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Improving governance arrangements for vegetable value chains in sub-Saharan Africa: the case of Bahir Dar, Ethiopia and Cotonou, Benin

RESEARCH ARTICLE

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Abstract

Improved governance arrangements are central in strengthening value chains with sustainable, resilient farming and healthy nutrition. This study explored governance arrangements important to the vegetable value chains in Food System Labs in Bahir Dar (Ethiopia) and Cotonou (Benin). The study collected data through face-to-face interviews from different actors including input suppliers, producers, processors, wholesalers, retailers and from different supporting institutions such as credit organizations in the vegetable value chains in the two regions. The paper uses descriptive analysis for quantitative data, content analysis for qualitative data, and the strengths, weaknesses, opportunities, and threats (SWOT) analysis method in the context of the indicator-based assessment framework to examine governance arrangements. Results indicate that multiple but also alternating modes of governance arrangements exist along the vegetables value chain. Spot market relations dominate at the successive stages of the value chain where different actors randomly interact at every transaction. Relational governance in terms of information sharing is notable among producers who attach high relevance to farmer associations as well as traders who largely trust and source information from amongst themselves. The value chains are typical of limited collaboration between actors coupled with weak processing skills. In addition, unconducive storage facilities undermine the potential of upgrading despite changing preferences and growing demand for vegetables. The study recommends development and strengthening of actor organizations such as cooperatives and associations, provision of an enabling environment where vegetable value chains can thrive, and national level efforts to develop post-harvest handling skills and infrastructure, as well as exploitation of last mile digitization initiatives to increase competitiveness of vegetable trade.

Keywords: governance arrangements, sub-Saharan Africa, value chain, vegetables
JEL Codes: Q13, Q18

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1. Introduction

Today, approximately three billion people cannot afford a healthy diet with estimates highest for Africa (78%) followed by Asia (44%), Latin American and the Caribbean (23%), Oceania (3%), and Northern America and Europe (1%) (FAO *et al.*, 2023). While agriculture forms a significant portion of economies, the sector is confounded by several challenges in the agribusiness ecosystem especially for African countries. Key, among them are poorly functioning value chains which are characterized by low production and productivity, poor quality of harvest, lack of standardization, lack of market support services, insufficient roads infrastructure and high transportation costs, high taxes as well as poor governance practices and structures (Africa Union, 2017).

Current advances towards globalization and high urbanization rates have increasingly put pressure on agricultural value chains affecting the food and nutrition landscape. Lack of efficient value chains leads to shortage of food types in diets and consumption of expensive alternatives. Poorly functioning business environments limit business growth by increasing costs and risks thereby decreasing competitiveness and investment among others (Webber and Labaste, 2009). This has negative implications to accessing sufficient, safe, nutritious food to meet dietary needs and food preferences for an active and healthy life through price and affordability (Herforth *et al.*, 2020). It necessitates direct efforts towards creating an enabling environment to facilitate the development of value chains (Branca *et al.*, 2021). Governance structure (GS) is one central aspect of the value chain analysis that highlights the importance of inter-relationship agreements between different actors within the value chain such as farmers and traders (Sharma *et al.*, 2023). GS describes the rules and procedures under which the food supply chain operates with a possibility to take different forms depending on the market actors within the system.

Value chain governance denotes the relationship among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use. In other words, governance is about power and the ability to exert control at any point along the value chain where some actors set and/or enforce parameters under which others in the chain operate. This is a critical part of the enabling environment and require prioritization in projects that aim at streamlining the functioning of agricultural value chains with a great potential for improvement of Africa's agribusiness landscape. Besides, reorienting food systems that deliver healthy diets demands for better governance and accountability (Herforth *et al.*, 2022).

Existing literature on governance structures within the agricultural value chain has been studied by several authors. Fritz *et al.* (2008) used transaction cost analysis in investigating the hypothesis that trust-based relationships can be established within the specific governance structures chosen by the agents in the food sector in general. Based on three case studies from Italy they found corroboration for this hypothesis. Abel *et al.* (2019) investigated how the African indigenous vegetables value chain governance influences farmer's participation in the value chain in Kenya. The study recommends the inclusion of famers in market management committees and the establishment of binding contractual arrangements with supermarkets. Sharma *et al.* (2023) found that governance structures within the cauliflower and tomato sectors in Bangladesh were significantly affected by education of farmers, distance to the nearest market, access to extension services, access to price information, trust commitment, transaction in specific investment, preferences of diversification, farm size, transactional uncertainty, and access to producer's cooperative. Ouma *et al.* (2017) analysed governance structures in Uganda's smallholder pig value chains by applying the New Institutional Economics framework. They found that most relationships at the pig production node of the value chain are based on spot market governance structures supported by personal relationships and trust.

With the role of governance therefore, this research builds on two local food systems case studies in Benin and Ethiopia to assess governance arrangements of the vegetable value chain and identify potential improvements with a focus on improving connections between actors as well as increasing access to healthy food products in view of the existing strengths, weaknesses, opportunities, and threats. Through a case study approach, the aim is to develop and test in situ governance arrangements of local food systems that can help local decision-makers identify suitable configurations for stakeholders' interactions towards more efficient and sustainable vegetable value chains.

The study specifically answers the following research questions: (1) How do actors operate along the vegetable value chains in Food System Labs (FSLs) configurations? (2) What gaps exist in value chain operations with respect to governance structures and roles? (3) What are the potential improvements in the vegetable value chain governance with a focus on increasing access to healthy food products and improving connections between actors? (4) What innovative governance arrangements exist for pilot in the FSLs configurations with reference to strengths, weaknesses, opportunities, and threats of vegetable value chain?

2. Analytical framework

Value chains encompass the organization, coordination and linkages, power dynamics, and governance between actors (Helmsing and Vellema, 2011; Ingram *et al.*, 2018). Governance has been linked to both economic and social upgrading in various global value chains (Kissi and Herzig, 2024). Peterson *et al.* (2001) distinguished five major governance structures, namely spot/cash markets, specification contracts, relation-based alliances, equity-based alliances, and vertical integration. On the other hand, Gereffi *et al.* (2005) developed five types of global food chain governance namely, market, modular, relational, captive, and hierarchy which range from low to high levels of explicit coordination and power asymmetry. Food chains are unique largely due to the perishable nature of inventory and seasonality but also the special consumer demands for food safety and quality, which significantly affects the logistics of each stage in the food chain (Kline *et al.*, 2016).

