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Integrated Urban Agriculture: Constraints Facing Livestock Keepers in Kinondoni; Dar es Salaam City, Tanzania

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Abstract: Various researches conducted in Dar es Salaam city, Tanzania show that urban agriculture makes significant contribution to household livelihood. Despite this contribution, the growth of integrated urban agriculture in the urban areas is not convincing. Thus, this study aimed at establishing constrains facing integrated urban agriculture. Specifically, the study assessed livestock management system adopted by integrated urban farmers, and determined type of constraints they are facing.The study adopted a cross-sectional research design whereby both quantitative and qualitative data were collected through household survey and focus group discussions. Random sample of 132 integrated urban farmers was selected to accomplish this study. Quantitative data were analysed using SPSS while qualitative data were analysed using content analysis. The findings indicate that less than 50% of integrated urban farmers are practising intensive livestock management system. Also, it was shown that, integrated urban agriculture faces a number of constraints including investment capital constrains, technical expertise, incredible hatcheries, water shortage and diseases. From the study findings, the study concludes that, practising semi-intensive and extensive livestock management system which is contrary to the municipality bylaws guiding livestock keeping in urban areas reduce productivity of the sub-sectors in the study area as well as increasing the chance of failure. Therefore, individual farmers' initiatives, governmental and non-governmental efforts should focus on providing solution to various challenges facing urban farmers.

Key words: *Integrated, urban agriculture, livestock, management system, Constraints*

1.0 Introduction

Livestock keeping is the important subsector on integrated urban agriculture since it receives as well as give out resources for other subsector and thus effective and efficiency use of scarce resources in urban areas (Miccoli *et al.,* 2015). Various findings show that integrated urban agriculture is among livelihood strategies adopted by urban household to reduce vulnerability and sustaining livelihood outcomes such as income, food security and improved housing (Komarek *et al.,* 2015; Miccoli *et al.,* 2015).

Urban farmers have commonly practicing monoculture farming system by either engaging in crop production, livestock farming or aquaculture farming (De Bon *et al.,* 2010 that offer little benefits to farmers. However recent findings proved integrated urban agriculture to be a livelihood solution to urban farmersMiccoli *et al.,* (2015). Due to the threat for increased world population, rural-urban migration as well as shift of urban farmland to residence land raised a call for integration has been made to influence efficient utilization of resource and increased profitability (Poulsen *et al.,* 2015; Miccoli *et al.,* 2015). Even though integrated urban agriculture being identified as a model for efficient resource utilization and livelihood improvement, its

adoption is relatively low (Gupta, 2012). This raises an empirical research question on why integrated urban agriculture practices have been limited. This might be due to various factors likelow returns from the sector (Poulsen *et al.*, 2015). A number of studies have been done for urban agriculture in Tanzania such as those related to profitability, institutionalization, and governance; but little has been explored in relation to constraints facing integrated urban agriculture in Tanzania. Therefore, this study aimed at assessing constraints facing integrated urban agriculture. The question asked included what the livestock management system integrated urban farmers adopted and what constraints are facing integrated agriculture.

2.0 Methodology

Kinondoni Municipality is the area selected for this study, it is one of the municipal in Dar es Salaam city. The municipal is experiencing tropical climatic condition due to its close proximity to the equator and warm Indian Ocean, which is favourable for agricultural activities. Kinondoni municipal was chosen since it is the leading District whose dwellers engaged in agricultural activities compared to the other three Districts of Temeke, Kigamboni and Ubungo within the region (Mlozi*et al.*, 2014). The study adopted a cross-sectional research design. According to Kothari (2004), such research design allow data to be collected only once at a time without repetition.

A purposive sampling was employed to select six wards. A random sampling technique was used to get 132 urban farmers practising integrated agriculture from a sampling frame that was prepared by listing all integrated urban farmers in each ward. The formula developed by Krejcie and Morgan (1970) was used to get a sample of 23 respondents from each ward making 138 respondents for the entire study. However, due to various field challenges including availability of respondents, 132 household heads interviewed. The sampling unit was made of households where household head, or any adult aged above 18 years involved in integrated urban agriculture was interviewed.

Six Focus Group Discussions (FGDs) were organised (one from each ward). Each FGD comprised of 6 to 8 participants as recommended by Kumar and Kalyani (2011).Also 12 in-depth interview conducted whereby by crop and livestock extension officers from each ward interviewed. Qualitative data analysis was done using content analysis while quantitative data were analysed using Statistical Package for Social Sciences (SPSS).Ms excel was used in preparation of graphs and tables. A descriptive statistic(frequency and percentage) mainly used in analysis of data in this study to understand the management system adopted by farmers, constraints facing integrate urban agriculture and reason for adoption of each agricultural management system.

