Original Article **ISSN: 2788-8517 (online), 2788-9963 (Print)**

Journal of Urban Development Studies
Vol. 2, Issue 2 (2022)

Rural-Urban Linkages under Irrigation Farming Scheme: The Case of Merawi Town and the Watershed of Koga Irrigation Project, Ethiopia

Dereje T. Adgeh*, Yalganesh T. Alemu

Urban Land Development and Management, Ethiopian Civil Service University, Email: dtdereje@gmail.com; ORCID: https://orcid.org/0000-0003-3803-3054

[2]Center for Urban Management Transformation Training and Consultancy, Ethiopian Civil Service University, yalganesh.tilahun@ecsu.edu.et

Received: 12 July 2022, revised: 07 September 2022, accepted: 16 November 2022

Abstract

Rural-urban linkages have the potential to play an important role in the generation of income, employment, and wealth for both rural and urban areas. The paper examines urban-rural linkages under irrigation schemes by taking the case of Merawi Town with Koga Irrigation watershed region. In line with this, the study intended to analyze the case areas' forward and backward production linkages, consumption linkages, and marketing linkages. Farmers, merchants, urban residents, and government officials who directly have a part in the rural-urban linkage process were questioned to gather qualitative and quantitative data, which was then used to address the goals that were supposed to be met. The findings disclosed that the level of rural-urban linkage in production linkage in the study area was fragile. The backward production linkage was relatively better than the forward production linkage. The availability of farming inputs in the nearby town was the main factor for the existing backward production linkage. The backward production linkage in the study area was reflected mainly through farmers' use of herbicides and insecticides and irrigation equipment supplied from Merawi town. Based on the findings, to foster the existing rural-urban linkage of the case area, there should be updates on marketing system improvement, expanding agro-processing industries, providing basic and farm-related infrastructures, improving the supply of farming inputs and protecting eucalyptus tree invasion over the irrigation-shade area.

Keywords: *Urban-rural, Forward linkages, backward linkages, regional development, farming inputs, urban services*

1. Introduction

Linkages between rural and urban areas play a significant role in the process of constructing means of subsistence. Spatially, urban-rural linkage has two components (Akkoyunlu, 2015); the urban component that impacts rural developments and the rural component that impacts the urban one.

The influence that urban centers have on the surrounding rural areas is the basis for the first sort of rural-urban connection that is being considered. In several theories and models of

regional development, this kind of connectivity has been characterized as being present. The linkage created by the effects of urban areas upon their rural hinterlands has been described in different views.

One dominant theory to do so is the functional regional development theory. This theory is developed by Hinderik and Tutu (1998) and Higgins (2017). The core of its premise is that regional development is brought about by industrialization and urbanization, which reinforces the agricultural sector development in the rural hinterlands. It concludes that modernization through socio-economic development for rural areas is attained if and only if the urban areas are priory gets developed and industrial expansion. Functional regional development for overall regional development is elaborated through growth and rural services center strategies (Tegegn , 2003; Akkoyunlu, 2015).

The growth center strategy is derived from Perroux's growth pole theory and believes industrialization of urban areas sprays modernization light to the hinterland rural areas (Nilsson et al, 2014; Higgins, 2017). Because industries have the potential to create farm-related jobs for farmers and produce farm imputes, which increase agricultural productivity. This strategy advocated urban areas are a means to bring rural development.

The rural service center strategy again describes small urban centers are engines of development for themselves and their rural hinterlands (Shah, 1974; Higgins, 2017). They are service centers from which the farmers can access information, farm imputes like Fertilizer, sell their extra far products, and have social and administrative services. In this regard, functional regional development theory advocates that urban areas take the lion's share of regional development by bringing mutual growth to themselves and their rural farming communities.

The other dominant theory that advocates the impacts of urban areas on rural ones is agropolitan theory (Friedmann, 1979; Shah, 1974; Nilsson et al, 2014). This theory again gives a weighted share of influence in regional development laid on small urban areas because of their proximity to rural areas. Under this thought, rural areas are natural reserves to sustain the ecosystem, but urban areas are places of wealth accumulation and centers of services to rural farming communities. Accordingly, linking the two geographical regions is crucial to sustaining the growth of urban areas to create natural exposure and bring ecological balance to the region (Nilsson et al, 2014). So, regional development is attained by the economic contribution of urban areas and the natural sustainably share of rural areas.

The influence that rural regions have on urban centers and activities that are not related to agriculture is an example of the second kind of connection that occurs as a result of rural-urban interaction. The arguments that fall under this alternative explain the way in which the influence of rural development sidesteps the influence of metropolitan areas on rural areas. The New Economics of Growth by Mellor, which was mentioned by Tegegn, serves as the conceptual point of departure for this line of thought (Tegegn, 2003; Akkoyunlu, 2015; Somanje et al, 2020). A surge in food grain production would promote development in agri-related sectors (trade, transport, and services, among other things), as well as expansion of industrialization, which brings about urbanization. This is the main premise of the argument.

This trend emphasizes that rural development will become the sole reason for establishing and developing urban areas. The theory traced back to the evolution of cities as initiated by the development of agriculture. Ancient urban centers in Asia, Africa, America and Europe had evolved after producing extra agricultural products.