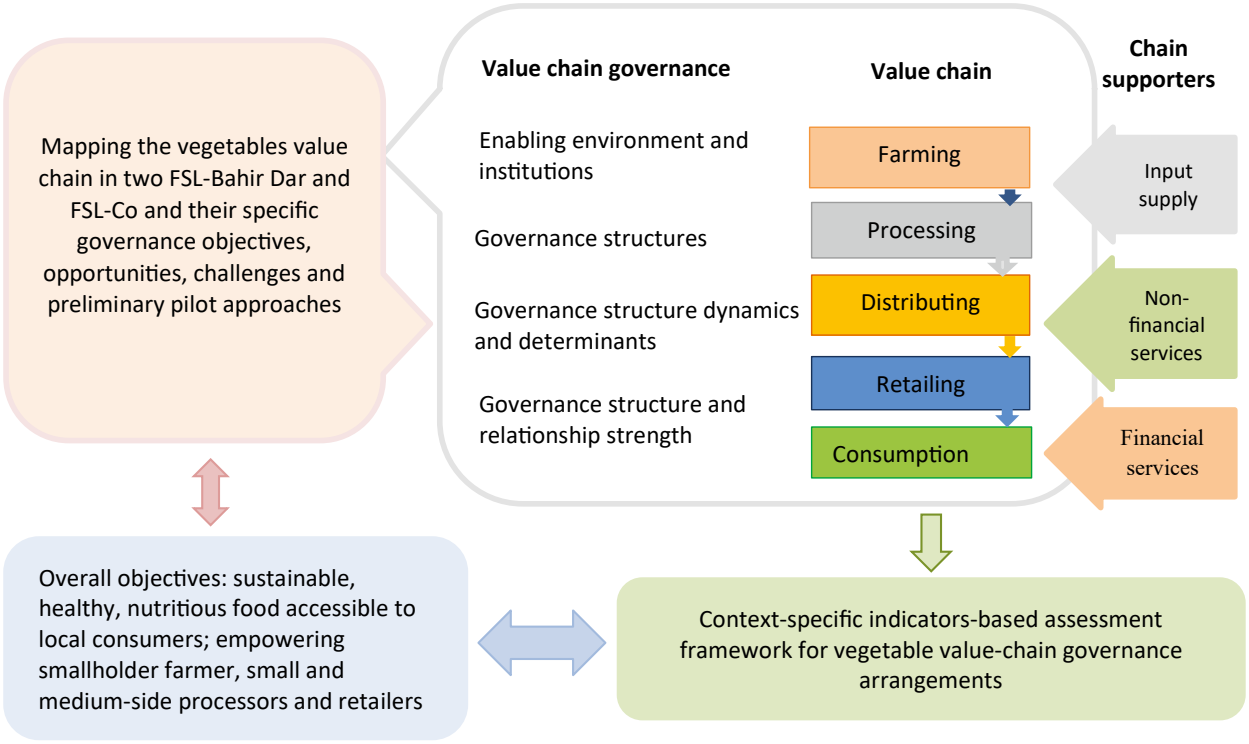

Figure 1. Assessment framework (Chen *et al.*, 2021).

Chen *et al.* (2021) elaborated a more comprehensive assessment framework aimed at strengthening the diversity, sustainability, resilience and connectivity of food systems (Figure 1). This study further presents critical components of food governance arrangements including the enabling environment and institutions, Governance structures, Governance structure dynamics and Governance structure and relationship strength. The current study therefore, adopts the framework and indicators described to identify governance arrangements of the vegetable value chain for improved governance. The framework in Figure 1 identifies four governance areas including the enabling environment and institutions, governance structures, governance structure dynamics, as well as relationship strengths with attention to sustainability, healthy and nutritious food products for local consumers, empowering small and middle-sized farms, processors and retailers. For each food chain governance aspect, a number of suitable indicators are identified as underpinned by previous research (Gereffi *et al.*, 2005; Herforth *et al.*, 2022; Peterson *et al.*, 2001).

The indicator set is expectedly applicable in food chain contexts where focus is on fostering healthy diets among local consumers and sustainable food production as well as the empowerment of food chain actors. This study therefore, adopted this assessment framework to get evidence of the governance arrangements that can help decision-makers improve the efficiency and functioning of food chains.

3. Methods

The study collected primary data using structured questionnaires. Data were collected from different actors along the value chains including from input suppliers, producers, processors, wholesalers, retailers and from different supporting institutions such as credit organizations.

3.1 Description of the case study areas

The study was conducted in two Food System Labs (FSLs) within Sub-Saharan Africa (SSA), namely FSL-Bahir Dar in Ethiopia (Fig. 2A) and FSL-Cotonou in Benin (Fig. 2B). To understand the value chain

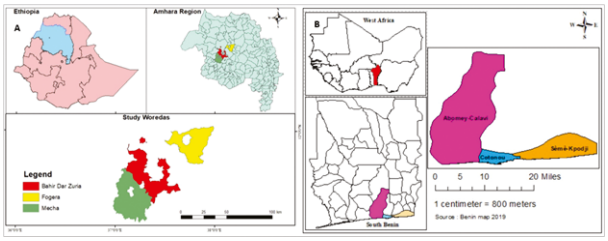

Figure 2. A map showing the location of Bahir Dar (Ethiopia) (A) and Cotonou (Benin) (B).

governance arrangements, the two study areas were purposively selected based on their relative importance to communities for better nutrition and welfare with respect to different aspects elaborated in Chen *et al.* (2021) framework, including:

(1) the lead actor/initiator where a varied range of food chain actors play key roles in food chain functions from production, processing, distribution to consumption;
(2) the geographical heterogeneity in terms of food chain governance arrangements, institutional, economic, environmental and social conditions to ensure cross-cases exchange and learning, as well as;
(3) innovativeness and learning potential focusing on reconnecting sustainable food production with food consumption, healthy diet within local food system challenges.

This study focused on the most popular vegetables namely, tomato (*Solanum lycopersicum*) and onion (*Allium cepa*) of the Food Systems Lab in Bahir Dar (FSL-BD), Ethiopia; and African basil (*Ocimum gratissimum*), carrots (*Daucus carota*), and African eggplants leaves (*Solanum macrocarpon*) of Food Systems Lab in Cotonou (FSL-Co), Benin. Ethiopia's diversified agro-climatic conditions are suitable for producing a variety of vegetable crops with tomato and onion taking an economically important place (Desalegn, 2021; Yeshiwas *et al.*, 2024). Unlike production areas concentrated in the Rift Valley area primarily due to easy access to irrigation water, smallholder farmers produce vegetables under rain-fed conditions.

In Benin, vegetables are produced from different systems and locations, namely; lowland vegetable farming system in rural areas as well as urban and peri-urban production systems. The irrigated system is the main vegetable cropping system in the country followed by the rainfed system. The Governments of Ethiopia and Benin have given high priority to the vegetable sub sector for its potential to meet the current and future food-system challenges as well as boost agricultural development in the two countries (Hengsdijk *et al.*, 2021; Houessou *et al.*, 2021). Food System Labs were supportive in developing prototype pathways that address complex challenges along the vegetable value chains in Ethiopia and Benin, but also generating usable knowledge with equitable collaboration for sustainable food systems. The study thus, was part of a regional research and innovation-based project implemented in six African countries to create more sustainable, equitable and resilient food systems. The intervention took the Food System Labs (FSLS) approach in collaboration with an array of stakeholders including social entrepreneurs, farmers, activists, businesses and policy makers.

