EISSN: 2707-0425

East African Journal of Science, Technology and Innovation, Vol. 7 (Special Issue 1): January 2026

Horticulture value chain mapping: An Illustration of participating youths in Tabora Municipality, United Republic of Tanzania

*[1]KOMBA, M. E., [1]MWANAMBUU, D., [1]MWICHANDE, M., [2,3]MARANDU, G., [1]SHIMWELA, M., [3]NYINONDI, E., [1]MAGOMERE, K.M., [1]KIMISHA, J

[1]Tanzania Agricultural Research Institute, P.O. Box 127, Bukoba-Tanzania
[2]Brainy Connect Foundation, P.O. Box 491, Bukoba-Tanzania
[3]Sokoine University of Agriculture, P.O. Box 3000, Morogoro-Tanzania

*Corresponding Author: martinemmanuel149@gmail.com

Abstract

Youth participation in Tanzanian agriculture sector especially in horticulture subsector is not satisfactory in spite of promising prospects unveiled in the subsector. The understanding on participating status of the youths along horticultural value chains is crucial to design strategies for attracting more youths in the subsector. Such understanding is not well known despite its essentiality stated. This study used the youths from Tabora Municipality as a case to understand horticultural value chain maps and respective coordination mechanisms along the chains. The study adopted a mixed data collection techniques of digitalized youth survey and focus group discussions with descriptive and content analysis as methods of analysis used. It was then found that the youths participate in value chain nodes such as production, processing, storing, local trading, transporting, wholesaling, retailing and consumption with differing participation frequency. For instance, none of the studied youth farmers were found operating registered processing firm due to capital limitation at their disposal. Youth farmers were also found to perform activities beyond one node (multitasking) of value chains with little efficiency. Another notable finding was that youth farmers were missing reliable extension, credit and quality accreditation services that jeopardize productivity and their operating business environment. Coordination was eventually found miserable as youth actors along the chain were not trusting each other. Finally, for attracting more youths into the subsector, the study recommended institutional arrangements like contract farming being adopted in the subsector given the prevailing nature of horticultural crops and status of the actors along the chains.

Key words: *Chain mapping; Coordination mechanisms; Tabora, Vegetable produce; Youths*

Cite as: Komba *et al*. (2026). Horticulture value chain mapping: An Illustration of participating youths in Tabora Municipality. *East African Journal of Science, Technology and Innovation 7 (Special Issue 1).*

Received: 10/03/25
Accepted: 09/12/25
Published:15/01/26

Introduction

Horticulture achieves critical significance in the agriculture landscape of Tanzania. The rising population and emerging farm distress all signify the diversification of agriculture in Tanzania. This makes sense from the ecological and economic perspectives. With this already felt climate change impacts attributed to decline in staple crops produced, horticulture subsector could be viable option in reinforcing food security for most civilians in the country. Nevertheless, like any other agricultural subsector, presence of constant labor supply is pre-requisite for desirable delivery of horticulture. Based on that labor requirement it is seen important noting that out of 61, 741, 120 Tanzanians, most are the youths who account for 67% of labor force in the country. But this labor force face some significant challenges including low capital for investment, lack of extension guides and trainings in grabbing agricultural opportunities (Ng'atigwa, 2020; URT, 2022). It is further worth noting earlier that a youth in this case is referred to a person with an age ranging from 15 to 35 years (NDP, 2017).

Despite the aforementioned youth labor force, this age group is pronounced to have very little or completely no access to job opportunities. It is from this situation that the country is now striving to put forth master plans in areas of production that can hold and employ a number of people particularly youths. Horticulture subsector as one among these areas, there has been many initiatives to emphasize youth engagement in the subsector's value chain. These initiatives include, Agriculture Sector Development Program (ASDP), export processing zone act 2006, agricultural marketing policy 2008, the cooperative society act 2013 (URT, 2021). Similarly there is ongoing program known as Building Better Tomorrow (BBT) (URT, 2022). These altogether drive youths to engage in this sub-sector . The Tanzanian horticultural sub-sector grows swiftly with an average rate of 11% per annum which is almost two-fold the overall growth of the agriculture sector (Msafiri and Mwombela, 2021). More important is that annual production of horticultural crops has reached an average of 7,560,010.70 tons and contributed to about TZS 1.38 trillion shillings (Ng'atigwa *et al.*, 2020; URT, 2021). This sub-sector could allure youth intervention motivated by its prospective for rapid economic return and the slight land requirement contrary to staple crops (Ng'atigwa *et al.*, 2020). The labor rigorous nature of the horticulture subsector could likewise connote youth engagement in this sub-sector.

Almost all regions in Tanzania make horticultural production activities and Tabora is not exceptional (NBS, 2017; USAID, 2020). Tabora is coupled with climatic conditions, infrastructures and labor force ideal for the production activities. The statistical report by URT (2022) indicated that about 501,969 people live in Tabora municipality and the youths account for 58.1% . Additionally, the Tabora municipality has been reported to have 47% of its arable area potential for horticulture production (URT, 2012). Horticulture could therefore provide a lucrative income for sustainable development of youths in Tabora region. Having noted this important opportunity, it is thus imperative to recognize different coordination strategies required to develop the horticultural value chain for successful involvement of youths in the horticultural value chain in Tabora municipality.

Value chain is expressed as the comprehensive range of practices necessary for bringing a service or output from conception through different phases of production and delivering the final product to consumers and disposal after use (ADB, 2018; HassanI *et al.,* 2021; FAO, 2022). The agricultural value chain can further be described as an economic unit of analysis for given commodities that embraces a logical grouping of economic practices linked vertically by the market relationship (Kulwijila *et al.,* 2018; FAO, 2022). Mapping of the actors, linkages, product flow and the constraints faced by actors is the initial step in horticulture value chain (Makindara, 2012; Kulwijila *et al.,* 2018). Mapping in this context refers to the process of identifying distribution of the youths as the actors along the value chains related to horticulture (Mohapatra and Ramadas, 2022). Value chain mapping is further important in demonstrating how the product flows from raw materials to the end markets and illustrates the way industry functions (Kulwijila *et al.,* 2018; Mohapatra and Ramadas, 2022).

