Opportunities and Challenges of Integrating Nutrition into ANZA Business Accelerator Programs for Improving SMEs Product & Services

Agricultural Value Chain Analysis Report

Prepared by:

Tanzania Food and Nutrition Centre (TFNC),

P. O. Box. 977, Dar es Salaam, Tanzania,

22 Barack Obama Road,

E-mail Address: barua@tfnc.go.tz,

Telephone: +255+255 734275369,

Website: www.tfnc.go.tz

Acronyms & Abbreviations

AFVC	Agricultural Food Value Chains
DPs	Development Partners
FAO	Food and Agriculture Organization
GMP	Good Manufacture Practices
IDD	Iodine Deficiency Disorder
MoA	Ministry of Agriculture
MoH	Ministry of Health
NCDs	Non-Communicable Diseases
NGOs	Non-Governmental Organization
NMNAP II	National Multi-Sectoral Nutrition Action Plan II
OFSP	Orange-Fleshed Sweet Potatoes
RDA	Recommended Dietary Allowance
R&Ds	Research and Development
SIDO	Small Industries Development Organization
SMEs	Small and Medium Enterprises
TAHA	Tanzania Horticultural Association
TBS	Tanzania Bureau of Standards
TFNC	Tanzania Food and Nutrition Centre
PPP	Public Private Partnership
UIC	Urinary Iodine Concentration
VAD	Vitamin A Deficiency
WHO	World Health Organization
WASH	Water Sanitation and Hygiene
WFP	World Food Programme

Acknowledgement

On behalf of the TFNCs` consultancy team, the Principal Investigator Dr. Hoyce Amini Mshida would like to express her deepest appreciation to all those who provided support to the team to ensure the accomplishment of this survey report.

The team extends their sincere gratitude to ANZA team for their kind support, positive contributions, open discussions and for sharing their insights and program documents to ensure that the survey is well done. The team includes but not limited to; Country Director of ANZA Joshua Elias, the Programs Manager Ms. Dinah Kikuli and Kelvin Majura who participated through face-to-face interview.

The team would also like to extend their deepest appreciation and gratitude to the Director of Tanzania Food and Nutrition Centre (TFNC), Dr. German Leyna for her valuable support and advice during the entire period of the assignment.

Special gratitude goes to the survey team of this particular study Dr. Hoyce Mshida (PI), Dr. Nyabasi Makori (Co-PI), Dr. Anselm Moshi and Ms. Aika Lekey for their dedication and commitment in executing this assignment.

Special thanks go to the TFNC administration team including finance team for their administrative and logistics support in the entire process of the study. We sincerely extend our thanks to the ANZA Organization for their generous funding support for undertaking this study. Finally, we are thankful to Tanzania Food and Nutrition Centre staff for their inputs and feedback which played a critical role in finalization of the survey report.

EXECUTIVE SUMMARY

INTRODUCTION

Malnutrition affects millions globally, with nearly 690 million people hungry and increasing rates of overweight/obesity. In Sub-Saharan Africa, including Tanzania, where SMEs supply 80% of food, limited nutritional knowledge among entrepreneurs contributes to health issues such as non-communicable diseases and nutrient deficiencies. To address this, SMEs need improved capacity in nutrition, appropriate technology, and financial support. ANZA, an NGO supporting agricultural entrepreneurs, aims to integrate nutrition aspects into its business accelerator programs. This study assesses SMEs' current nutritional knowledge, identifies barriers and opportunities for nutrition integration, and provides recommendations for enhancing the nutritional quality of their products. The findings will help ANZA design programs to improve public health and tackle malnutrition in Tanzania.

METHODOLOGY

The study focused on four regions in Tanzania which are Arusha, Dar es Salaam, Mtwara, and Manyara where 60 participants were selected from the actors along the agricultural value chain such as SMEs, farmers, processors, input suppliers, transporters, wholesalers and support organizations for in-depth interviews. A cross-sectional design was used, combining both quantitative and qualitative methods. Structured questionnaires assessed the participants' knowledge and practices on nutrition in the agricultural value chain.

Data were analyzed using SPSS for quantitative data, with results presented in frequencies, percentages, and visuals. Qualitative data were transcribed, translated, and analyzed thematically to identify key themes and insights. The methodology provided a detailed understanding of the challenges and opportunities for integrating nutrition into agricultural practices.

KEY FINDINGS

SMEs' Understanding of Nutritional Quality in Food Products

The survey reveals that while 100% of SMEs recognize the marketing benefits of considering nutritional quality in food products, only 75% understand key factors like nutrient density (40%) and nutrient preservation (60%), indicating a need for further training. Only 33% understand the importance of ingredient lists on labels, and 50% associate nutritional quality with consumer health and safety, while

35% link it to consumer trust. Although 100% of SMEs acknowledge the marketing advantages, with 55% emphasizing market penetration, deeper insights are needed. Regarding food labels, 80% prioritize manufacturer information, 50% focus on ingredients and expiry dates, but only 15% understand the importance of nutritional information. Additionally, 60% see nutritional labelling as essential for product content, 25% for dietary management, and only 5% recognize its regulatory compliance role, with minimal awareness of its impact on consumer safety and allergens. Overall, there is a clear need for targeted training to improve SMEs' understanding of nutritional quality and labelling, enabling them to capitalize on market opportunities related to consumer health.

Consideration of Nutritional Quality in Food Processing SMEs

The study highlights significant gaps in SMEs' consideration of nutritional quality in food processing. Only 10% of SMEs selected raw materials based on nutritional value, with 25% focusing on supply reliability and freshness. In transportation, 25% considered cost and 20% used specialized vehicles, but there was little awareness of maintaining nutritional quality during transit. In handling and storage, less than 60% adhered to proper practices, and only 15% followed essential GMP standards. Packaging selection was inadequate, with only 40% considering appropriate materials. Regarding branding and labelling, 50% cited cost barriers, and 30% understood the benefits of nutritional quality, focusing on profit margins (45%) and market reach (20%). Overall, the SMEs demonstrated low knowledge in all areas, indicating a need for capacity building to improve product quality, regulatory compliance, and market competitiveness.

Quality control

Effective quality control is essential for SMEs in the food processing sector to ensure product consistency, safety, and compliance with regulations. The study found that 62.5% of SMEs demonstrated awareness of key quality control measures, but their understanding of specific aspects, such as raw material control (15%) and process monitoring (30%), was low, indicating a need for further training and regulatory enforcement. Additionally, 57% of SMEs showed limited compliance with standards, and only 25% gathered consumer feedback to improve product quality. In terms of food safety, 71% reported awareness of basic standards, but only a few understood the importance of GMP (25%) and ingredient sourcing (30%). The findings highlight significant gaps in SMEs' ability to implement food safety measures and

quality control, emphasizing the need for tailored capacity-building programs and innovative models to address these challenges.

SMEs future direction

SMEs (n=20) primarily view technology for product diversification and marketing, with 62.5% using social media for learning. Few recognize its potential to enhance nutritional quality through advanced tools, innovative processing, and automated systems. For future growth, SMEs prioritize business sustainability (25%), improving food processing and nutrition knowledge (20%), sourcing quality raw materials (15%), practicing GMP (15%), and consulting experts to enhance nutritional quality (15%). Achieving these goals requires integrating business development with food and nutrition capacity building.

Specific Challenges opportunities and recommendations for food processing SMES

The study identified key challenges and opportunities for food processing SMEs in Tanzania to integrate nutrition aspects into their products. Key challenges include technological limitations (85%), inadequate capital (95%), limited nutrition knowledge (90%), lack of product development expertise (75%), absence of clear nutritional guidelines (90%), consumer preference for low-quality products (90%), and burdensome taxation (90%). These constraints highlight a critical gap in knowledge regarding nutritional quality and food product quality control.

On the opportunity side, SMEs can benefit from capacity-building programs focused on nutrition and quality control. Key opportunities include the development of a tailored model for nutritious and safe food production, the advancement of digital technology to enhance consumer awareness, and tapping into the growing market for nutritious foods driven by rising health consciousness and malnutrition concerns. Business support organizations can assist SMEs in securing loans by combining efforts to overcome technological and operational challenges.

The consultant recommends a comprehensive program integrating business development, management, and food nutrition to help SMEs improve product quality and expand their businesses. Emphasis should be placed on fostering synergy among value chain actors, facilitating collaboration between medium and small-scale entrepreneurs, and enhancing consumer awareness on healthy eating. A school-based nutrition awareness program, in collaboration with public institutions and local governments, is suggested to promote healthy eating and drive consumer demand for nutritious products.

Smallholder farmers' knowledge on nutrition

The survey revealed significant gaps in farmers' knowledge and practices regarding nutrition and the production of nutritious food crops. Farmers' knowledge on nutrition was limited, with 100% of farmers not considering bio-fortified seeds important for enhancing nutritional quality. Instead, 65% selected seeds based on high yield, and 35% prioritized fertilizer quality. Challenges faced by farmers include technological limitations (60%), lack of capital (70%), low market prices (100%), unpredictable climate conditions (100%), and high input costs (70%). These issues prevent farmers from accessing quality seeds, inputs, and skilled labour. Opportunities for improvement include access to agricultural education and expert guidance (41%), availability of agricultural loans (18%), and effective land utilization (29%). Initiatives to enhance nutritional quality include training on good agricultural practices, using bio-fortified crops, and proper storage techniques. All farmers (100%) expressed a need for capacity-building to improve their production methods and ensure higher nutritional quality. Recommendations emphasize the importance of using high-quality, nutrient-dense crops like bio-fortified seeds to enhance the nutritional value of SME products, improve market competitiveness, and support public health.

Transportation of Agricultural produce

The survey highlights critical challenges and opportunities in agricultural product transportation. Key issues include inadequate temperature control during loading (2/3 of transporters), inconsistent hygiene practices (1/3 follow strict sanitation), and poor packaging solutions (reliance on plastic sacks), all of which compromise produce quality. During transportation, temperature management remains a challenge, with only 2/3 managing airflow to regulate temperatures, while punctuality and vehicle maintenance are inconsistently practiced. Offloading procedures also face issues, such as a lack of temperature checks and inconsistent handling. Opportunities for improvement include using specialized vehicles with temperature control, improving packaging materials, enhancing quality control through trained personnel, and implementing monitoring systems to ensure consistent adherence to best practices. Recommendations emphasize investing in specialized vehicles, establishing stringent quality control, and providing intensive training for transporters. These changes could significantly improve the transportation of nutrient-rich agricultural products, supporting the agricultural value chain and addressing malnutrition.

Knowledge of nutrition among wholesales

Wholesalers play a crucial role in the agricultural value chain, but there is a significant gap in their knowledge of nutrition and quality assurance. Most wholesalers have limited understanding of nutritional standards and often fail to implement basic practices such as proper labeling, refrigeration, or adhering to national guidelines. Informal relationships with suppliers and inadequate storage facilities contribute to inconsistent product quality and safety, risking consumer health. Financial constraints and lack of technical expertise further hinder effective quality control.

However, opportunities exist to improve the situation, such as adopting solar-powered refrigeration, forming partnerships with organizations like ANZA and SIDO for training, and capitalizing on growing consumer demand for nutritious products. Financial incentives could also help wholesalers invest in quality improvements.

Specific recommendations include enhancing training, investing in technology and infrastructure, ensuring regulatory compliance, and providing financial support to improve the overall quality and safety of food products in the agricultural value chain.

Legal and regulatory framework

The Tanzania Bureau of Standards (TBS) is responsible for ensuring product quality and standardization in Tanzania. It operates across eight zonal offices and requires SMEs to meet specific standards for certification, which involves a complex, costly process that includes obtaining various permits and certifications from government entities. While SMEs with SIDO certificates receive a fee exemption for the first few years, the process can take up to 21 working days, with future plans to expand laboratory services for efficiency.

A key issue is the lack of mandatory nutritional labeling for TBS certification, despite its importance under the National Food Labelling Regulations. This oversight could hinder SMEs' competitiveness, particularly in international markets where such labeling is required. TBS enforces product quality through inspections, testing, and traceability, but implementation challenges remain due to limited resources and outdated regulations.

Collaboration with organizations like SIDO and training on good manufacturing practices help ensure product quality along the value chain, but challenges like uncertified products, consumer awareness, and limited resources for timely service persist. Opportunities exist through fee exemptions for SMEs and

increasing market demand for quality products. However, to improve product quality, TBS needs to strengthen regulations, enhance training for SMEs, and raise public awareness on product standards.

Other actors in the agriculture value chain

The agricultural value chain in Tanzania involves various actors, including input suppliers, NGOs, financial institutions, and organizations like SIDO, each playing a role in supporting SMEs. Input suppliers focus on providing fertilizers, seeds, and agricultural equipment, but they do not consider nutrition aspects in their offerings. NGOs like ANZA and SOMO assist SMEs by providing training on business, value addition, and market linkages, but nutrition aspects, particularly in product labelling, are often overlooked. Financial institutions, such as EFTA and AKIBA Commercial Bank, provide loans based on business experience and collateral but do not incorporate nutrition criteria. SIDO offers technical training and financial support to SMEs but similarly lacks a focus on nutrition in their programs. Challenges for SMEs include limited resources, inadequate packaging, poor raw material selection, and a lack of traceability. Opportunities include enhancing training programs to integrate nutrition aspects, improving collaboration among stakeholders, and providing mentorship and market linkages to SMEs to boost product quality and business sustainability.

General recommendations

i. **Program Integration**: A program combining business development, management, and food nutrition is recommended to help SMEs improve nutritional quality and grow.
ii. **Financial Support & Fund Raising**: SMEs need help raising capital for technology acquisition, e.g., through loan models using machinery as collateral, and accessing government grants, subsidies, and venture capital.
iii. **Support for Compliance**: Organizations like ANZA should foster traceability, voluntary compliance, and offer capacity-building to improve SMEs food quality and safety.
iv. **Quality Control**: SMEs struggle with quality control, safety, and maintaining consistent standards. Support organizations should develop innovative food safety models, involving SMEs, regulators, and experts.

v. **Regulatory Knowledge Gaps**: SMEs lack awareness of food safety systems, regulations, and documentation. A model for business contracts promoting compliance and raising consumer awareness is necessary.

vi. **Nutritional Labeling**: Training programs should emphasize the importance of nutritional labeling and branding for business growth.

Recommendations specific to ANZA

i. **Clustering SMEs**: ANZA should consider mapping and cluster SMEs by product type, advising them to pool resources together, to acquire technologies and meet loan requirements easily.

ii. **Food and Nutrition Training**: ANZA should consider incorporating food and nutrition into its business accelerator programs, partnering with experts to help SMEs produce nutritious and safe foods.

iii. **Consumer Awareness**: ANZA should consider including consumer awareness programs on healthy eating and nutritious food choices in school programs, through social media, and in collaboration with public institutions.

iv. **Tailored Model Development**: ANZA should collaborate with food experts such Tanzania Food and Nutrition Centre, SIDO and regulatory authorities such as TBS to develop and scale an SME-tailored model for producing nutritious and safe foods using a human-centered design approach.

v. **Certification and Regulatory Guidance**: ANZA should consider including nutrition and compliance components in their curriculum to help SMEs understand certification requirements and navigate regulatory processes.

vi. **Nutrition and Safety Guidelines**: ANZA should work with food and nutrition experts such as Tanzania Food and Nutrition Centre and regulatory authorities such as TBS to develop tailored nutrition and food safety guidelines for SMEs.

Measurable indicators for assessing nutrition-specific value

The following indicators are expected to evaluate the impact of integrating nutrition into ANZA's accelerator programs, focusing on both qualitative and quantitative aspects:

Measuring Product Nutritional Improvement

i. **Nutrient Content Analysis**: Measure changes in SMEs products key nutrients (e.g., vitamins, minerals) and reductions in unhealthy ingredients (e.g., trans fats, added sugars).
ii. **Product Reformulation**: Track the proportion of SMEs products that have been reformulated to improve nutrition.
iii. **Compliance with Standards**: Track the number of SMEs products meeting nutritional standards and earning quality marks.

Assessment of Labeling and Communication

i. **Nutritional Labeling Compliance**: Measure the percentage of SMEs products with updated nutritional labels.
ii. **Consumer Awareness**: Assess changes in consumer perception and awareness regarding nutritional value through surveys and feedback.

Marketing and Sales Performance

i. **Sales Growth**: Analyze sales changes for SMEs products with improved nutritional value.
ii. **Market Share**: Measure changes in market share for improved products.
iii. **Consumer Acceptance**: Gather customers' feedback on taste, quality, and nutritional value of reformulated products.

Business and Impact Opportunities

i. **Cost Analysis**: Track changes in SMEs` production costs related to improving nutritional content.
ii. **Economic Benefits**: Evaluate financial benefits from increased sales or market share.
iii. **Operational Adjustments**: Assess the changes among SMEs in production processes and ingredient sourcing for improved nutrition.
iv. **Training and Capacity Building**: Measure the number of training sessions on nutrition and reformulation offered to the targeted SMEs.

Program Engagement and Implementation

i. **Participation Rates**: Track the number of SMEs participating in the program and their level of engagement in planned activities.

ii. **Support Utilization**: Measure how extensively SMEs use the provided resources, such as training, technical support, and financial incentives. This could be done through observation and interviews.

Regulatory and Certification Compliance

i. **Certification Achievement**: Measure the number of SMEs or products that achieve relevant nutritional certifications.
ii. **Compliance with Guidelines**: Track adherence to national or international certification guidelines.

Long-Term Impact

i. **Sustainability**: Assess evidence of SMEs in maintaining or improving nutritional value after the program ends.
ii. **Program Longevity**: Measure the continuation of good manufacturing practices implemented during the program.
iii. **International Market Penetration**: Track the number of SMEs products reaching international markets.

Feedback and Continuous Improvement

i. **SME Feedback**: Collect feedback from participating SMEs on the program's effectiveness and usefulness.