3.2 Sampling and sample size

Determination of respondents at every value chain stage purposively considered gender involvement with at least 50% of the interviewees being women. Other criteria were the geographical location of vegetable trading centres, size of markets and availability of value chain participants. From FSL-Bahir Dar, data were collected from 157 value chain actors spread over three (3) districts in Amhara Region. The crops targeted were onions and tomatoes. Northwestern Ethiopia was purposively selected as the main vegetable producing area. Using the proportionate sampling technique, a total of 53, 52 and 52 value chain actors were sampled from Bahir Dar Zuria, Fogera, and Mecha districts, respectively. With generated lists of value chain actors, the simple random sampling technique was employed to select respondents, namely, producers (60), middlemen (10),

transporters (10), wholesalers (10), retailers (10), consumers (20), input dealers (10), extension services providers (8), revenue offices (6), finance and credit providers (5), bureau of agriculture (3) and traders (5) at regional and district levels.

From FSL Cotonou, similarly three districts namely, Cotonou, Abomey-Calavi and Sèmè-Kpodji, dealing in carrot, African basil and African eggplant, were sampled. Abomey-Calavi and Sèmè-Kpodji are neighbouring communes and peri-urban areas to Cotonou. For both producers and traders, generated lists of value chain actors were obtained from market gardeners and traders associations, respectively. Using these lists, a total sample of 83 producers were sampled using the simple random sampling method. This was followed by proportionate sampling technique used to select market gardeners by district that is, Cotonou (41), Abomey-Calavi (10), and Sèmè-Kpodji (32). The sample distribution of traders (retailers/wholesalers) generated using the simple random sampling technique were as follows; Cotonou (41), Abomey-Calavi (9) and Sèmè-Kpodji (34). Other value chain actors were sampled using the proportionate sampling technique that is, processors (9), transporters (14), agro-inputs dealers (2), credit providers (8), labelling organizations (3), Territorial Agency for Agriculture Development (2), and Urban Gardeners Associations (4).

3.3 Data and data collection

In both study areas, quantitative data were collected from sampled commodity value chain actors during the face-to-face interviews. Individual survey questionnaires using the computer-assisted Personal Interviewing (CAPI) tool were used to collect individual level data in separate modules of socioeconomic demographics; food chain commodity; access to resources and utilization; procurement; storage; marketing channels; sorting/grading products; sociocultural and institutional elements; governance and facilitating functions. The survey also captured data using some qualitative open-ended questions that captured respondents' opinions and knowledge on the vegetable value chain's strengths, weaknesses, opportunities and threats. The data collection was conducted in a period of four weeks from August to September 2021.

3.4 Data analysis methods

The methodology employed follows Yin's (2003) researcher's model, which consists of analyzing the case studies in an exploratory and descriptive manner. It is Yin's view that, when 'the process has been given careful attention, the potential result is the production of a high-quality case study which implies that a complete research process includes the plan, design, preparation, data collection, analysis and reporting (Yin, 2014).

In our study, the data were cleaned and analyzed using Excel and Stata statistical software packages. To understand the socio-demographic characteristics of the sampled actors, descriptive statistics such as frequencies, percentages, means and standard deviations were computed.

In addition, qualitative data were analyzed using the content analysis approach to establish a framework of thematic ideas. The presences of certain words, phrases, sentences, and themes, or relationships of such certain words and themes in the interview texts were quantified via coding. Frequencies of each code category were calculated using Excel to identify the most relevant issues with the higher value of recurrence in the text regarding strengths, weaknesses, opportunities, and threats for whole supply chain. Content analysis can identify the intentions and focuses on focus group discussions and open-ended questions. The tool also identifies the occurrence of concepts in the text and tries to examine the relationships among codes in the texts. Finance and credit providers, labelling organizations, territorial agencies for agriculture development, consumers, and governmental bureaus were not considered for this analysis since the questions were focused on the potential for entrepreneurship in the supply chain.

Finally, a strengths, weaknesses, opportunities, and threats (SWOT) analysis was used to examine potential innovative improvements to governance arrangements in view of existing strengths, weaknesses, opportunities, and threats.

4. Results and discussion

4.1 Vegetable value chain actors in Bahir Dar (Ethiopia) and Cotonou (Benin)

In both Food System Labs (FSLs), vegetables undergo different successive processes, namely: procurement, storage, sorting or grading, and distribution with the main actors being input dealers, producers, middlemen/brokers/assemblers/collectors, transporters, retailers, wholesalers, and consumers. Actors performing facilitating functions include extension service providers, development agents, revenue officers, finance and credit providers, a regional office of agriculture, and the Bureau of Trade.

4.1.1 Input supply

Agro-input outlets stock agro-inputs including seeds, fertilizers, pesticides, herbicides, and farm equipment. Men largely own these input shops (67%) in FSL-Bahir Dar while half of the sampled input dealers owned the input shops in FSL-Cotonou under partnership terms and are commonly located close to production areas. Almost all producers in FSL-Bahir Dar purchased seed and fertilizer as well as pesticides (96.6%). In FSL-Cotonou, 95% of the producers bought seed and 93% purchased fertilizers. In other words, vegetable producers largely depended on agro-input dealers for farm inputs including seeds, fertilizers, agrochemicals, and inputs for every production cycle. Some input dealers provided technical assistance to their clients especially on application of agrochemicals and fertilizers substantiating the role of extension service delivery.

4.1.2 Production

In FSL-Bahir Dar, a majority of farmers grew vegetables on averagely 0.5 to one acre of land largely using irrigation practices. In FSL-Cotonou, vegetable producers operated comparably smaller plots ranging from 0.2 to 0.4 acres. Farmers mostly owned plots under which they grow their vegetables with a few farmers operating on rented land. In both countries, vegetable production involved low levels of improved input use amidst the high commercialization of the vegetables value chain with only 6.3% and 1.0% in FSL-Bahir Dar and FSL-Cotonou, respectively. In FSL-Bahir Dar for instance, about 84.1% and 87.0% of the produced tomato and onion, respectively, were for sale while only 6.8% tomato and 6.3% onion retained for home consumption. Notably, producers lost slightly more quantities in form of post-harvest losses estimated at 9.0% for tomato and 6.7% onion harvests. Similar to FSL-Bahir Dar, most of the vegetable produce estimated at 96.7%, 97.1% and 96.7% for carrots, basil and egg plants, respectively, was sold in FSL-Cotonou. Of the total harvest, producers lost about 2.9% of basil, 3.3% of carrots and 3.3% of eggplants in post-harvest handling activities. Most importantly is that producers in both countries grew more than one vegetable at a time including amaranth, beetroot, cabbage, celery, pepper, bitter leaf, and lettuce, as a form of diversifying income sources.

4.1.3 Trade

In both countries, the largest share of vegetables produced was traded going through different channels from the producer stage to consumer within domestic markets. Tomato producers sell through two main channels, namely (1) about 81.8% is channelled to traders including middlemen, wholesalers, and finally retailers; and (2) about 18% is directly sold to consumers. Similarly, the majority of onion producers sold to middlemen (71%), followed by aggregators (37%) with little produce sold to consumers. For all vegetables, retailers tend to undertake different value addition practices including sorting, reapportioning into smaller bundles, cutting, and packing of vegetables for sale to consumers. While both males and females traded vegetables, the large proportion of traders were male for both tomato (71%) and onion (76%) value chains.