Most studies on value chain mapping have been conducted in staple crops' value chain in

Tanzania for instance of Mmasa and Msuya, (2012); Makindara, (2012); Mkani, (2013); Chagomoko *et al*., (2014); Wilson and Lewis, (2015) and many more. While previous research has focused on staple crops, there is limited information on horticulture value chain mapping specifically involving youths (example; Ng'atigwa *et al*., 2020) in spite of the need stated earlier.. Adding on that, such need of conducting value chain mapping in horticultural subsector is even more heightened to know coordination strategies required to advance the horticultural value chain with more involvement of youths in Tanzania (Palmer, 2020). With Tabora municipality as a showcase, this study was therefore conducted to pervade the existing knowledge gap of how the youths are distributed and what activities they perform along horticulture value chains. The study was thus carried out in Tabora municipality to map value chain and accordingly pinpoint the coordination strategies for successful involvement of youths in the horticulture value chain. Understanding these coordination strategies would help policy makers to implement pertinent measures that intensify horticultural value chain and successful youth involvement.

Theoretical Perspective

This study is guided by two theories namely Supply Chain Management and New Institutional Economics (NIE). The Supply Chain Management theory generally proposes the channel integration efforts that focus on organizational structures and associated relationships, coordination strategies, inter and intra enterprise communication as well as inventory and cost management (Chandra and Kumar, 2014). This theory is relevant in understanding the horticulture value chain structure including, the linkages between nodes, vertical and horizontal integration between and within enterprises respectively, node(s) at which male and/or female youths are mostly concentrated, the profit generated at each node as well as the factors and coordination strategies for successful youth involvement in the horticulture value chain.

The NIE theory mainly proposes that the individuals are "intendedly rational, but only limitedly so, in other words individuals are featured by bounded rationality thus they need information which is costly (Wajda, 2015). The theory is sub-divided into three streams namely, the Transaction Cost theory, Property Rights theory and the Agency theory. The transaction costs are the costs of negotiating contracts, monitoring performance and getting to know trading partners (Parada, 2002). According to this theory sources of transaction costs include, information searching, options analysis and contract drawing (Chotkowski, 2010). Another theoretical stream is the Property Rights theory. Mahoney (2004) defined property rights as the package of decision rights involving the asset which gives the owner rights to take some actions and preventing others from taking those actions. These rights give the owner privileges such as rights of use, benefit and excluding others from them (Segal and Whinston, 2010). Agency theory on the other hand focuses on the relationship between two parties namely, the principle and agent or the buyer and a supplier. The NIE perspective is generally relevant in demonstrating the impacts of, finance on the information transfer between actors, Cost minimization strategies and the property ownership (such as land) for successful youth intervention in the horticulture value chain.

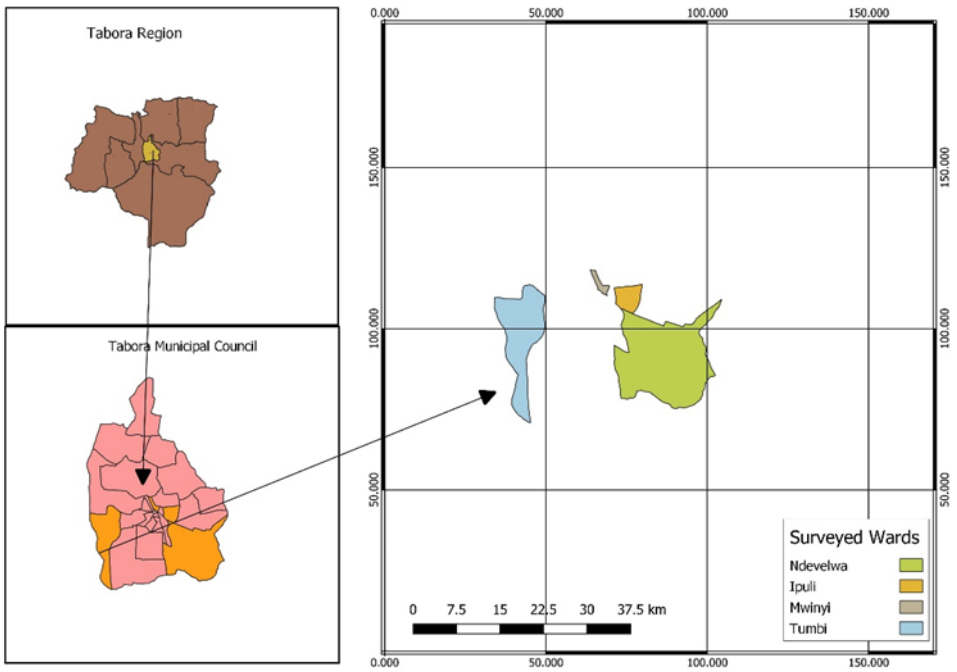
Materials and methods

Description of the study area

This study was done in Tabora Municipal Council (Figure 1) which is among eight councils administratively found in the Tabora region. The municipality geographical location lies between Latitude 4° 52' and 5° 9' South and Longitude 32° 29' and 33° 00' East (URT, 2021). Demographically, human population of the Municipality is mentioned to reach 501,969 with 58% are the youths (URT, 2022). Climatologically, the Municipality is characterized by annual mean temperature ranging between 22°C -26°C as well as average annual rainfall ranging between 800mm-1000mm. Moreover 48% of the Municipal land is suitable for vegetable farming (URT, 2012). Besides favorable climate and arable land available, the administration of the Municipality has put forth strategic plans to enhance development of horticultural subsector in the area (URT, 2021). Principally, all these facts stated here have justified the selection of youths from Tabora Municiapality as an illustration for this study.

Figure 1

Map of Tabora Municipal Council showing the surveyed wards



Research design

Source and Typology of data used

A cross-sectional design was used in this study. This is because the design allows the data being collected at a single point in time for determining interdependence amongst the variables under consideration (Babbie, 1999). Primary data were collected through survey conducted in Tabora Municipality. Facts were collected from youth participating in horticulture subsector. Secondary data were collected through online published texts and Sokoine National Agricultural Library (SNAL).