This theory again advocates the development impact is assured by creating conducive linkages between the two special units. In this regard, the

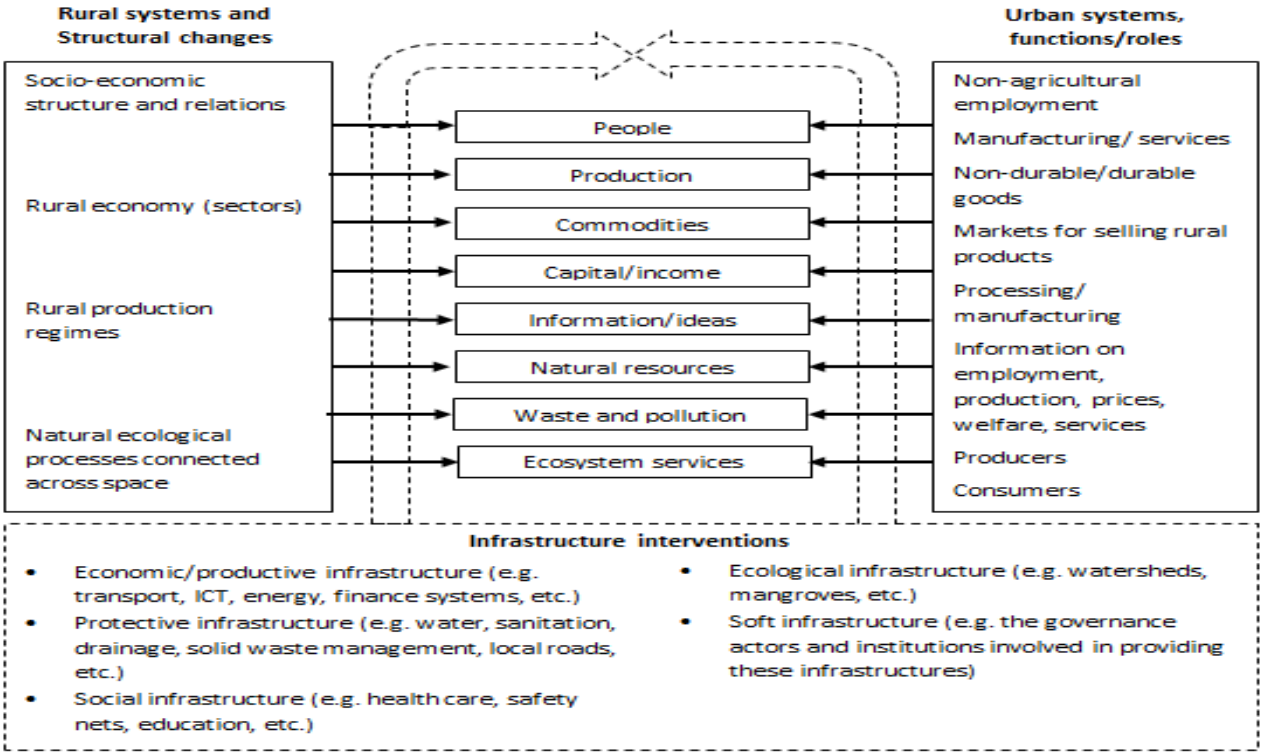
linkages most frequently cited are forward consumption linkages, backward production and forward production linkages (Tegegn, 2001; Akkoyunlu, 2015).

Forward consumption linkages have resulted when rural inhabitants expend agricultural products to access locally produced goods and services in urban areas. Priory, this situation is brought up when agricultural productivity and extra products buy such services and goods. Meanwhile, the urban inhabitants, whose economy is dependent on non-agricultural products, could expand the Market for their goods and services. In such a way, the urban-rural linkage is created by the high impact of rural areas on the linkage (Forster et al, 2015; Eppler, Fritsche and Laaks, 2015).

The other one in rural impacts urban development is by establishing backward production linkage. This linkage type is created when agriculture can absorb inputs produced by industries in nearby urban areas. Small urban areas, especially in developing countries, are not expected to have industrial potential to produce farm machines like tractors and combines, and fertilizers too. In this regard, backward production linkage does not effectively impact the development of urban areas by rural counterparts (Nilsson et al, 2014; Higgins, 2017).

Forward production linkage is the other type of linkage that describes how rural development impacts the urban through creating linkages. This linkage type refers to the local processing of agricultural outputs. Suppose the urban areas are well organized by being the center of service and goods for the demands of the hinterland agricultural community. In that case, the stage shows the accumulation of wealth because of agricultural productivity and reserve level raw materials to insist service providers' demand to start establishing industries that can process locally produced agricultural products. In this way, a high level of interaction between the rural and urban geographically interacting regions is established: the rural areas become the source of industrial inputs and urban areas become sources of farming inputs. This argument reveals that a high level of socio-economic and special linkages between urban areas and the rural hinterlands is the means to drive regional development (Akkoyunlu, 2015; Higgins, 2017; Higgins, 2017)

According to the findings of research on rural-urban linkages, a number of different elements might influence the form and strength of linkages. A thriving rural economy must first demonstrate consistent increase in agricultural production. This is the most fundamental prerequisite (Tegegn, 2001; Sietchiping, 2014). Efficient agricultural production will not be effective unless strong socio-economic and physical linkages exist with urban areas. Simply having surplus agricultural production cannot assure the development of the area/region because they should at least get a market to sell out the products and get access to goods and services produced in urban areas. For example, rural areas, which have a good potential for agricultural productivity and are located very far away from urban areas, could not be equally developed with the same potential areas near urban centers. This is because the former lacks to create accessibility of their surplus product while the latter has. Generally, it is possible to conclude from the above theories that urban-rural linkage means regional development. Diagrammatically, rural-urban linkages can be shown as;



Source: Akkoyunlu, S. (2015)

Megerssa (2007), in his study on rural-urban linkages in Gimbi and its hinterlands, the West Wallaga zone, came up with the findings that the production-consumption linkages are generally weak. This is mainly because of the farmers' limited production and consumption capacity. Hailu and Wubshet (2004), the rural-urban linkages in the Amhara region are poorly developed due to the significant subsistence nature of agriculture and low development of manufacturing industries in urban areas.