In FSL-Cotonou, the largest proportion of the marketable basil produce was channelled to traders, particularly, retailers (82.4%) followed by wholesalers (14.4%) with smaller basil quantities channelled directly to

consumers (1.8%). In rare cases, a few basil quantities (0.7%) were exported, a consistent finding with Santacoloma *et al.* (2021) that vegetable production is largely oriented towards domestic markets. The carrots and eggplants value chains followed the same trend where the highest proportion of vegetables was channelled directly to retailers (79.1% and 83.3%), followed by wholesalers (16.7% and 14.9%), respectively. Smaller quantities were channelled to exporters (2.1% and 0.3%), consumers (1.2% and 1.5%). It is also worth mentioning that producers often sold standing vegetable crops. In such arrangements, traders provide a ready market for producers' vegetable farms and assume any associated risks that may arise thereafter. On the other hand, farmers earn low prices from the sale of standing crop because they lose ownership of the crop at early stages of the value chain. Nonetheless, some producers maintained their farms until harvest to sell fresh vegetables to traders or directly to consumers.

Vegetable processing was clearly an additional activity in FSL-Cotonou with a few carrots directly channelled to processors (0.9%). In FSL-Cotonou, females dominated trading of vegetables. Comparably, vegetable producers in FSL-Bahir Dar largely dealt with traders who resold vegetables to fellow traders while FSL-Cotonou producers sold the largest share directly to consumers. In both countries, consumers were largely comprised of individual buyers with a few institutional and producer organizations. In FSL-Bahir Dar for instance, only a few producers had market linkages to institutional buyers and producer organizations located in North Mecha woreda. Farmer organizations in Africa are increasingly getting involved in marketing functions with success not only related to cash crops, but also high-value commodities - the case of horticultural export crops in Kenya. Widadie *et al.* (2022) argue that producer organizations upgrade their value chains through linking vegetable smallholders with modern retail markets largely changing the nature of trade to contractual arrangements as well as enhancing member access to input and output market services.

In both countries, traders mostly purchased stock on a weekly basis most probably due to the associated short shelf life of vegetables. Nonetheless, the frequency at which different traders, namely, middlemen, wholesalers and retailers purchased vegetables varied, ranging from once a week to twice a week, fortnightly, and monthly in rare cases depending on the scale of operation and the market demand. Traders largely used hired means to transport vegetable produce to markets, and in FSL-Bahir Dar, trucks and carts were a common means of transport with just a few traders who handled small quantities using public vehicles, own bicycles, on foot by carrying produce on heads/shoulders or animal transport.

Generally, vegetables were stored using different traditional methods in efforts to keep the produce fresh. Tomato stock was largely stowed on bare ground (56%) followed by the use of wooden boxes (39%) and room facility (6%). Onion was mainly stored on bare ground (51%), in wooden boxes (26%) as well as stacking produce in sacks or off the ground in a room facility (23%). Carrots and basil were commonly stored in aerated baskets (54%, 42%), freely on stands at home or their market stalls (25%, 47%) while the rest used sacks (21%, 11%), respectively. Eggplants were largely stored on stands (55%) and aerated baskets (46%).

Findings further indicated that spoilage of vegetables occurs at differing stages of post-harvest management. Tomato spoilage was more during transit (6%) than storage (4%) and at the point of sale (4%). Onion spoil more at the point of sale (3%) than during transit (2%) or storage (2%). Carrots, basil and egg plants spoil more at storage (4%, 8%, 5%) than at the point of sale (2%, 2%, 2%) or during transit (0.3%, 0.4%, 1%), respectively. Specifically, spoilage during storage largely affected producers and those in FSL-Bahir Dar since vegetable producers in FSL-Cotonou tend to sell off standing crops ready for harvest. In both countries, vegetable spoilage at the point of sale largely affects retailers. While temperature conditions are relatively conducive, different actors were most challenged by rodent attacks - tomato (83%), onion (72%), carrots (61%), basil (53%) and eggplants (55%) at the different storage facilities. Consequently, storage facilities for vegetables remained a major concern at the successive stages of the value chain. Its notable that vegetable growth and development are influenced by different environmental factors where high temperatures affects photosynthesis, respiration, aqueous relations and membrane stability while also affecting negatively the post-harvest processes of the vegetables (Motsa *et al.*, 2015).

During harvest, the quality of vegetables supplied on market keeps differing when traders stock new harvests on the routine schedules. The quality of older stock keeps deteriorating due to the poor storage facilities amidst the limited vegetable value addition technologies. This also comes with a corresponding change in prices with older produce selling at lower prices just to cash back some of the invested capital while fresh produce earns the prevailing market prices. While some actors neither sorted nor graded onions with a perception that the onion produce is always of the same quality, a number of other vegetable actors sorted, or graded their stock to take advantage of product differentiation. In FSL-Bahir Dar, producers sold graded vegetables to consumers as well as traders, especially wholesalers and retailers while producers in FSL-Cotonou mainly sell graded vegetables to retailers. This implies that traders are key determinants of the price vegetable producers in FSL-Bahir Dar eventually receive based on the quality attribute while retailers take more advantage in FSL-Cotonou. In both countries, all trader categories mainly sold graded vegetables to consumers hence, enjoying more control over the final prices of produce. Grading vegetables is done based on several attributes such as the extent of skin damage, colour, size, shape, produce damage and taste.

4.2 Enabling environment and institutions for the vegetable value chain

An enabling environment is critical for the development of value chains as it spurs business growth by reducing costs and risks while increasing competitiveness and investment. In both countries, several institutions ensure an enabling environment for the vegetable value chain in terms of production, trading, finance and advisory services. In FSL-Bahir Dar, vegetable actors still operated some of their traditions and societal norms such as *Ikub*, which is a traditional savings and credit method and *Debo*, a cultural approach of working together. These are common interventions equally accessed by both genders alongside the NGOs and private sector microfinance schemes. As an important attribute for capitalization of the vegetable value chain, *Ikub* provides affordable financing to both farmers and traders, namely, middlemen (90.0%), transporters (90.0%), wholesalers (85.7%), producers (79.7%) and retailers (70.0%). In the same way, some vegetable value chain actors (41%) access microfinance schemes in FSL-Cotonou. The Promotion of Agricultural financing towards Agricultural Enterprises (ProFinA) intervention supports increased access to finances in rural areas in addition to a number of organizations that provide access to microfinance for increased investment among poor women. Additionally, vegetable traders largely operate cash-based transactions that further encourage small business investment in the vegetable sector.

In Bahir Dar, *Debo* is another social intervention that facilitates timely execution of activities at group level mainly at the production stage of the vegetable value chain. *Debo* facilitates collective action among producers but also attracts incentives in the form of seedlings and prizes to excelling performers from both private and public interventions. In FSL-Cotonou, a growing number of vegetable value chain actors are increasingly joining associations to advantage of building business connections, easy access to finance, supplies, current market information and trends as well as conflict management.