Sampling procedure and sample size

Tabora Municipal council was purposefully selected as study site due to its compelling record in prospects of horticultural production as stated earlier. Basically, four wards namely Ipuli, Mwinyi, Ndevelwa and Tumbi were surveyed in Tabora Municipality. One village was purposefully chosen from each ward to make it four (based on). In general, the selected wards and villages were intentionally selected due to existence of more horticulture units in these areas compared to other wards in Tabora Municipality.

The target population for this study was the youths engaging in activities along the horticultural value chains. A total of 90 youths was randomly selected as sample size for interviews and their responses were recorded.

The sample size involved number of youths in position to participate in horticulture subsector, which was determined using following the formula by Conchran (1974) under assumption of unknown population

$$n = \frac{Z^2 p(1-p)}{e^2} \quad (1)$$

$n = sample\ size, Z = at\ confidence\ level,\ p = population\ proportion \quad e = marginal\ error$

Therefore, based on the formula in equation 1 above, and the argument made by Matata *et al.*, (2001) that having 80-120 persons are adequate for most socio-economic studies in Sub-Sahara Africa, this study used 90 youth as sample size for data collection. The sample size of 90 was taken considering the fact that undersized sample could lead to ineffectiveness to produce useful results, while an oversized one could lead to usage of more resources than optimally necessary (Kimaro *et al.*,2015).

Research Instruments

Both questionnaire and interview schedules were used in this study to collect sufficient data from the youth participating in horticulture subsector. The questionnaire was administered to capture data on the nature of participation to horticulture value chain for each youth surveyed. Moreover, questionnaire instrument was pre-tested to 10 respondents to check and/or improve its reliability before actual data collection. The interview schedules were conducted under question guide in questionnaires and youth's responses were recorded by enumerators. Specifically, information collected include socio-demographics of the youths, type of horticultural crop(s) that the youths were involved with, activity (ies) that the youths were involved in the horticultural crop value chain, challenges in his or her activities, relationship between the youths and fellow farmers, the actors that the youths were relying on to make their day to day activities and status of support services like Research and Development (R&D), credit and extension support. Moreover, in order to get more insights from respondents on nature of their activities along horticulture value chains, four focus group discussions (FGD) such that one in each ward surveyed with FGD participants ranging from 6 to 7 who were randomly drawn from initial sample size. Therefore, based on the instruments used, both qualitative and quantitative facts were collected.

Data analysis

The collected data from questionnaires were entered, sorted, processed, summarized and further analyzed by applying Statistical Packaging for Social Science (SPSS) statistical software. Moreover, the data were quantified and analyzed using descriptive statistics for both questions with single and multiple responses. Depending on which subsector/crop the youths were participating under horticulture, mapping analysis was applied to map the horticultural crop value chains. This was done considering how the surveyed youths are linking to other actors, key activities that they engage and flow of the product they produce along their value chains. Equally important, data collected using FGDs were analyzed using content analysis where by stronger facts stated by participants were taken in justifying other information collected by questionnaires. Specifically, the collected information was selected as quotations and keywords were made and coded. Then the coded keywords were representing themes for conceptualization and interpretation in the study findings.