Eshetu (2007) studied rural-urban linkages under the pastoral and non-pastoral farming system in Fentale and Minjar-Shenkora *Weredas (small administrative region)* and reported that the Minjar-Shenkora has relatively strong background production linkages than the Fentale woreda. Regarding the market linkages, the same is true for both Weredas. That is, the pastorals have relatively weak linkage than the non-pastorals. Tassew (2002), in his study of farm/non-farm income linkages in Northern Ethiopia, reported that agriculture has limited backward and forward production linkage in the Tigray region. However, the consumption linkages are relatively stronger than the production linkages.

Studies of rural-urban linkages conducted in the region mainly focus on identifying the roles of urban centers in supporting the development of their hinterlands with less emphasis on backward and forward production linkages and their connection to the sustainable livelihoods of rural households. This study is expected to fil1 this gap by assessing the role of rural-urban linkages in Merawi Town and its hinterlands under the Koga Irrigation agricultural area.

In general, the study seeks to investigate how agricultural irrigation projects shape the linkage and bring regional development. The research is intended to answer the question; "What seems like the scenario of rural-urban linkages found presently between Merawi Town and Koga Irrigation water shade regions, and the respective roles played by the spatial units for local level development?" by emphasizing production, consumption and marketing linkages.

2. Methodology

2.1 Description of the study area

Merawi Town: Location and Physical Characteristics

Merawi is one of the towns in Amhara Regional state that has been given the status of Municipality administration since 2014. is located roughly 30 kilometers to the south of Bahir Dar and approximately 525 kilometers away from Addis Ababa, the capital of Ethiopia. To be more specific, the town is situated seven kilometers away from Koga Dam at the following latitude and longitude coordinates: 11°24'31" North 37°9'39" East It has an elevation of 1901 meters above sea level. The administrative headquarters of the Mecha Woreda are also located in this town.

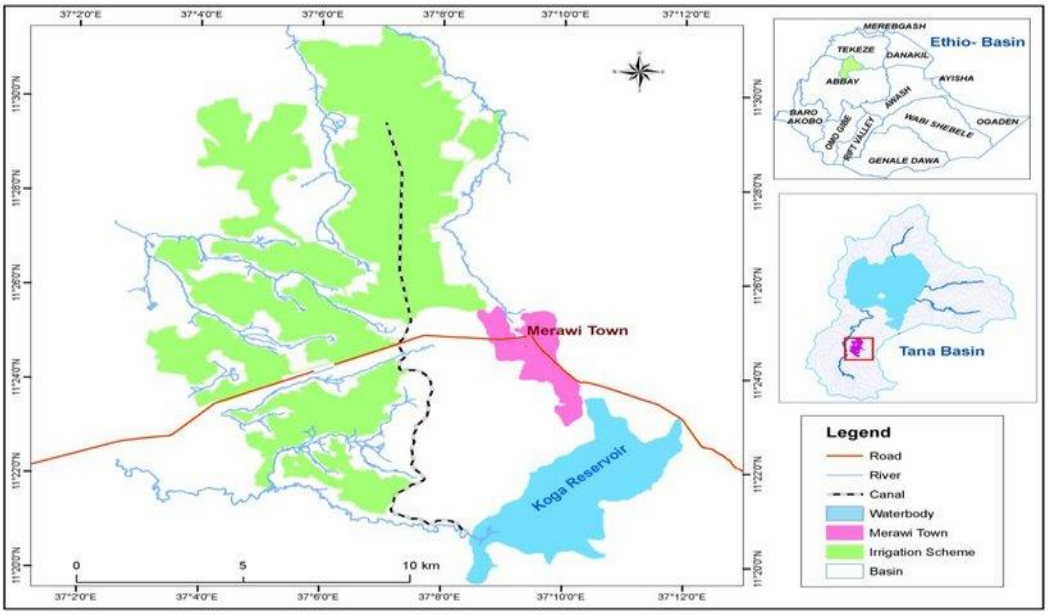


Figure 1 Location Map of the study area (*Source: Mecha woreda Koga Project Office, unpublished)*

Koga Irrigation Project area: Location and Physical Characteristics

The Koga Irrigation Project is located in the Mecha Woreda, which is about 526 kilometers distant from Addis Ababa, the capital city of Ethiopia. Merawi, the headquarters of the woreda, is located around 7 kilometers from the project. The project is located in the Woyina Dega' agro-climate zone, which is at the head of the Blue Nile basin inside the Lake Tana Watershed. The project's latitude is from l1o 10' N to 11o 25' N, and its longitude ranges from 37o 02' E to 37o 17' E. The region is affected by the Intertropical Convergence Zone, the northern trade winds, and the southern monsoon, according to UNESCO (2004) and other sources listed in (Kassie K.E, 2018). Because of this, it experiences a dry time that is referred to as "Winter," and it starts in December and continues until the end of May. The months of June and July mark the beginning of Ethiopia's summer, also known as the country's rainy season, which continues through the months of September and October. The region receives an average of 1560 millimeters of precipitation per year, and the average daily temperature is between 16 and 20 degrees Celsius. The Koga Irrigation Development Project irrigates a total of 7004 hectares of land, which is located within a catchment basin that spans 22,000 hectares (Koga irrigation development project office, 2019).