Table of Contents

Acronyms & Abbreviations ii
Acknowledgement iii
Executive Summary iv
Table of Contents xiii
List of Tables xv
List of Figures xvi
1. Introduction 1
1.1 Background Information 1
1.2 Objectives of the study 3
1.2.1 The main objective 3
2.2.2 Specific Objectives 3
2. STUDY METHODS 4
2.1 Study area, Design and Sample Size Determination 4
2.2 Data collection tools 4
2.3. Data collection 5
2.4 Data analysis 5
2.4.1 Quantitative data 5
2.4.2 Qualitative data 5
3. SURVEY RESULTS 6
3.1.1. Social demographic information 6
3.1.2. Common Food Products Processed by SMEs 6
3.1.3 Knowledge on Nutritional Quality of a product 7
3.1.4 Consideration of Nutritional Quality of a product 11
3.1.5 Quality control 15
3.1.6 Support from Stakeholders 18
3.1.7 Future direction 18
3.1.8 Challenges and Opportunities for SMEs to consider nutrition aspects in their products 19
3.2 Smallholder Farmers 21
3.2.1 Social Demographic Characteristics of Farmers 21
3.2.2 Crops cultivated by smallholder farmers 21
3.2.3 Farmers knowledge on nutrition 22
3.2.4 Challenges hindering small holder farmers to produce nutritious foods crops 22
3.2.5 Opportunities to produce quality produce in terms of nutrition 23

3.2.6 Initiatives to enhance farmers to produce nutritious quality food crops..... 24
3.2.7 Conclusion and Recommendations 24
3.3 Transporters of Agricultural produce..... 25
3.3.1 Quality assurance during the loading process 25
3.3.2 Assurance of Quality during Transportation..... 26
3.3.3 Quality Assurance during Offloading..... 27
3.3.4 Challenges that transporters face in protecting the product quality during transportation 27
3.3.5 Opportunities 28
3.5.6 Conclusion..... 28
3.3.6 Recommendations 28
3.4 Wholesale/Retails..... 29
3.4.1 Knowledge of Nutrition Among Wholesalers 29
3.4.3 Challenges in Maintaining Nutritional Quality 30
3.4.4 Quality Control Aspects 32
3.4.5 Challenges in Implementing Quality Control among Wholesalers 33
3.4.6 Opportunities 35
3.4.7 Conclusion..... 36
3.4.8 Recommendations 36
3.5 Legal and Regulatory Frameworks..... 37
3.5.1 An overview of TBS..... 37
3.5.2 TBS Service Coverage..... 37
3.5.3 Criteria for offering Mark of Quality..... 38
3.5.4 Costs and Fee associated with TBS Mark of Quality 38
3.5.5 Key issues to consider for offering Mark of Quality 38
3.5.6 Measures for product quality maintenance..... 39
3.5.7 Product quality and safety Measures 39
3.5.8 Ensuring Product Quality along the Value Chain 40
3.5. 9 Opportunities 40
3.5.9 Challenges 40
3.5.10 Recommendations 41
3.6 Other Actors in the Agricultural Value Chain..... 41
3.6.1 Input suppliers 41
3.6.7 SIDO..... 45

List of Tables

Table 1. Farmers' Knowledge of nutrition ……24

Table 2. Opportunities to improve the nutritional quality of food crops……..25

List of Figures

Figure 1: Sampling plan for the interviews……..4

Figure 2: Products processed by SMEs ……8

Figure 3: Food entrepreneurs Understanding of Nutritional quality……..9

Figure 4: Understanding of content of food label……12

Figure 5: Consideration of aspects of nutritional quality by Food Processing SMEs ……14

Figure 6: Quality Control……18

Figure 7: Crops cultivated by smallholder farmers……23

1. 0 Introduction

1.1 Background Information

The burden of malnutrition continues to have a severe impact globally on society at large, with distinct effects on individuals, households, communities, and businesses across the entire spectrum of the value chain. Trends in global hunger and malnutrition had been reducing over the last two decades. However, current global estimates indicate that, almost 690 million people are hungry and the number has increased by 10 million in the last year. In Sub-Saharan Africa around 19%, double the global average (1). Further, the triple burden of malnutrition continues to threaten lives of people in low income countries with prevalence of overweight and obesity increasing steadily worldwide with almost 40% of the adult population impacted (2). Women of reproductive age and children below five years of age are the most affected groups. Therefore, access, availability and affordability of healthy nutritious diets are key to shift the current malnutrition trends. However, this is challenging as fundamental changes in strategies and systems are required throughout the agricultural value chain process (i.e. production, processing, distribution and consumption) with commitments at both national and global levels (3).

The resent raise in demand for high nutritious food in the global market has driven the Agricultural Sector to restructure its food systems to cutter the market demand (4). Considering practicing nutrition sensitive agriculture through integration of nutrition aspects into agricultural value chain, has been recommended not only to ensure production of safe and nutritious food in the market but also to address the problems of malnutrition globally (5). The main focus has been on capacitating agricultural entrepreneurs particularly SMEs with appropriate technology, materials, finances and training on nutrition sensitive aspects alone the value chain. For developing countries where majority of its people do not afford nutritious foods, promotion on fortification and bio fortification of staple foods has been the best option to enhance availability of essential vitamins and minerals in the diets and address the problems of malnutrition (6).

Thus, the food supplied to the market need to be nutritious enough to provide nutrient required to ensure optimal health. The food system should be such that activities done by each of the Agricultural value chain actors considers nutrition value. The decisions made and activities done by each actor on each node of the value chain should impacts on the quality including nutritional quality of the final product. Thus, it is

imperative for all actors of the value chain get equipped with knowledge and capacity to always ensure nutritional quality of the final food products. The nutritional quality, consequently have bearing on food security and public health as most of health problems can be traced back from the foods that people consume (7).

In Tanzania for example, most of the foods in the market about 80%, are supplied by SMEs, most with limited knowledge on nutrition aspects. The consequences of these is that consumers are exposed to foods processed without considering the nutritional quality and safety and this has led to various health problems including non-communicable diseases, food borne diseases and in-toxifications mainly from natural plants toxins (8) and mycotoxins, (9), heavy metals under absorption and utilization of nutrients due to presence of anti-nutrient compounds. Moreover, consumers are exposed to foods not properly labelled lacking information such as nutrition composition, warning about potential allergens and as well unjustifiable claims. To uplift the quality of food profile in the market, SMEs need to be capacitated in terms of technology, financially as well as market information to produce and deliver quality, safe and nutritious foods products.

ANZA is among the NGOs which provides support to entrepreneurs across different sectors, the majority of them being from the agricultural sector, offering products and services. However, a significant challenge faced by entrepreneurs in the agricultural sector is limited nutritional knowledge, resulting from lack of consideration for the nutritional value of their final products throughout the entire production cycle from cultivation and harvesting to post-harvest handling, processing, packaging, labelling, storage, and distribution (10). Moreover, considering the high micronutrient deficiency among the population in developing countries, embracing nutrition knowledge among agricultural entrepreneurs will play a significant role in the efforts towards improving the nutritional and health status of the population.

Therefore, this study aims at understanding the opportunities and challenges associated with integrating a nutrition component into ANZA's business accelerator programs, to assist entrepreneurs in considering the nutritional value of their products and services more effectively. The study involved key small and medium entrepreneurs in the agricultural value chain particularly SMEs, farmers, input suppliers, transporters, food processors, wholesalers, support organizations such SIDO, NGOs such as SOMO and EFTA), financial institutions and regulatory organization (TBS), in a view to gather and analyze

information on challenges and opportunities for the value chain actors to integrate nutrition in their products and services. This is in order to advise ANZA in deciding whether to initiate a nutrition-specific component in her organization structure or integrate nutrition aspects in her existing acceleration programs. Thus, the survey study explored the values chain actor's knowledge and practice on nutrition, challenges and opportunities for the actors to integrate nutrition aspects in their products and services, as well as the constrains for SMEs to consider nutrition aspects in their product and services. The study provides actionable recommendations on what and how ANZA may support the agricultural entrepreneurs to consider nutrition value in their products and services. The consultant also provides a list of indicative measurable indicators to assess the nutrition specific value added to ANZA accelerator programmes.

1.2 Objectives of the study

1.2.1 The main objective

To understand the opportunities and challenges associated with integrating a nutrition component into ANZA business accelerator programmes, helping entrepreneurs to consider the nutritional value of their products and services more effectively.

1.2.2 Specific Objectives

(i) To understand the current knowledge and practice of the small and medium Agricultural entrepreneurs (SMEs) on nutritional value of their products and services.

(ii) To determine the opportunities and challenges for small and medium entrepreneurs in considering nutrition aspects in their products and services.

(iii) To provide clear, actionable recommendations for ANZA on integrating nutrition components into their accelerator programs.

(iv) To provide indicative measurable indicators for ANZA to assess the Nutrition-Specific value added to the accelerator programmes.

2. 0 STUDY METHODS

2.1 Study area, Design and Sample Size Determination

Participants were drawn from 4 pilot regions earmarked by the client i.e. Arusha, Dar es Salaam, Mtwara and Manyara out of thirteen regions under the ANZA accelerator programmes. From each region participants were strategically and purposively selected based on the list provided by the client where lead SMEs, lead farmers and processors, supporting organizations including SIDO, Agro-processors associations, Local Government Authority, Leaders of the respective district, NGOs were involved. Thus, a total of 15 respondents from each of the 4 selected regions were selected to make a total of 60 respondents for the in-depth interviews. The study plan is as presented on figure 1 below;

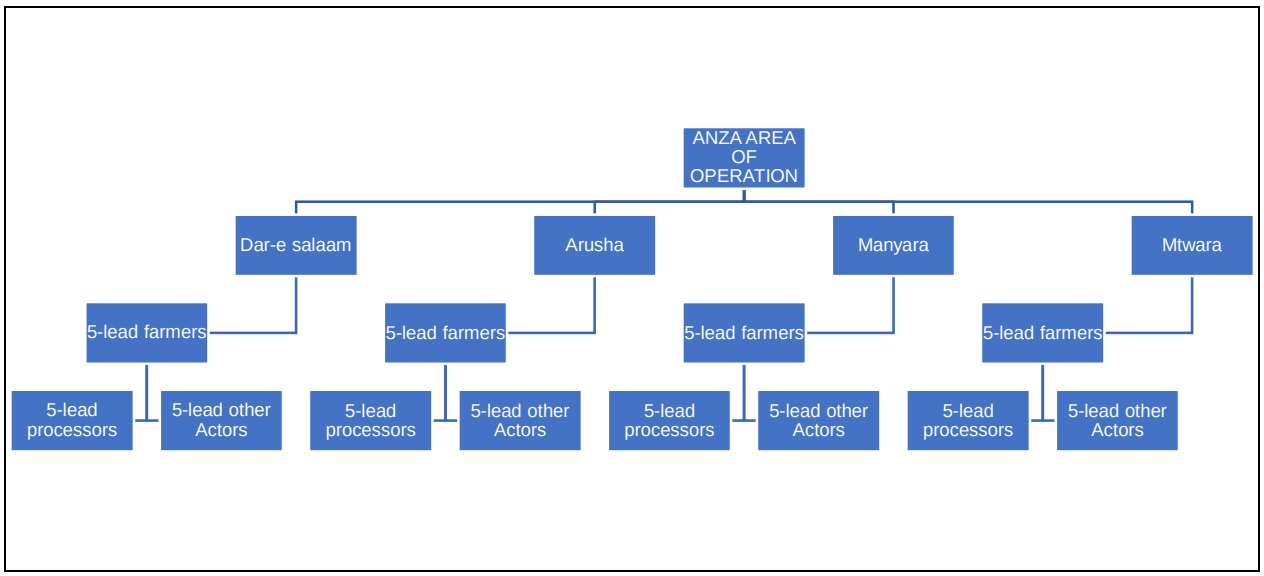

Figure 1. Sampling plan for the interviews.

2.2 Data collection tools

The study was a cross-sectional survey in which data collection tools were carefully designed to collect both quantitative and qualitative information as per the objectives of the assignments. The survey tools were broadly open-ended structured questionnaire designed to explore deeper understanding on knowledge and practice of the small and medium agricultural entrepreneurs regarding nutrition values in their products and services. The information gathered included socio-demographic characteristics, knowledge on nutrition, current entrepreneur's practices, production, processing, distribution, challenges

and opportunities for actors involved in agricultural value chain to consider nutritional value in their products and services. The questions were therefore tailored for each actor on the value including farmers, input suppliers, transporters, food processors and wholesalers. Other actors considered were extension officers, technical organizations (SIDO), credit providers (AKIBA Commercial Bank, SIDO, EFTA), Non-Governmental Organizations (NGOs) such as SOMO as well as regulatory authorities, in this case TBS. A special set of questions were also designed for better understanding the current operations of ANZA organization. The model of interview was in-depth face to face interview, in which the respondents were visited and interviewed at their premises or at conveniently agreed location. Further, few actors were interviewed via phone calls especially for those who were out of their offices during the survey date.

2.3. Data collection

The survey gathered both quantitative and qualitative data through face-to-face interviews using structured questionnaire. The interview probed more about existing challenges and opportunities for small-medium sized agricultural entrepreneurs and farmers to increase the nutritional value of their product. Others actors, along agricultural value chain were also interviewed to complement information on available opportunity for SMEs to consider nutritional value of their product.

2.4 Data analysis

2.4.1 Quantitative data

Quantitative data were cleaned and analysed using Stata version 15.0 (STATA Corp, College Station, TX). Frequencies and percentages were used to summarize the categorical data. The study findings were then presented in form of figures, tables and pie charts.

2.4.2 Qualitative data

Audio records from In-depth interviews were transcribed, and the transcripts were translated from Kiswahili to English. Thematic analysis was used to group the data according to similarities through the development of themes, subthemes and codes. The collected information was subsequently summarized by main themes, sub-themes, and codes were generated. The information generated from the analysis was presented as percentage in graphs or tables, boxes or paragraphs. Thus the analysis was done manually.

3.0 SURVEY RESULTS

3.1 Small and Medium Food Processors

3.1.1. Social demographic information

A total of 20 (14 females and 6 males) SMEs were interviewed, majority (60%) completed tertiary education, 25% secondary school, 5% high school and 10% in primary school, this signifies a high level of knowledge they had. Experience in producing products varied among SMEs, whereby 75% had experience ranging from 5 to 10 years, 10% had experience of more than 10 years and 15% had experience of three years to five years, indicating that, interviewed SMEs had adequate experience in food processing and product development.

3.1.2. Common Food Products Processed by SMEs

Products processed by the SMEs who participated in the study (n-=20) are presented in Figure 2 below, products processed by many SMEs were complementary foods and honey (30%), followed by unprocessed cereals, spices, and cooked foods (20%), then sunflower oil and peanut butter (15%). Most of the SMEs process more than one food product. The study shows a big variation in the type of food products processed by SMEs of which experience sharing and learning from each other could be a bit trick. Thus, the establishment of SME hub to ensure that limited resources available for them are appropriately shared such as technology and expertise.

Figure. 2: Products processed by SMEs

3.1.3 Knowledge on Nutritional Quality of a product

Understanding of nutrition, enables food processers (SMEs) to improve product quality, ensure compliance, meet market demands, and ultimately succeed in a competitive market. Findings revealed that all SMEs (100%) were aware on marketing advantages of considering nutritional quality of their products, as presented in figure 3 below and detailed information of the analysis given in Appendix 3. It is very important for SMEs to have basic knowledge on nutritional quality help them adhere to regulatory standards and guidelines.

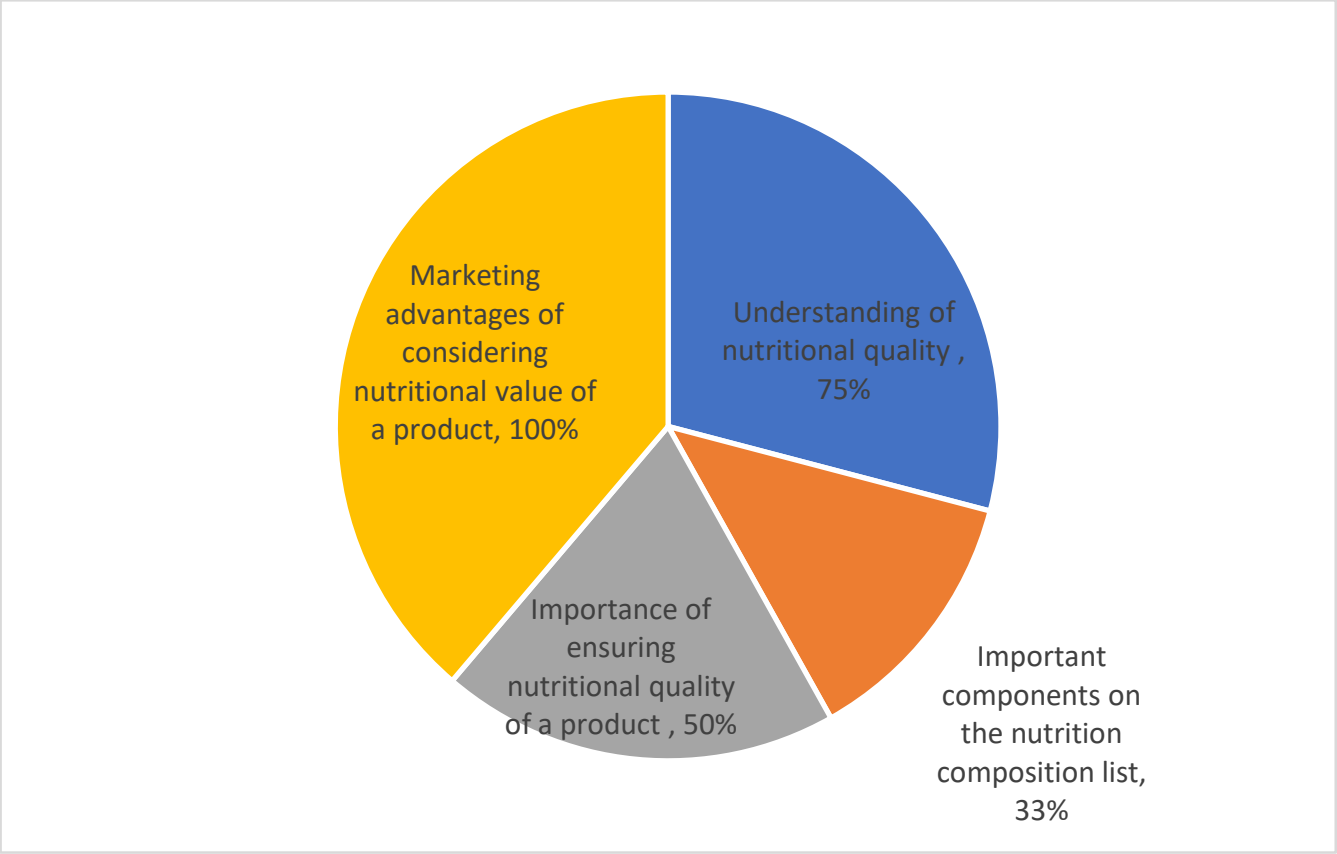

Figure 3: Food entrepreneurs Understanding of Nutritional quality

3.1.3.1 Understanding nutritional quality

The nutritional quality of a food product refers to how well it meets dietary needs and supports overall health of an individual. Based on the survey, bout 75% of the SME's responses (n=20) correlated to the factors to be considered to ensure nutritional quality of a product. Forty percent (40%) of the SMEs mentioned that, a product containing nutrient necessary for good health in adequate amounts which corresponds to nutrient density while 60% mentioned the use of techniques that ensure preservation of nutrient which correspond to minimally processed products. Small and medium enterprises (SMEs) play a strategic role in the food supply chain in low- and middle-income countries, accounting for over 80% of food sales ((i)a.i.11). The results obtained in this survey revealed that the SMEs understand only some of the factors which affect nutritional quality of their products and thus more capacity building is needed to upgrade their knowledge on nutrition and improve the nutritional quality of their products. It is therefore critical to create an enabling environment to facilitate SMEs involved in food processing to gain adequate knowledge on nutrition as a potential solution to tackle all forms of malnutrition. This should attract the attention of multiple stakeholders including policy makers, R&D institutions, supporting organizations including NGOs in addressing this challenge.

3.1.3.2 Important components on the nutrition composition list

Ingredient list may give indication of nutrients present in the particular food product. Of the interviewed SMEs, only 33% of the responses reflect understanding of the entrepreneurs on the important components of the nutrition composition list (which include products ingredients and amount of ingredients, benefits of ingredients). This implies a very low knowledge on the importance of what goes on the nutrition composition list among the interviewed SMEs. The diet-related health concerns have been increasing intensely from the last few years across the globe. It became really important that the consumer must have knowledge of the product they consume. The best way to inform the consumers about the product and the nutrients it carries is to provide information about the product on the label. Food labels play the role of informing the consumer about the product, its ingredients and nutrients it contains ((i)a.i.12). Training programs should emphasize this aspect.

3.1.3.3 Importance of ensuring the nutritional quality of a product

The important role of food and nutrition in public health is being increasingly recognized as crucial for its potential impact on health-related quality of life and the economy, both at the societal and individual levels

((i)a.i.13). Findings from the survey revealed a low level of understanding of the importance of ensuring the nutrition quality of their products among SMEs whereby 50% related nutrition quality with consumer health and safety, 35% consumer trust, and 10% market trust. Ensuring high nutritional quality builds trust with consumers, as they are more likely to choose and remain loyal to products that they perceive as healthy and beneficial (18), thus, more capacity building is required in terms of training and awareness creation.