Another aspect was that vegetables continue to exhibit an ever-growing demand in both countries with prioritization in strategic development plans at national level mainly owing to their nutritional importance. Vegetables are typical of short maturity periods and thus associated with multiple harvests especially with the existing government support to develop irrigation technologies for small-scale commercial producers. With its price elasticity of demand, producers tend to earn relatively more profits during the off-peak seasons. In FSL-Bahir Dar for instance, tomatoes and onions are among the most popular vegetables often used in a variety of dishes as raw, cooked or processed products and hence, associated with a ready market (Desalegn, 2021). A number of interventions to improve availability and access to vegetable commodities for improved nutrition are promoted under the Government of Ethiopia's National Nutrition National Nutrition Program. In FSL-Cotonou, the Conseil National de l'Alimentation et de la Nutrition (CAN) and the Agence Nationale de l'Alimentation et de la Nutrition (ANAN) are continually encouraging interventions to reduce malnutrition among communities with training for increased consumption of vegetables. Notably, the Integrated School Feeding Programme (SFP) supported by the government and World Food Programme currently expanding beyond distributing legumes and cereals to supplying vegetables and fruits bound to enhance sustainable market

linkages for smallholder vegetable producers and traders. In addition to improving food and nutrition security, the Projet d'Appui aux Infrastructures Agricoles dans la Vallée de l'Ouémé (PAIA-VO) project is further investing in improving agricultural infrastructure for irrigation, transport networks, storage and marketing, agro-processing as well as capacity building of all value chain actors. Besides, the increasingly changing preference for healthier diets as communities in both countries position at the heart of fighting malnutrition further spurs the demand for vegetables that are relatively cheaper and rich sources of vitamins and minerals.

In both countries, the governments were very instrumental at capacity building and continuous trainings, regulation of agrochemical use for health and nutritional safety, illegal trading inspection, as well as the development of improved technologies. In FSL-Bahir Dar, findings indicate that the majority of producers receive production related information from mainly the government (63%), followed by fellow producers (60%), traders (58%), radio (32%), telephone (28%), and NGOs (27%). Producers rated government, fellow producers, mobile phones, and NGOs to be high relevance sources of information as traders and radio were of average relevance. In FSL-Cotonou for instance, research institutions and organizations such as International Institute of Tropical Agriculture (IITA) and ABSSA recently developed technologies that increased productivity while maintaining properties of safe foods that are free from toxins and contamination. The government itself, through the National Plan for Agricultural Investments and Food and Nutritional Security aims to increase by 25% the production of vegetables.

Notably however, a few actors access technical support despite efforts to fill existing capacity gaps. In FSL-Bahir Dar for instance, only 42% (producers), 50% (middlemen), 43% (wholesalers) receive technical support. As a result, non-government organizations substantiate the national efforts to improve performance and increase competitive advantage of vegetable value chains through free distribution of improved inputs, training of good agricultural practices including integrated pest management, organic production and irrigation practices but also post-harvest handling skills, business management and provision of transportation services. Involvement of the private sector is led by NGOs (81%) such as SNV Ethiopia, Mennonite Economic Development Associates (MEDA), Organization for Rehabilitation and Development in Amhara (ORDA), Feed the Future, Save the Children, Agro-Business Induced Growth Programme (AgroBIG), Food and Agriculture Organization (FAO), all with government support under the Agriculture Transformation Agency (ATA).

The vegetable subsector favourably thrived with lots of institutional support such as the Market Gardening Development Support (PADMAR) project that supports market-oriented producers through agronomic trainings in FSL-Cotonou. Like Ethiopia, the government of Benin focuses on food quality through BNZ_CGT initiative, facilitate production of safe and nutritious foods under the National Food Safety Agency (Agence Béninoise de Sécurité Sanitaire des Aliments (ABSSA)), and encourages vegetable consumption as a source of vitamins and other micronutrients through its health department. In addition, the government through its regional agencies such as Departmental Directorate of Agriculture, Livestock and Fisheries (DDAEP) programs and Territorial Agency for Agricultural Development (ATDA) programs supports adoption of improved vegetable varieties through inputs distribution, access to finance for operational actors including producers, processors, and traders. In addition, implements awareness and sensitization programs for the majority of producers that use agrochemicals to adhere with pre-harvest intervals in the vegetable harvesting schedules. Other projects by non-government organizations include the Hunger Project, PROCARD, Volunteering Entrepreneurship for Development (VED), SEMEVO Programme and Project Green Benin that support producers with technical advice and access to finance, especially the poor women.

Overall, there has been a growing culture of regulating agrochemical use for either production of non-toxic foods for consumers' safe health or the traditional attitude of conserving their agricultural land from harmful chemicals at production in both countries. Coupled with agricultural education from government sponsored and private systems, producers receive training on Occupational Health and Safety (OHS), environmental safety, and agrochemical use to meet product quality standards for nutrition safety under National Nutrition Programs in both countries increasingly undertake good agronomic and post-harvest handling practices. Critical components of the vegetables value chain governance arrangements are detailed in Table 1.

Table 1. Vegetables value chain governance arrangements in FSL-Bahir Dar, Ethiopia and FSL-Cotonou, Benin.

Governance component	Main related indicators	Study findings
Enabling environment and institutions	■ Socio-cultural factors (informal). ■ Laws and regulations. ■ Non-market mechanism e.g., quality standards and initiatives. ■ Investment and finance service e.g., microfinance.	In Ethiopia, some traditions and societal norms such as *Ikub*, a traditional savings and credit method support financial access along the vegetables value chain; and *Debo*, a cultural approach of working together among producers. Other relevant financial support programs include Mennonite Economic Development Associates (MEDA), Agro-Business Induced Growth Programme (AgroBIG), among others. In Benin, the Promotion of Agricultural financing towards Agricultural Enterprises (ProFinA) intervention was one of the programs that support financial access to value chain actors. More increasingly, the formation of associations by vegetables value chain actors for easy access to finance as well as business related linkages and market information. Existence of regulations and programmes for improved food safety but also with particular focus on environmental sustainability and food system development. Such programmes include International Institute of Tropical Agriculture (IITA), Agence Béninoise de Sécurité Sanitaire des Aliments – ABSSA and a number of other non-government organizations in Benin. Existence of national and international research institutions such as World Vegetable Center focused on improving vegetable quality, productivity, and post-harvest handling practices in collaboration with projects such as Safe locally produced vegetables for West Africa's consumers (SAFEVEG) and PADMAR share knowledge with vegetables value chain actors for improved value chain performance. Ethiopia also offers an enabling environment through its national food and nutrition policy aimed at improving the safety and quality of food throughout the value chain but also literacy programs implemented by regional bureaus of health. Owing to the prioritization of vegetables among high value commodities that can improve food and income security in both countries, governments facilitate training programs on Occupational Health and Safety (OHS), environmental safety, and agrochemical use to meet product quality standards for nutrition safety. Presence of local initiatives and practices aimed at improving food quality and reducing malnutrition such as the Conseil National de l'Alimentation et de la Nutrition (CAN), the World Vegetable Center, the Alliance of Bioversity international and CIAT and World Food Programme supported by government for the School Feeding Programme (SFP) in Benin. In Ethiopia, a number of interventions under the National Nutrition Program already rolled out to improve nutrition through increased availability, and access to vegetables for consumption.

Table 1. Continued.