2.2 Research Methodology

To achieve the objective of the study, a clear and appropriate research methodology is vital. According to (Kothari, 2004), the descriptive research type describes the quantitative and qualitative aspects of respondents; interest, attitude and perception towards the issue under study. This study employed a descriptive research design and mixed research approach to deal with the issue under study. The reason behind choosing this research design is because of the paper's particular intentions and the nature of the data to be used. It simply describes the scenario of urban rural linkages, elaborates the sayings of the respondents about extent and type of linkages, and shows how the existing linkage is still established based on the respondents' assumptions.

A mixed research approach was employed to capture the best of both qualitative and quantitative approaches. A quantitative approach is applied to conduct an in-depth analysis of data obtained via questionnaires which were distributed to sample respondents (farmers who live in the Koga Irrigation watershed area, Merawi town residents and traders).

The mixed approach in this research is applicable in two distinct phases. In the first phase, quantitative data were collected by using a questionnaire from respondents (sampled based on Kothari's sample determination stated as "for the population greater than 10000, the probable sample size taking 95% confidence level is 384"). However, there were only 255 respondents who filled the questionnaires properly, and the analysis and concussion is made based on that. The respondents on the survey questionnaire were farmer households who live in the irrigated region. In the second phase, qualitative data were collected by interviewing project managers, rural elderlies, Woreda administrators, Project workers and managers. Moreover, document reviews like journals, manuals, and reports were done side by side to collect secondary data supply from the web, friends' hands, and libraries. The data were analyzed concurrently using SPSS statistical analysis for quantitative data and case narration for qualitative data analysis.

3. Results and Discussion

CASE — 1: FGD case summery with Farmers

".... Indeed, the coming to effect of Koga Irrigation has changed our life in many aspects. Unlike the previous times, we could cultivate twice a year and crop types that we had never even seen before, like wheat, cabbage, and tomato. We produced crops to feed our family before, but after the irrigation started, all the farmers in the scheme grew the vegetables and cereals like maize and wheat for the Market. We farmers are benefited many dimensionally by the irrigation. During Winter season, getting green grass for our oxen was unthinkable, but now we can get that along the canals. We are known for ox ranching. As soon as finishing' the Winter plow, we start ranching the oxen for sale. This grass helped us to fatten them in a short time. Even we could get water access from the irrigation in our village to domestic use and animal drinking. Our fruits around our home are green throughout the year. It is eye-catching to stay outside with our families this season. ... .

We grow cereals like Dagusa and Maize for home consumption in the winter, enough for our annual home consumption. The vegetables and cereals are grown intentionally for sale during the winter season. From the productivity perspective, vegetables are far greater than cereals like maize and wheat. However, since they are perishable, we are decreasing the cultivation of vegetables and more tend to grains, especially wheat. Whatsoever, we could earn better due to Koga Irrigation, and our life is changed considerably. Many of us could buy a home in Merawi Town and our children follow their education being in their home, and sometimes we could get rest there after returning from Merawi market. Not only for ourselves, but we are also essential for the town from various perspectives. We, the farmers, own most of the town's bajajs (three-wheel taxis). We supply vegetables and maize almost throughout the year at a low price. The town's youth, both females and males, are passing their winter season are laborers on our farms. All the merchants, loaders and brokers are the town's inhabitants. We buy farming

inputs like pesticides and fertilizers from such merchants at a high price.....

A farmer FGD participant explained the inputs he used for a 4.5ha land Potato cultivation in this year (2019/20 production year) as (His name reserved for security purpose January 2020),'

"... .... I have a spent 30quintal DAP (45,000 ETB), l04Qtl potato seed (83,200 ETB), 6 liters pesticide (3000 ETB) and around 40,000 ETB for wage employed on potato farm from planting the seeds, watering and collecting the produce. For example, I hired 50 laborers while planting the seeds for three consecutive days by paying 150 ETB/day for each labor. So, I spent more than 180,000ETB on Potato production only. Furthermore, I have 1ha wheat and 0.5Ha onion, whose cost is not calculated yet well. Except for 45quintal of the seed bought from Sekela, all inputs were bought from Merawi Town... ...."..... However, the government seems as do not want to help us. We are paying tax and contribution for' Alma and other required payments, but we are in many infrastructural problems. The road to the town is not well serviced, except for consuming our farm. We should go to 3Hrs round trip to Malawi Town for electric grinding."

The lack of a market for our production worsens the problem, especially the vegetables. We dumped tomato and onion products since there were no buyers, even with meager prices. For example, the tomato was dropped to 2 birr/kg. So, we the farmers are tending more to produce cereal crops, mainly wheat during irrigation session, though the productivity is less when compared to vegetable growing. They raise grievances on the value added by the farmers are captured by other external bodies like brokers and merchants, and they said that the government is the reason and accountable for."