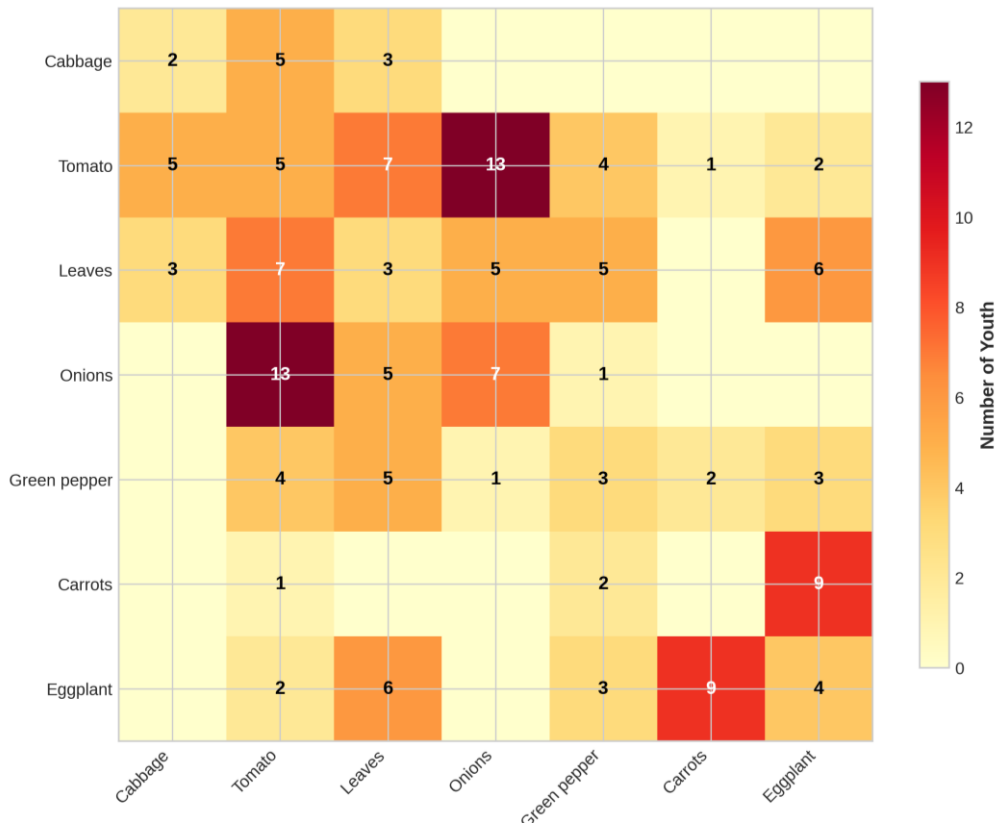
Results

Youth distribution in horticulture

In the group of surveyed youth, there were found no any youth participating in horticultural subsections like citrus, spices, root and tubers. In this reason, results in Figure 2 of heatmap have showed the number of surveyed youths participating in vegetable related crops particularly cabbage, tomatoes, onions, carrots, okra, eggplant and leaves that include Chinese leaf, spinach and sweet potato leaves. It was again found as shown in Figure 2 that there were few numbers of youths only participate in one vegetable crop (26.7% cumulatively) compared to majority of them who participate in dual vegetable crops (73.3%). The results further indicated that some combinations did not involve youths; this is manifested by 0% as shown in Figure 2 (pastel yellows). Onion mentor the list in term of youth participation in sole crop (7.78%) followed by tomato (5.56%), carrots on the other hand has pastel yellow stipulating no youth involvement (0%). The extent of youth involvement in onion may perhaps be as the result of good environmental condition (annual average temperature 22^0C-26^0C and the average annual rainfall 800mm-1000mm).

Figure 2

Number of youths participating in horticultural crops in Tabora Municipality, United Republic of Tanzania



Note: Diagonal values represent single crop production; off-diagonal-values represent crop combinations

In dual crops However, the most preferred combination for youth participation was Tomato-Onion with 13 youth (14.44%), Carrots and eggplant stick to the second position having 10% of the sampled youths. On the flip side, Cabbage- onions, Cabbage- Green pepper, Cabbage- Carrots, Cabbage-eggplant and Leaves-Carrots combinations run in the tail with 0% of youth participation.

Results from value chain mapping

Youth participation along Vegetable value chain

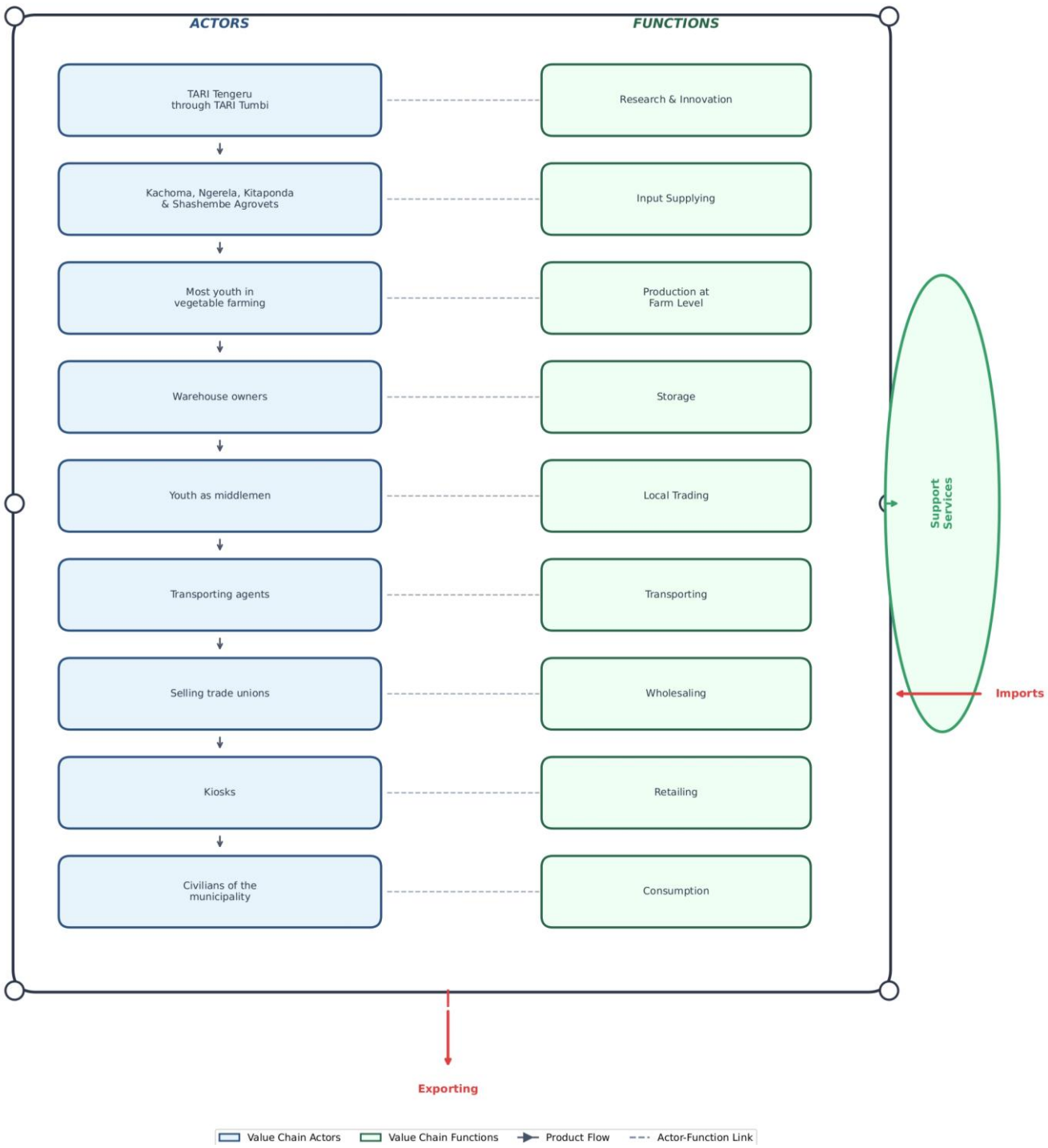
Findings from Figure 3 have indicated that in the node of research and innovation is where vegetable value chain starts. In fact, no any youth surveyed was found to be a formal/professional researcher, rather they just rely on activities conducted by professional researchers and innovators especially on getting information of appropriate inputs to buy from agro-dealers based on the recommendations from the researchers. In this case, TARI-Tengeru and TARI-Tumbi were mentioned by the respondents as the key actors in this node where these youth farmers in Tabora MC could receive information on appropriate technologies (scientifically researched) to apply on their vegetable related endeavors like improved productivity. Moreover, youth farmers were found to see themselves as informal researchers. The surveyed youth farmers are the innovators of the problems in day-to-day observations in their activities related to crops

they participate This was one among the emphasizes in FGDs where by it was reported that:

"*I remember one agricultural expert from TARI Tumbi came here in our ward and one of her remarks was calling us farmers the informal researchers by experience, I remember and act on her statement in my day-to-day farming activities. Whenever I observe challenge in my onions, I still contact the expert asking her to find solution for my crops. We don't wait for agriculture expert to visit our plots, we somehow know our crops nowadays, and experts are seldom visiting our farms*". (Youth farmer, FGD-Tumbi ward).