3.0 Results and Discussions

3.1 Type of Agriculture Integration Practiced by Farmers in the Study Area

According to Victor *et al.*, (2018) majority of urban farmers in Kinondoni Municipality (98%) commonly practiced crop-livestock integration while only few integrate livestock and fish or crop livestock and fish keeping as shown in Table 1. The high proportion for crop-livestock integration practices than other types were influenced by the notion that crop-livestock integration is a promising way to address agricultural sustainability issues (Moraine *et al.*, 2017). In addition, this crop-livestock integration practice has more of cultural orientation (Mvena,

1999) unlikely fish keeping which is anupcoming sub-sector in Tanzania and there is inadequate information about it (Mwaijande and Lugendo, 2015). Thus, livestock remain a key sub-sector on integrated urban agriculture.

Table 1: Types of integration

Type of integration	Frequency	Percentage
Crop and Livestock Production	130	98.5
Livestock and Fish Farming	1	0.75
Crop Production, Livestock and Fish Keeping	1	0.75

Source: Kelvin *et al.*, 2018

3.2 Management System Practices by Farmers in the Study Area

The municipality is implementing the Urban Authorities' by-law of 1982, No 2 and the Dar es Salaam City by-laws of 1989. These by-laws set limits for the number of livestock to be kept per household with an emphasis on zero grazing. According to the by-law the maximum number of cattle allowed is four while for chicken is 3000. Also, the by-laws insist on intensive keeping and no one is allowed to move animals or to use tethering system. However, as shown in Figure 1, 29% of respondents still practice extensive livestock keeping while about the same percent combine intensive and extensive system. Only 43% of the respondents reported intensive livestock management system.

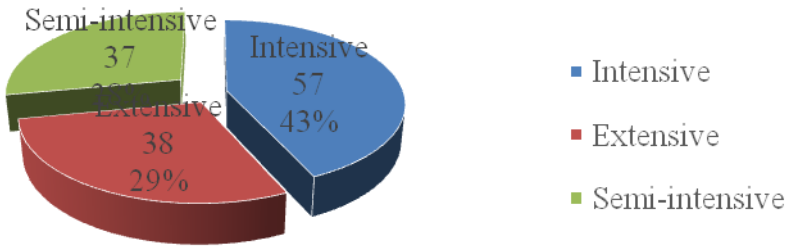

Figure 1: Livestock management system adopted

These findings show that significant number of farmers (56%) is conflicting Kinondoni Municipal Council by-laws. This could also mean either the respondents do not consider by-laws as important factor for regulating livestock keeping since authorities were not very strong on enforcing these by-laws (Jacobi *et al*., 2000) or they are not informed of the existence of these by laws which restrict them from practicing those systems. This conflict between farmers and the by-laws normally is not good for sustainability of subsectors.

Given the practice of keeping livestock extensively or semi intensive by farmers, the study explored enabling factors that facilitated few farmers who adopted intensive livestock keeping. The findings in Figure 2 show that 40.4% of respondents practiced intensive livestock management system to avoid dispute with municipal authority and neighbours. This shows that

there are some farmers who were aware of the by-laws regulating livestock keeping in the study areas. Other reasons that the respondents gave for intensive livestock keeping were availability of enough capital and avoidance of diseases.

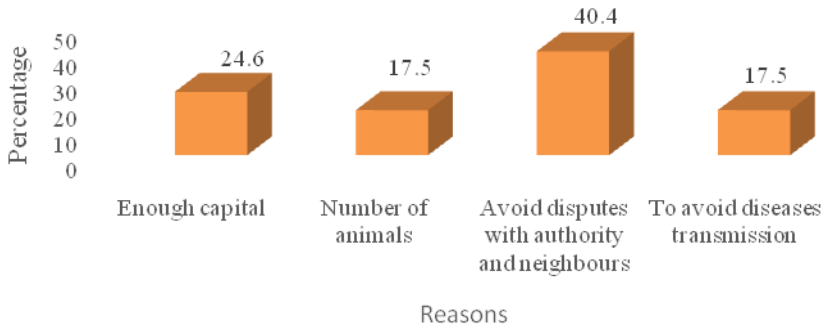

Figure 2: Reasons for intensive livestock management

On the other hand, majority of the famers (Table 2) who preferred extensive and semi-intensive livestock management system reported lack enough capital to be the main driver for their decision. This was because intensive livestock management system is a capital-intensive system, which requires enough labour for care and financial capital for intensive feeding (Ndambi *et al.*, 2008), thus those without enough capital opted for extensive and semi-intensive system.