3.1.3.4 Marketing advantages of considering nutritional value of a product

Consideraction of nutritional value of a food product can offer several marketing advantages including helping brands to attract and retain customers, differentiate themselves in the marketplace, and build a positive reputation. All responses (100%) given by the entrepreneurs interviewed reflect understanding of the marketing advantages of considering nutrition in their food products with the highest score being 55% hinted on market penetration, 15% customer trust and loyalty, 25% improve customer health, 25% premium pricing potential, 30% market expansion and 5% attracting business partners. However, the scores per each attribute implies low understanding of the benefits of business advantages of considering nutritional quality in their products.

The market shares of health and wellness foods and beverages is largest, globally, with naturally healthy and fortified/functional category being the largest market segments whereas "free-from" category is the fastest-growing category. Consumer interest in healthy lifestyles and demand for healthier products and services continue to escalate globally. The global health and wellness food markets was valued at $825bn in 2022 and is projected to reach 1495bn in 2023, growing at a compounded growth rate of 6.1% ((i)a.i.19). This is an immense opportunity for SMEs who integrate nutrition value in their products as also discussed in the desk review section 2.4. Thus, SME processors need to be capacitated to tap into this opportunity. The integration of food technology and nutrition on one side and business management including marketing on the other side is the best model in capacitating the food processing SMEs.

3.1.3. SMEs understanding of food labels

Food labels provide crucial information on food packaging allowing consumers to make healthier and more informed food choices. Understanding of SMEs on important information to be included in food labels was assessed, Findings revealed that 80% prioritize manufacturer information, 50% ingredient list, 50% manufacturing and expiring date, 40% product name, and 30% TBS logo, however, special certifications (like organic, non-GMO, or fair trade) or claims (such as "gluten-free" or "low-fat") such

specific attributes of the products were not mentioned by any of the interviewed SMEs. Generally, the interviewed entrepreneurs have a low understanding of the necessity of nutrition information (15%), storage conditions (5%), and serving suggestions on labels (5%). Health claims such as common allergens of certain types of food such as peanuts, soy, milk, eggs, etc. which are crucial for individuals with allergies were not mentioned by any of the interviewed SMEs. The provision of information on health claims helps consumers to choose products that meet their health and ethical standards.

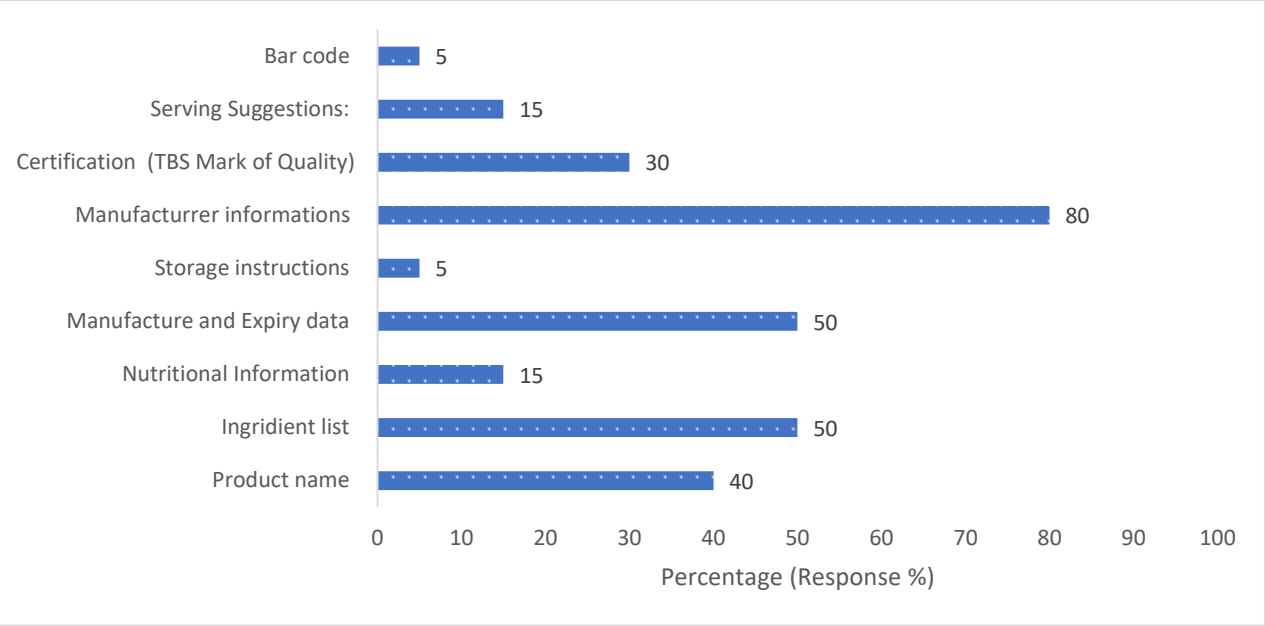

Figure 4: Understanding of content of food label

Whereby PN=Product name, IL Ingredient list, NI Nutrition Information, SI Storage Information, MI manufacturer's information, CF Certification (TBS), Serving suggestions, BC Barcode

The importance of nutritional labelling was assessed among SMEs, revealing a limited understanding of its significance. Interviewed SMEs identified the benefits of nutritional labelling as follows, 60% recognized its role in providing essential product content, 25% acknowledged its importance for dietary management, particularly for individuals with health conditions like diabetes, hypertension, or heart disease, and only 5% noted its role in ensuring compliance with regulations and standards set by regulatory authorities. However, important issue such as highlight potential allergens and ingredients that could cause adverse reactions, helping consumers avoid products that may trigger allergies or intolerances were not mentioned. Nutritional labelling is essential for empowering consumers to make informed food choices and manage their health effectively. By providing detailed information about calories, macronutrients,

micronutrients, and allergens, help individuals align their diets with their health goals. Therefore, importance of nutritional labelling should be well understood by SMEs to protect health of consumers.

3.1.4 Consideration of nutritional quality of a product

The nutritional quality of a product refers to its capacity to provide essential nutrients that contribute to overall health and well-being of consumers. The study evaluated nutritional quality of SMEs products by examining the following key factors: -

3.1.4.1 Selection of raw materials

Considering the nutritional quality of a product in the selection of raw materials is fundamental for ensuring overall quality of the final product. Findings revealed that 25% of SMEs select raw material based on reliability of supply through contractual arrangements, 25% based on freshness, 10% based on nutritional value e.g. through bio-fortification and 8% based on safe storage practices and handling, percentage scores are presented in Figure 5. The level of response to the key factors was ≤ 25%, and this reflects low understanding on the importance of considering nutritional quality in selecting raw materials among SMEs. Small and medium entrepreneur are highly dependent on the input of raw materials; farm level constraints can have a serious bearing of the food processing industry. Furthermore, seasonality crises create uncertainties for the enterprises relying on agricultural products (i)a.i.20). During periods of low production, it might be necessary to source raw material from distant regions, as also reported in other studies (i)a.i.21). Study indicated that food processors in Tanzania have been facing challenges and difficulties in securing raw material of high quality (i)a.i.22), this is due to majority of SMEs lack capacity for bulk purchase and storage. As indicated in the interview only few (25%) of the entrepreneurs have adopted contractual arrangements with farmers or suppliers. This could be due to the fact that often smallholder farmers do not honour contracts especially when they know they can sell at slightly higher price in the open market (23). To address this challenge, needs an integrated approach model involving many stakeholders such as policy makers, support organizations, regulatory organizations, R&Ds and financial institutions.

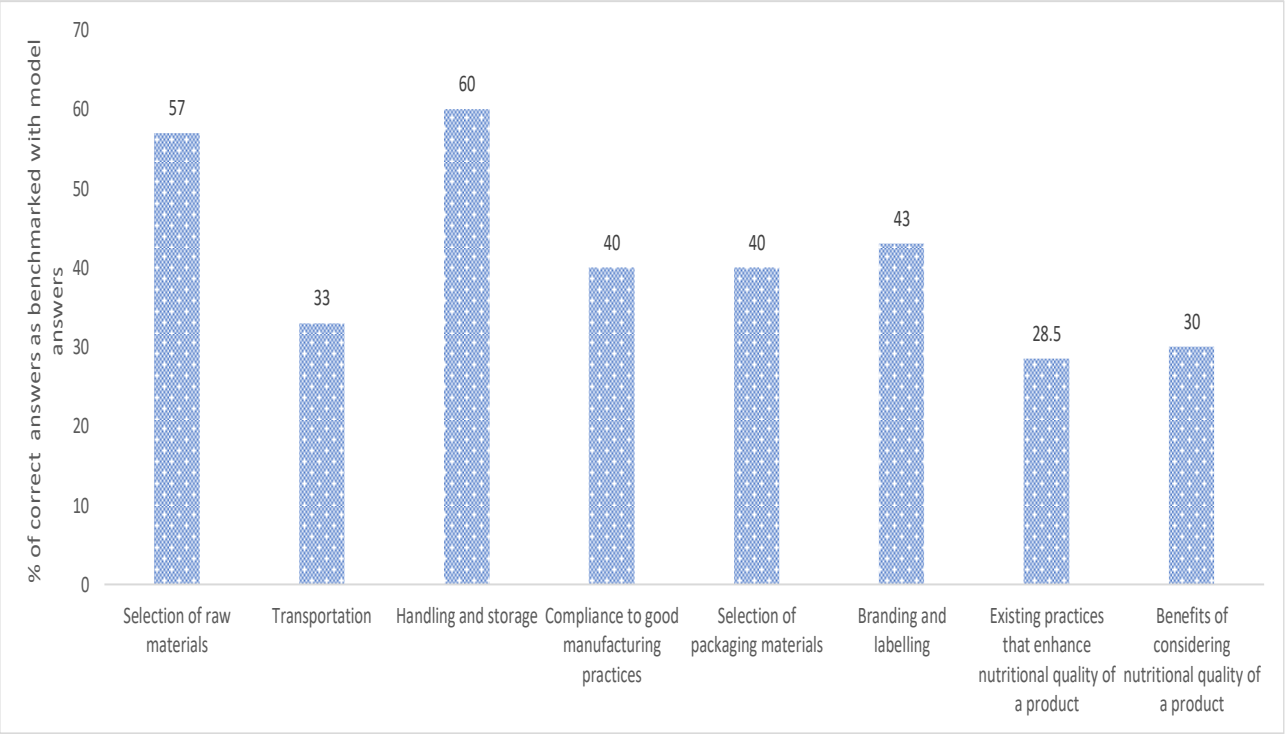

Figure 5: Consideration of aspects of nutritional quality by Food Processing SMEs

3.1.4.2 Transportation

Food transportation vehicles must meet various requirements to ensure that food products and raw materials are delivered safely and maintain their quality throughout the transit period. Findings revealed that SMEs consider the following factors when selecting mode of transportation of food product/raw material, whereby 10% consider sanitation and hygiene of the vehicle, 20% choose vehicles specialised for food transportation and 25% consider cost of transportation. Low understanding on consideration of nutrition quality during transportation was observed among SMEs. Implementation of appropriate handling practices to avoid bruising, crushing, or other physical damage that can impact nutritional quality was not done. Additionally, key issue on prevention of moisture related factors particularly for dry or sensitive products were not taken into consideration. Capacity building that includes this aspect should be of importance to the entrepreneurs considering maintaining the nutritional quality of raw material/products throughout the transportation process.

3.1.4.3 Handling and storage

Proper handling practices and storage of raw materials are crucial factors to consider for maintaining quality, safety, and nutritional value. The responses given by the SMEs responded were ≤ 60% of the essential requirements, whereby 5% corresponded to proper storage practices (separation of material of different nature to avoid cross contamination), 20% used pallets and cartons, 10% consider duration of storage (FFO); 15% hygiene and sanitation and 15% apply temperature control measures. Therefore, the responses for each practice were ≤ 20%. Thus, demonstrating a very low understanding of the importance of considering nutrition aspects during product handling and storage, indicating the need for capacity building covering this aspect.

3.1.4.4 Compliance to good manufacturing practices

Adhering to good manufacturing practices (GMP) is crucial to ensure product safety, quality, and regulatory compliance. Findings revealed that, only few ≤15% could mention at least 40% of the vital GMP practices as follows; Hygiene and Sanitation (facility cleanness and personal hygiene (15%), Food Safety and Quality Control (Ingredients sourcing, control of critical process and product testing) (15%), Employees training and regular assessment of their competence (15%). The low level of compliance to GMP by SMEs was also reported by Martina 2017 (24) of 22% compliance who studied SMEs involved in maize milling at Kinondoni Dar-es salaam. The reasons for low compliance are attributed to low level of knowledge on food processing, not having proper food processing facilities including building, low level of regulation enforcement by regulatory bodies as well as low capital investment. Thus, implying the critical need of integrated capacity building on food processing, nutrition and management is very crucial in maintaining quality.

3.1.4.5 Selection of packaging materials

Selection of packaging materials require consideration of several factors to ensure the nutrition quality of food products is preserved. Findings from the survey indicated that, only 40% mentioning selection of appropriate packaging materials without being able to give details, 10% considered purchasing from reliable supplies and 5% consider effectiveness. This indicates that SMEs lack necessarily knowledge to consider nutrition value in relation to the selection of packaging materials, issues such considering barrier properties to limit light, oxygen, moisture that can degrade the nutritional quality of the product was not considered. Additionally, factors such as material safety, temperature resistance, compatibility to processing methods, regulatory compliance, shelf life and consumer safety, were not considered on

selection of packaging materials. The challenge could also be from the demand side where consumers focus more on the product affordability and most do not bother about the packaging of the product (25).

3.1.4.6 Branding and labelling

Low understanding of the entrepreneurs on the importance of branding and labelling in the communication of the product attributed to consumers was observed among SMEs. Addressing the key elements, of nutritional quality in branding and labelling, SMEs can effectively communicate the nutritional quality of their products, build trust with consumers, and differentiate themselves in the marketplace. During the interview, 50% of the respondents alluded that the cost associated with lab analysis to establish nutritional facts is a limiting factor for considering nutritional quality in labelling, whereas 20% mentioned that it's not a mandatory criterion for certification by TBS. Thus, nutrition training to emphasize the importance of considering nutrition quality in branding and labelling of products is an urgent need for SMEs in the surveyed area.

3.1.4.7 Existing practices that enhance nutritional quality of a product

Enhancing the nutritional quality of food products is vital for food processing SMEs to meet consumer demand and promote better health. Important practices that SMEs should adopt to enhance nutritional quality include: (i) Incorporate Whole Ingredients; (ii) Optimize Processing Techniques; (iii) Reduce Added Sugars and Salt; (iv) Fortify Products; (v) Improve Ingredient Sourcing; (vi) Innovate Recipes; (vii) Engage with Nutrition Experts. Of the interviewed SMEs (n=20) 28.5% responses hint on practices that enhance nutritional quality as compared to the model answer above. 25% of respondents mentioned solar drying which falls under optimizing processing techniques and 5% mention obtaining raw material from single source which hint on improving ingredient sourcing. Thus, the use of practices that enhance nutritional quality of food products is very low among the entrepreneurs who participated in this survey. Thus, capacity building to SMEs to including processing techniques to enhance nutritional quality is needed.

3.1.4.8 Benefits of considering nutritional quality of a product

Considering the nutritional value in food products offers a range of benefits for SMEs. These include (i) Increased Consumer Demand; (ii) Competitive Edge; (iii) Enhanced Brand Reputation (iv) Regulatory Compliance, (v) Increased Market Reach; (vi) Higher Profit Margins; (vii) Customer Loyalty and Retention, (viii) Opportunities for Partnerships; (ix) Adaptability to Trends; (x) Consumer education (on

healthy eating habits, foster a more informed customer base and support public health initiatives). Based on the model answer the interviewed SMEs (n=20), 30% of the answers were correct, whereby 45% hinted on a higher profit margin, 20% hinted on increased market reach and 15% hinted on consumer education. This indicates very limited understanding of the benefits of considering nutrition aspects in their products. Therefore, training programs to SMEs need to emphasis on this aspect.

Overall, the entrepreneurs who participated in the study demonstrate low knowledge of Nutritional quality in all aspects discussed in section 3.1.4, including selection of raw material, transportation, handling and storage, compliance to GMP, selection of packaging materials, branding and labelling, existing practices that ensure nutritional quality and benefits of considering nutritional quality in products. This is a challenge for the SMEs to be able to penetrate prime markets, also addressing the public health issues such as malnutrition and non-communicable diseases. Besides, reasons given by SMEs in the survey, poor reinforcement of laws and regulations governing the food industry is key contributor to this complacency. Support organizations such as ANZA in their programs could encourage business contracts which foster traceability to enhance compliance and thus adding quality and safety value to the end products. Supporting Organizations such as ANZA could foster voluntary compliance through capacity building and insisting traceability and sales contracts. This is also discussed in length in the desk review report section

3.1.5 Quality control

Quality control in food processing is not just about maintaining product standards; it is a comprehensive approach that impacts safety, efficiency, and growth. For SMEs, effective quality control is a vital component of their strategy for long-term success and sustainability in the competitive food industry. The results are summarised in Figure 6 and briefly discussed below. Detailed information is given in Appendix 3.

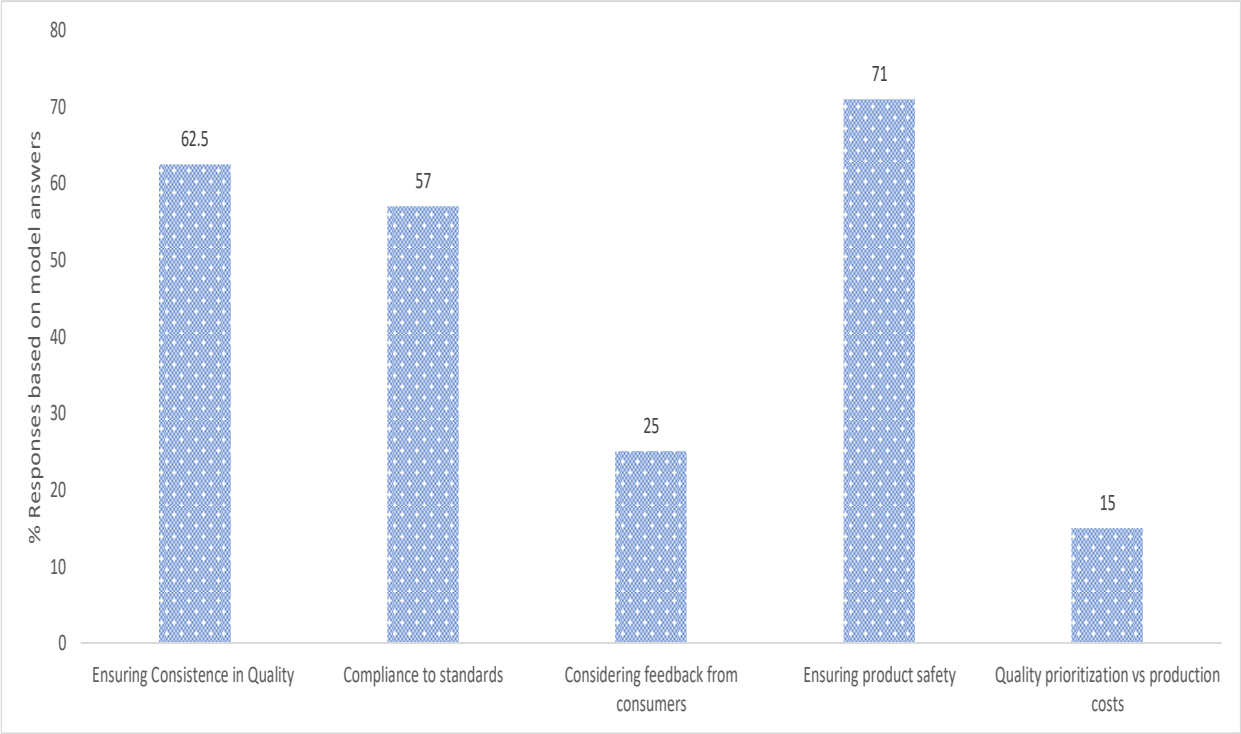

Figure 6: Quality Control

3.1.5.1 Ensuring Consistence in Quality

Ensuring consistency quality control in food processing is crucial for maintaining product standards, meet regulatory requirements, and satisfy customer expectations. Important consideration includes (i) SOPs (documentation and training (ii) Raw Material Control (suppliers management and inspection of incoming raw materials); (iii) Process Control (equipment calibration and process monitoring; (iv) Product Testing and Analysis (in-house and Third part testing); (v) Hygiene and Sanitation (cleaning protocols and personal hygiene) (vi) Traceability (record keeping and batch tracking); (vii) Continuous Improvement (Feedback mechanism and root cause analysis); (viii) Regulatory Compliance (standard and regulations and documentation). Overall, the responses given by the SMEs corresponded to the model answers listed above by 62.5%. When each attribute was considered separately, generally, the scores demonstrated low understanding of the SMEs on how to ensure consistent quality (≤30%,) in which for raw material control (15%), process monitoring (30%); feedback mechanism (5%) and regular auditing and testing of raw materials (5%). Low level of knowledge and awareness regarding consistent quality monitoring corresponds to their low level of GMP compliance, which is characteristic feature of SMEs around the global (26). Therefore, more capacity building in terms of training and testing capacity (equipment), as

well more enforcement for compliance by regulatory authorities is required for the SMEs to ensure consistence quality of products.