Figure 3

Horticulture Value Chain Map in Tabora Municipality, United Republic of Tanzania



Agricultural Input supply

Findings from Figure 3 have described that agricultural inputs for vegetable production are supplied by agro-dealers. According to strategic report by URT (2021) Tabora MC has 47 formally recognized agro-dealers. Based on the information shared by the surveyed youths, there are six agro-dealers that these youths are often going to purchase inputs for vegetable production. The frequently mentioned agro-dealers during FGDs included Kachoma, Ngerela, Kitapondya and Shaghembe agrovets.

In addition, from the questionnaires all 90-youth participating in vegetable production admitted that they purchase seeds and pesticides from agro-dealers, but on the other hand only 80% of the youth farmers purchase industrial fertilizers from these officially registered agrovets. Nevertheless, in one of the FGDs there was the youth farmer who reported that:

"*I and my wife are growing matembele (sweet potato leaves) for commercial purpose. We like to grow this horticultural crop because it is less costly in inputs and management. See, we reproduce seeds (cuttings) on own and plant again and again, we use manure from droppings of hens that we keep. This is different from our fellow farmer growing onions*"

(Youth farmer, during FGD in Ipuli Ward)

From this youth farmer's report, it is clearly seen that sweet potato leaves' farmers produce their own seeds in terms of cuttings, they do not rely on seed supplying formal agents.

Vegetable Production

As it has been described in Table 1, all of the surveyed youths participating in vegetable value chains are the producers or farmers. The possible reason for such situation is that youths are in working age, they can easily go for farming operations like tillage which are more labor intensive with lower capital intensity than in other vegetable value chain activities like processing and retailing which are more capital intensive with lower labor intensity, pest/disease controlling, harvesting and post-harvest handling activities.

Table 1

Number of youths participating along vegetable value chains in Tabora Municipality, United Republic of Tanzania

Node	Research& Innovation	Input supply	Production	Storing	Local trading	Transporting	Whole saling	Retailing	Consumption
No. of youths	0	0	90	80	45	22	75	12	90
Percent	0	0	100	100	50	0	66.7	0	100

Vegetable processing and grading

Processing and grading are normally done to improve form utility, meaning that effort to ensure consumers receive product with form that they actually desire. Processing in vegetable is done not only improving quality and span of the product but also upgrading its convenience to consumers. In the study area, it was found that vegetables were processed and graded locally by the farmers themselves. In other words, from discussion with youth farmers it was reported that no fully registered enterprise/company majoring in vegetable advanced processing rather the available processing units deal with grains. The surveyed youth farmers reported that few of them are processing leaves and sell directly to consumers through their micro kiosks. It was further reported by these youth farmers that they are not financially able to register and operate advanced processing firms for vegetable produces like tomatoes due to huge capital investment required.

Storing

Like in any other agricultural produces, vegetable storing is done to increase time utility. Meaning that an idea and/or effort of making a vegetable produces is available for customers whenever they need them. Observation from study area revealed that there were no communal warehouses for the youth farmer to store their vegetable produces, rather only 25 (12 farmers and 13 middlemen) youths own their own small warehouses. Findings from the study area further showed that most vegetables produced by the surveyed youths (farmers) are sold at farm gates, this is likely being accelerated by high perishability degree of the produces. Nevertheless, all youths (28% of all respondents) participating in onion value chain reported that they normally store their produces but that decision is subject to desirability of the prevailing market prices.

Local trading

Results from Table 1 have showed that half (45 respondents) of the interviewed youths were participating in local trading, meaning that they were the middlemen. These are actors involved in buying produces from farmers and sell to the wholesalers and retailers.

Transporting

Activities done at this point of vegetable value chain include but not limited to moving inputs like fertilizers from the suppliers to farmers' farming sites, moving laborers from and to farming sites, moving vegetable produces from farm gates to wholesaling points or any other type of customers by using trucks or any other means of transport. Transporting activities in vegetable value chain are important in adding place utility, meaning that making the produces available in right location. Observation from FGDs with youth farmers in the study area revealed that they often transport bulk inputs like fertilizers from agro-dealers at their own cost because of small quantity that they purchase. It was further reported that youth farmers neither communally nor privately own truck to transport their vegetable produces instead few of them transport their items using bikes (*boda boda*), however they admit that such transporting means is not just unable to accommodate their product bulky but again compromise quality of products in transit leading to massive post-harvest losses and reduced market access.

Wholesaling and retailing

The two are discussed here together as it was observed some of the surveyed youths are wholesalers and also owning small retailing points. Wholesaling in this context entailing buying vegetable produces in large quantities from producers/farmers while retailing involves selling produces to last consumers. Youths who are wholesalers were found to buy vegetable produces from farmers and sell to retailers through Kachoma market. As stated earlier some of these wholesalers were found to be retailers as well. Meaning that they also own kiosks (*genge*) where they sell their produces in small quantities directly to final consumers

Consumption

The actors in this node are consumers whereby, the households, schools and restaurants were observed being the consumers of vegetable products produced by youth farmers in Tabora Municipal Council. All respondents admit through FGDs that they have not yet started to export their vegetable products through cross border trade due to capital limitation but they dream to go beyond the borders given that they are financially capacitated. This has clearly showed that vegetables produced by these youth farmers are consumed by local consumers.