".....Beyond the infrastructure challenge, farm inputs shortage and absence is critical for irrigated farming. The government has a scheduled supply of DAP, Urea and fertilizers as possible for rain-fed farming during the Summer (the rainy season in Ethiopia) season through unions and cooperatives. However, there is little supply of DAP, Urea and best seeds by Koga Union, which can't satisfy more than one-fifth of input demand. From the urban traders, we can fulfill the remaining 3/4'h demand of Fertilizer and best seed demand. There would be no pesticide in the town unless we reserved it during Summer (the rainy season in Ethiopia). A 50birr pesticide during Summer (the rainy season of Ethiopia) usually becomes 500birr and more during irrigation seasons (Winter), and sometimes might not be found at all…."

The main issues forwarded to farmer participants were intended to share their opinion on the significance of irrigation to their farming, their productivity (type, input usage, and turnover) and the challenges they face in their overall agricultural activity. Accordingly, the following table summarizes the main points of the FGD.

Source: FGD participants, January 2020

Case — 2: Interviewees' summery

"... Koga irrigation is a gift from this government for this area's farmers to have two to three farming sessions. They grow crops dominantly Dagusa and Maize during the Summer (the rainy season of Ethiopia) session from Ginbot to Meskerem, and they grow various vegetables like onion, tomato, Potato, cabbage and chili, and cereals like wheat and maize. In this area, wheat had never been part of cultivation before irrigation started. The first irrigation session is often inaugurated mostly in October and ends in January. The dominant produces include wheat, maize and the above vegetables, but in the 2" sessions of irrigation farming, Potato takes the lead."

"....The farmers in the irrigated region had very fragmented land plots. However, after the irrigation, they are given one plot similar to their fragmented plot sums. Such land holding is vital for a farmer to control and farm. From this, two percent is deducted from each farmer for way, land for investors and youth cooperatives. Land size for each farmer ranges from 2.5Ha to 0.5Ha...

Irrigation is/has changed the livelihood of the farmers in different aspects. The productivity and agricultural produce type are considerably altered with the same or less agrarian plot. Formerly, there was vast grazing land, but after that, that land was changed to a crop and vegetable production site. Beyond this, the farmers' ranching culture is developed. This day, they have a trend of buying

oxen in May and finishing their plow in June. From June to September, the oxen become ranched and sold back until Meskel. Then the farmers again buy other oxen for irrigation farming between September and October to finish plowing until the first week of November. Then the oxen again become ranched to be sold for X-Mass. One fattens ox has usually valued as two to three oxen. The irrigated crop residue and the green grass called Rodas along the water canals help the farmers to fatten their oxen."

"...The coming up of this irrigation is not only advantageous for the farmers, but it is playing a great role in the development of Merawi Town. Some benefits include whole year-round fresh maize and many farmers directly investing in the town by buying buildings and vehicles. Fresh vegetables like onion, Potato, tomato, chili and cabbage are usually full in the town's Market at a low price. Some parts of the town's community, especially older women, are directly engaged in retailing of such domestic consumption. ...Moreover, many of the town's youths (especially females) are laborers on the farmer's irrigated land. For this purpose, many female students from neighbor Weredas continue their high school education, intending to be employed during their break times. Some towns' youth small and medium-scale cooperatives are engaged directly in the supply of inputs from the irrigated region. For example, cooperatives engaged in ox ranching activity get oxen to feed from the residue of irrigation crops and vegetables. Still, some ranching oxen are bought directly from such farmers."

However, the main problems that become bottlenecks for further productivity and rural-urban linkages exist. These include unable to cover the whole irrigated land in irrigation sessions, more customary based irrigated water usage, tendency to cover their plot with eucalyptus trees, and marketing of vegetables (easily perishable agricultural produces), lack of farming inputs, absence of agricultural processing industries, etc.

Some Summer (the rainy season of Ethiopia) crop types like Dagusa stay on land up to the end of December by consuming the irrigation time. Furthermore, this crop, by nature, is land drier. The farmers need extra/unplanned water to soften the land for the plow. This usually becomes a water-sharing conflict between the farmers—the other problem is marketing linkage for perishable agricultural products. Since the farmers do not cultivate in the cluster, some produce reaches first while different types are late. So, the farmers have to supply their products in the local Market, like Merawi, Wetet Abay and Birakat. This time, the price of such products becomes low, and the farmers are demotivated to cultivate the same product in the next crop year. There is no farm processing industry in and around Merawi Town, except for producing one cooling store for perishable outputs.

Not only on the part of the outputs, has the marketing problem faced the input considerably. Most of the time, the farmers themselves buy inputs like fertilizers, best seeds and pesticides from traders of Merawi and other surrounding Weredas. They might buy with a 50-80% increase from the usual price.

The main issues forwarded to interviewees were to inquire about the main activities, how and what the government is engaged in to increase irrigation farming performance, marketing linkages and linking irrigation farming to raise urban livelihoods. Moreover, as key informants, they requested to forward their perceptions about the opportunities and challenges of increasing such linkages. Interviews from Koga Irrigation and Watershed Management Office and others like from Small and Medium Scale Enterprises office, Office of Trade and market development office of Merawi town, and Mecha Wereda Rural Development and Natural Resource office described the general scenario of Koga Irrigation Farming, the opportunities and treats, and the rural-urban linkage with Merawi Town.