3.1.5.2 Compliance to standards

SMEs in the food processing sector can take several steps to ensure they comply with national, regional, international and industry standards. Compliance is crucial not only for meeting legal requirements but also for ensuring safety, quality, and customer trust. Basing on the necessary requirements for compliance with standards, the majority of respondents 57% lied at very low level to comply to standards, whereby 20% focused on quality control, 20% GMP and TBS standards, and 20% hygiene and sanitation measures. Most not aware of any food safety management systems, nor any food quality and safety regulations, nor proper documentation etc. This signals a serious lack of enforcement of laws and regulations as also evidence in the desk review report section 3.4. To address this challenge there needed a model for contractual business arrangements that fosters compliance as well as rising consumers' awareness to attract voluntary compliance.

3.1.5.3 Considering feedback from consumers

Obtaining and utilizing customer feedback effectively can be a valuable strategy for food SMEs to improve the nutritional quality of their products. This can be achieved through gathering and analysing consumers' feedback. Findings from the survey indicated that only 25% of SMEs do collection consumers feedback. Thus the scores were very low 10-30%. Need training on the means and importance of gathering and utilizing customer feedback on improving the nutritional quality of products and how it benefits both consumers and producers.

3.1.5.4 Ensuring product safety

Ensuring food safety is critical for food processing SMEs to protect consumer health, maintain product quality, and comply with regulation. About 71% of the respondents reported hint on the standard requirements of food safety with very few understanding on the other attribute such as GMP 25%, Ingredient sourcing 30%, documentation and auditing 10%; process monitoring 5%, 20% does nothing to ensure food safety. Generally, from literature key constraints identified are related to food safety standards implementation (27). Among those, drawbacks relevant to SMEs food processors in Tanzania are lack of attitude or motivation, lack of education and training, lack of awareness, inadequate infrastructure and

facilities, inadequate process control techniques, limited financial resources to implementation of food safety management system. Food safety is thus a serious gap especially to SMEs food processors, there is a need of developing an innovative model for food safety system tailored for food SMEs in Tanzania. A model has to be developed and piloted in small area say one district including SMEs processing different products and after it can be optimised and validated to scaled up to a wider coverage.

3.1.6 Support from Stakeholders

3.1.6.1 Capacity building

The interviewed SMEs (n=20) indicate to have received training from different organizations including SIDO, TBS, NGOs, BRELLA and TCCIA (50%), funding of Operation from NGOs (10%), training and equipment support from ANZA (15%), Have not received support (25%). Moreover, among interviewed SMEs (n=20), 60% have had encounter with answer, 60% have received training from ANZA. SMEs can be assisted to access finances for investment and operation through various strategies e.g. to access Government Grants and Subsidies through guidance on how to search and apply, eligibility criteria, to assist SMEs in negotiations with financial institution, connecting SMEs to venture capital, business development, partnership and networking, information on tax incentives etc. Detailed information is given in Appendix 4.

3.1.7 Future direction

3.1.7.1 Technology advancement impact on nutritional quality of product

SMEs interviewed (n=20) view technology as a vehicle for product diversification (20%) see social media as means of fast-tracking marketing functions whereas 62.5% consider social media as a facilitator for learning; 40% facilitate marketing and sales, and 20% speed up communication. Thus, the respondents missed out on how technology advancement can impact the nutritional quality of their products for example (i) Enhanced ingredient analysis through advanced analytical tools and real-time monitoring (ii) Improved process technics such as minimally invasive Processing technologies e.g. high-pressure processing (HPP) and microwave-assisted thermal sterilization (MATS) can preserve nutrients better than traditional methods (iii) Ingredients innovation e.g., probiotics, prebiotics, plant-based proteins that can enhance the nutritional value of products, also fortification using essential micronutrients can significantly improve product quality; (iv) Automated production systems can improve consistency in product

formulation and reduce human error, leading to more reliable nutritional quality across large batches. One way through which these SMEs can assisted besides training on how to use technology to ensure product quality, is design models through which they can access loans from financial institutions for acquiring necessary technologies such as sales agreement using equipment purchased or stocks as collateral. Detailed information is given in Appendix 5.

3.1.7.2 Towards improving nutritional quality of products

The interviewed SMEs consider the following as their future direction (prioritize business sustainability (25%), Deeper knowledge and skills on food processing and nutrition (20%), means of sourcing high quality raw materials (15%), consider practicing GMP (15%), Consulting food and nutrition experts to improve the nutritional quality of their products (15%) and working hard to improve nutritional quality of their products (10%). To achieve both business sustainability and nutritional quality, there is a need of a model which integrates business development skills and food and nutrition capacity building.

3.1.8 Challenges and Opportunities for SMEs to consider nutrition aspects in their products

3.1.8.1 Challenges

The main challenges for food processing SMEs to consider nutrition aspect in their products as revealed by the interviewed entrepreneurs are; 85% technological limitations, 95% inadequate capital, 90% limited knowledge on nutrition, 75% lack of knowledge on product development, 90% lack of clear guidelines on nutritional information, 90% consumer preference of low-quality products and 90% overwhelming taxation systems. During in-depth interviews it was evident that there is a critical low knowledge of most aspects of nutritional quality and quality control of food products.

3.1.8.2 Opportunities

On the side of supporting and technical organizations, there is an opportunity for SMEs who are eager to learn and assisted to develop capacity to integrate nutrition aspects in their products as well as implement quality control measures in their food processing activities. The following are available opportunities for supporting SMEs to improve nutritional quality of their products: -

i. Developing, validating and upscaling SMEs` tailored model for production of nutritious and safe foods. The model development and implementation should employ Human Centred Design Approach which will involve the SMEs, local governments, regulators such as TBS Authorities,

support organizations, Financial institutions, Business experts and Food and Nutrition Experts particularly the Tanzania Food and Nutrition Centre (TFNC).

ii. Advancement of the digital technology, and presence of food and nutrition experts (TFNC) in the country, a program can be designed to reach the public with appropriate nutrition and health diets messages in a view rise consumer's awareness on nutritious and safe foods so as to foster voluntary compliance with food quality control standards and regulations.

iii. Big market for nutritious foods attributed to problems of malnutrition and rise of consumer awareness of health eating as exemplified in desk review report section 2.4.

Business supporting organizations as well as food and nutrition sectors particularly TFNC could put together their expertise to organize the SMEs so that they can use their combined potentials to qualify for loans from the commercial institutions to address technological and operations challenges.

3.1.8.3 Conclusion and Recommendations

In addition to the recommendations given in the desk review chapter 5, from observation made in this survey, the consultant recommends a program that integrates business development, business management, and food and nutrition to enable the food SMEs consider nutritional quality in their products and grow their business. In the capacity building a special emphasis should be put on synergy among all relevant actors to a particular value chain in which each actor will have a stake and a binding relationship and accountability. A practical approach could be starting with medium scale entrepreneurs and create an understanding in the value chain such that the micro and small entrepreneurs become suppliers of semi-processed materials to the medium entrepreneurs. Or mobilize several of the micro and small entrepreneurs to pool together their capital so that they can attain to the qualifications of a medium entrepreneur. This will make it easier for them to be included in a scheme for obtaining credit from financial institutions.

Since consumer demand is a vital force in driving entrepreneurs change of attitude and practice, it is recommended that ANZA should consider including in her accelerator programs a component for consumers' awareness creation on the importance of health eating. A practical approach could be school awareness program on health eating and nutritious foods, which can be done in collaboration with public institutions mandated to coordinate nutrition initiatives and as well, the local Government.

3.2 Smallholder Farmers

3.2.1 Social Demographic Characteristics of Farmers

A total of 17 smallholder farmers were interviewed, 76.5% were male and 23.5% were female. The majority of farmers completed primary school (41.2%), while 35.3% completed tertiary education and 11.8% completed secondary school, 11.8% completed high school. Majority of farmers (70%) cultivated maize as indicated in Figure 7. All smallholder farmers (100%) reported farming as their main economic activity. Findings from the survey revealed that 82.4% of the interviewed farmers were not members of any agriculture associations. Farmers' associations significantly promote farmers' growth by helping them share and solve common problems on agricultural inputs, credit, technical knowledge, networking, and marketing of their produce. Such services aim to improve farming activities and enable farmers to gain economic benefits to sustain production and their well-being (11).

3.2.2 Crops cultivated by smallholder farmers

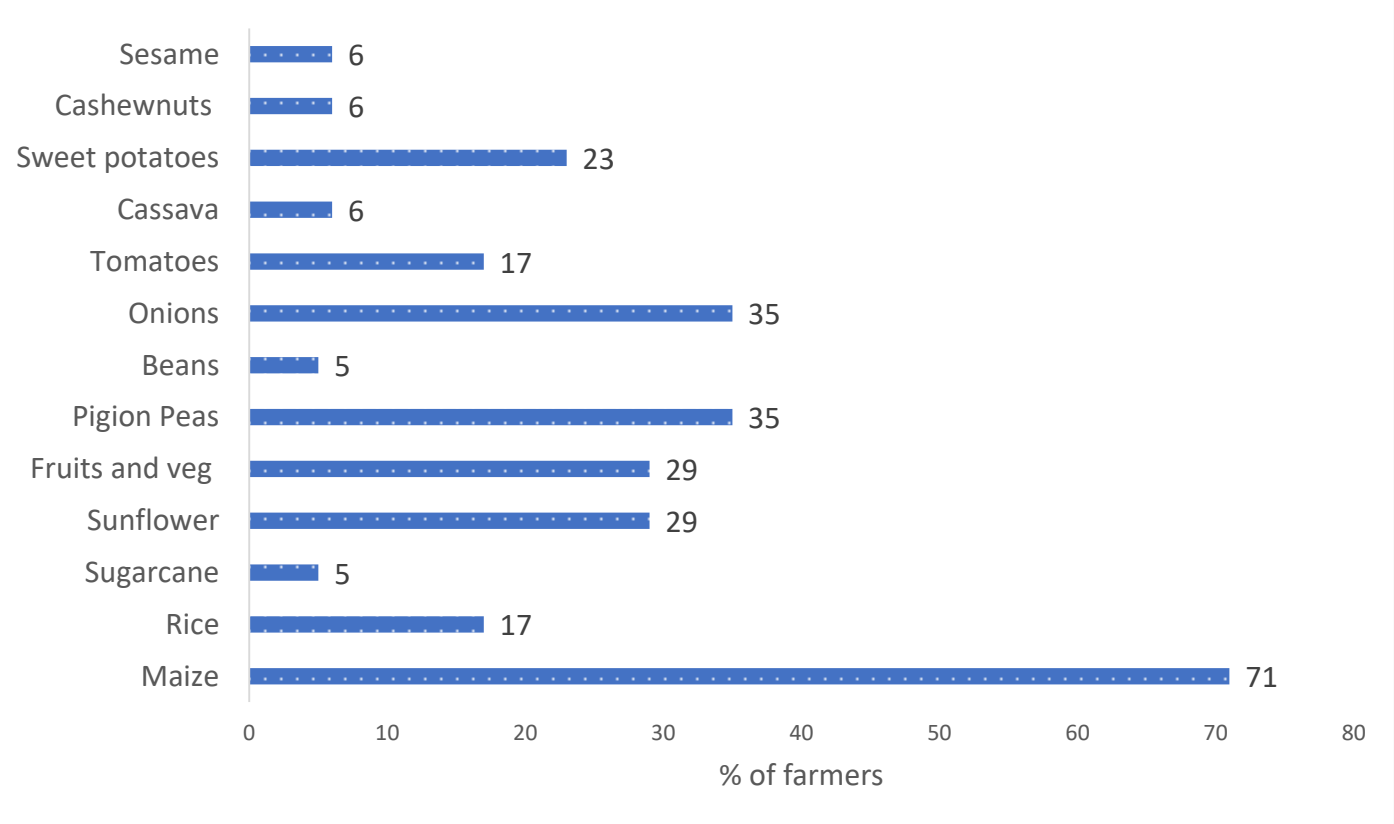

Figure 7: Crops cultivated by smallholder farmers

3.2.3 Farmers knowledge on nutrition

The survey findings revealed that low understanding of farmers on the selection of agricultural inputs, important aspects such as checking for input certifications, labels, and quality assurances were not considered as important criteria to ensure the quality of agricultural inputs. Additionally, all farmers (100%) did not consider buying bio-fortified seeds as an important criterion in the selection of quality seeds to enhance the nutritional quality of their produce, instead, the criteria for selection of seed was based on high-yield variety (65%) as indicated in Table 1 below. Farmers need to consider cultivating bio-fortified crops which are more nutrient-dense than non-bio-fortified crops to ensure availability of nutritious products in the market. Using bio-fortified crops in processing food products can be a very good strategy to enhance the nutritional quality of products, helping to address the problem of malnutrition and improving overall public health.

Table 1. Farmers' Knowledge of nutrition

Factors to consider in selection of farm inputs	% of farmers
High-yield seed varieties	65%
Rainfall availability	29%
Advice from extension officer	29%
Shelf life of agro-input	17%
Recyclability of seeds after harvesting	12%
Safety of agro-input (that does not have chemicals)	11%
Quality of fertilizer	35%
From Reputable and reliable companies	5%

3.2.4 Challenges hindering small holder farmers to produce nutritious foods crops

Small holder farmers are facing challenges to produce nutritious foods crops, findings from the survey revealed that 60% of the interviewed farmers face technological challenges including inability to afford/ owning technology, majority still using hand traditional hoe. Additionally, capital has been observed to be hindrance factor, whereby 70% of farmers don’t have collateral to support access of soft loans from bank and other financial institutions, these situations limit farmers from buying quality seeds, fertilizers,

supporting farming operations and hiring knowledgeable labourers. The survey findings further reported that all farmers (100%) have been facing the challenge of low market price of agricultural produce after harvesting as compared to high cost of production, thus limiting them from adhering to good agricultural practices, accessing quality seeds and agricultural inputs, always they opt for cheap inputs to cut down farming operation costs. Additionally, findings from the survey revealed that 100% of interviewed farmers face a challenge of unpredicted climatic condition which affect productivity of food crops. Findings indicated further that 70% of farmers are overwhelmed with high price of agricultural input supplies, this include fertilizers, seeds, pesticides etc. Farmers were unable to purchase agro-input, the cost is very high compared to the limited capital they had. Additionally, 64% of farmers were unaware of policies that protect farmer's welfare.

3.2.5 Opportunities to produce quality produce in terms of nutrition

The survey findings revealed further that, a low level of awareness among farmers regarding opportunities to enhance the nutritional quality of their agricultural produce. Specifically, only 41% of farmers recognized that access to agricultural experts and educational resources could be beneficial. Additionally, 18% of farmers noted that the availability of soft loans from recognized financial institutions could also be an opportunity, other opportunities are indicated in Table 2 below. One significant opportunity for improving the nutritional quality of agricultural produce lies in accessing specialized agricultural education and expert guidance. By providing farmers with targeted training on good agricultural practices and nutritional enhancement methods, can bring good outcomes in enhancing the nutrient profile of their crops. Furthermore, establishing partnerships with financial institutions and offering soft loans in terms of cash, subsidies, farming equipment, and technology can support the initiative. This approach not only equips farmers with the knowledge, technology, and resources needed for improved nutritional quality of food crops but also creates a conducive supportive environment for sustainable agricultural practices.

Table 2. Opportunities to improve the nutritional quality of food crops

Opportunity	% of farmers
Effective utilization of available land	29%
Access to cheap labor	35%
Availability of agricultural loans from recognized financial institutions	18%
Accessibility of agriculture education and advice from experts	41%
Availability of weather information released by Tanzania Metrological Agency to plan farming activities	18%

3.2.6 Initiatives to enhance farmers to produce nutritious quality food crops

The survey findings revealed a high need for capacity building on additional knowledge and skills required to enable farmers to improve the nutritional quality of their produce, all farmers (100%) raised a need to undertake training on good agricultural practices, modern cultivation of nutritious crops using bio-fortified crops and proper storage of food crops without using pesticides. The identified farmer's needs are crucial in enhancing the nutritional quality of food crops, by integrating modern cultivation techniques with bio-fortified crops, farmers can significantly increase the nutrient density of their produce. Implementing sustainable good agricultural practices, such as minimizing the need for chemical pesticides, helps preserve the nutritional integrity of the crops and protect the health of consumers. Proper post-harvest storage techniques, including controlled environments and effective handling methods, prevent nutrient loss and spoilage. These practices ensure that food crops retain their maximum nutritional value, benefiting both the farmers and consumers.

3.2.7 Conclusion and Recommendations

The quality of agricultural produce is an essential factor to take into consideration when improving the nutritional quality of SMEs products. High-quality agricultural produce is often richer in essential nutrients, when used by SMEs, will enhance the nutritional quality of products, build a reputable brand with a competitive market advantage, and improve the health and well-being of consumers. Therefore,

farmers need to adhere to good agricultural practices and make use of bio-fortified seeds which are nutrient-dense.

3.3 Transporters of Agricultural produce

Transportation plays an important role in the agricultural value chain, supporting the transfer of agricultural produce, by ensuring the efficient transportation of the produce, preserving their quality along the trip from producers to the end consumers. This particular section presents a complete analysis of transporters` assessments through face to face interview. A total of three transporters were involved in the interview. Challenges and opportunities associated to protecting the quality of agricultural produce throughout transportation were probed. Further, the critical quality assurance issues throughout the loading, transit, and unloading stages, identifying opportunities for improvement to maximize the overall efficiency of the transportation process were also explored.

3.3.1 Quality assurance during the loading process

The loading step is critical in establishing the fundamental conditions for agricultural product transportation. During this step, the study findings revealed numerous key issues considered by transporters to ensure product quality as highlighted hereunder;

Ensuring appropriate temperatures during loading is critical, especially for perishable items. The analysis indicated that one out of three transporters responded to take the necessary steps to manage temperature properly. One of the precautions mentioned is to load the goods in the early morning hours before dawn to avoid the formation of high temperatures that might accelerate the spoiling of the produce. Furthermore, it was reported that many transporters employ plastic bags with large perforations to improve ventilation inside the trucks. Nonetheless, the absence of widespread adoption of these approaches demonstrates a significant lack of knowledge and skills, underlining the necessity for strict compliance with temperature as stipulated in the regulations.