Table 2: Reasons for using extensive and semi-intensive livestock management system

Reasons	Extensive		Semi-Intensive	
	Frequency	Percentage	Frequency	Percentage
Labour availability	1	2.6	3	8.1
Allow animal exercise	0	.0	2	5.4
Land availability	8	21.1	6	16.2
Number of animals	9	23.7	1	2.7
Lack of enough capital	20	52.6	25	67.6
Total	38	100	37	100.0

3.3 Constraints Facing Farmers Practising Integrated Urban Agriculture

Regardless the types of integration adopted by urban farmers, farmers are generally experiencing a number of constraints. Among all challenges (Table 3.2), farmers cited diseases (67.4%) as the most challenging constraint than any other type of constraints, and conflict with neighbours (2.3%) was the least.

Table 3: Constrains facing integrated urban farmers

Constraints	Frequency	Percentage
Diseases & pest	89	67.4
Lack of enough capital	68	51.5
Poor weather & water shortage	50	37.9
Conflict	3	2.3

3.3.1 Insects, pests and diseases

The study shows that insects, pests and diseases were among the challenges facing integrated urban agriculture. The most common diseases in the study areas were viral and bacterial diseases including Newcastle, chronic typhoid, marek, gumboro, trips, sleeping sickness, mastitis, and coccidiosis affected livestock. This shows that pest and diseases affected both crops and livestock. In addition, this information was revealed during focus group discussion, participants informed that pest and diseases constraints their production. For example, one farmer shared his experience about the situation as indicated in the quote:

"*I had 3200 chicken, and within 8 weeks I lost 1800 due to diseases mainly Newcastle, chronic typhoid and gumboro which are most common in our areas. Even though my flocks were vaccinated, yet they were infected, this is because of maybe fake vaccines."* (FGD, Mbezi ward).

It was also revealed that electricity instability because of power rationing led to decay of vaccines at the agro-shops. Also it was found that farmers in the fish sub-sector had no knowledge about the presence of insects, disease or pest as they complained of stunted fish.

3.3.2 Investment capital

Integrated urban farmers are much interested in expanding their investments in this sub-sector, however, majority of farmers were challenged by lack of enough capital. The study findings show that 51.5% of the respondents lacked capital for improving intensive livestock management system for high productivity. Modern agricultural technologies such as greenhouse technology and artificial insemination to mention a few were very expensive for ordinary farmers to afford. A small green house cost a minimum of 5 million while artificial insemination cost Tshs. 50 000 per cow. In a FGD, participants complained of capital constraints, which seriously challenge them in practicing integrated urban agriculture. For example, one of the participants said:

"*The artificial insemination technicians are soughtfrom the private sector and their services are very expensive to afford. A technician needs to be paid Tshs. 50 000 for artificially inseminating a cow and if the cow does not conceive you have to pay for another insemination. I am very interested of getting high breed dairy cow but only the technology is not affordable."* (FGD, Kunduchi ward*).*

The study found that capital constraints were high because farmers lackedaccesses to credit. According to Konneth (2010), loans in most cities in developing world are not readily available to the poor urban producers.

3.3.3 Poor weather condition and lack of water supply

Findings further show that almost one-third (32.6 %) of the respondents were affected by poor weather conditions. Unreliable weather patterns and unpredictable rainfall affect not only rural farmers but also urban farmers. Although the Dar es Salaam Water Supply Corporation (DAWASCO) strictly prohibit the use of tape water for agricultural purposes, some respondents secretly admitted to use it. Farmers reported very high increase charges come than normal charges when DAWASCO discovers the use of tape water for irrigation. Thus, farmers do not opt for use of tape water for agriculture. Observation showed that, DAWASCO order of not using tape water for agriculture affects not only crop production but also livestock. Livestock keepers normally buy water for their livestock hence increasing cost of production,

which led to decline in profit margin. This relates with Berbel *et al.* (2000) findings where it was reported that if water pricing were selected as a policy tool, farm income would decrease by around 40% as well as reduction of number of crops available for farming.

