the number to how important it is to you for each of the factors. (**5**= Very important, **4**= Important, **3**= Slightly important **2**= Less important, **1**= Not important, **0**= Not a factor)

9. **Factors you will consider before buying vegetables**	**5**	**4**	**3**	**2**	**1**	**0**
The person selling						
Availability of the vegetable						
Income						
Usage of the vegetable						
Price of the vegetable						
Quality of the vegetable						
Food safety						
Distance to the market or vegetable seller						
My health						
Presentation of the vegetable						

10. **Qualities or Characteristics of vegetables you will consider**						
	5	**4**	**3**	**2**	**1**	**0**
Cleanness of the vegetable						
Freshness						
Colour of vegetable						
The hardness of the vegetable						
Nutritional value						
Pest damage						
Shelf-life						
Texture						

Any other……..……

11. Are you able to get the quality of vegetables you want from the market centre?
    1= Yes [ ] 0= No[ ]
    If NO, why…….

12. Are you able to get the different types or varieties of vegetables you want? 1=Yes []
    0=No []

13. Does the stability of prices influence your decision to buy vegetables? 1=Yes [] 0=No
    []

14. What is the cost of travel from your house to this market? GHS ……

15. How much money do you and your family spend on the purchase of vegetables each
    month?……

SECTION C: Market Centre Characteristics Information from Both Consumers and Retailers

Please indicate your level of satisfaction with the facilities in the market you purchase or trade-in. Please tick the number that represents your satisfaction with the features/infrastructure in the market, based on a Likert scale of **0** to **5**. (5= Excellent, 4= very good, 3= good, 2=bad, 1 very bad and 0= does not exist).

Characteristic	**5**	**4**	**3**	**2**	**1**	**0**
1. Washrooms for traders and buyers						
2. Space to move around to buy or sell						
3. Number of sheds or stores for traders						
4. Water to wash vegetables before and/or after purchasing						
5. Security at the market						
6. Lighting in the market centre						
7. Waste disposal system						
8. Fire management (fire service, availability of fire extinguishers, etc.) at the market.						
9. Cleaning service (sweeping of the market centre)						
10. Car park for buyers and sellers						

SECTION D: SOCIO-ECONOMIC INFORMATION OF RESPONDENTS

1. **Sex**: 0=Male [ ] 1=Female [ ]

2. **Age**: .....

3. **Marital Status:** 1= Married [ ] 2= Single [ ] 3= Divorced [ ] 4= Widowed [ ]
5= Engaged [ ] 6= Separated [ ] 7= Consensus [ ]

4. **Household size** .....

5. Please indicate your religious affiliation **(please tick noting possible mixed religious preferences common in Ghana)**

1= African Traditional Religions Only [ ]

2= African Traditional Religions and Christianity [ ] **Mixed religious preferences**

3= African Traditional Religions and Muslim [ ] **Mixed religious preferences**

4= Christian Only [ ]

5= Muslim Only [ ]

Other Religions (Please specify) ……..……

6. **Level of Education (current level of education)**

Level of Education	Length (Years)	Level of Education	Length (Years)
No Schooling		Technical Institute	
Incomplete Primary		College of Education	
Complete Primary		Bachelor's Degree	
Junior High		Postgraduate Degree	
Senior High		Others	

7. **What is the estimated average monthly income for the following years:**

2022: GHS……. 2021: GHS…….

Use this tabular form as a guide and the interviewer should insert the code at the appropriate places.

0. Zero (0) GH₵ 0.0 □
1. Less than GH₵100 □
2. GH₵100-GH₵200 □
3. GH₵201- GH₵300 □
4. GH₵301-GH₵400 □
5. GH₵401-GH₵500 □
6.GH₵501-GH₵600 □
7. GH₵601- GH₵700 □
8. GH₵701-GH₵800 □
9. GH₵801-GH₵900 □
10. GH₵901-GH₵1000 □
11. GH₵1001-GH₵1100 □
12. GH₵1101-GHC1200 □
13. GH₵ 1201-GHC1300 □
14. GH₵1301-GHC1400 □
15. GH₵1401-GHC1500 □
16. GH₵1501-GH₵1600 □
17. GH1601-GH₵1700 □
18.GH₵₵1701- GH₵1800 □
19GH ₵1801-GH₵1900 □
20.GH₵1901-GH₵2000 □
21.GH₵2001-GH₵2100 □
22 GH₵2101-GH₵2200 □
23.GH₵2201- GH₵2300 □
24.GH ₵2301-GH₵2400 □
25.GH₵2401-GH₵2500 □
26.GH ₵C 2501-GHC2600 □
27. GH₵2601-GHC2700 □
28.GH₵ 2701-GHC 2800 □
29GH₵ 2801-GHC 2900 □
30.GH₵ 2901-GHC3000 □
31. GH₵3000- GH₵4000 □
32. Over GHC 4000 □

8. Which tribe or ethnic group do you belong? **(Refer to Appendix for guidance)**

…….……..