Sanitary protocols: Proper hygiene and sanitation while loading is an important factor that directly influences the quality of fresh produce. According to the report, 1/3 of transporters follow strict handling including hygiene and sanitation requirements, which include full washing and drying of trucks prior to loading. Furthermore, only a tiny fraction of laborers uses loader-specific gears, which helps to reduce the

danger of contamination. This research uncovers variations in hygiene and sanitation measures, which might lead to contamination and deterioration of food quality during transportation.

Packaging and Transportation: To minimize damage and preserve product integrity during transit, proper packaging and handling procedures are required. According to the survey, although 2/3 of transporters reported packing produce in properly sealed bags to reduce spilling, only 1/3 reported arranging the bags in rows to avoid overlap and tearing. Furthermore, all interviewed transporters reported carrying just one kind of food at a time to minimize cross-contamination, although only 1/3 of them reported using burlap to separate different types of vegetables as required. Despite its benefits, the systematic adoption of these procedures highlights the need for more consistent training and rigorous adherence to ideal transportation methods.

3.3.2 Assurance of Quality during Transportation

Transportation phase presents various challenges that may affect the quality of agricultural goods. It is critical to preserve the quality of the products at this period. Temperature management is critical during transportation, particularly for produce that are sensitive to temperature differences. The survey findings indicated that 2/3 of the interviewed transporters manage temperature by allowing natural airflow during transit facilitated by opening vehicle doors or ventilators. Nonetheless, the success of this strategy is questionable, especially given the limitations connected with the usage of plastic bags, which do not offer enough airflow. This highlights the need for better packaging alternatives that can maintain consistent temperature management throughout the delivery procedure as well as opting for appropriate vehicles to ensure that the quality of the products to be transported is not compromised.

Punctuality and car maintenance are of utmost importance. This has been achieved by precise scheduling to minimize delays that might damage the quality of the products. According to the report, although some transporters prioritize timely departure and regular vehicle maintenance, only one transporter reported consistently adhering to these techniques. Inconsistencies in this subject harm overall crop quality, since delays may result in prolonged exposure to harsh conditions.

Documentation is another concern which is insufficient record-keeping during transportation. The survey revealed that only 1/3 of transporters reported keeping a logbook to record particular information gathered throughout the loading and offloading procedure. Lack of sufficient documentation impedes the capacity

to set traceability system (monitor and fix) any issues that may arise during transportation, increasing the complexity of quality assurance services.

3.3.3 Quality Assurance during Offloading

During offloading, the product is examined to verify its condition before being taken to storage. At this point, it is critical to maintain strict hygiene and sanitation to ensure that the product reaches clients in excellent condition. The following are some of the key issues highlighted during interviews that ensure quality during offloading of products;

Sanitary Conditions: According to the survey, the majority of transporters (2/3) dump produce in warehouses equipped with pallets to prevent direct contact with the floor. Adhering to this practice helps to maintain the sanitary conditions essential to prevent contamination and spoilage. However, the implementation of cautious item handling throughout the offloading process, which is critical to avoid accidents, is inconsistent. Such irregularities may cause bruising or other sorts of damage, reducing the product's quality including the nutritional quality.

Protocols for temperature checks and inspections: The study's key finding is the widespread disregard for temperature monitoring and inspection procedures throughout the offloading process. The use of these procedures is critical for maintaining the product's optimal conditions during transportation. It is critical to create stricter processes for transporters since the absence of such checks increases the risk of quality degradation during the last stage of transportation.

3.3.4 Challenges that transporters face in protecting the product quality during transportation

The interviewed transporters highlighted some of the key challenges as, the absence of continuous temperature control during loading which offers a significant risk of degradation, especially for perishable produce, where 2/3 of transporters reported being unable to use proper temperature control procedures, Inadequate hygiene standards; The lack of consistent cleanliness standards throughout the loading, transporting, and offloading procedures may lead to contamination, jeopardizing produce quality, Inadequate packaging solutions; The reliance on plastic sacks, which are ineffective in maintaining enough air circulation, highlights the need for improved packaging solutions to better preserve the quality of commodities during transit, Failure to follow temperature checks and inspection standards during offloading increases the possibility of quality degradation during the last stage of transportation, Insufficient Specialized Vehicles: The absence of vehicles specifically built for the transportation of

agricultural items exacerbates issues with temperature control and cleanliness, exacerbating the deterioration of produce quality.

3.3.5 Opportunities

Despite the challenges reported, the survey identified various opportunities to enhance the transportation methods and improve the quality of agricultural produce such as;

i. The use of customized vehicles equipped with temperature control and hygiene aspects has a significant potential to reduce rotting and preserve product quality during transit.
ii. Improved packaging: The creation and application of improved packaging materials that promote air circulation may overcome the challenges of current approaches, such as plastic sacks, and improve product quality throughout transit,
iii. Improved Quality Control: Employing specialist on quality control personnel and conducting frequent inspections throughout the transportation process provides the opportunity to ensure compliance with best practices and maintain high standards, Transporters may improve their compliance with important hygiene and temperature control measures by supplementing training programs that focus on the most effective approaches for handling agricultural commodities,
iv. Monitoring Mechanisms: Implementing monitoring systems to oversee the transportation process allows for the consistent application of quality assurance processes, particularly in small-scale enterprises where such supervision is generally lacking.

3.5.6 Conclusion

Transporters play an important part in the agricultural value chain. However, the survey findings reveal significant weaknesses in their current practices, notably in the areas of temperature control, hygiene, sanitation, and overall quality assurance. The resolution of these challenges provides considerable opportunities to increase the efficiency of transportation operations. Adopting the recommended modifications might significantly improve the transportation of high-quality, nutrient-rich products to consumers, therefore strengthening the whole agricultural value chain and addressing the problems of malnutrition in the community as well.

3.3.6 Recommendations

The study's results include the following recommendations for improving the quality of agricultural products during transportation;

i. Allocating resources to vehicles equipped with advanced temperature control and hygiene systems will significantly reduce the chance of rotting/spoiling during transit. Maintaining stable temperatures is vital for delivering perishable items, thus this investment is extremely important.

ii. Establishing tight quality control procedures, such as having quality control personnel present at all stages of loading, transportation, and unloading, as well as performing regular inspections, would effectively maintain high standards and reduce the risk of quality degradation. The implementation of this strategy guarantees that any issues are detected and resolved in a timely manner, reducing the negative impact on harvest quality.

iii. Develop and implement intensive training efforts for transporters, concentrating on the best practices for handling agricultural produce. To prevent contamination and degradation, cleanliness and temperature control must be prioritized.

iv. Develop monitoring and traceability mechanisms, to ensure that quality assurance procedures are implemented consistently throughout the transportation process, monitoring systems must be established. Small-scale operations with limited oversight should emphasize the use of such systems.

3.4 Wholesale/Retails

The agricultural value chain in Tanzania plays a vital role in the national economy, providing food products essential for the people's health and well-being. Wholesalers are key actors within this chain, responsible for the distribution of products from producers to retailers and consumers. This report provides an in-depth analysis of the role of wholesalers in maintaining the nutritional value and safety of food products. The analysis is based on a comprehensive face to face interview done with wholesalers in the agriculture value chain. The focus is on the knowledge of nutrition among wholesalers, their relationships with suppliers, product quality control practices, and the challenges and opportunities they face in ensuring product quality.

3.4.1 Knowledge of Nutrition Among Wholesalers

The role of nutrition in the agricultural value chain is critical, particularly in ensuring that food products contribute positively to consumers` health. However, the findings from the survey revealed a significant gap in nutritional knowledge among wholesalers, which directly impacts the quality and safety of food products reaching the market.

3.4.2 Awareness and implementation of nutritional standards

Based on the interview, the majority of wholesalers display a rudimentary understanding of the importance of nutritional quality. For instance, some of wholesalers understand that maintaining the nutritional integrity of products like milk requires refrigeration. However, this awareness does not consistently translate into practice only few of the wholesalers ensure proper labeling of the products they purchase. Many wholesalers fail to implement basic nutritional standards, such as ensuring that products are labeled with accurate manufacturing and expiry dates. This oversight can lead to the sale of products that exceed their optimal nutritional value, posing potential health risks to consumers.

The analysis reveals that only a small fraction of interviewed wholesalers adhere to the Tanzania Bureau of Standards (TBS) guidelines, aimed at ensuring that food products meet minimum nutritional and safety standards. The lack of compliance is partly due to a limited understanding of these standards and their importance, but also due to the perceived costs and complexities involved in adhering to them. This gap in knowledge and implementation is a significant barrier to ensuring that the food products distributed by wholesalers are both safe and nutritious.

3.4.3 Challenges in Maintaining Nutritional Quality

The analysis highlights several challenges that wholesalers face in maintaining the nutritional quality of the products they handle. One of the primary challenges is the lack of proper storage facilities. For example, while wholesalers dealing with perishable items like milk recognize the need for refrigeration, the majority do not have access to reliable refrigeration systems. This is particularly problematic in regions where electricity supply is inconsistent, leading to frequent power outages that can spoil perishable goods.

In addition to infrastructure challenges, there is a widespread lack of understanding among wholesalers about the broader implications of nutritional quality. Many wholesalers focus primarily on the profitability of their operations, often at the expense of nutritional considerations. This short-term focus on profit can lead to decisions that compromise the nutritional value of food products, such as opting for cheaper, lower-quality packaging that does not adequately protect the product from spoilage.

3.4.3.1 Impact on consumer health

These knowledge and practice gaps have serious consequences. Consumers are at risk of purchasing and consuming products that have diminished nutritional value or are potentially unsafe. This is particularly

concerning in a context where malnutrition remains a pressing public health issue. The distribution of nutritionally compromised products can exacerbate the malnutrition problem, especially in vulnerable populations that rely on these products as a primary source of nutrition. Unfortunately, the majority of consumers do not consider the nutritional aspects of the products they purchase but rather the overall appearance and volume/quantity vs price of the product.

3.4.3.2 Supplier Relations and Quality Assurance

The relationships between wholesalers and their suppliers are a critical component of the agricultural value chain, influencing both the quality and safety of the products distributed to consumers. The findings of the survey revealed that these relationships are often informal and based on trust rather than on formal contracts or agreements, which has significant implications for quality assurance.

3.4.3.3 Informal supplier relationships

The informal nature of supplier relationships means that wholesalers often lack the leverage to enforce quality standards. All of the wholesalers analyzed operated based on trust-based relationships, while valuable in fostering long-term partnerships, do not provide the same level of assurance as formal contracts that specify quality requirements and accountability measures. As a result, wholesalers are frequently at the mercy of their suppliers' practices and decisions, with little option if the quality of the supplied goods does not meet expectations.

This informality also extends to the traceability of products. About 50% of wholesalers interviewed have no traceability mechanisms in place (without formal agreements that include traceability requirements) it is challenging for wholesalers to track the origin of their products or verify that they have been handled according to established quality standards. This lack of traceability is a significant risk factor, as it limits the ability to identify and address potential issues in the supply chain, such as contamination or adulteration.

3.4.3.4 Quality assurance practices

The lack of formal supplier relationships among wholesalers leads to weak quality assurance practices, resulting in poor product quality. The analysis shows that; majority of wholesalers do not engage in systematic quality assessments of the products they receive. Instead, they rely on the assumption that

trusted suppliers will deliver goods that meet the necessary standards. This approach is problematic, as it overlooks the possibility of unintentional lapses in quality or deliberate shortcuts by suppliers.

Even among wholesalers who recognize the importance of quality assurance, there is a significant gap in their ability to implement effective practices. For instance, among the interviewed wholesalers only few have received training on quality assessment from organizations like SIDO, have provided training on quality assessment to some wholesalers, but these initiatives are not widespread, and the provided training often fails to address the complex challenges involved in quality assurance. As a result, many wholesalers are ill-equipped to conduct thorough quality assessments or to implement corrective actions when problems are identified.

3.4.3.5 Impact on product quality and safety

The inadequacies in supplier relationships and quality assurance practices have a direct impact on the quality and safety of food products. The survey findings revealed that about 67% of wholesalers are distributing products without formal quality checks, there is a higher likelihood that substandard products will enter the market, potentially leading to health risks for consumers. For example, products that have not been properly tested for contaminants or that have been stored under suboptimal conditions may pose significant risks, particularly for vulnerable populations such as children, the elderly, and those with compromised immune systems.

3.4.4 Quality Control Aspects

Quality control is a critical aspect of ensuring that food products meet safety and nutritional standards. However, the study findings reveal significant deficiencies in the quality control activities conducted by wholesalers in the agricultural value chain as highlighted hereunder;

3.4.4.1 Inadequate Quality Control Procedures

The survey findings shows that, majority of interviewed wholesalers lack formal quality control procedures in place which is particularly concerning in a context where food safety is paramount. Without structured quality control processes, wholesalers are unable to consistently ensure that the products they distribute meet the necessary standards for safety and nutritional value.

For instance, only one wholesaler out of three interviewed reported conducting regular testing and analysis of the products they handle. This lack of testing means that potential issues, such as contamination or

spoilage, may go undetected until the products have already reached consumers. In some cases, wholesalers may rely on visual inspections or basic sensory evaluations to assess product quality, but these methods are insufficient to identify serious issues, such as microbial contamination or nutrient degradation.

3.4.4.2 Variation in Quality Control Practices

There is also significant variation in the quality control practices observed among wholesalers. Only 25% of them implemented even basic quality control measures. Wholesalers have adopted basic measures like checking for visible signs of spoilage or adhering to packaging standards, but the sector does not consistently apply these practices. This inconsistency reflects a broader lack of standardization in quality control practices, which undermines the overall effectiveness of these efforts.

The training provided by organizations like SIDO has had some positive impact, particularly in raising awareness about the importance of quality control. However, the overall level of quality control remains low, and the training provided is often not sufficient to equip wholesalers with the tools and knowledge they need to implement robust quality control systems. Furthermore, the lack of regular internal and external audits leaves significant gaps in the quality assurance process, making it difficult to identify and address systemic issues that may be compromising product quality.

3.4.5 Challenges in Implementing Quality Control among Wholesalers

Several challenges hinder the implementation of effective quality control practices among wholesalers. One of the most significant challenges reported is the lack of access to appropriate testing equipment and facilities. Many wholesalers operate on tight margins and cannot afford the costs associated with purchasing quality control equipment or upgrading their facilities to meet regulatory standards. This financial constraint is a major barrier to improving quality control practices. In addition to financial challenges, there is also a lack of technical expertise among wholesalers. Quality control requires a certain level of technical knowledge, particularly in areas such as microbiology, chemistry, and food science. However, many wholesalers lack access to this expertise, either because they do not have the necessary training or because they cannot afford to hire qualified personnel. This gap in technical knowledge further worsens the challenges associated with implementing effective quality control practices.

3.4.5.1 Supply Chain Issues

One of the most significant challenges wholesalers face is the lack of consistency and reliability in the supply chain. Suppliers often have limited knowledge and capacity to produce high-quality products, leading to inconsistencies in the quality of goods received by wholesalers. The informal nature of supplier relationships exacerbates this issue, making it challenging to enforce quality standards.

3.4.5.2 Regulatory Compliance

Regulatory compliance is another major challenge. Many wholesalers do not adhere to existing regulations, either due to a lack of awareness or because compliance is perceived as too costly. This non-compliance is particularly evident in the areas of product labeling and quality assurance, where the absence of proper standards can lead to significant health risks for consumers.

3.4.5.3 Infrastructure and Technological Constraints

The lack of infrastructure, particularly in terms of proper storage facilities and quality testing equipment, poses a significant barrier to maintaining product quality. For instance, the reliance on electricity for refrigeration, especially for perishable items like milk, is a critical issue. Frequent power interruptions lead to product spoilage, which not only results in financial losses but also poses a risk to consumer health. Additionally, many wholesalers lack the technological tools necessary for effective quality control, such as testing kits for assessing the nutritional content of food products.

3.4.5.4 Financial constraints

The high cost of quality assurance, combined with a lack of financial resources, discourages wholesalers from investing in better quality control measures. This is particularly problematic for small-scale wholesalers who operate on thin margins and cannot afford the costs associated with purchasing quality control equipment or upgrading their facilities to meet regulatory standards.

3.4.6 Opportunities

3.4.6.1 Technological advancements

Despite the challenges, there are several opportunities for wholesalers to improve quality assurance in the agricultural value chain. One of the most promising opportunities is the adoption of technological advancements. For instance, the introduction of solar-powered refrigeration systems could provide a more reliable and cost-effective alternative to traditional electricity-dependent systems. This would help wholesalers maintain the nutritional quality of perishable products, even in areas with frequent power outages.

3.4.6.2 Partnerships and Training

Partnerships with organizations like ANZA and SIDO offer significant potential for improving the knowledge and skills of wholesalers. These organizations can provide targeted training on quality assurance, nutrition, and regulatory compliance, helping wholesalers to better understand the importance of maintaining product quality. By enhancing the capacity of wholesalers, these partnerships can contribute to a more robust agricultural value chain that prioritizes consumer health and safety.

3.4.6.3 Market Demand for Quality Products

There is a growing market demand for high-quality, nutritious products, driven by increasing consumer awareness of the importance of nutrition. Wholesalers who invest in quality assurance and adopt best practices have the opportunity to differentiate themselves in the market and attract more customers. This shift in consumer preferences represents a significant opportunity for wholesalers to capitalize on the demand for healthier, safer food products.

3.4.6.4 Financial Incentives

The introduction of financial incentives, such as subsidies for quality improvement, could further encourage wholesalers to prioritize product quality. These incentives could be used to offset the costs of upgrading infrastructure, purchasing quality control equipment, or obtaining certification from regulatory bodies. By reducing the financial burden on wholesalers, these incentives could play a critical role in improving the overall quality of food products in the agricultural value chain.

3.4.7 Conclusion

Wholesalers play a crucial role in the agricultural value chain, responsible for ensuring that food products reach consumers in a safe and nutritious state. However, the current state of knowledge, quality assurance practices, and infrastructure among wholesalers is inadequate, leading to significant risks for consumer health. Addressing the challenges identified in this report through targeted training, investment in infrastructure, promotion of regulatory compliance, and provision of financial support there is significant potential to improve the overall quality of food products in Tanzania. Leveraging the opportunities presented by technological advancements, partnerships, and growing market demand, wholesalers can play a pivotal role in enhancing the nutritional quality and safety of the food products they distribute. These improvements will not only benefit consumers but also contribute to a more robust and sustainable agricultural value chain in Tanzania.

3.4.8 Recommendations

3.4.8.1 Enhance training and capacity building

It is recommended that targeted training programs be developed and implemented to improve the knowledge and skills of wholesalers in the areas of nutrition, quality assurance, and regulatory compliance. These programs should be facilitated by organizations like ANZA and SIDO and should focus on practical, actionable strategies for maintaining product quality.

3.4.8.2 Invest in Infrastructure and Technology

Investment in infrastructure and technology is essential for improving the quality of food products in the agricultural value chain. We should encourage wholesalers to embrace technological advancements like solar-powered refrigeration systems to guarantee the nutritional quality of perishable products. Furthermore, we should prioritize investing in quality testing equipment to empower wholesalers to regularly evaluate the quality of their products.

3.4.8.3 Promote Regulatory Compliance

Promoting regulatory compliance among wholesalers is crucial, especially in the areas of product labeling and quality assurance. This could be achieved through a combination of training, financial incentives, and

stricter enforcement of existing regulations. We can improve the overall quality of food products in the agricultural value chain by ensuring wholesalers adhere to national and international standards.