Support services

These include service from the subsector's enablers and/or regulators. The services comprise but not limited to extension services, credit facilities, Research and development (R&D) and quality accreditation. All interviewed youths mentioned the services extreme important to them in improving their vegetable productivity and business environment. However out of the support services mentioned earlier (extension, credit, R&D and quality accreditation), only R&D was mentioned being reliably provided to youth farmers studied. The finding has clearly indicated that the provision of services like credit, extension and quality accreditation is not reliable, exposing the vegetable productivity at the jeopardy of shrinking as the provision of services cannot be overlooked.

Coordination along vegetable value chain

In this context, coordination entails interrelationship and intra-relationship among youth actors along vegetable value chains. By

intra-relationship here it means connectedness among the actors in the same node of value chain. The relationship in this study is considered as horizontal coordination. On the other hand, by interrelationship here it means the connectedness between the actors from different nodes of vegetable value chains. The relationship in this study is considered as vertical coordination.
Findings from the studied youths have revealed that 90% of the youths participating in farming have subscribed in groups revealing intra-relationship among themselves. There were 8 groups that were subscribed by these youth farmers. It was further observed that these groups were formulated to capacitate their members financially through saving and affordable interest micro-loans. None these 8 groups subscribed by the surveyed youths were for agriculture purposes like input cost sharing motive. The finding is further evidenced by respondent's statement in one of the FGDs:

"*I wish to have group of us as vegetable farmers one day so that we can help each other in farming activities, currently we have groups for just saving and borrowing each other, personally I use some of this borrowed money to run farming activities*"
(Youth farmer, FGD-Mwinyi Ward)

In addition, it was reported by the interviewed youths that after harvesting they are often found themselves at dilemma where right to sell their produces at premium prices as such information is seldom available as middlemen at farm gates are not trustworthy. Particularly, tomato farmers were recorded to complain fraudulent acts of some middlemen on prevailing price tags. Middlemen in tomato value chain were mostly complained to take advantage of high perishability nature of tomato to exploit the farmers knowing that the farmers could not afford to wait for higher prices at the risk of their produce spoilage. All these further implying high transaction cost incurred among the surveyed youth farmers especially those related to information searching, these could be minimized by having pre-contractual arrangements with potential buyer.

Moreover, lack of trust between actors along vegetable value chain has probably triggered these youth farmers to perform more than what they originally compelled to perform. As stated earlier, some of the surveyed youth farmers are also middlemen, or some are wholesalers and retailers or farmers and wholesalers at the same time. This can be viewed as multitasking of actors along vegetable value chain. Principally, multitasking by an actor is likely to reduce efficiency in one or both nodes that the actor is participating, also may have multiplying effects like increased unemployment in Tabora Municipality.

Discussion

Gathambiri *et al.* (2021) and Maselle (2022 provide valuable insights into agricultural participation among youths, which resonate with the findings of this study. Maselle emphasizes the varied engagement levels across different horticultural sectors, contrasting with Gathambiri *et al.*'s focus on specific crop preferences and combinations among youths. The results here underscore a notable absence of youth involvement in certain horticultural subcategories like citrus, spices, and root/tubers, aligning with Maselle's observations on sectoral disparities. Conversely, the prevalence of youth engagement in dual vegetable crops, particularly combinations such as Tomato-Onion and Carrots-Eggplant, mirrors findings by Gathambiri *et al.* regarding popular crop pairings among young farmers. The study's detailed breakdown of youth participation rates in specific vegetable crops, such as cabbage, tomatoes, onions, carrots, okra, eggplant, and various leaves, echoes both Maselle and Gathambiri *et al.*'s emphasis on understanding crop diversification trends and the factors influencing crop choice among youth farmers.

Tomato-Onion combination attracts more youths certainly due to comparatively higher market demand for these crops (Putter and Koesveld, 2007). This corresponds to the study in Mvomero district by (Gulamiwa, 2015) which suggested that market availability for onion and tomatoes significantly influence youth interaction in the tomato-onion value chain.

The study shows that most of farmer in study area do not apply organic fertilizer on their farm and this finding conforms to another finding by Babasola *et al* (2018), who found in Kwara-Nigeria that low number of farmers applying organic fertilizers (chicken dropping and cattle dungs)

because of bulkiness in their transportation. For the case of seed source, as stated earlier youth farmers at large purchase seeds in agrovets instead of using the recycled seeds for next cropping season. This is probably because of technicalities required in making seeds for vegetable crops like onions, and low productivity is common for recycled seeds in tomato seedlings (Gabriel *et al*., 2021).

Furthermore, this finding reveals that many youths prefer to participate as producers or farmers and it conforms to another finding by Mundo (2019) who found in Zanzibar that youths are participating more in farming operations due to capital intensity nature of retailing, processing and input supplying activities along horticulture value chains. Additionally, in this node of farming, most activities related to vegetable value chains are actually performed here (Barber *et al*., 2017). Some of common activities performed by the vegetable farmers include land clearing and leveling, planting, fertilization, irrigating and weeding.

In another hand, it has been observed possible for the interviewed youths to store their onions probably because the vegetable is less perishable over other vegetable crops like tomatoes and leaves. The finding is in consensus with observation in onions by Jeckoniah *et al*. (2015) who also found in Northern Tanzania that all farmers surveyed were able to store their onions using traditional methods.

As the finding stated from Table 1 show that half of interviewed youths are participating in local grading i.e. middlemen could probably be crucial by given better margins that are mentioned to be accrued by the farmers when there is intermediation. This finding is supported by Abebe *et al*. (2016) who also found in Rural Ethiopia that farmers with intermediation (middlemen) accrue 25% more gross profit than those farmers without intermediation.

Interrelationship between actors along vegetable value chains exists at very marginal extent. No any youth farmer who had reported having contractual agreement with another actor back or forth of his node in the value chain. This is unsafe given the nature of vegetable products as supported by Au *et al*., (2021) who found the similar situation existing among vegetable smallholder farmers in Vietnam and they finally remarked that contract farming is important in vegetable production for reinforcement of bargaining power and transaction cost minimization among the actors along the value chain.

