
Information needs and sources used by small-scale horticulture farmers in Morogoro urban, Tanzania

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Abstract

While the role of information in improving small-scale horticultural farming in urban areas is widely acknowledged in the literature, its potential cannot be realized unless the information needs that enlighten the stakeholders about the appropriate information sources are known. This is because horticultural farming is an information intensive endeavour and it is full of uncertainties. This study investigated information needs and the sources used by small-scale horticulture farmers in Morogoro Urban in Tanzania. A mixed-method research design was used to collect data from 133 respondents. Questionnaires, observation, and interviews were used in the data collection process. Descriptive analysis was used in analysing quantitative data, while content analysis was used for qualitative data. The findings of the study show that farmers needed information on sowing/harvesting time, disease and pest control, erosion control, harvest storage, and produce markets. Friends/colleagues ranked as important information sources, followed by extension officers, libraries, Internet, colleagues, cooperatives, Nanenane exhibitions, radio, and newspapers. The challenges faced including the unavailability of extension officers, and long distances to/from libraries were mentioned as significant factors hindering farmers' use of small-scale horticultural farming information and horticultural development in general. Recommendations have been provided that, equip small-scale horticultural crop farmers with up-to-date knowledge and skills to shape the farmers' thinking, knowledge, and attitude. Such awareness will add value to the information exchanged through interpersonal relationships. Employing more skilled extension officers and the use of modern ICT to improve horticulture farmers' information access is also recommended.

Keywords: Information needs; information sources; information access; small horticulture farmers; horticultural crops; Tanzania; Morogoro urban.

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Introduction

The role of information for various socio-economic undertakings is highly recognized in the literature (Nyam *et al.*, 2015; Doughan, 2020; Manteaw, 2022). Information is needed in all spheres of life and it is regarded as one of the main requirements for development that everybody needs daily to be able to carry out any activity (Masele, 2019). It provides the expertise needed to deliver services well, make better decisions, improve performance and achieve competitive advantage (Moody & Walsh, 2002; Li *et al.*, 2014). Thus, information is considered a vital resource, alongside land, labour, capital and skills (Doughan, 2020). According to Manteaw (2022), information is an important factor needed to sustain the development of any society as it enhances better utilization of other



resources such as land, labour, capital and skills in a sustainable manner. Accordingly, the importance of information to farmers and horticultural farmers in particular is enormous (Adio *et al.*, 2016; Kaske *et al.*, 2018).

Horticulture production is one of the information intensive endeavours (Kaske *et al.*, 2018) as it involves intensive growing per unit land area (Singh & Malhotra, 2011). Yet like other agricultural undertakings, horticulture farming is full of uncertainties. To bring substantial development in the sector, understanding the information needs and ensuring that access to timely, reliable, and relevant horticultural information is critical (Kaske *et al.*, 2018). According to Solano *et al.*, (2003), information is a tool to reduce such uncertainties; it is a necessary input in the decision-making processes. According to Elly and Silayo (2013), farmers require proper information to plan for their activities, make choices of the inputs and eventually on when and where to sell their products. Thus getting the required information on time may help to reduce uncertainty and also improve the quality of agricultural decisions (Manteaw (2022; Siyao & Sanga, 2023). Babu *et al.*, (2011) affirm that there is a direct relationship between the availability of information and agricultural development. In other words, effective access to relevant information is essential for improving agricultural productivity and bringing about social and economic change (Salau *et al.*, 2013; Elly & Silayo, 2013) in developing countries including Tanzania (Lwoga *et al.*, 2010).

According to Sense-making theory (SMT) by Dervin (1992), information must be relevant to an individual information needs before he/she decides to pay attention to it, evaluate it finally use it. This is also in line with the Wilson model of information seeking behaviour which adjoins that it is the perceived information needs of users that result in demand for information sources or channels regardless of the sources' formality (Peter *et al.*, 2022). In other words, understanding the information needs [a recognition of a person's inadequacy in the knowledge possessed to satisfy a goal (Donald, 2007)] related to horticultural production is important for horticultural development. Unless the information is considered relevant to the users' needs, it will be ignored (Sualman & Jaafar, 2011). It is, thus, important for information professionals to have a broader understanding of the user groups' information needs to determine if, how, and by what means, they should develop and package information to meet their needs.