3.4.8.4 Provide financial support

Financial support, in the form of grants, subsidies, or low-interest loans, should be made available to wholesalers to help them invest in quality assurance measures. This financial support could be used to offset the costs of upgrading facilities, purchasing equipment, or obtaining certification from regulatory bodies. By reducing the financial burden on wholesalers, these measures could encourage greater investment in quality control and ultimately lead to safer, more nutritious food products.

3.5 Legal and Regulatory Frameworks

3.5.1 An overview of TBS

Tanzania Bureau of Standards (TBS) is the national regulatory body established by the Parliamentary Act No. 3 of 1975 and later replaced by the Standards Act No. 2 of 2009. Specifically, TBS was mandated to undertake measures for quality control of products and to promote standardization in industry and commerce. The roles and responsibilities of TBS includes; undertaking measures for quality control of commodities, services and environment of all descriptions and promote standardization in industry and trades, to make arrangements or provide facilities for the examination and testing of commodities and any material or substance manufactured, produced, processed or treated and approve, register and control the use of standard marks in accordance with the provisions of the Standards Act, as well as to capacitate clients on issues related to standards and regulations.

3.5.2 TBS Service Coverage

During the survey, about two quality control experts from the TBS where interviewed, where both were males with Master's degree levels and have worked with the organization for more than five years. Based on their responses, TBS operates across the country with eight zonal offices as follows; TBS Headquarters: Dar es salaam, TBS Central Zone: Dodoma, TBS lake zone: Mwanza, TBS Northern Zone: Arusha, TBS Southern Highlands Zone: Mbeya, TBS Southern zone: Mtwara, TBS Western Zone: Kigoma. The survey revealed that the board has limited number of technical staff with limited knowledge on nutrition.

3.5.3 Criteria for offering Mark of Quality

It was further noted that for the SMEs to be offered the mark of quality, the following aspects must be taken into consideration; the product has to meet the standard specifications, processing premise must comply with TBS requirements, applicant TIN number certificate, business license, source of raw materials, sketch of the factory premise and location must be attached with the clients application form, certificate of environmental and social impact assessment from NEMC as well as certificate of attainment of food processing training from SIDO together with the evaluation form must also be submitted to TBS. The process is costly and time consuming as SMEs need to secure certificates and permits from different government entities. The study by Piatti-Fünfkirchen M, 2020 came out with similar findings which reported that agricultural entrepreneurs in Tanzania encounters a number of procedures and high costs to register their businesses than any other countries in SSA (28). Such procedures involve different sectors and agencies within the government including TBS, OSHA, TRA, TBA to mention few (29). More efforts are needed to scale down the time costs of business registration a move that could incentivise informal businesses to formalise. Further, creating awareness on business registration procedures could reduce tension among agricultural entrepreneurs and ensure conducive business environment.

3.5.4 Costs and Fee associated with TBS Mark of Quality

The participants responded further that, the service is free of charge for three years for SMEs with SIDO certificates, from the fourth year, the SMEs has to contribute 25%, followed by 50% in the fifth year, 75% in the sixth year and later 100% in the seventh year onwards. For SMEs with no SIDO certificates have to pay prior the service, and the costs depends on the number of parameters to be tested/analysed from the particular food product. The time taken for the SME to acquire the TBS mark of quality 21 working days' maximum, but it is subject to the submission of completed application forms with all the required supporting documents. In addition, they insisted that the applicant must follow the process closely via online to see if there is any ask from the board and respond timely. One of the participants stated that, efforts are under the way to expand the laboratory services to the zone offices and ensure the service is offered within three days. Having a laboratory in the eight zones could be an opportunity for SMEs to reduce costs and time spent in the process of obtaining the TBS mark of quality.

3.5.5 Key issues to consider for offering Mark of Quality

To ensure fare analysis of SMEs` product, a client has liberty to request approval or feedback regarding their product in accordance to relevant standards, inspection, registration, testing and traceability (farm to

fork) which is done through an established online system and also testing of product is done as per established procedures. Surprisingly, consideration in nutritional facts information in the products labels was reported as not mandatory requirement for offering the TBS mark of quality although it is an important aspect in the product labelling as per the National Food Labelling Regulations of 2006 (30). This could make SMEs reluctant to consider analysing the nutritional composition of their products as well as adding such important information in their products taking into consideration the costs associated with analysing the nutrients composition of food, and thus miss the opportunity to comply and compete with the outside market. In addition, for the SMEs products to penetrate to the international markets one must comply with the regional and global standards requirements of which nutrition composition of a product in labelling is among the mandatory requirements for obtaining bar codes and marks of quality. Thus, ANZA need to consider training SMEs on the important aspects to consider to be able to win not only the local markets but also the global market. Further, ANZA in collaboration with other stakeholders need to advocate for amendment and review of the existing National Food Regulations to in cooperate such an important aspect in offering TBS mark of quality.

3.5.6 Measures for product quality maintenance

Measures in place to ensure the quality of products in the markets were reported as; conducting collaborative ad hock inspections in the factories and food stores done between TBS and MOH through Health Officers followed by nullifying and banning the product which violate the TBS standards. Further, the Media advocacy to consumers to consider purchasing quality products (products with standard mark) is highly promoted by the authority to ensure consumers` informed choices. For SMEs to maintain the quality of their products, inspections including testing, approval and traceability all along from production to the market is often done. Despite the fact that, regular inspections by TBS and other authorities are key to ensure that product quality are maintained, SMEs should also make sure that they do not compromise the quality of their products to build a trust to their customers and ensure sustainability of their businesses.

3.5.7 Product quality and safety Measures

To ensure that, safety and quality of the SMEs products including nutritional quality, the participants responded that, TBS has developed various guidelines, standards and Acts which all together governs monitoring and traceability systems to ensure safety and quality of SMEs' products as stipulated in chapter three of the desk review. In spite the fact that, the policy and legal framework is in place, it is evident that its implementation is a challenge and therefore, need for its reinforcement by relevant authorities to ensure

proper implementation is key. Further, some of them are outdated and therefore need to be reviewed. Based on the desk review recommendations section, it is clear that creating enabling environment for SMEs through establishing and strengthening the existing regulatory and policy frameworks will ensure compliance to standards, quality products and increased income among SMEs.

3.5.8 Ensuring Product Quality along the Value Chain

To ensure quality of products along the agricultural value chain, TBS in collaboration with key stakeholders such as SIDO, TRA, NEMC and NGOs, have been offering training programs on good manufacturing practices to SMEs to ensure that their products comply with the standards stipulated in the National regulations. SIDO also assist them register and certify their products for consumer safety. Respondents highlighted further that some of the control measures in place to control unhealthy products in the markets include, awareness creation to consumers through media on healthy and unhealthy food products, ensuring that products are communicated in a language which is easy for consumers to understand and make informed choices (normally English and Swahili) and also ensure compliance to standards through inspection and by banning all products which do not comply from been sold to the market, strengthening and improving the operational systems for inspection, testing, certification, and monitoring of products from production areas to the market.

3.5. 9 Opportunities

The participants highlighted that, Fee Exception given to SMEs to obtain TBS mark of quality could attract more SMEs to apply for certification services. Presence of SMEs hubs (SIDO) and collaboration with other Institutions dealing with SMEs reduces the workload to TBS is among the opportunities for entrepreneurs along the chain to produce nutritious food products. In addition, due to increase in market demand of production of quality and safe foods, SMEs has market advantage to produce more to sustain demand side.

3.5.9 Challenges

Some of the challenges highlighted by TBS in ensuring the nutritional quality of products in the local market include, Mushrooming of uncertified local products in the market, Limited resources including human resources and equipment for offering the services timely, Limited knowledge to SMEs about products standards and compliance, Consumers unaware of products quality, Businesses that do not endure and products that remain in the market for a short time, thus presenting challenges for monitoring.

3.5.10 Recommendations

TBS could facilitate fair trade practices, enabling producers to access external markets, boosting exports, and ultimately contributing to national GDP growth. The research team learned that TBS is actively working to enhance consumer awareness of product quality through various channels. These efforts include media campaigns, public events like NANE NANE and SABA SABA, direct stakeholders' engagement, and regular training programs for SMEs in collaboration with institutions such as SIDO and TANTRADE. Key takeaways to TBS experts include the importance of mandatory nutritional labelling regulations for SMEs and the need for SMEs to gain a deeper understanding of standards and production requirements to meet specific product criteria.

3.6 Other Actors in the Agricultural Value Chain

3.6.1 Input suppliers

During interviews, the research team managed to interview four input suppliers such as SEED Co, EFTA, TFA. Among the services offered include, fertilizers, pesticides/herbicides, seeds of different varieties and agricultural equipment. Other services include capacity building to SMEs and farmers on good agricultural and manufacturing practices as well as linkage with markets. Consideration of nutrition aspects in selecting agricultural inputs was reported as not considered when Input suppliers offer services to customers. All interviewees responded that, their main focus is on seeds preferred by farmers, those of high yields, keen on expiring dates and also consider selling agricultural inputs which are authorized by TBS. Interviewees highlighted further that, there are challenges for them to ensure nutrition aspects when offering services to farmers including limited knowledge on good agricultural practices, high costs associated with ordering bio fortified seeds from research Institutes including TAHA and Seliani Research Institute, unfavourable climatic conditions for some seed varieties, unfriendly regulatory systems with overwhelming taxes to input suppliers and challenges related to the supply chain.

The opportunities highlighted for input suppliers to consider nutrition aspects in their services were, farmers be trained on good agricultural practices including proper choices on fertilizers based on soil type, establishing farmers classless for comprehensive coaching and mentoring sessions.

The input suppliers recommended that, pre testing viability of seeds varieties before selling it by involving farmers, advocating for consumers to opt for nutritious products, consider selecting high quality seed varieties by farmers and nutrition campaigns to advocate for healthy eating.

3.6.2 Non-Governmental Organizations (NGOs)

3.6.2.1 NGOs` Overview

The research team also managed to interview a representative from ANZA and an NGO called SOMO which is also focusing on empowering SMEs. ANZA was established since 2012, started in Kilimanjaro, then expanded to 20 regions in Tanzania, now it covers the entire country with a coverage of more than 8,700 employments and 2,900 entrepreneurs. Based on the interviews with the participants from these organizations, their main responsibility is to capacitate SMEs to ensure value addition of their products, link them to technologies, markets and access to soft loans. They also offer training on business and finance management including basic foundation on business acceleration aspects, investment acceleration, establishing community hubs to support entrepreneurs to participate in networking events, showcasing their products, linkage with innovators & distributors, one stop centre, SIDO, TBS, EABC to attain certificate of origin and TAHA to ensure Quality in production. Both organizations deal with SMEs from agriculture, health and energy sectors. What SOMO do differently when compared to ANZA is that, they also deal with farmers directly while ANZA deal with farmers via SMEs.

3.6.2.2 Recruitment of SMEs

Recruitment of SMEs is done through Traditional means such as referrals from local government authorities, use of dataset from Tanzania chamber of commerce, women chamber of commerce and announcement through media. SMEs who are already engaged in a business and passionate to increase their income are invited to join the programs after been screened and selected based on the themes of the programs and their training needs. The steering committees of the respective organizations screen for potential SMEs who will be enrolled for a kick-off meeting followed by generic group trainings. After a generic training SMEs receive a one to one coaching, and mentorship which goes together with market linkages, networking, showcasing and advertising. Despite the training packages offered to the SMEs focusing on improving the nutritional quality of SMEs products through selection of fortified raw materials, the program does not cover aspects such as involving nutritional facts into product labels. Such knowledge gap could be addressed by in cooperating nutrition aspects into ANZA training modules and engage Institutions responsible for Nutrition agenda such as TFNC.

3.4.2.3 Measures to ensure nutrition aspects along the value chain

Both NGOs have established a specific module that introduce SMEs to agricultural value chain including safety on production, handling and distribution procedures to ensure that the entire value chain is nutrition sensitive.

3.4.2.4 Challenges

Some of the challenges which the NGOs are facing when implementing its programs include; SMEs demanding for allowances whenever they are called for training regardless of training benefits they receive, some opting multiple businesses while they are still immature, lack of team work where SMEs attempt doing everything by themselves with no consideration to engage other experts to assist them in their firms, lack of mechanisms in place to do self-assessments, unsupportive enabling environments, financial constraints, insufficient mentorship and poor logistics mechanisms within their businesses. Further, challenges that hinder integration of nutrition into SMEs products were highlighted as, traditional behaviour (poor selection of raw materials, processing and packaging by SMEs, Lack of traceability mechanisms, Lack of capital, Availability of Raw materials in seasonality/unsustainable input supplies, and use of poor technologies.

3.4.2.5 Opportunities

Availability of raw materials for processing goods e.g. simsim, soya and legumes, presence of supportive infrastructures such as electricity to support production and existence of institutions that support nutrition aspects and SMEs in particular.

Presence of mechanisms in place to ensure financial stability and client satisfaction, signed MoU with some institutions like CRDB, SIDO to support provision of training and loans to SMEs, presence of post program support done to followup the SMEs after they have graduated, endline survey to know progress and design refresher program, trouble shotting challenges, share opportunities, learning through experience sharing and ensuring that SMEs are Interconnected.

Collaboration and networking among SMEs and also with the NGOs to ensures that SME's products are promoted through social media and also used as role models and motivational speakers in some forums, supporting SMEs in Branding & marketing of their products, support in social media calendar and website development for showcasing their products, link to distributors, preparation of SMEs publicity materials although it depends on SMEs commitment and cost sharing.

3.4.5.6 Recommendations

Among the recommendations from the participants interviewed include; SMEs should consider establishing a production hub where they can easily be supervised and share limited resources available, have a one stop center for service provision to link with other services, have mentors who have succeeded in their business.

SMEs to become keen to learn more on entrepreneuwship, search for assistance from technical experts to gain more skills on processing, products compliance and NGOs to set mechanisms for SMEs to be given referals/access to experts e.g.SIDO, TBS.

3.4.6 Loarn Providers

3.4.6.1 Criteria for SMEs to be offered Loans

The interviews also involved financial entities offering loans to SMEs and other actors along the agricultural value chain. Some of the loan providers which were interviewed include EFTA who offers loans in form of equipment and machineries, while others were AKIBA COMMERCIAL BANK and SIDO. For SMEs and farmers to quilify for the loans, must have adequate skills on the business he/she is requesting for the loan, experience of not less than six months in the business sector, must have specific and known area for business, must be a residence, must have attended trainings at SIDO, demonstrated ability to pay back the loan, must have business license, if it is a farmer, must have a capacity to service the loan and not less than five years' experience in farming. Others criteria include, having a collateral and not engaged in other loans. Prior been given loans, the entrepreneurs are trained on how to manage the finances they lend and repay the given loan with ought to jeopardize their businesses. No any consideration of nutrition aspects by loan providers when offering loans to agricultural actors along the value chain. In cooperating nutrition aspects as one of the criteria to be offered loans by loan providers could steer up the efforts towards promoting nutrition aspect along the chain.

3.6.6.2 Challenges

Some of the challenges highlighted include, lack of collaterals, Limited knowledge about the business, lack of business which is under operation and Having many loans which can cause difficulties in servicing the given loan, lack of referees, while some customers lack qualifications due to limited information they have.

3.6.6.2 Opportunities

SMEs having trainings which equip them with knowledge and skills on business is a potential opportunity which ensures business growth and increased income.

3.6.7 SIDO

3.6.7.1 General Overview of services offered

The survey team, also managed to interview expert from SIDO as a loan provider and also as SMEs technology and capacity building hub. The organization was established in 1973 and it is responsible for supporting SMEs through four main programs which include; i). Training on food processing, Backery, Milk processing, Botiques processing, soap and cosmetics making, ii). providing financial support in terms of loans, iii). Marketing and iv). Technology transfer. The training service reachout up to more than 900 SMEs per anum for the case of Arusha Region and it is demand driven. The duration of the training programs is normally five days after which SMEs are given access to the SIDO hubs to repractice whatever they think that they didn`t master well during trainning. The costs for the trainning is normally shared betweem SMEs and SIDO where each participant has to pay a total of 100,000 Tzs as fee for the five days training package. During trainning, SMEs are also equiped with other courses including packaging and labeling and business management. However, the training focus mainly on quality and compliance with national standards but it doesn`t involve nutrition aspects such as consider displying nutritional facts during labeling. For SMEs to ensure nutritional quality of their products and compliance with international standards, SIDO should also consider this aspect as an important part of their training, either by engaging nutrition experts in their programs or by reffering the SMEs to the Insitutions responsible for this agenda. Further, TBS and SIDO should consider collaborating with other stakeholders to support SMEs in meeting both the national and international standards for businness sustainability and growth.

3.6.7.2 Challenges

SIDO highlighted some of the challenges they are facing when rendering capacity building services to SMEs limited resources including human and financial resources to support SMEs trainings, Challenges associated with availability of proper packaging materials for SMEs to appropriately pack their products for export. Simmilar challenges were also reported in other studies as highlighted in the desk review report under section 2.2. on Challenges for SMEs to integrate nutrition in their products.

3.6.7.3 Opportunities

After the SMEs has graduated, a one to one coaching and followups are done to make sure that they master and practice whatever they are tought. Depite of the close followup, they also participate in the product testing and provide recommendations the TBS when the need arise. Further, they organize trade fare and exihibition events to support SMEs in showcasing their products and fetch for the market. In the entire process, engagement of other stakeholders including TBS, OSHA, NEMC, TRA and local government authorities is mandatory to ensure that SMEs are well equiped and linked to such authorities. Having such potential stakeholders on board is an opportunity for ANZA to also consider engaging them and advocate for nutrition aspects to ensure that product and services offered by SMEs are of high quality and nutritious.

3.7 General recommendations

In addition to the recommendations given in the desk review chapter 5, from observation made in this survey, the consultant recommends a program that integrates business development, business management, and food and nutrition to enable the food SMEs consider nutritional quality in their products and grow their business.

The SMEs besides training need assistance on how to raise capital for acquiring appropriate technologies as well as operational capital. This can be done for example through designing a model through which they can access loans from financial institutions for acquiring necessary technologies e.g. through sales agreement using stocks or the machinery itself as collateral. Another way is for the support organizations to search and provide SMEs information on Government Grants and Subsidies through guidance on how to search and apply for, eligibility criteria, also through assisting the SMEs in negotiations with financial institution, connecting SMEs to venture capital, business development, partnership and networking, information on tax incentives etc.

Overall, the entrepreneurs who participated in the study demonstrate low knowledge of Nutritional quality in all aspects including selection of raw material, transportation, handling and storage, compliance to GMP, selection of packaging materials, branding and labelling, existing practices that ensure nutritional quality and benefits of considering nutritional quality in products. This is a challenge for the SMEs to be able to penetrate prime markets, also addressing the public health issues such as malnutrition and non-communicable diseases. Besides, reasons given by SMEs in the survey, poor reinforcement of laws and

regulations governing the food industry is key contributor to this complacency. Support organizations such as ANZA in their programs could encourage business contracts which foster traceability to enhance compliance and thus adding quality and safety value to the end products. Supporting Organizations such as ANZA could also foster voluntary compliance through capacity building and insisting traceability and sales contracts.

Generally, the SMES demonstrated low understanding and practicing of quality control aspects among the food processing. SMEs who participated in the survey, including ensuring consistency quality, compliance to standards, considering feedback from consumers, ensuring food safety and prioritization of quality vs. products costs. Thus, it is recommended that, capacity support organizations such as ANZA, in collaboration with food and nutrition experts to work with the SMEs and using human centred design approach an innovative model for food quality and safety management tailored to SMEs. The initiative should also involve other actors local Governments, regulatory organizations, financial institutions, insurance companies from design to implementation and evaluation.