Source: Squeezed Interviewee responses, January 2020

The Nature and Extent of urban-rural linkages in the study area

It is commonly agreed that rural-urban linkage plays a crucial role in the effort of poverty reduction and economic growth. Understanding the characteristics of the specific local context of rural-urban linkage and recognizing diversity among locality and households have been critical elements for researchers, policymakers and development actors.

As indicated in the literature, the linkages between small towns and its hinterland could be categorized into different types: production, marketing, consumption, financial and environmental linkages. The patterns of linkages could be identified from the frequency of visits of farm households to the nearby small towns. In this part, we investigated the characteristics, dimensions, and trajectories of the urban-rural links present in the region under investigation. In addition to this, the factors that determine rural-urban connectivity in the research region were discussed.

Backward production links and forward production linkages are the two forms that production linkages may take. Backward production linkage happens when farmers in the periphery use agricultural inputs from the adjacent town. These farming inputs might include things like fertilizers, better seeds, pesticides, herbicides, and other similar substances. On the other hand, forward production connections refer to the businesses in the neighboring town that are responsible for the processing and distribution of the agricultural products that are produced in the hinterland (Mewael B. 2016).

The study area has two dominant cropping seasons: Summer (the rainy season in Ethiopia) and Winter. The main crops are grown in the Summer (the rainy season of Ethiopia), including Maize and Dagusa, depending on rained agriculture. However, it is based on irrigation that the Winter season agricultural activities are based. There are different vegetables like cabbage, tomato, Potato, onion and cereals. Dominantly wheat and maize are cultivable in irrigation-based agriculture. So it is possible to assume that the farmers use a considerable quantity of inputs.

Farming inputs help increase agricultural productivity by nourishing crops with minerals necessary for production and controlling pests and weeds. Therefore, small towns are expected to improve farmers' access to farming inputs. The extent to which local farmers use farming inputs and extension services and the capacity of small towns to provide these services to the local farmers could reveal the impact or role of small towns on the hinterlands. Moreover, it could reveal the nature of the hinterlands' backward production linkages with the small towns.

Table 1: Rural Households' Utilization of Farming inputs, 2018/19

Agricultural Input	Reported as "Yes"	Average Expenditure/	Source	
	Number (%)	Household	Rural	Urban
Fertilizer (DA and URIA)	255(100)	4332	-	100%
Improved seed	255(100)	1884	-	100%
Herbicides & Insecticide	134(52.5)	760	-	100%
Zero Tillage chemical	22(8.6)	1600	-	100%
Total Respondents	221			

Source: Field survey, 2020

The backward production linkage was shown in the study area via farming inputs. The table above illustrates the predominant farming inputs used by the sample rural households in the Koga

irrigation region. These include fertilizers, insecticides, herbicides, improved seeds, zero tillage chemicals and irrigation-related items. All the households used all types of the above-listed inputs in 2018/19. However, besides the economic consideration, the degree (for example, frequency and quantity) and reason of use differed from household to household. For example, some respondents have small size arable land than others.

Regarding the pattern of use of these inputs, commercial Fertilizer (DAP) was dominant in the study area. As the table shows, all of the sample rural households used improved seeds and fertilizers. The Fertilizer was collected from the town and distributed to the households in different Kebeles either by the cooperatives or by themselves. In this way, the cooperatives and the farmers' union played an essential role in facilitating the rural-urban linkage through the supply of farming inputs to the households.

On the other hand, about half (52.5%) of the sample respondents used herbicides and insecticides. These chemicals were mainly used when weeds and insets occurred. Farmers in the study area were solely dependent on the urban area (urban traders in Merawi town) to supply these herbicides and insecticides. The backward production linkage in the study area was reflected mainly through farmers' use of the above farming inputs supplied from Merawi Town.

Backward production linkage was also supported by the provision of equipment used for irrigation. This also created job opportunities for urban residents who were engaged in small and medium-scale enterprises in the service and trading sectors. In addition, the farmers' union (situated in the town) sells agricultural equipment such as sickle, sprayers, and hoes to the rural households in the study area.

Though there are substantial agricultural products in the study region, there are no agriculture output processing industries. This indicates the absence of forwarding production linkage between the town and the rural study area; thus, there is no industrial base linked to the hinterlands.. Especially since vegetables are easily perishable, the farmers tended to be inclined to produce cereals like wheat though the productivity is less than the vegetable growing.

The town has a substantial industrial base (textile, marble, shoe, and flour), but it does not have any real direct contact with the people who live in the surrounding countryside or the manufacturing activities that take place there. Except for the limited employment prospects and accompanying market opportunities for food products from the rural hinterland, these industrial operations were outward-directed and export-oriented, and thus contributed very little to the general economy of the local community. In the same way that the nation's fashion industry is reliant on imported raw materials, so too is the nation's manufacturing industry.

The extension service is an important component in the process of elevating the agricultural output of individuals living in rural areas. The whole of the sample of respondents said that they have obtained a variety of services from the town, including those pertaining to farm extension services, agricultural instruments, and veterinary services. The rural-urban connectivity in the region under investigation was improved as a direct result of this factor's favorable effects. Such who were involved in irrigation also acquired their supplies and fuel from the town since it was the central location for those activities.