Farmers' information needs have increased now more than ever before due to the extent of sophistication of the globalized market we are in, as enabled by, among others, the advancement in the level of ICT and the web. Besides, the reliability of information needs identified, some years ago may no longer be wholly relevant for today's knowledge society (Herman, 2004). Additionally, Horticultural farmers' lack of information is a paradox that continues to debilitate the efforts to improve horticulture production in most of the developed countries. Therefore, the required horticultural information must reach the intended users in a most convenient, timely manner and at affordable costs to ultimately meet their needs (Salau, *et al.*, 2013; Elly & Silayo, 2013).

While lack of agricultural information is identified as one of the key factors that have limited agricultural advancement in developing countries, no one can categorically claim to know all the information needs of farmers, especially in an information-dependent sector such as horticulture (Addison *et al.*, 2022; Manteaw, 2022). This is because the information needs such as what and when to produce, sources of inputs, credit facilities, improved seed varieties, weather and marketing of outputs frequently

keep on changing (Bonephace *et al.*, 2022; Siyao & Sanga, 2023). Evidence (by Meitei & Devi 2009; Savolainen, 2012; Elly & Silayo, 2013; Salau, *et al.*, 2013) further indicates that the information needs of small-scale farmers are personal, location specific, and temporally sensitive. While recent studies were carried out on enhancing the competitiveness of the horticultural industry in Tanzania and they point out the role of information in bettering production, improving access to market, post-harvest techniques, and financial opportunities (Ng'atigwa *et al.*, 2020; Msafiri & Mwombela, 2021) specific horticultural information needs and sources used by horticulture farmers in Morogoro urban are unclear or not documented.

An understanding of users' contextual information needs, is also instrumental to information service providers to establish and design effective information systems for farmers' access to relevant information for improving farming activities. Studies (Lwoga *et al.*, 2010; Singh & Malhotra, 2011; Denyes, 2014) assert that for smallholder farmers to make the most of their harvests, they need access to a range of information that can help them decide when best to buy inputs or sell their yields, saving them time and money; planning for weather changes or protecting plants against frost; picking the best-yielding seed varieties; and distinguishing between disease and pests and responding appropriately. While identification of information needs and sources used by farmers is key to the provision of relevant information to horticulture farmers, studies conducted to investigate information needs and the respective sources used by small-scale horticulture farmers in Tanzania and Morogoro Urban in particular are missing. It was from this motive this study was formulated to investigate the information needs and sources used by small-scale horticultural crop farmers in Morogoro Urban. Specifically, the study examines the information needs of small-scale horticulture farmers; the sources of information for small-scale horticulture farmers in Morogoro Urban; and factors that hinder the use of information by small-scale horticulture farmers in Morogoro Urban. The rest of the paper comprises a literature review, the methodology applied, findings presentation and discussion, conclusion and recommendations.

Literature Review

Theoretical Review

This study is guided by two theories; the Sense-making Theory and the Information Seeking Behaviour model. The Sense-Making theory as invented by Brenda Dervin in 1980, proposes that information is not something that exists apart from human behavioural activity (Dervin, 1992). Rather, it is created at a specific moment in time-space by one or more humans (Dervin, 1992). Sense making is implemented in a situation in time and space, which identifies the differences between the contextual situation and the desired situation; an outcome, that is a consequence of the sense-making process and a bridge, that is some means of closing the gap between situation, a gap/bridge and outcome. Dervin has expressed these elements in terms of a triangle: situation, gap/bridge and outcome (Patel *et al.*, 2021).