Most of the SMEs seem not to be aware of any food safety management systems, nor any food quality and safety regulations, nor proper documentation etc. This signals a serious lack of enforcement of laws and regulations. To address this challenge there needs a model for contractual business arrangements that fosters compliance as well as rising consumers' awareness to attract voluntary compliance.

Special emphasis needs to be put in the training curriculum on the importance of nutritional labelling and the business advantages associated with appropriate nutritional labelling and branding.

3.8 Recommendations Specific to ANZA

i. Many SMEs in the food processing sector lack the necessary capital to invest in advanced technologies for producing nutritious, high-quality products or implementing robust safety management systems. To address this challenge, ANZA could develop an innovative program that maps SMEs and clusters them based on their product type. By consolidating several SMEs producing similar products, a collective approach could enable them to pool resources, acquire advanced technologies, and improve their eligibility for loans.

ii. Many SMEs lack the necessary knowledge in food and nutrition. To address this gap, ANZA should integrate a food and nutrition component into its business management accelerator program. By partnering with food and nutrition experts from organizations like TFNC and regulatory bodies like TBS, ANZA can provide SMEs with training and mentorship to produce and supply safe, nutritious foods, ultimately contributing to their business growth.

iii. Consumer demand is a powerful driver of change for entrepreneurs. To leverage this, ANZA should consider incorporating a consumer awareness component into its accelerator programs. This could involve school-based awareness programs on healthy eating and nutritious food choices, conducted in collaboration with relevant public institutions and local governments. Additionally, nutrition experts such as TFNC can develop targeted messages to promote healthy eating and informed consumer choices. These messages can be disseminated through social media and local radio to raise public awareness and stimulate demand for nutritious and safe foods, ultimately influencing the attitudes and practices of SMEs and the entire value chain.

iv. ANZA should collaborate with food and nutrition experts such as TFNC and regulatory authorities like TBS to develop, validate, and scale a tailored model for SMEs to produce nutritious and safe foods. This model should be developed and implemented using a Human-Centered Design Approach, involving SMEs, local governments, regulators, support organizations, financial institutions, business experts, and food and nutrition experts to ensure ownership, visibility and sustainability of the developed model.

v. One of the constrains for SMEs to produce and supply nutritious products is certification with the regulatory authorities. Here the problem is twofold, one is lack of understanding of the SMEs on the requirements by the authorities and lack of resources to fulfil those requirements, secondly is the difficulty attributed to the myriad is the large number of the regulatory organizations and the bureaucracy involved in obtaining services. ANZA is advised to include in her curriculum a component dealing with search for and pass information the relevant organizations and the requirement for certification to the SMEs.

vi. One significant constraint for SMEs in producing and supplying nutritious products is the challenge of obtaining certification from regulatory authorities. This challenge stems from two main issues: a) Lack of Understanding and Resources: SMEs often lack a clear understanding of regulatory requirements and the resources necessary to meet them and b) Complex Regulatory Landscape: The numerous regulatory organizations and bureaucratic processes involved in

obtaining certification can be daunting for SMEs. To address these challenges, ANZA should incorporate a component into its curriculum that provides SMEs with information on relevant organizations, certification requirements, and guidance on navigating the complex regulatory landscape.

vii. Given the absence of specific nutrition and food safety guidelines tailored to SMEs, ANZA should collaborate with food and nutrition experts and relevant stakeholders, including TFNC, SIDO, and TBS, to develop, validate, and implement such guidelines. These guidelines will help SMEs improve the quality of their products and ensure compliance with regulatory standards.

4.0 Measurable indicators to assess the nutrition-specific value added to ANZA accelerator programmes

From the key recommendation that the best approach that ANZA can assist the SMEs to add nutritional value to the products that both convenient and cost effective is integration of nutrition component into her accelerator program. The implementation of such a program goes beyond training to involving coaching and mentorship, also technical support e.g. raw material and finished product composition analysis.

The assessment of the success of this program aims at improving the nutritional value of products processed and supplied by SMEs, the focus should be on both qualitative and quantitative indicators. These indicators will help evaluate the program's impact on the nutritional quality of the products as well as the broader outcomes for the SMEs involved. This will include the following;

4.1.Measuring SMEs` products nutritional improvement

i. Nutrient Content Analysis: Assess the nutritional composition of products before and after the program to determine changes in key nutrients like vitamins, minerals, and fibre and evaluate the reduction of unhealthy ingredients such as trans fats, added sugars, sodium, and antinutritional factors.

ii. Product Reformulation: Determine the proportion of products that have been reformulated to improve their nutritional content.

iii. Compliance with Standards: Measure the increase in the number of products that have obtained the TBS mark of quality by assessing their compliance with specific nutritional standards defined by the program.

4.2. Assessment of the SMEs product labelling and communication

The assessment should cover (i) Nutritional labelling compliance including percentage of products with updated labels reflecting improved nutritional content; (ii) compliance i.e. adherence to regulatory requirements for nutritional labelling; (ii) consumer awareness this to be assessed through consumer feedback to assess changes perception and awareness respecting the nutritional value of the products, measured through surveys or market research

4.3.Marketing and sales performance

This should include analysis of sales data. (i) To assess sales growth i.e. changes in sales figures for products with improved nutritional value compared to those without; (ii) Market share to determine changes in market share for the improved products; (iii) Consumer acceptance i.e. Customer Feedback to measure positive or negative feedback from customers regarding the taste, quality, and nutritional value of the reformulated products.

4.4.Business and impact opportunities

This includes (i) cost analysis including cost of reformulation to measure Changes in production costs associated with improving nutritional value, (ii)economic benefits i.e. assessment of any financial benefits derived from increased sales or market share, (iii) Operational adjustment -process change to measure number of and type of changes made to production processes or sourcing of ingredients to improve nutritional content; (iv) Training and Capacity Building: Number of training provided to staff on nutrition and product reformulation.

4.5. Program Engagement and Implementation

To assess (i) participation rates to include SMEs Enrollment: Number and percentage of SMEs participating in the program, and Engagement Level: Frequency and extent of participation in program activities, workshops, or consultations; (ii) support utilization to determine resource Utilization i.e. Extent to which SMEs use provided resources, such as technical support, training materials, or financial incentives.

4.6.Regulatory and Certification Compliance

This includes;

(i) Certification i.e. Achieved Certifications measured by number of products or SMEs that have achieved relevant nutritional or health-related certifications.

(ii) Compliance with Guidelines: Adherence to national or international nutritional guidelines or standards.

4.7. Long term impact

(i) Sustainability ongoing improvement to measure evidence of continued efforts by the SMEs to maintain or further improve nutritional value beyond the program's duration

(ii) Program Longevity: Continuation of practices and reforms implemented during the program.

(iii) Number of SMEs penetrated International market.

4.8. Feedback and Continuous Improvement:

(i) Participating SMEs feedback Program evaluation to obtain SMEs feedback about the effectiveness and usefulness of the program

Suggestions for Improvement: Number and type of suggestions received for program enhancement.

5.0 References

1. FAO, IFAD, UNICEF, WFP, WHO, The State of Food Security and Nutrition in the World 2020.
2. Global Nutrition Report, 2018.
3. The State of Food Security and Nutrition in the World 2020.
4. Shekar, Nutrition and Income Poverty. 2005.
5. TNNS. (2018). "Tanzania National Nutrition Survey Using SMART Methodology (TNNS) 2018." Dar Es Salaam, Tanzania: MoH, TFNC, NBS, OCGS, and UNICEF.
6. TDHS. (2022). "Tanzania Demographic Health Survey and Malaria Indicator Survey." Tanzania Demographic and Health Survey and Malaria Indicator Survey.
7. The food environment is defined as the interface between the wider food system and how people acquire food. It consists of two domains, the external food environment, and the personal food environment. These domains are interrelated in terms of physical, socio-cultural and economic domains (Turner et al., 2017).
8. Ditlevsen K, Sandøe P, Lassen J, (2017). Healthy food is nutritious, but organic food is healthy because it is pure: The negotiation of healthy food choices by Danish consumers of organic food https://doi.org/10.1016/j.foodqual.2018.06.001.
9. Tanzania Labelling Study Report (2016). Assessment and Research in Child Feeding (Arch): Labelling Study Report, Tanzania. Available at; https://archnutrition.org/wp-content/uploads/sites/2/2016/07/Labeling-Study-Report-Tanzania.pdf.
10. Sweet L, (2012). "A critical analysis of the labels of processed complementary foods for infants and young children in South Africa against international marketing guidelines." PhD diss., North-West University, Potchefstroom Campus, 2012.
11. Monroy-Gomez, J., Ferraboschi, C., van Zutphen, K.G., Gavin-Smith, B., Amanquah, D. and Kraemer, K., 2022. Small and medium enterprises' perspectives on food fortification amid the growing burden of malnutrition. *Nutrients*, *14*(18), p.3837.
12. Donga, G. and Patel, N., 2018. The Nutrition Label–Which Information is Important to the Consumer. *International Journal of New Technology and Research*, *4*(11), pp.53-56.
13. Di Renzo, L., Colica, C., Carraro, A., Cenci Goga, B., Marsella, L.T., Botta, R., Colombo, M.L., Gratteri, S., Chang, T.F.M., Droli, M. and Sarlo, F., 2015. Food safety and nutritional quality for the prevention of

non-communicable diseases: the Nutrient, hazard Analysis and Critical Control Point process (NACCP). *Journal of translational medicine*, *13*, pp.1-13.

14. Lähteenmäki, L., 2013. Claiming health in food products. *Food Quality and Preference*, *27*(2), pp.196-201.
15. Karwowska, M., Stadnik, J., Stasiak, D.M., Wójciak, K. and Lorenzo, J.M., 2021. Strategies to improve the nutritional value of meat products: Incorporation of bioactive compounds, reduction or elimination of harmful components and alternative technologies. *International Journal of Food Science & Technology*, *56*(12), pp.6142-6156.
16. Hajeb, P., Sloth, J.J., Shakibazadeh, S.H., Mahyudin, N.A. and Afsah-Hejri, L., 2014. Toxic elements in food: occurrence, binding, and reduction approaches. *Comprehensive Reviews in Food Science and Food Safety*, *13*(4), pp.457-472.
17. Mollakhalili-Meybodi, N., Arab, M. and Zare, L., 2022. Harmful compounds of soy milk: Characterization and reduction strategies. *Journal of Food Science and Technology*, *59*(10), pp.3723-3732.
18. Wu, W., Zhang, A., van Klinken, R.D., Schrobback, P. and Muller, J.M., 2021. Consumer trust in food and the food system: a critical review. *Foods*, *10*(10), p.2490.
19. Yu, M. and Watson, S., 2024. Market Overview of Health and Wellness Food Products. In *Flavor-Associated Applications in Health and Wellness Food Products* (pp. 3-19). Cham: Springer International Publishing.
20. Tersoo, P., 2014. Agribusiness as a veritable tool for rural development in Nigeria. *International letters of social and humanistic sciences*, (03), pp.26-36.
21. Tiisekwa, F.C., Good Manufacturing and Hygienic Practices at Small and Medium Scale Pineapple Processing Enterprises in Rwanda
22. Ruteri, J.M. and Xu, Q., 2009. Supply chain management and challenges facing the food industry sector in Tanzania. *International Journal of Business and management*, *4*(12), pp.70-80.
23. Ogori, A.F. and Joeguluba, O., 2015. Food processing and agro-business productivity challenge: The case of watermelon in Nigeria. *World Wide Journal of Multidisciplinary Research and Development*, *1*(1), pp.1-5.
24. Lyimo, M.J., 2017. *Good manufacturing practices compliance: The case of registered small scale maize milling industries in Ubungo and Kinondoni Districts, Tanzania* (Doctoral dissertation, Muhimbili University of Health and Allied Sciences).

25. Mrosso, R.M., Genda, E.L. and Tutuba, N.B., 2022. Effects of Product Innovation on the Performance of Women-led Micro and Small Enterprises in the Food Processing Industry, Tanzania. *The UONGOZI Journal of Management and Development Dynamics*, *32*(1), pp.41-63.
26. Hasnan, N.Z.N., Basha, R.K., Amin, N.A.M., Ramli, S.H.M., Tang, J.Y.H. and Ab Aziz, N., 2022. Analysis of the most frequent nonconformance aspects related to Good Manufacturing Practices (GMP) among small and medium enterprises (SMEs) in the food industry and their main factors. *Food Control*, *141*, p.109205.
27. Chaoniruthisai, P., Punnakitikashem, P. and Rajchamaha, K., 2018. Challenges and difficulties in the implementation of a food safety management system in Thailand: A survey of BRC certified food productions. *Food control*, *93*, pp.274-282.
28. 46. Piatti-Fünfkirchen M, Ally M. Tanzania Health Sector Public Expenditure Review 2020. Tanzania Heal Sect Public Expend Rev 2020. 2020.
29. Bymolt rbymolt R, JdAnjou A. Lessons on small and medium-scale maize flour fortification in Tanzania Lessons learned from the Millers Pride-Lishe Bora project. 2017;(June).

6.0 ANNEXES

Appendix 1: SMEs` Knowledge on nutritional quality

Subtheme	Responses by SMEs	(%)	Remarks
Understanding of nutritional quality	Selection of quality raw material	10	The nutritional quality of a food product refers to how well it meets dietary needs and supports overall health. Certain factors need to be considered collectively to decide whether the food product in question determine how well it contributes to a balanced and healthful diet. These factors include Density of essential nutrient (vitamins, minerals, protein, fibre) relative to the amount of calories Balanced ratio of carbohydrates, proteins, and fats with an emphasis on healthy fats, lean proteins, and complex carbohydrates The presence of essential vitamins and minerals (Foods rich in micronutrients like vitamin A, vitamin C, iron, calcium, and potassium) Minimally processed, with little or no sugar and or salts, also processes which enhance bioavailability of nutrients About 75% of the SME's responses (n=20) correlated to the factors to be considered to ensure nutritional quality. 40% mentioned a product containing nutrient necessary for good health in adequate amounts which corresponds to nutrient density 60% mentioned the use techniques that ensure preservation of nutrient which correspond minimally processed products. Thus, more capacity building is required
	Contain nutrients necessary for good health in adequate amounts	40	
	Authenticity (appearance, odour, integrity, not expired)	5	
	Good processing techniques that preserve nutrients	60	
	Understanding of ingredients and its composition	25	
	Low in harmful components	15	
Important components on the nutrition composition list	Ingredients	25	Important components of nutrition composition list are Calories, Macronutrients (Carbohydrates, proteins and fat), Micronutrients (vitamins and minerals), Sodium, cholesterol, serving size. Percentage Daily Values (how much a nutrient in a serving of food contributes to a daily diet, based on a standard 2,000-calorie intake) Ingredient list may give indication of nutrients present in the food product Only 33% of the responses reflect understanding of the entrepreneurs of the important components of the nutrition composition list (which included ingredients and amount of
	Amount of ingredients	10	
	How to use product	15	
	Benefits of the ingredients	5	
	Expiry date	15	
	Warnings (e.g. presence of certain ingredients	5	
	Name of the product	5	
	Bar code	5	

	Mark of quality	5	ingredients, benefits of ingredients). Training programs should put emphasis on this aspect.
	Nutritional facts	10	
Importance of ensuring nutritional quality of a product	To ensure consumers` health and safety	50	Ensuring the nutritional quality of a food product is vital for several reasons, affecting both individual health and broader public health outcomes. These factors include: **health and well-being** (prevention of deficiencies and chronic diseases management), **optimal growth and development** for both children and adults, weight management (balanced nutrition); **mental health** nnutrients like omega-3 fatty acids, B vitamins, and antioxidants play roles in brain health and mood regulation, potentially reducing the risk of mental health disorders. **Food Safety**: Ensuring nutritional quality often involves checking for and reducing harmful substances like excessive sodium, trans fats, and added sugars, which can negatively impact health. **Transparency and Trust**: Ensuring high nutritional quality builds trust with consumers, as they are more likely to choose and remain loyal to products that they perceive as healthy and beneficial. The SMEs interviewed (n=20) could relate to the model answers (≤50%), where by 50 related nutrition quality with consumer health and safety, 35% consumer trust and 10% market trust. Thus more capacity building is required in terms of training
	To build Consumers` trust	35	
	To ensure Market penetration	10	
	Food to be nutritious	5	
Marketing advantages of considering nutritional value of a product 1	Market expansion opportunities	30	Consideraction of nutritional value of a food product can offer several marketing advantages including helping brands to attract and retain customers, differentiate themselves in the marketplace, and build a positive reputation All responses (100%) given by the entrepreneurs interviewed (n=20) reflect understanding of the marketing advantages of considering nutrition in their food products with the highest score being 55% hinted on market penetration, 15 customer trust and loyalty, 25% improve customer health, 25% Premium pricing potential, 30% market expansion and 5% attracting business partners However, the scores per each attribute implies low understanding of the benefits of business advantages of considering nutritional quality in their products, thus more training is needed.
	To improve customers' trust and loyalty	15	
	Attract business partners Increase customer base and thus increase revenue	5	
	Help to penetrate prime markets	55	
	Improve health of consumers	25	
	Increase value of the product (Premium pricing potential)	25	

Appendix 2: Consideration of nutritional quality by SMEs

Subtheme	Response	(%)	Remarks
Selection of raw materials	Contractual relationship with suppliers	25	When SMEs in the food processing industry select raw materials to ensure the nutritional quality of their products, they should consider the following key factors: (i) Source and Origin (traceability and regional characteristics, (ii) Nutrient content (iii) Quality and Freshness (Freshness and quality standards); (iv) Supplier Reliability (consistency and certification), (v) Regulatory Compliance (standard and regulations; (vi) Storage and Handling (proper storage and handling procedures (vii) Consumer Preferences and Trend (Health trends and dietary requirement) Out of the responses of the interviewed SMEs (n=20) 57% correspond to the model responses (answers) with 50% hinting on reliability of supply through contractual arrangements and freshness and quality standards, 10% on nutritional e.g through bio-fortification and 8% on storage and handling. Other practices are purchase of bulk materials to ensure quality (5%), virtual inspection based on experience (40%). The level of response to the key factors is ≤ 25%, and this reflects low understanding of importance of considering nutritional quality in selecting raw materials among SMEs Thus, this need to be considered in capacity building for the SMEs
	Purchase freshly produced raw material	25	
	Inspect virtually for signs of mycotoxins	10	
	Purchase raw material in bulk	5	
	Inspection based on experience	40	
	Selection of Quality raw materials	10	
	Safety of raw materials	5	
	Appropriate Storage area of raw material	8	
	Selection of raw materials based on the nutritional quality. e.g. bio-fortified beans and maize	10	
Transportation	Use moisture proof packaging (**Authentic packaging material)**	25	Food transportation vehicles must meet a range of requirements to ensure that food products are delivered safely and maintain their quality throughout in the transit. Essential requirements include (i)Temperature control (refrigeration or freezing and monitoring), (ii) Sanitation and hygiene, (iii) proper ventilation; (iv) securing goods (to avoid damage); (v) vehicle maintenance' (vi) traceability and documentation and compliance to regulations
	Hygiene and sanitation of the vehicle, equipment and people	10	
	Vehicles specialized for food products transportation	20	
	Minimize time the time food spends on transit	20	
	Costs of transportation	20	