According to reports from the youth famers, the groups that they have registered consisted of other individuals who are not in vegetable value chains. In this sense, groups have to be farmers' groups otherwise; it is hard for group members of different undertakings to support each other when it comes to activity specific concern. The finding conforms to another finding by Nalle *et al*. (2023) who concluded in Indonesia that farmer's groups are substantial vital in developing farmers activities as things like negotiation power can be enhanced.

Conclusion

Investing opportunities have been unveiled in horticulture subsector, yet Tanzanian youths are mentioned to struggle finding good undertaking for income generation. This study used a case of youths from Tabora Municipality to map horticulture value chains with special focus on vegetable value chains. After such mapping, evaluation on governance and coordination of these value chains were done to reinforce youth participation and eventually improving respective income generated. It was found that youth's vegetables go through the chain nodes like research, input supply, production, processing, storage, local trading, transportation, wholesaling, retailing and lastly, consumption. Moreover, youth farmers along vegetable value chain were found to have many challenges which jeopardize participation of more youths in the subsector. On top of that, the found challenges were node specific meaning that actors in each node have their distinct challenges being addressed respectively, for instance capital limitations in processing and lack of reliable extension services in farming. Considering holistic horticulture value chain, credit and quality accreditation services are questionable. Further, in coordination mechanisms, there was found the subscription of most youth farmers in saving and credit groups but not in farmers' groups which are useful in horizontal

coordination of the vegetable value chains. Overall, it was also found that youth actors along vegetable value chain do not have trust to each other meanwhile contractual agreement between themselves is almost absent.

Policy implications and recommendations

The surveyed youths were found to prefer purchasing inputs like fertilizers and seeds from agro-dealers implying that agricultural technology dissemination through this age group could be useful. It was further found that all of the youths surveyed were the farmers with none of them operating vegetable processing firm. This has provided strategic implication that these youths could be capacitated in terms of finance and skills to make them operating vegetable processing firms which are mentioned important in winning price premiums. Specific strategies like, targeted training programs, micro-financing schemes, or public-private partnerships could be very applicable in this case.

Also, it was found shortage of efficient storing facilities as key challenge in the node of storing. This could be addressed by constructing communal warehouses (starting with warehouse for highly perishable tomatoes and leaves) with all required infrastructures to heighten span of vegetables produced by youth farmers. Equally important, since it was found that half of the youths surveyed do not believe in middlemen, knowledge should be shared to both youth farmers and middlemen to achieve trustworthy intermediation between the actors.

Moreover, in spite of not being reliable to the surveyed youth farmers, extension, credit and quality accreditation remain crucial support services towards attracting more youths to join horticulture subsector. Credit and accreditation services should therefore be provided at affordable costs and fees. Extension officers should always be cooperative to youth farmers in an effort of making their horticulture productive and prosper.

In coordination, under the facilitation of Local Government Authorities (LGAs), farmers' groups should be formed by youths in vegetable subsector if their focus is to increase bargaining power and sharing production cost. Since it was also found that actors are not trustworthy to one another along vegetable value chains which has led them to multitasking, this calls for the actors to cleanse their societal reputation and trust, this could first reduce transaction costs for the youths already in the chain and secondly eradication of multitasking which eventually increasing employment opportunities to the youths even outside the chains. Finally, for attracting more youths into the subsector, the study recommends institutional arrangements like contract farming being adopted in the subsector given the prevailing nature of horticultural crops and status of the actors along the chains.

Acknowledgement

This research was privately funded by researchers; without their funds this study could have been undone. Finally, we would like to acknowledge the role that has been played by early reviewers set by Tanzania Commission for Science and Technology (COSTECH) through Science, Technology and Innovation Conference and Exhibitions (STICE).

Ethical approval and consent

Authors of this research undeniably declare that all ethics from data collection, analysis and in report writing were adhered to the best of their knowledge.

Conflict of interest

Authors of this research article confidently declare that there is no any conflict of interest pertain to this work.

References

Abebe, G., Bijman, J. & Royer, A. (2016). Are middlemen facilitators or barriers to improve smallholders' welfare in rural economies? Empirical evidence from Ethiopia. *Journal of Rural Studies* 43, 203-213pp.

Au, Q. H., & Culas, R. (2021). Contract farming and vegetable value chain efficiency: A study from Quang Nam Province, Vietnam. In D. Horváth (Ed.), *Opportunities and challenges of*

smallholders and smallholding (pp. 215-237). (Agriculture Issues and Policies). Nova Science Publishers. https://novapublishers.com/shop/opportunities-and-challenges-of-smallholders-and-smallholding/

Babbie, E. R. (1999). Survey Research Methods. Wards worth Publishing Co., Belmount, California. 335 pp.

Barber, J., Alford, J., Ayendera, A & Bowler, B. (2015). Value Chain Analysis of the Fruit and Vegetable Market for Smallholder Farmers in Zanzibar. *VSO ICS Report*. Available at https://www.vso.ie/sites/default/files/VSO%20Value%20Chain%20Analysis%20CASH.pdf

Babasola, O.J., I.J. Olaoye , O.A. Alalade, B.M. Matanmi & O.D. Olorunfemi. (2018). Factors Affecting the Use of Organic Fertilizer among Vegetable Farmers in Kwara State, Nigeria. Tanzania Journal of Agricultural Sciences (2017) Vol. 16 No. 1, 46-53

Case, C. A. (2015). *Mapping of the Sweet Potato Value Chain Linkages between Actors , Processes Mapping of the Sweet Potato Value Chain Linkages between Actors , Processes and Activities in the Value Chain : A Case of " Michembe " and " Matobolwa " Products*. *January*. https://doi.org/10.5539/sar.v1n1p130

Chandra, C & Kumar, S. (2014). Supply Chain Management in theory and Practice: A passing fad or fundamental change. *Industrial Management and data systems*

Cruickshank, D., Grandelis, I., Barwitzki, S. & Bammann, H., eds. 2022. Youth-sensitive value chain analysis and development – Guidelines for practitioners. Rome, FAO. https://doi.org/10.4060/cb8489en.