Generally, the findings showed that the level of production rural-urban linkage in the study area was very low or weak. The backward production linkage was relatively better than the forward production linkage. The availability of farming inputs in the nearby town was the main facilitator for the existing backward production linkage. The backward production linkage in the study area was reflected mainly through farmers' use of herbicides and insecticides, modem beehives and irrigation equipment supplied from Merawi town. The forward production was almost

missing in the study area. Almost all sample households did not sell part of their farm products to processing plants found in Merawi town. The following section discusses the marketing linkage in the study area.

Marketing Linkages: When people in cities and towns buy agricultural goods directly from those living in rural areas, this is an example of a marketing connection at action. Therefore, agricultural production is the input into the process of marketing linkage, and the result of the process is the consumption of the product by customers in urban areas. In addition to this, it may be seen when people living in rural areas make purchases in urban areas. Typically, it refers to the movement of commodities between urban and rural regions, including agricultural and manufactured products (White, 2005).

Marketing linkage is the main form of rural-urban linkage. Food grain, livestock and livestock product, vegetable, honey and merchandise flow between urban and rural areas. Marketing channels for agricultural produce are the means by which food grains flow from rural to urban areas. The most direct link between the producers and consumers is when agricultural producers sell their produce directly to the consumers. However, marketing linkage between agricultural producers and urban consumers is mainly provided through a network of traders or intermediaries.

In the study area, marketing linkage is manifested by the purchasing of crops like tef Finger Millet, maize, wheat and the like; vegetables like cabbage, onion, tomato, Potato and the like; livestock and their products by urban dwellers and the purchase of manufactured goods and different services by rural dwellers.

While field observation occurred, there was a surplus supply of different vegetables in Merawi market. Moreover, there were cattle and fatten oxen that showed there is a strong marketing linkage. However, the FGD participants strongly argued that the Market could not absorb all the agricultural products, so the price is very low for vegetables. Urban traders are mainly engaged in trading crops than those vegetables, so, at the production site, the farm size used for vegetable production is reduced to one-third of the former.

Consumption Linkages: The movement of urban commodities and commerce, whether they are created locally or imported, takes place from metropolitan regions to rural ones. The important connections in the chain of consumption are formed by the activities that cater to the needs of the rural families as consumers. That is, the rural families generate demand for urban commodities in the small towns, which is how rural-urban links come about. This is something that becomes readily visible when smaller towns offer the necessary commodities and services for exchanges between rural regions and metropolitan centers. Consumer and manufacturing products are mostly supplied to rural regions by the towns located in between them. Though it is difficult to capture and document all types and varieties of these goods, the expenditure pattern of major durable and consumable items is treated under this section.

Table 2: Average Expenditure and Place of Purchase of Goods

Goods	Average Expenditure	Reporting Farmers	Place of Purchase	
			Town	Rural & Town
Clothes/ Shoes	2634 (annually)	255(100)	100%	
Household utensils	720 (annually)	191 (75.1)		
Exercise book, pen & others	586	250 (98.2)		
Total	3940 Birr			
Building materials	500 (annually)	37 (14.5)		
Coffee/Sugar/Tea	110 (monthly)	251 (98.6)	186(72.9%	69(27.1%)

Goods	Average Expenditure	Reporting Farmers	Place of Purchase	
			Town	Rural & Town
Salt/Spices/ Pepper	100 (monthly)	225 (100)	)	
Oil/Kerosene/Soap/ Dry cells	350 (monthly)	225 (100)		
Others	50 (monthly)	225 (100)		
Total	1100 Birr			
Total Annual Expenditure		5040 Birr)		

Source.' Field survey, 2020

The table above presents the households' estimated average expenditure on durable (annual spending) and consumable (monthly expenditure) items. As shown in the table, the entire sample of rural households purchased durable (household utensils) goods in Merawi town, while three-fourths of the sample rural households purchased non-durable goods in the town. Regarding the non-durable goods, almost all sample farmers purchased consumables such as soap, kerosene, oil, sugar, and coffee. Every family in the sample allocates some portion of their budget to the purchase of non-durable and durable consumer goods. Each of the sample households spent a yearly average of 3,940 Birr on long-lasting items (including things like clothes and shoes, household utensils, and exercise books). This showed the rural population of the Koga irrigation region made some expenditure on urban goods. Almost all sample rural households spend some money on both durable and consumable items in Merawi town. Though a difference was noted in households with respect to their place of purchase, the town met the demand of the hinterland for urban goods and services. Therefore, in relative terms, there was a strong consumption linkage in the study area.

In general, it is possible to conclude that there are linkages created between Merawi Town and the Koga irrigated region rural area though the extent is different. Production linkage is somewhat firm in the backward dimension but not forward. Since rural inhabitants have enough expenditure due to surplus agricultural production sold out to the Market, there is high urban goods consumption linkage. The marketing linkage is relatively low for vegetables than agricultural crop products.

4. Conclusion

The study's main objective was to explore the scenario of rural-urban linkages and how agricultural irrigation projects shape the linkage to bring regional development. The necessary data were drawn from primary and secondary sources to achieve the study's objectives.

The sustainable development of both rural and urban areas requires a mutual relation between these two spatial units. The findings disclosed that the level of rural-urban linkage in production linkage in the study area was fragile. The backward production linkage was relatively better than the forward production linkage. The availability of farming inputs in the nearby town was the main factor for the existing backward production linkage. The backward production linkage in the study area was reflected mainly through farmers' use of herbicides and insecticides and irrigation equipment supplied from Merawi town.