			The responses given by the SMEs interviewed (n=20) reflects low consideration of nutrition quality during transportation (33%). Failure to mention factors such as temperature control, traceability and documentation is point of concern. Capacity building that includes this aspect should be of importance to the entrepreneurs
Handling and storage	Store materials of different nature in different stores to avoid cross contamination	**5**	Handling and storage of food products require stringent practices to ensure safety, quality, and compliance with health regulations. Important practices include: Temperature control (refrigeration/freezing, monitoring); hygiene and sanitation (personal hygiene and sanitation; Proper storage practices (packaging, shelving raking and separation of goods to prevent cross contamination); Pest control, inventory management, handling procedures, compliance with regulation; emergency preparedness, Quality control (inspection and quality assurance), security (access control and surveillance) The responses given by the SMEs cover ≤ 60% of the essential requirements, by ≤ 20 of all respondents. Thus, demonstrating a very low understanding of the importance of considering nutrition aspects during product handling and storage. Thu, capacity building covering this aspect is invaluable
	Observe the duration of storage depending on nature of materials	**10**	
	Use of pallets and cartons in warehouse/stores	**20**	
	Storage at appropriate temperature according to the nature of the product	**15**	
	Ensuring hygiene and sanitation	**15**	
	Storage of materials in a dry place	**20**	
	Good ventilation	**10**	
	Use of appropriate packaging material	**10**	
	Ensure using special safety gears, (gloves, coats and shoes)	**5**	
Compliance to good manufacturing practices	Emphasize hygiene at all levels of the process flow	**15**	For SMEs in food processing, adhering to GMP is crucial to ensure product safety, quality, and regulatory compliance Foundational areas for SMEs to establish a strong compliance framework for GMP compliance include: Hygiene and Sanitation (facility cleanness and personal hygiene) Food Safety and Quality Control (Ingredients sourcing, control of critical process and product testing) Employees training and regular assessment of their competence
	Use approved preservatives/additives at acceptable amounts	**5**	
	Use of protective gears to ensure food hygiene & safety	**15**	
	Ensure Environmental cleanness	**10**	
	Ensure quality of raw material	**25**	
	Ensure availability of cleaning equipment	**10**	

	Cleanness of packaging materials	**5**	Documentation and traceability Equipment and Facility Maintenance (facility design and layout, equipment calibration and maintenance Pest management and monitoring Compliance to local and international or specific industry standards Have emergency procedures in place (recall procedures and crisis management plan Supplier management (Assess and qualify suppliers, audit and monitor suppliers regularly Risk management (Hazard analysis and preventive controls The responses from the SMEs who participated in study (n=20), only few ≤15% could mention 40% of the fundamental GMP Practices. Thus, implying the critical need of training of SMEs on GMP practices.
	Good customer services	**15**	
	Monitoring temperature during process and during packaging	**15**	
	Use of trained labourers/Man powers	**15**	
	Personal hygiene of processing instruments and environment	**15**	
	Good health of food processors	**5**	
	Preventing contamination	**5**	
	Laboratory analysis of product to ensure compliance	5	
Selection of packaging materials	Use of appropriate packaging materials	40	When selecting packaging materials, food SMEs should carefully consider several factors to ensure the nutrition quality of their food products is preserved. These include (i) Barrier Properties (oxygen, moisture and light, (ii) Chemical Interactions (non-reactive , material, no leaching of particles /molecules into the food), (iii) Durability and protection (mechanical protection and seal integrity), (iv) Temperature sensitivity (thermal stability and temperature control; (v) Shelf Life Considerations (extended shelf life, can easily be labelled for expiry date; (vi) cost effectiveness, (vii) environmental impact ; (viii) compatibility to processing methods; (ix) consumer preference; (x) regulatory compliance Responses from SMEs who participated in the (n=20), 40% mentioned selection of appropriate packaging materials without being able to give details, 10% mentioned purchasing from reliable supplies and 5% consider effectiveness. This indicates that these entrepreneurs lack necessarily know how to consider nutrition value in relation to the selection of packaging materials
	Cleanness of packaging material	5	
	Purchase packaging material from reliable sources	10	
	Most packaging materials have no good quality	5	
	Good quality of packages	20	
	Price of the package	5	

Branding and labelling	Use of appropriate colours to reflect the true origin of the product	15	To reflect nutritional quality of products food processing SMEs when branding and labeling their products should consider several key aspects: (i) Clear Nutritional Information (Nutrition facts panel and serving size); (ii) Claims and Certifications (Health claims and certification); (iii) Ingredient Transparency (ingredient list and allergens information)' (iv) Visual Appeal and Design(nutritional highlights , design and colour); (v) (Regulatory Compliance (local regulation and accuracy); (vi) Consumer Engagement (feedback mechanism and social proof; (vii) Educational Content health tips and serving suggestions) Out of the respondents (n=20), about 43% of responses compared to the models' answers given above hint on nutritional quality in branding and labelling by few numbers of the participants (3-4) out of 20 equals to 15-20% Addressing the key elements, of nutritional quality in branding and labelling food processing SMEs can effectively communicate the nutritional quality of their products, build trust with consumers, and differentiate themselves in the marketplace During the interview 50% of the respondents alluded that cost associated with lab analysis to establish nutritional fact is limiting factor for considering nutritional quality in labelling, whereas 20% mentioned that its not a mandatory criterion for certification by TBS Thus, nutrition training to emphasis on the importance of considering nutrition quality in branding and labelling of products is an urgent needed for these SMEs
	Labelling to reflect originality of products	5	
	Design of the name to be short	5	
	Logo to have attractive Colour and to reflect originality	5	
	Quality of the labels	5	
	Price of the labels	10	
	Labels which contain full information on the importance of the products	20	
	Name of business	5	
	Name of product	10	
	Volume of the product	5	
	Manufacturing and expiring date	10	
	Attractive label	5	
	Few important details of the products	10	
	Quality packaging materials are mostly preferred although they are expensive and sometimes unavailable	5	
	Majority display the ingredients contents but not nutritional content of the products	20	
Existing practices that enhance nutritional quality of a product	Adhering to good manufacturing practices as per trainings obtained from SIDO	35	Enhancing the nutritional quality of food products is vital for food processing SMEs to meet consumer demand and promote better health. Important practices that SMEs should adopt to enhance nutritional quality include: (i)
	Ensure buying raw materials from known source (single	25	

	source) to maintain product quality		Incorporate Whole Ingredients; (ii) Optimize Processing Techniques; (iii) Reduce Added Sugars and Salt; iv) (Fortify Products; (v) Improve Ingredient Sourcing; (vi) Innovate Recipes; (vii) Engage with Nutrition Experts Of the interviewed SMEs (n=20) 28.5% responses hint on practices that enhance nutritional quality as compared to the model answer above. 25% of respondents mentioned solar drying which falls under optimizing processing techniques and 5% mention obtaining raw material from single source which hint on improving ingredient sourcing Thus, capacity building to SMEs to including process techniques to enhance nutritional quality is needed
	Close monitoring and follow ups to make sure the factory workers do not skip some of the procedures which may compromise the product quality	20	
	Maintaining good ratio of raw materials	5	
	Using solar dryer for drying raw materials (avoid direct contact with sunlight especially when drying vegetables)	5	
Benefits of considering nutritional quality of a product	May add value to the product and profit because the market for SMEs products is growing	45	Considering the nutritional value in food products offers a range of benefits for SMEs. These include (i) Increased Consumer Demand; (ii) Competitive Edge; (iii) Enhanced Brand Reputation (iv) Regulatory Compliance, (v) Increased Market Reach; (vi) Higher Profit Margins; (vii) Customer Loyalty and Retention, (viii) Opportunities for Partnerships; (ix) Adaptability to Trends; (x) Consumer education (on healthy eating habits, foster a more informed customer base and support public health initiatives). Basing on the model answer the interviewed SMEs (n=20), 30% of the answers were correct, whereby 45% hint on higher profit margin, 20% hint on increased market reach and 15% hint on consumer education. Therefore, most SMEs need training on the benefits of considering nutritional value in their products.
	Expand customer base	20	
	Getting assurance of the market	10	
	Quality assurance	10	
	Solving nutrition challenges in the community	15	

Appendix 3: SMEs Products Quality control

Response	Responses	(%)	Remarks
Ensuring Consistence in Quality	Purchasing raw materials from single source	25	Ensuring consistency quality control in food processing is crucial for maintaining product standards, meet regulatory requirements, and satisfy customer expectations. Important consideration includes (i) SOPs (documentation and training (ii) Raw Material Control (suppliers management and inspection of incoming raw materials); (iii) Process Control (equipment calibration and process monitoring; (iv) Product Testing and Analysis(in-house and Third part testing); (v) Hygiene and Sanitation (cleaning protocols and personal hygiene) (vi) Traceability (record keeping and batch tracking); (vii) Continuous Improvement (Feedback mechanism and root cause analysis); (viii) Regulatory Compliance (standard and regulations and documentation) Basing on minimum requirements for SMEs 62.5% were hinted by the respondents, at low levels ≤30% whereby 25% hinted on raw material control 30% on process monitoring, 5% feedback mechanism, regular audit, raw material testing. Therefore, more capacity building in terms of training and testing capacity (equipment) is required for the SMEs to ensure consistence quality of products.
	Close supervision at all levels of production	30	
	Follow good manufacturing practices	20	
	Feedback from customers	5	
	Regular auditing by say SIDO	5	
	Inspection or testing of raw material using different techniques depending on the nature of the material	5	
	Through ensuring proper storage conditions and prosper labelling	5	
	Selection of good packages	5	
Compliance to standards	Adhering to good manufacturing standards	20	SMEs in the food processing sector can take several steps to ensure they comply with national, regional, international and industry standards. Compliance is crucial not only for meeting legal requirements but also for ensuring safety, quality, and customer trust. SMEs can navigate this process through (i) Understand

	Maintaining the quality as per TBS requirements	20	Relevant Regulations and Standards (TBS std relevant to the particular food product, The Tanzania Food, Drugs and Cosmetics - Regulations, 2011, Food Labelling Regulation, 2006, Tanzania Food and Nutrition Policy of 1992, Tanzania Food (Control of Quality &Food Hygiene) Regulations of 1998 Sect. 3, Tanzania National Bio-fortification guideline of 2020, The National Health Policy 2007), **International Standards e.g.** from the Codex Alimentarius or specific industry standards; (ii) Implement a Food Safety Management System (FSMS) e.g. HACCP principle even if not certified). (iii) Maintain Proper Documentation (records and SOPs); (iv) ensure Quality Control (testing and inspection and training of employees); (v) Ensure hygiene and sanitation; (vi) stay up-to-date; Engage with certification bodies, (vii) consult experts, develop the culture of compliance through commitment and continuous improvement Basing on the necessary requirements for compliance with standard the respondents (n=20) hint on 57% at very levels (small % of respondents), quality control (20%), GMP and TBS standards (20%), hygiene and sanitation (20%) Most not aware any food safety management systems, nor any food quality and safety regulations, nor proper documentation etc.
	Visual inspection In some cases	10	
	Measurement of pH Strick adherence to hygiene procedures	10 20	
	Measurement of refractive index	5	
	Monitory quality of Raw material, temperature control, processing time and quality of packaging	20	
Considering feedback from consumers	Useful for improving products based on consumers' feedback	30	Obtaining and utilizing customer feedback effectively can be a valuable strategy for food SMEs to improve the nutritional quality of their products. This can be achieved through: (i) Gathering Customer Feedback (Surveys and Questionnaires, Customer Reviews and Ratings, Focus Groups, Product Sampling, Customer Service Interactions); (ii) Analysing Feedback; (iii) Implementing Changes; (iv) Monitoring and Evaluation Out of basic techniques to obtain and utilize customer feedback the respondents (n=20) hint on only 25%, i.e. only collection, no analysis, implementation of changes
	Use social media and feedback questionnaire to collect customer's feedback	15	
	Through product promotion, customer interviews, customer	35	

	visits and telephone calls		and monitoring and evaluation. Furthers scores were very low 10-30%. Need training on the means of gathering and utilizing customer feedback
	Using suggestion box	10	
	Using link specifically for customers to provide their feedback by responding to questions	10	
	No means for feedback	30	
Ensuring product safety	Adhering to GMP	25	Ensuring food safety is critical for food processing SMEs to protect consumer health, maintain product quality, and comply with regulation. Steps for SMEs to ensure food safety: (i) Develop and implement HAACP principles even if not certified; (Adopt GMP (facility cleanness, personal hygiene and training), (iii) Maintain Proper Food Handling Procedures (temperature control, practices to prevent cross contamination, ingredient sourcing), (iv) Implement Quality Control Measures (inspection and testing and traceability; (v) Ensure Proper Documentation and Record-Keeping (vi) Regular audit and inspection; (vii) Foster culture of food safety 71% of the respondents (n=20) hint on the standard requirements of food safety with very few hinting on an attribute (GMP 25%, Ingredient sourcing 30%, documentation and auditing (10%); process monitoring (5%) 20% does nothing to ensure food safety. Food safety is thus a serious gap especially with SMEs food processors and stakeholders including supporting organizations need to focus effort on this aspect.
	Obtaining raw materials from a single source	30	
	Use TBS standard as benchmark though not certified	10	
	Use experts advise	5	
	Use MART MAUZO (keep record of customers)	5	
	Monitor processing and packaging to maintain the original status of product	5	
	Use external audit biannually (SIDO)	5	
	Use no system	20	
Constrains in	Limited technological know how	30	

<table>
<tr><td rowspan="5">maintaining product quality</td><td>Challenges associated with getting quality raw materials</td><td>30</td><td rowspan="5">Food processing SMEs (Small and Medium Enterprises) often face several constraints in maintaining product quality
According to the SMEs interviewed (n=20) major constrains in maintaining product quality include limited technological know-how (30%), accessing quality raw material (30%), limited resources including capital to acquire processing machinery (20%), low knowledge about quality aspects (10%), unavailability of quality packaging materials (5%) and market competition (5%) Thus, training on food processing technologies and quality assurance is required. Also training on how to obtain capital especially on how to acquire qualify for loan from commercial banks, financial management is dire need for the SMEs. Thus, a model for integration of business and technological capacity building</td></tr>
<tr><td>Limited resources including capital to acquire processing machinery</td><td>20</td></tr>
<tr><td>Low knowledge regarding quality aspects</td><td>10</td></tr>
<tr><td>Poor availability of packaging materials</td><td>5</td></tr>
<tr><td>Market competition</td><td>5</td></tr>
<tr><td rowspan="5">Quality prioritization vs production costs</td><td>Difficult because of high costs associated with production of high-quality products.</td><td>65</td><td rowspan="5">For food processing SMEs, balancing quality and production costs is crucial for long-term success. Some strategies need be adopted to help prioritize quality while managing costs. These may include
(i) Adopting quality management system such HACCP. This can reduce waste and improve efficiency, which can help control costs in the long run.
(ii) Invest in Training of employees on quality control practices and standards Well-trained staff are less likely to make errors that can compromise quality and lead to costly rework or product recalls.
(iii) Focus on regular review and Process Optimization to enhance efficiency streamlining operations can reduce waste, minimize downtime, and improve product consistency, all of which can help balance quality with production costs.
(iv) Invest in Technology: modern equipment and automation can lead to significant long-term savings. Technology can improve precision, reduce waste, and enhance consistency, which supports both quality and cost management
(v) Build strong relationship with suppliers to ensure consistent supply of quality raw materials. This plus bulk purchase can help to manage cost</td></tr>
<tr><td>Produce own raw and certify some suppliers</td><td>10</td></tr>
<tr><td>Challenges are addressed using standard operating procedures</td><td>5</td></tr>
<tr><td>Reduce the amount but maintain quality</td><td>5</td></tr>
<tr><td>Avoid the use of agency to produce the product to maintain</td><td>10</td></tr>
</table>

	Manages the cost of Production while maintain quality.	5	(vi) **Use lean manufacturing principle which focus on reducing waste and improving efficiency** (vii) Engage in continuous improvement (e.g. Kaizein) this helps maintain quality while finding cost-saving opportunities. (viii) Monitor KPIs of quality and cost, to find out where to allocate resources and identify areas where improvements can be made. (ix) Prioritize preventive maintenance to minimize downtime and repair costs, which helps in maintaining production efficiency and quality. (x) Foster a culture of quality The interviewed SMEs (n=20) hinted very little on the strategies to balance quality and costs of operations (15%) who mentioned employment of standard operating procedures and producing own of raw materials. This should be an area of focus by support organization, as well, other stakeholders to help the entrepreneurs understand how optimize costs while maintaining quality

Appendix 4: Support from Stakeholders

Capacity building	Receive trainings from different stakeholders (including SIDO, TBS and NGOs BRELA, TCCIA) about good manufacturing practices	50%	The interviewed SMEs (n=20) indicate to have received training from different organizations including SIDO, TBS, NGOs, BRELLA and TCCIA (50%), funding of Operation from NGOs (10%), training and equipment support from ANZA (15%), Have not received support (25%) SMEs can be assisted to access finances for investment and operation through various strategies e.g. to access Government Grants and Subsidies through guidance on how to search and apply, eligibility criteria, to assist SMEs in negotiations with financial institution,
	learn from media, other successful SMEs and public events including *nane nane*	10	
	Received support from ANZA (including training and equipment	15	

	Received financial support from NGOs to operational costs	10	connecting SMEs to venture capital, business development, partnership and networking, information on tax incentives etc)
	Have not received any support	15	
Encounter with ANZA	Have heard of ANZA	60	Among interviewed SMEs (n=20), 60% have had encounter with answer, 60% have received training from ANZA Other interviewers please complete this section
	Received invaluable business training Training on record management, financial management, differentiating between consumer and customer which has helped to advance marketing	60	
	Would like more training on nutrition and also awareness to consumers about nutrition	20	
	Have not heard about ANZA	20	

Appendix 5: SMEs` Future direction

Technology advancement impact on nutritional quality of product	May help in product diversification, also improving packaging	5	SMEs interviewed (n=20) view technology as a vehicle for product diversification, 20% see social media as means of fast-tracking marketing functions whereas 62.5 consider social media as a facilitator for learning; 40 facilitate marketing and sales, 20% speed up communication Thus, the respondents missed out how technology advancement can impact nutritional quality of their products for example (i) Enhanced Ingredient Analysis through advanced analytical tools and real time monitoring (ii) Improved process technics such Minimally **Invasive Processing t**echnologies e.g. high-pressure processing (HPP) and microwave-assisted thermal sterilization (MATS) can preserve nutrients better than traditional methods (iii) Ingredients innovation e.g. e.g., probiotics, prebiotics, plant-based proteins that can enhance the nutritional value of products, also fortification using essential micronutrients can significantly improve
	Technology such as social media may help to faster marketing of products	20	
	Facilitates self-learning through the social media	62.5	
	It enhances time management	20	
	It facilitates marketing and sales	40	

	Speeds up as it makes communication easy	20	product quality; (iv) **Automated Production Systems** can improve consistency in product formulation and reduce human error, leading to more reliable nutritional quality across large batches
			Here there only 11 respondents, please if you have filled in here do so!!
Towards improving nutritional quality of products	Not to compromise quality for financial gains but to focus on business sustainability	25	The interviewed SMEs consider the following as their future direction (prioritize business sustainability (25%), Deeper knowledge and skills on food processing and nutrition (20%), means of sourcing high quality raw material (15%), practicing GMP (15%), Consulting food and nutrition experts to improve nutritional quality of their products (15%), Work hard to improve nutritional quality (10%) To achieve both business sustainability and nutritional quality, there is a need of a model which integrates business development skills and food and nutrition capacity building
	Seek to gain deeper knowledge and skills about food processing and nutrition quality	20	
	Consider selecting high quality raw materials for good products	15	
	Following good principles of production	15	
	Work hard to improve quality	10	
	Consult food and nutrition experts to improve product quality	15	

7.0 Supplementary Materials

7.1 Below are some of photos showing some of the food products processed by SMEs


MWAGEGI
BETTER KEEP IN FRIDGE AFTER OPEN
Faith Produ
Sweety
UBUYU
Proudly Tanzania


MORINGA OLEIFERA


SOYA
CASHEWNUTS
500g
SOYA GROUP
Manufactured by geedesa poduct
Tel:+255753176262
Email:geridaniel43@gmail.com


TUNU
Tea
Masala
100 gm