SECTION E: SOCIO-ECONOMIC INFORMATION OF SPOUSE OF RESPONDENTS

1. **Sex**: 0=Male [ ] 1=Female [ ]

2. **Age**: .....

3. **Marital Status:** 1=Married [ ] 2=Single [ ] 3=Divorced [ ] 4=Widowed [ ] 5=Engaged [ ] 6=Separated [ ] 7= Consensus [ ]

4. **Household size …….**

5. **Please indicate your spouse's religious affiliation (please tick noting possible mixed religious preferences)**

   1=African Traditional Religions Only [ ]

   2=African Traditional Religions and Christianity [ ] **Mixed religious preferences**

   3=African Traditional Religions and Muslim [ ] **Mixed religious preferences**

   4=Christian Only [ ]

   5=Muslim Only [ ]

6. **Level of Education (current level of education)**

Level of Education	Length (Years)	Level of Education	Length (Years)
No Schooling		Technical Institute	
Incomplete Primary		College of Education	
Complete Primary		Bachelor's Degree	
Junior High		Postgraduate Degree	
Senior High		Others	

7. **What is the estimated average monthly income of your spouse for the following years**

2022: GHS……. 2021: GHS…….

Use this tabular form as a guide

0. Zero (0) GH₵ 0.0	☐	16. GH₵1501-GH₵1600	☐
1. Less than GH₵100	☐	17. GH1601-GH₵1700	☐
2. GH₵100-GH₵200	☐	18.GH₵₵1701- GH₵1800	☐
3. GH₵201- GH₵300	☐	19GH ₵1801-GH₵1900	☐
4. GH₵301-GH₵400	☐	20.GH₵1901-GH₵2000	☐
5. GH₵401-GH₵500	☐	21.GH₵2001-GH₵2100	☐
6.GH₵501-GH₵600	☐	22 GH₵2101-GH₵2200	☐
7. GH₵601- GH₵700	☐	23.GH₵2201- GH₵2300	☐
8. GH₵701-GH₵800	☐	24.GH ₵2301-GH₵2400	☐
9. GH₵801-GH₵900	☐	25.GH₵2401-GH₵2500	☐
10. GH₵901-GH₵1000	☐	26.GH ₵C 2501-GHC2600	☐
11. GH₵1001-GH₵1100	☐	27. GH₵2601-GHC2700	☐

12. GH₵1101-GHC1200 ☐
13. GH₵ 1201-GHC1300 ☐
14. GH₵1301-GHC1400 ☐
15. GH₵1401-GHC1500 ☐

28.GH₵ 2701-GHC 2800 ☐
29GH₵ 2801-GHC 2900 ☐
30.GH₵ 2901-GHC3000 ☐
31. GH₵3000- GH₵4000 ☐
32. Over GHC 4000

8. Which tribe or ethnic group does your spouse belong to? **(refer to Appendix for guidance)** ……

THANK YOU FOR YOUR TIME AND PARTICIPATION

APPENDIX 1: OFFICIAL ETHNICITY CLASSIFICATION USED BY THE GHANA STATISTICAL SERVICE

Akan	**Ga/ Dangme**	**Ewe**	**Guan**	**Gruma**	**Mole-Dabani**	**Grusi**	**Mande**	**All Others**
Agona	Ga		Akpafu, Lolobi, Likpe, Bowiri, Buem, Santrokofi, Akposo	Bimoba	Builsa (Kangyaga or Kanjaga)	Kasena (Paga)	Busanga	
Ahafo	Dangbe		Avatime, Nyongbo, Tafi, Logba	Kokomba	Dagarte (Dagaba), Lobi , Wali (Wala)	Mo	Wangara	
Ahanta	Other Ga-Dangbe		Awutu, Efutu, Senya, Breku	Basare(Kyamba)	Dagomba	Sissala	Others	
Akuapem			Cherepong, Larteh, Anum-Boso	Pilapila	Kusasi	Vagala		
Akwamu			Gonja	Salfalba (Sabulaba)	Mamprusi	Other Grusi (e.g. Lela, Templensi, Birifor, Yangala, Miwo)		
Akyem			Nkonya	Kotokoli	Namnam (Nabdom)			
Aowin			Yeji, Nchumuru, Krachi, Nawuri, Bassa Achode Nkomi, Wiase, Dwan	Chamba (Kyamba)	Nankansi, Talensi & Gurense (Frafra)			
Asante			Other Guan	Other Gurma	Nanumba			
Asen (Assin)					Mosi			
Bono (Banda)					Other Mole-Dagbani			
Bawle								
Chokosi (Anufor)								
Denkyira								
Twifo								
Evalue								
Fante								
Kwahu								
Nzema								
Sefwi								
Wasa								
Other Akan								