Daystar, J. (2020). *Case study growth of tanzania ' s horticulture sector : role of taha in reducing food loss case study growth of tanzania ' s horticulture sector : role of taha in reducing food loss*. *September*.

Dubey, S. K., Singh, R., Singh, S. P., Kanpur, I. Z., & Mishra, A. (2020). *A brief study of value chain and supply chain*. *September*.

Gabriel, I., Olajuwon, F & Michael, B. (2021). Smallholder Farmers' Perception On Tomato (Solanum Lycopersicum) Seedling Technologies In The North West Zone Of Nigeria. *International Journal of Agricultural Extension*. 09 (01). 79-89

Gulamiwa. (2015). *Youth participation in holticulture and*. Mzumbe university.

Hassan, B., Bhattacharjee, M., & Wani, S. (2021). *Value-chain analysis of horticultural crops-regional analysis in Indian Value-chain analysis of horticultural crops-regional analysis in Indian horticultural scenario*. *January*. https://doi.org/10.22271/allresearch.2020.v6.i12f.8122

Jain, V., Kumar, S., Soni, U., & Chandra, C. (2017). Supply chain resilience : model development and empirical analysis Supply chain resilience : model development and empirical analysis. *International Journal of Production Research*, *July*, 1–22. https://doi.org/10.1080/00207543.2017.1349947

Jeckoniah, J., Mdoe, N & Nombo, C. (2015). Mapping Of Gender Roles And Relations Along Onion Value Chain In Northern Tanzania. *International Journal of Asian Social Science*, 3(2):523-541

Kimaro, P.,Towo, N &bMoshi, B. (2015). Determinants of Rural Youth's Participation in Agricultural Activities: The Case of Kahe East Ward in Moshi Rural District, Tanzania. *International Journal of Economics, Commerce and Management*. 3(2): 1-47

Kulwijila, M., Makindara, J., & Laswai, H. (2018). *Grape Value Chain Mapping In Dodoma Region , Tanzania*. 171–182.

Mahoney. (2004). *Property Rights Theory*. *1989*, 109–138.

Mango, N., Mapemba, L., Tchale, H., Makate, C., Dunjana, N., Lundy, M., Mango, N., Mapemba, L., Tchale, H., & Makate, C. (2018). Cogent Business & Management Maize value chain analysis : A case of smallholder maize production and marketing in selected areas of Malawi and Mozambique Maize value chain analysis : A case of smallholder maize production and marketing in selected areas of Malawi and Mozambique. *Cogent Business & Management*, *5*(1), 1–15. https://doi.org/10.1080/23311975.2018.1503220

Maselle, A. E. (2022). Contribution of vegetable

farming to livelihood outcomes among the youthinihumwa and mtumba wards, dodoma city, tanzania. Tia.

Matata, J. B., Anandajayasekeram P, Kiriro T.N, Wandera E.O & Dixon J. (2001). Farming systems approach to technology development and transfer: FARMESA, Harare, Zimbabwe. 424 pp.

Mohapatra, S., & Ramadas, S. (2022). *Value Chain Mapping and Analysis*. *July*.

Mpelangwa, E. M., Sørensen, O. J., & Bengesi, K. M. (2022). *The value chain of traded products of medicinal plants in Tanzania : the emerging role of formulators*. *13*(1), 1–14. https://doi.org/10.1108/AJEMS-06-2021-0287

Msafiri, B. D., & Mwombela, S. (2021). *Enhancing Competitiveness of Horticultural Industry in Tanzania*. *May*.

Mundo, C. (2019). Assessment of Factors Affecting Effective Participation of Youth in Horticulture Farming in Tanzania: A Case Study of Zanzibar Islands. Open University of Tanzania.

Nalle, M., Asa, M & Indrasti, R. (2023). The Role of Farmer Groups In Increasing of Rice Farmers In Lakekun Village, Kobalima Sub-District, Malaka District East Nusa Tenggara Province. The 4th *International Conference on Sustainable Agriculture and Environment*. doi:10.1088/1755-1315/1153/1/012022

Ng'atigwa, A. A., Hepelwa, A., Yami, M., & Manyong, V. (2020). Assessment of factors influencing youth involvement in horticulture agribusiness in Tanzania: A case study of Njombe Region. *Agriculture*, *10*(7), 287.

Noel. (2015). Projection of sorghum production response through multiple uses promotion strategies in selected districts of Tanzania

Parada, J. (2014). *Original Institutional Economics and New Institutional Economics : Revisiting the Bridges (or the Divide) Original Institutional Economics and New Institutional Economics : Revisiting the Bridges (Or the Divide)*. *April 2005*.

Putter, H. De, & Koesveld, M. J. Van. (2007). *Overview of the vegetable sector in Tanzania*. 1–38. http://edepot.wur.nl/30946

Republic, T. U., Bureau, N., Ministry, S., & June, F. (2013). *Tanzania in figures 2012*.

Segal, I., & Whinston, M. D. (2010). *Property Rights* *. 1–93.

Suska, J. (2016). *Possible Applications of the Theory of Transaction Costs in Corporate Management*. *2016*(4), 251–264. https://doi.org/10.18276/frfu.2016.4.82/1-21

URT (2013). *Tanzania in figures 2012*. National Bureau of Statistics. Dar es Salaam, Tanzania

URT (2021). T*he agro-industrial development program special agro-industrial processing zones (sapz)*. *2*. Ministry of Agriculture. Dodoma, Tanzania

URT. (2021). Tabora Municipal Council Strategic Plan 2021/2022-2025/2026. Tabora, Tanzania.

URT. (2022) Ministry of Finance and Planning, Tanzania National Bureau of Statistics and President's Office - Finance and Planning, Office of the Chief Government Statistician, Zanzibar. The Population and Housing Census: Administrative Units Population Distribution Report; Tanzania

Wajda. (2016). *The new institutional economics - main theories*. https://doi.org/10.14636/1734-039X

Wilson, R.T. and Lewis, I. (2015) The Rice Value Chain in Tanzania. A Report from the Southern Highlands Food Systems Programme. The Food and Agriculture Organization of the United Nations, Rome.