Sense-Making Theory has been used in several fields, most notably communications, and information science, and has been applied toward informing practice areas of information system design references (Naumer *et al.*, 2008). The strength of Sense-Making Theory lies partly in its ability to reveal the nature of a

problematic situation, the extent of information services required to bridge the gap of uncertainty, confusion, or whatever and the nature of the outcomes from the use of that information (Patel et al., 2021). It asserts that information seeking is a result of some motives an individual has that determine how and what type of information to be selected at a particular time (Sualman & Jaafar, 2011). The theory has been widely applied in determining information seeking and usage; it is considered strong in explaining relationships between situational factors and efforts toward fulfilling information needs and information seeking (Sualman & Jaafar, 2011; Abolafia, 2010). While the Sense-making theory was found powerful in explaining the link between users' situational factors and information needs, this study had to supplement it with the Wilson model of Information Seeking Behaviour by Wilson (1981) to enjoy its explanatory power related to information seeker's context, information needs as well as sources.

According to Wilson (1981; 1999), information-seeking behaviour is a consequence of one's information needs. Wilson proposed a threefold view of information seeking: the context of the seeker, the system employed and the information sources that might be drawn up (Wilson, 1999; Wilson, 2006; Wilson, 2010; Dipak & Kundu, 2020). Wilson's (1996) model modification, lists three important issues that are related to information seeking to include the "context of the information seeker, the information channel (electronic or manual) and the information resource itself" (Wilson, 1999). Despite being modified (Wilson, 1996; Wilson, 1999) the model's emphasis remains intact; information seeking behaviour is a subject of perceived information needs of users, which in turn determines the source irrespective of its formality or channel (Peter *et al.*, 2022). Thus, the model regards information seeking as a problem-solving activity, and for this reason, it is better suited to the group under particular study (Peter *et al.*, 2022). Conceptualizing from the model, the information seeker's context should determine the information needs and the respective type of information to be required. Information providers (sources) must be planned in a way that they can fulfill those needs.

Several studies have employed the use of the theory in studying users' information needs in different contexts. Ikoja–Odongo and Ocholla (2004) studied information needs and information seeking behaviour by informal sector/small businesses in Uganda. Mchombu (2000) studied the information needs of women in small businesses in Botswana. Gichohi, Onyancha, & Dulle (2017) used the theory to assess how public libraries in Meru county, Kenya address the information needs of small enterprises. It was from this point, that this study found the theory useful in conjunction with the Sense-making Theory to guide the study phenomenon under investigation.

Empirical literature review

Information and Information Needs for Horticultural Production

While studies identify information as a resource of immense importance for small-scale horticulture farmers to overcome their knowledge inadequacies (Lwoga *et al.*, 2010; Kaske, 2020), an effective information provision strategy must be informed by a clear understanding of their information needs. Empirical studies (Mittal *et al.*, 2010; Elly & Silayo, 2013; Borlund & Pharo, 2019) assert that horticulture farmers require proper information to plan for their horticultural farming activities, make the choice of the inputs

to be used and eventually on when and where to sell their products. Based on the horticultural farming cycle the required information may be related to farm management ranging from understanding of weather and soil conditions, planting, and irrigation, fertilizer/pesticide application, harvesting/storage, post-harvest management as well as market related information such as prices, and demand logistics (Mittal *et al.*, 2010). Information needs may also be based on awareness among farmers about horticultural technologies for adoption. In a peri-urban horticultural farming context that involves intensive growing per unit land area, the need for quality information increases (Kaske *et al.*, 2018), failure of which can turn unsustainable, leading to ecological degradation, food insecurity and economic crises (Fantini, 2023; Mlozi *et al.*, 2004). To the best of the current researcher's knowledge, the information needs by small-scale horticulture farmers in Morogoro urban is not known or undocumented, a point that triggered the study whose findings are presented in this paper.