Governance component	Main related indicators	Study findings
		Infrastructural investment especially at developing and improving small-scale irrigation systems for better productivity along the vegetables sub-sector. An example is the Projet d'Appui aux Infrastructures Agricoles dans la Vallée de l'Ouémé (PAIA-VO) project in Benin, and the Organization for Rehabilitation and Development in Amhara (ORDA) in Ethiopia. Notably however, attention to the development of storage and processing facilities remain negligible.
Governance structure	■ Spot/cash markets. ■ Contract governance (market contracts and production contracts, contract farming). ■ Relation governance (relation-based alliances; equity-based alliances; and vertical integration).	In both countries, majority of the value chain actors trade vegetables for immediate transactions in market thus with a large market share of spot markets. Spot market arrangements are relatively more common in Benin (93%) compared to Ethiopia (83%). Only 8% and 24% of the actors do trade vegetables under contract arrangements in Ethiopia and Benin, respectively. Only 6% in Ethiopia and 8% of the actors in Benin have formal long-term market arrangements with other entities mainly in form of strategic partnerships between suppliers and buyers, followed by joint ventures. In Benin, some strategic alliance arrangements also exist.
Governance structure dynamics	■ Access to information and knowledge. ■ Participation in partnership networks. ■ Competences of farmers and other vegetable value chain actors. ■ Price determination ■ Value-added.	In Ethiopia, most of the actors (73%) depend on traders for information, especially on markets and market trends, within the spot-based market arrangements. Traders mainly obtain information from fellow traders implying relational governance arrangements. Other important sources of information on agricultural technologies and markets, actor experiences, knowledge and skills include mobile phones (48%), government extension services (42%), fellow farmers (40%) and radio (24%). In Benin however, the flow of information along the vegetable value chain is largely influenced by producers (61%). While traders depend on producers' market decisions for participation at the successive levels of the value chain, producers mainly depend on fellow producers and their organizations for information. These relational governance arrangements among producers sometimes turn into spot-market governance arrangements when they source information from traders at the point of sale. Vegetable traders also exhibit relational governance arrangements as they source information from fellow traders but also some cases of modular governance arrangements when, they especially retailers, depend on farmer organizations (58%) for information.

Table 1. Continued.

Governance component	Main related indicators	Study findings
		In both countries, the combination of government sponsored sessions and technical trainings, public sensitizations and programmes from a number of private institutions facilitates improved vegetable production for food and nutrition security but also income generation. However, vegetable value chain actors continue to grapple with the most pressing challenge of poor storage and processing facilities. This further limits actors' exploration of potential premium prices that may be associated with consistent supply of quality vegetables in and out of the production seasons.
Governance structure and relationship strength	■ Linkages between chain actors, conflicting goals and disconnects. ■ Cooperatives and associations. ■ Multi-stakeholder platform.	Most of the producers, retailers, consumers and facilitating service providers perceive the level of collaboration between vegetable actors to be of low intensity in Ethiopia due to the often-single time interactions. In Benin however, actors perceive the level of collaboration to be averagely intense because of the increasing membership to actor associations. In both countries, producers mainly join groups while traders rarely associate with group activities. Coupled with limited public campaigns and awareness programmes, this limits the potential benefits of multi-stakeholder collaborations along the vegetables value chain.

4.3 Governance structure

Overall, majority of the vegetable value chain actors operated cash-based transactions where actors engage at random with every transaction. In both countries, actors engaged in individual spot transactions from which they negotiate prices as well as other requirements including volumes and quality without prior discussions. This was more common in FSL-Cotonou (93%) compared to FSL-Bahir Dar (83%). Majority of actors did not use any form of contracts in their business activity and the share of contract arrangements remained very low along the vegetable value chain. In such spot arrangements, actors have limited interactions from node to node often leaving producers poorly linked to lucrative markets and traders.

Only 8% and 24% of the actors traded vegetables under contract arrangements in FSL-Bahir Dar and FSL-Cotonou, respectively. In FSL-Bahir Dar, traders mainly had market linkages based on contract arrangements, and in FSL-Cotonou, even producers were engaged in such markets perhaps owing to the existing producer organizations. The low adoption of vegetable contract-based transactions is partly attributed to the vulnerability of vegetable production to the changing climatic conditions amidst the slow adoption of irrigation technologies and thus prone to dwindling supplies. Moreover, vegetable processing was yet to attract commercial market demand, as majority consumers prefer fresh vegetables. Some little processing was notable for preservation of vegetables meant for home consumption. This partly explains the great lack of awareness on vegetable processing where only 41% and 14% of the actors in FSL-Bahir Dar and FSL-Cotonou were aware of processed vegetable products. This coupled with the perishability of vegetables further makes vegetable markets unreliably stable.

Results revealed that only 6% in FSL-Bahir Dar and 8% of the actors in FSL-Cotonou had formal long-term market arrangements with other entities mainly in form of strategic partnerships between suppliers and buyers, followed by joint ventures. In FSL-Cotonou, some strategic alliance arrangements also existed. Subsequently, there was very little or no formal collaboration among market actors along the vegetable value chain due to the common nature of the simple one-time transactions. This implies that the governing mechanism remains pricing which usually is typical of information asymmetry since exchange of information is limited among actors primarily driven by self-interest of participating parties. In the same way, buyers miss influence over production especially the quality control aspects and this partly affects the aspects of food safety for healthy and nutritious consumption.

4.4 Governance structure dynamics

Vegetable marketing was largely done on individual basis in the two countries, an arrangement that is typical of low bargaining power as well as poor access to functional markets and market information. Overall, most of the actors (73%) depended on traders for information, especially on markets and market trends in FSL-Bahir Dar. Majority of producers mainly depended on traders (68%) for information within the spot-based market arrangements. This implies that farmers are vulnerable to market distortions and depend on traders for competitive prices. Consequently, the chain is driven by traders who control the flow of information largely used for negotiations in their favor while taking advantage of the limited coordination amongst producers. Traders interact with retailers and thus are able to assess the prevailing market demand and at the same time with producers which gives them the ability to estimate availability of supplies. All traders mainly obtained information from fellow traders implying relational governance arrangements. Among traders, actors with more capital have an advantage to interface with final consumers and as such, an opportunity to differentiate markets depending on the elasticity dynamics. Traders aside, other important sources of information were mobile phones (48%), government extension services (42%), fellow farmers (40%) and radio (24%).

By contrast, the flow of information along the vegetable value chain in FSL-Cotonou is largely influenced by producers (61%), followed by traders (44%) and government extension services (28%). Producers remain central actors working with traders but also the final consumers. Producers usually sourced inputs and make decisions of which vegetable varieties to grow depending on the market demand. These were usually in close relationship with traders including wholesalers and retailers to whom they sell their standing crops at an agreed cost. Most of the producers largely obtained information from producer organizations (86%) and fellow farmers (31%) rated as highly relevant sources, followed by traders (24%). The high reliance on producer organizations and fellow farmers related to the trust built among producers and hence, the relational governance arrangements that sometimes turned into spot-market governance arrangements when producers sourced information from traders at the point of sale. Wholesalers largely sourced information from fellow wholesalers (100%) and in some instances, from traders (17%) demonstrating relational governance arrangements while most retailers depended more on farmer organizations (58%) which signified some kind of modular governance arrangements than traders (52%) or fellow retailers (34%). In both countries, consumers mainly relied on retailers for price related information. Except for radio, all sources including government, fellow producers, traders, use of mobile phones, and trade offices are of high relevance to wholesale businesses. Importantly, the growing use of mobile phones by most actors including producers, middlemen, wholesalers and retailers implied an improvement in digitalization which is likely to come along with better pricing, production and investment information transmission along the entire vegetable value chains.