3.3.4 Social conflicts with neighbours

Conflict with neighbours, although was not high in the study area, it was more common in households that kept livestock. Respondents reported that livestock noises and odour from animal dung made neighbours complain most of which were reported to the local government offices. Normally the livestock keeping in the city is causing complaints to the local authority and residents specifically when the rules are not followed (Jacobi *et al.,* (2000). Also, farmers who practiced semi-intensive and extensive livestock management system quarrelled with neighbour especially when livestock invade neighbours' plots. These conflicts stressed and or led to termination of production. For example, during one of the FGDs, one participant reported it as follows:

"Although I tried to maintain hygiene to my level best in my piggery unit, my neighbours kept complaining about odour and caused noises to the extent of reporting me to the ward office, so I was ordered to stop pigs keeping." (FGD participant, Kunduchi ward).

It was also observed that improper discharge of water from fishponds also caused conflicts among neighbours. This could easily lead to a lack of consensus on the implementation of IUA and thus little chance of triggering virtuous processes, since they are more prone to risks of conflict (Miccoli *et al.,* 2015).

3.3.5 Lack of technical knowledge and skills

The study found that integrated urban farmers lacked knowledge and skills on integrated farming, which was fundamental for increased productivity and livelihood. For example, fish farmers admitted to have no formal training on proper fish farming. The knowledge and skills they had were all learnt from their fellow farmers. They have not consulted technical expert in fish keeping to equip them with necessary skills and knowledge about fishing sub-sector. The council's fish officer acknowledged lack of fish experts in the district as they had only one fish expert for the whole municipality. This made it difficult to reach all urban fish farmers. Lack of proper skills, some farmers reported to experience various challenge on fish keeping including stunted growth. Limited fishing knowledge has significant impact since farmers are not aware of quality of water to achieve best fish growth performance especially fish species tilapia which is common in Tanzania. Mwajiande and Lugendo, (2015) reported tilapia tolerate water between pH 3.7 to 11, while Goddek *et al.*(2015) observe that tilapia achieve best growth performance between pH 7.0 to 9.0. This means that farmers who fail to maintain this standard are likely to face poor performance.

3.3.6 Mushrooming of hatcheries

It was noted that, mushrooming of hatcheries for both day old chicken and fingerlings affected urban farmers in many ways including capital losses. Uncontrolled supply of a day old chicks is reported to cause losses to a number of urban farmers. During FGD at Bunju ward, the issue of incredible hatcheries was raised as follow:

"*If you depend on inter-chick for reliable and registered day old chicks, you haveto wait for long time before you receive your order, but the presence of unregistered hatcheries is of importance to us although the safety and quality of chicks we buy is not assured. Personally, I lost up to 250 chicken due to Marek infection as a result of buying chicks from these poorly managed hatcheries."*(FGD, Bunju ward).

Forthe case of fish, there are no reliable sources of fingerings in the study areas; farmers rely from Costal region for fingerling including Mbegani College in Bagamoyo and Nun seminary in Kibaha. For most of urban farmers who practiced integrated urban agriculture in the study area got fingerlings from fellow farmers (Mwajiande and Lugendo, 2015). This led to most farmers getting loss, as the fingerlings were not of good quality. This problem was raised during focus group discussion:

"I bought tilapia fingerlings from a certain farmer, the expectation were that after 3 months the tilapia would reproduce, I incurred many costs for fish feeds but up to five months they had not reproduce. Finally, I realized that, it was not the type of tilapia I wanted.Thus, I had to use that fake tilapia as feed for catfish." (FDG, Mbezi ward).

4.0 Conclusions and Recommendations

Based on the findings, it can be concluded that, majority of integrated urban farmers are practising semi-intensive and extensive livestock management system which is contrary to the municipal bylaws guiding livestock keeping in urban areas. This leads to social conflicts between livestock keepers, their neighbours, and the LGAs officials for not abiding to the by-law. Also, it was revealed that there are various constrain facing integrated urban agriculture; these are escalated mainly by lack of appropriate knowledge of integration and lack of capital for adoption of intensive farming system.

The study recommends that, financial supports are highly needed for farmers to adopt and practice intensive livestock management system as among the measure to combat existing constraints. The study also urges the development partnership between Kinondoni Municipal Council and microfinance Institutions to provide some affordable loans to urban farmers. In addition, the Kinondoni Municipal Council and other development partners should facilitate the dissemination of integrated urban agriculture knowledge to farmers and facilitate establishment of credible sources for chicks and fingerlings for enjoyment of maximum benefit bestowed in integration.

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