Although all sample rural households produced cereal crops and vegetables, the urban Market was unable to absorb the perishable products, which led to less production of the items from time to time. The area is well suited for crop production because cultivable land is very plain and fertile. Moreover, an irrigation system enables the farmers to cultivate in the winter when rain does not exist. This multiplies their former production capability. In the study area, crop

products supplied to the Merawi market from the hinterlands were huge, though the marketing linkage through crop was very weak, as the Market couldn't absorb the surplus.

Acknowledgments

We thank Ethiopian Civil Service University for funding to conduct this study.

Consent

There is no conflict of interest in this paper

Authors contribution

All authors have contributed in designing methodology, data collection, analysis and report writing

Reference

Akkoyunlu, Ş. (2015). The potential of rural–urban linkages for sustainable development and trade. International Journal of Sustainable Development & World Policy, 4(2), 20-40.

Akkoyunlu, Sule. (2013). The Potential of Rural-urban Linkages for Sustainable Development and Trade. NCCR Working Paper No 2013/37| December 2013.

Ali, M. (2013). Geographical analysis of rural-urban linkages in Amhara region, Ethiopia: A case study. IJAIR, 2(8), 428-431.

Egizahher, T. G. (2001). Rural-urban linkages under different farming systems: The cases of coffee and non-coffee growing regions in Ethiopia.

Eppler, U., Fritsche, U. R., & Laaks, S. (2015). Urban-rural linkages and global sustainable land use. GLOBALANDS Issue Paper, Berlin.

Forster, T., Santini, G., Edwards, D., Flanagan, K., & Taguchi, M. (2015). Strengthening urban rural linkages through city region food systems. Regional Development Dialogue, 35.

Friedmann, J. (1979). Basic needs, agropolitan development, and planning from below. *World Development*, *7*(6), 607-613.

Higgins, B. (2017). François Perroux. In Regional Economic Development (pp. 31-47). Routledge.

Kapfudzaruwa, F., Kudo, S., & Hansen, M. (2018). Rural-urban Linkages and Sustainable Development. Rural-Urban Linkages and Sustainable Development in Africa, 1.

Kassie, K. E., & Alemu, B. A. (2021). Does irrigation improve household's food security? The case of the Koga irrigation development project in northern Ethiopia. Food Security, 13(2), 291-307.

Koga irrigation development project office (2019). Irrigation agriculture related 2019 annual report

Legese, L. B., Serbeh-Yiadom, K. C., & Melesse, A. (2014). The role of Ethiopian medium and large scale manufacturing industries in strengthening rural-urban linkages. Developing Country Studies, 4(9), 142-151.

Mengesha, G. S. (2017). THE NATURE AND CHALLENGES OF RURAL-URBAN MARKETING LINKAGES IN ETHIOPIA-THE CASE OF KOBO TOWN AND ITS SURROUNDING RURAL AREAS. The Indian Geographical Journal, 92(2), 115-134.

Mfune, O., Mutisya, E., Popoola, L., Mungai, D., Fuh, D., & Olayide, O. (2016). Changing rural urban linkages in africa in a globalizing economy. African Journal of Sustainable Development, 6(2), 109-134.

N. Mushi (2003). Regional Development through Rural-Urban Linkages. the Dares Salaam Impact region, Dissertation, Dortmund University, Germany. Reprint from Third World Planning Review, Vol 20, No. 1, 1998

Nilsson, K., Nielsen, T. S., Aalbers, C., Bell, S., Boitier, B., Chery, J. P., ... &

Zasada, I. (2014). Strategies for sustainable urban development and urban-rural linkages. European Journal of Spatial Development, 25-p.

Roberta Capello and Peter Nijkamp (2009). Handbook of Regional Growth and Development Theories; Published by Edward Elgar Publishing Limited The Lypiatts 15 Lansdown Road Cheltenham Glos GL50 2JA UK

Shah, S. M. (1974). Growth centers as a strategy for rural development: India experience. Economic Development and Cultural Change, 22(2), 215-228.

Sietchiping, R., Kago, J., Zhang, X. Q., Augustinus, C., & Tuts, R. (2014). Role of urban–rural linkages in promoting sustainable urbanization. Environment and urbanization Asia, 5(2), 219-234.

Somanje, A. N., Mohan, G., Lopes, J., Mensah, A., Gordon, C., Zhou, X., ... & Takeuchi, K. (2020). Challenges and potential solutions for sustainable urban-rural linkages in a Ghanaian context. Sustainability, 12(2), 507.

Tadele Fule (1999). Urban-Rural Linkages in Agaro Area, Jimma Zone of Oromiya Region With Particular Emphasis on Coffee Trade, Dissertation defended, AAU.

Tadesse, Kassahun (2015). Optimizing Cropping Pattern Using Chance Constraint Linear Programming for Koga Irrigation Dam, Ethiopia. Irrigation & Drainage Systems Engineering. 04. 10.4172/2168-9768.1000134.

Walo, M. T. (2016). Bridging the rural-urban divide for local economic development in Nekemte and its hinterlands, Oromia, Ethiopia. Journal of Agriculture, Food Systems, and Community Development, 6(4), 125-143.