Horticultural Farming Information Sources and Their Accessibility in Developing Countries

With regard to horticultural farming, several sources are identified in the literature. However, the order of preference differs across studies. A study conducted by Sang and Cheruiyot (2020), among smallholder horticulture farmers in a Highland Zone of Kenya, revealed in their descending order; the extension services offered by public extension, extension services offered by Faith-based Organizations (FBOs) and Non-Governmental Organizations (NGOs), fellow farmers, the private companies involved in the marketing of farm inputs and those purchasing farm produce and a few (below 3.2%) on mass media. Elly and Silayo's (2013) study in rural Iringa observed their order of preferences: interpersonal communication, social gathering, farmers' groups or associations, village or cell leaders, cell phones, input suppliers, or agro-dealers. A study by Yaseen *et al.* (2016) from rural Pakistan revealed neighbour-friends-relatives and other farmers as the first source of information to be most preferred by 45%, while only 10% ranked agricultural extension staff as the first information source. The main sources of agricultural information for farmers in Ethiopia as observed by Fidaku *et al.*, (2021) are governmental and non-governmental extension service providers. Despite the existence of such sources, a small proportion of smallholder farmers access and utilize them (Fidaku *et al.*, 2021). The reason advanced included poor extension service delivery system in the country, and inaccessibility of the available agricultural information sources.

A study conducted by Mtega (2018) in Morogoro, Tanzania indicates that radio, mobile phones and village based agricultural advisors were the major sources of agricultural knowledge among farmers. Other sources used but ranking low included agricultural input suppliers, agricultural extension staff and television. Mtega's study recommended that radio stations should increase the number of agricultural programmes to be aired per week, while the government would reduce tariffs associated with the acquisition and maintenance of radio services. This is also adjoined by several other studies (such as Svensson, and Yanagizawa, 2009; Musawi; 2014; Kaske, 2020; Hoang *et al.*, 2022) that where modern information sources such as radio, television, mobile free short messaging services, social media, farmer's field visit, workshops and training are strategically deployed as they would offer enormous gain for agricultural information transfer.

Studies indicate that advances in modern farming methods have always been limited in developing countries, partly hampered by several barriers to accessing the required information. Magesa *et al.*, (2014) note that poor farmers find information services inaccessible due to their inability to afford internet bundles, and information searching illiteracy. It may also be due to failure to access communication media like computers, smartphones and the Internet or information provided by some media like TVs, newspapers, and radio considered of the more national market, and not customized for being relevant to a specific region's farmers' needs (Magesa et a., 2014). Such inaccessibility significantly affects farmers' use of agricultural information and agricultural development in general (Svensson, and Yanagizawa, 2009; Kaske, 2020; Hoang *et al.*, 2022).

According to Mathiesen (2014), a person has access to information when he/she has the freedom or opportunity to obtain, make use of, and benefit from it. Mathiesen (2014) further conceived "5 facets of information access" where he expounds that, for information to be accessible; it must meet the five facets which are: (1) availability, (2) reachability, (3) findability, (4) comprehensibility, and (5) usability. Correspondingly, other horticulture stakeholders including researchers and policy makers can only do optimally, if they are accessible to the right information as an important input in reaching sound decisions.

Literature Synthesis and Conceptual Framework

Based on the review of the Sense Making Theory and the Information Seeking Behaviour model, as well as the empirical literature, this study conceptualizes horticultural productivity as a function of small-scale horticulture farmers' access to horticultural information sources that meet the small-scale horticultural farmers' information needs. Yet, since information needs are context specific, temporally sensitive, and frequently change with time, deployment of information systems that would provide needs-specific and timely information, is important to improve horticultural productivity. The conceptual framework presented in Figure 1 flows along the Sense-making theory combined with attributes from the Information seeking behaviour model. The postulated information needs include having better production, having improved post-harvest technique, having access to credit/financial opportunities and having improved access to the market. This will be easily realized (as outcomes) if farmers have access to reliable information sources. Finally, the conceptual model emphasizes that; since information is context specific, and not permanent, a thorough understanding of the specific information needs, sources and means to access them is important for improving small-scale horticultural farming in Morogoro Urban in Tanzania.