With growing government support to upscale adoption of irrigation technologies, vegetable producers are to some level able to produce off-season and thus becoming better positioned to determine market prices during such periods. Besides, a combination of government sponsored sessions and technical trainings, public sensitizations and programmes from a number of private institutions facilitates improved vegetable production for not only food and nutrition security but also income generation. On the other hand, vegetable

value chain actors continue to grapple with the most pressing challenge of poor storage facilities especially during the peak season in view of the perishable commodities yet with limited processing opportunities. This increases actors' vulnerability to post-harvest losses. Postharvest technologies are renowned to reduce food losses and an indispensable pathway to increased income as well as food and nutrition security in sub-Saharan Africa (Affognon *et al.* 2015; Ariong *et al.* 2023). Some of the successful examples include Safal, the horticulture brand of Mother Dairy Fruit and Vegetable Pvt. Ltd that set up a network of state-of-the-art fruit and vegetable processing plants across India (Ravina *et al.* 2024). Using examples from Ghana, Rwanda and India, several studies show that there are a number of low-cost small-scale innovations that can reduce postharvest losses and improve returns to farmers by at least 30 percent. Some of these include the improved containers and smaller sized packaging materials for handling and transporting cabbages in Ghana, field packing under thatched roof structures and concrete flooring in Rwanda, and the zero energy cool chamber units for temporary storage of mixed vegetables in India (Ravina *et al.* 2024; Ridolfi *et al.* 2018).

Value addition practices such as vegetable sorting, grading, and, or packaging that would rather command better prices were still rudimentary and only done by a few actors perhaps attributed to the absence of national or even local quality standards for produce management. In addition, conventional farming practices, together with the use of chemical fertilizers and pesticides that were increasingly becoming popular farming methods partly explained by worsening environmental conditions linked to climate change (Demi and Sicchia, 2021; Kumar *et al.* 2022). These vegetable crops are exceedingly sensitive to climate change, particularly to increasing temperatures, which can directly impact their yield hence to address the challenges of climate change, it is crucial to develop vegetable varieties that are heat-resistant (Dumitru *et al.*, 2023)

Moreover, conventional farming practices are not sustainable in the long term (Panhwar *et al.* 2018). Though still in low quantities, unsafe chemical use practices pose serious occupational health and environmental consequences as well as food safety issues.

4.5 Governance structure and relationship strength

While the majority of vegetable value chain actors perceived the level of collaboration amongst themselves to be averagely intense in FSL-Cotonou (55%), only 36% perceived the same in FSL-Bahir Dar. Most of the producers, retailers, consumers as well as facilitating service providers especially the regional agricultural offices and extension service providers perceived the level of collaboration between vegetable actors to be of low intensity. This is partly explained by the often-single time interactions of transactions without expectation to re-engage in the future. In FSL-Cotonou, however, most of the actors including credit providers, producers, labelling organization, processors and retailers perceived the level of collaboration amongst themselves to be averagely intense. The growing sense of belonging to producer organizations and associations in FSL-Cotonou might explain the comparably intense level of collaboration among actors, which also comes with advantages of co-learning based on experience and skills development in production as well as effective marketing. In both countries, more producers belonged to some cooperative or association accounting for 78% in FSL-Bahir Dar and 98% in FSL-Cotonou while just a few of the other different actors belonged to some cooperative or association. A study by Acharya and Pant (2021) in Nepal focusing on dynamics of value chain in climate resilient vegetable finds that profit of the farmers depends on the market type they access, as farmers' revenue increases when they sell their produce either directly to the local market or through farmers' collection centre managed by farmers' co-operatives

In both countries, actors reported public campaigns about sustainability, healthy and nutritious foods in a range of 1 to 3 for the past 12 months. We observed an exception in FSL-Cotonou where one respondent from the territorial agencies for agricultural development had noted 30 sensitization programs through various media platforms including radios, TVs, talk shows, adverts, and posters. Only a few of the different actors in both countries, FSL-Bahir Dar (22%) and FSL-Cotonou (24%), were aware of initiatives and/or platforms that gather actors to foster sustainable vegetable agri-food systems in a multi-stakeholder approach.

Such initiatives and/or platforms conducted in FSL-Bahir Dar were mainly by research institutions (63%), educational institutions (51%), and government (40%), agri-food companies (34%) and with less activity from farmer organizations (17%). In FSL-Cotonou however, farmer organizations (78%) were leading, followed by government (32%) and agri-food companies (12%). Overall, limited public campaigns and awareness programmes not only derail potential influence on consumer behavior towards healthier foods but also fails food actors' confidence to enhance trade of more nutritious food products that further weakens the governance structure and relationship in both countries.

In terms of gender, participation of women and men varied along the vegetable value chain. In FSL-Bahir Dar, women were less involved in commercial vegetable farming and other trading activities that involve active labour force. Women dominated vegetable retailing (80%) and as such, had an opportunity to interface with final consumers as well as trade in several other agricultural produce at a time. Results indicated no difference in accessing market information and knowledge, markets, as well as credit, by gender. In FSL-Cotonou, males at 53% and 100%, respectively, dominated vegetable production and transportation activities. Domination of men at the production stage is attributable to more access rights to productive assets especially land following traditional informal norms where men take production decisions for implementation in the household while transportation requires more labour requirement to drive commercial vehicles as socially accepted in society. On the other hand, females dominated processing (89%), wholesaling (100%) and retailing (100%) activities along the value chain. Females largely carry out the processing and value addition activities because of the hygienic aspects desired and the sociocultural tradition that women process food. These results are in line with general trends in sub-Saharan countries where men are more interested in cash crops and marketable vegetables, while women are perceived as food crops producers for home consumption (Danso *et al.*, 2004; Fischer *et al*., 2017). Obuobie and Hope (2014) showed also that women are sometimes strongly involved in trade of traditional vegetable production compared to men in the context of Ghana in West Africa.

4.6 SWOT analysis of the vegetables value chain

Table 2 presents the SWOT analysis of the vegetable value chain providing an understanding of potential pilot actions for improvement in FSL-Bahir Dar (Ethiopia) and FSL-Cotonou (Benin). Along the value chain, different actors take advantage of existing opportunities using their business-related strengths but also experience some threats as they engage. Chagomoka *et al.* (2014) suggest that designing possible interventions should emphasize exploitation of strengths rather than simply addressing weaknesses. Similarly, good attention is required for both opportunities and threats to avoid undesirable outcomes once ignored during the process of strengthening the vegetable value chain.

From the SWOT results in Table 2, overall, the vegetable sub-sector is bound to thrive in both countries. Most of the interviewed actors anticipated that their businesses were to grow due to the high vegetable demand resulting from the burgeoning populations, suitable agro-ecological conditions, and access to finance. Moreover, both government and private sector efforts including small scale irrigation development, agrochemical use, technical trainings on agronomy, business skills, as well as food safety and nutrition result into better quality vegetable production for healthier diets within domestic and export markets.

On the other hand, a few actors still doubt the potential of growth for their businesses because of deficient market linkages and perishability of vegetables, which gradually affects business performance. Vegetable value chain actors are still grappling with many shortfalls. In the face of changing climate conditions and the irresistibly high susceptibility of vegetables to devastating pests and diseases, producers increasingly use agrochemicals with adoption of local irrigation methods to reduce the risk of crop failure. Yet, the unsafe agrochemical use threatens health, the environment as well as food safety, which necessitates continuous government interventions for stimulating sustainability of farming systems and rural development in both countries. According to Tal (2018), there is need to address legitimate concerns about conventional agriculture's adverse impacts with transformation of many harmful practices. There is also a need to strengthen research

Table 2. Summary of SWOT analysis of the vegetables value chains

Strengths	**Weaknesses**
Highly commercialized value chains with producer participation	Low production versus market demand with seasonality of supplies
Research and development with release of good quality varieties in favour of consumer preferences	Weak postharvest handling skills coupled with unconducive storage facilities
Microfinance schemes and traditional finance for production and trade investments	Low adoption of contract or long term arrangements
Favourable tropical climate and suitable soils	Poor market linkages and marketing techniques amidst the changing environments
Some multi stakeholder platforms to improve actor competitiveness and collaboration	Inadequate marketing space or facilities
Availability of labour force	Absence of standard regulations on trade resulting into price unfairness and measurement cheats
Opportunities	**Threats**
Prioritization of national nutrition programs	Low and frequent price fluctuations associated with small margins
Private and public investment with donor support to spur vegetable production – Good agricultural practices and irrigation development	Highly susceptible to weather changes, disease and pest attacks
Growing market demand with changing consumer preferences for healthier diets	Food loss due to perishability of vegetables
Infrastructural improvements with better linkages to production areas	
Exportation of vegetables to lucrative markets	
Increasing appreciation for collective action	

for organic food and farming in order to fill the existing knowledge gap and unlock the sectors potential (El Bilali, 2020). Investment in research and development as well as production and trade is likely to reduce the limited capacities, increase access to appropriate inputs and markets for organic farming in the context of sub-Saharan Africa (Schader *et al.* 2021).

To mitigate some of the weaknesses identified in the SWOT analysis in Table 2 such as poor market linkages and marketing techniques amidst the changing environments, the actors could potentially take advantage of increasing appreciation for collective action in order to mobilize the actors into actor organization to ensure effective and increased bargaining power among the group members. By understanding and aligning internal capabilities with the external environment, agri-food enterprises can improve their competitiveness and strategic positioning (Madureira *et al.*, 2024).

Furthermore value chain actors could avert the threat of high susceptibility to weather changes, disease and pest attacks by taking advantage of research and development with release of good quality varieties in favour of consumer preferences. Prioritizing infrastructural improvements enhances trade linkages to production areas that addresses the threat of food loss due to the perishable nature of vegetables.

On the other hand, to address the weakness of low production versus market demand with seasonality of supplies, government should leverage on private and public investment with donor support to spur vegetable production — good agricultural practices and irrigation development through use of extension workers.

Value chain actors should utilize the some multi stakeholder platforms to improve actor competitiveness and collaboration to avert the threat of low and frequent price fluctuations associated with small margins (Madureira *et al.*, 2024).

5. Conclusion and recommendation

The study attempted to understand the linkages between actors along the vegetable value chains in FSL-Bahir Dar (Ethiopia) and FSL-Cotonou (Benin), and assess governance arrangements to identify any gaps but also the potential innovative improvements in view of existing strengths, weaknesses, opportunities, and threats. Overall, the vegetable value chain is relatively straightforward with involvement of a few actors, namely producers, traders who include wholesalers and retailers as well as consumers at individual and institutional categories. Vegetable producers averagely operate small acreages of less than an acre of land and depend on agro-input dealers for farm supplies especially seed, fertilizers and agro-chemicals. While both participate, women were more dominant at the upstream end while men dominated production and trading activities along the value chain. In both countries, the vegetables value chains were highly commercialized with the largest proportion of vegetables produced traded domestically owing to the consumers' preferred quality attribute of freshness.

In both countries, spot market arrangements were common, largely attributed to the preference for cash-based transactions and issues of mistrust amongst actors. While spot market arrangements dominated at the various stages of the value chain in the two countries, we also observed relational governance relationships among traders as well as farmers. Relational governance arrangements were stronger among farmers in FSL-Cotonou attributable to the producer organizations and associations in place. As such, producers tend to influence the vegetable value chain in FSL-Cotonou while traders still take advantage in FSL-Bahir Dar. Modular governance arrangements were witnessed in FSL-Cotonou where most retailers depend more on farmer organizations (58%) for related information about vegetables. In both countries however, the use of mobile phones was an emerging form of information sharing and transmission after traders in FSL-Bahir Dar and producers in FSL-Cotonou implying the growing aspect of digitization along the value chain.

However, limited collaboration between actors spurred by the domination of spot-market arrangements continued to undermine the potential of upgrading the chain despite the increasingly changing and growing consumer preferences for vegetables. Besides, the vegetable value chain still suffers food loss issues due to the perishability nature of commodities amidst limited post-harvest handling skills and the under-developed storage infrastructure at the successive stages. This also explains the small-scale level of operations among most actors.

The study therefore, recommends that governments and other development partners develop and strengthen actor organization in the form of cooperatives and or associations. These would enhance collaboration among different actors and strengthen marketing linkages. Moreover, actor organizations encourage transparent interactions, equity and negotiation of power differentials that are essential for building trust between actors.

Furthermore, the study recommends provision of an enabling environment for engagement in contract and long-term market arrangements that commonly come with relatively stable and more assured markets. This is because at the production stage, the arrangement is likely to empower producers with not only improved production strategies of safe, healthy and nutritious vegetables through shared and adaptive learning but also improve their influence and bargaining power along the value chain. This may provide platforms for different stakeholders to develop actors' competences to take advantage of the growing vegetable demand for their nutritional importance even beyond domestic boundaries.

In view of food losses associated with the perishability nature of vegetables, there is need for national level efforts to develop post-harvest handling skills and facilities as well as storage infrastructure as an important step for increasing competitiveness of vegetables along the value chain.

In addition, efforts to exploit potential benefits of the last mile digitization initiatives emerge as an affordable opportunity for both public and private sector owing to the actors' increasing use of mobile phone to perform their day-to-day business activities. Adoption of digitization for exchange of good agricultural practices and phytosanitary measure, availability of financial resources for investment and markets related information for vegetable value chain actors is bound to encourage information transparency necessary for optimal arbitrage.

While formation of actor organizations is anticipated to increase competitiveness of the vegetable value chains and empower actors to venture into long-term contracts, there is need for further research to understand the salient factors that influence the different actors' choice of governance structures to ensure informed policy decisions and implementation meant for strengthening governance structures for the benefit of actors.

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