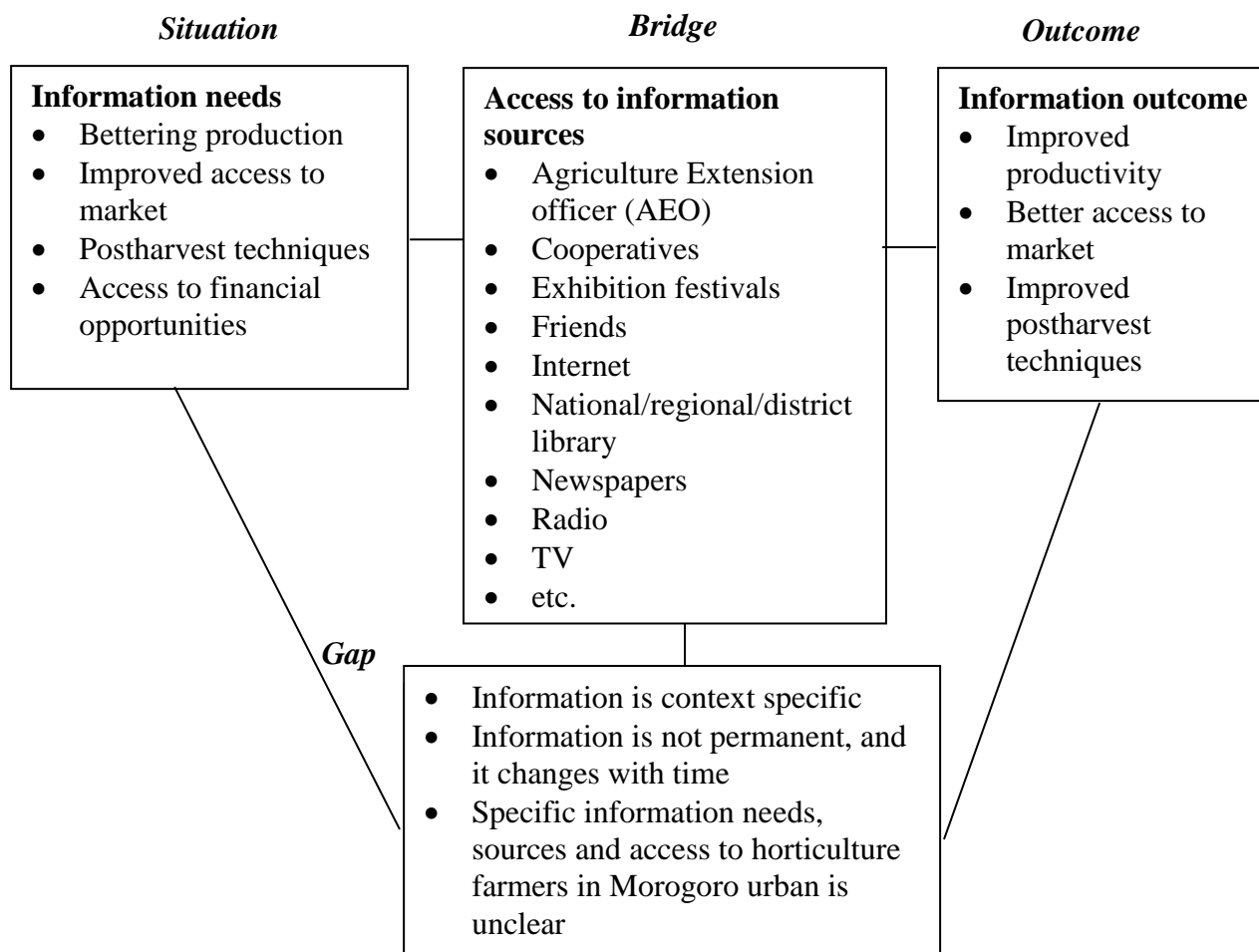


Figure1: Study conceptual framework

Methodology

This study was conducted in Morogoro Urban district. Morogoro Urban lies at latitude 37 East of the Greenwich meridian and is among five councils of Morogoro region. Other districts in the region are Kilosa, Kilombero, Ulanga and the new Mvomero District. Morogoro Urban is at the centre of these four Districts. The Morogoro Urban district is divided into 19 wards, namely Mwembesongo, Mjimpya, Kingo, Kingolwira, Uwanja wa Taifa, Saba Saba, Kiwanja cha Ndege, Mzinga, Mlimani, Mjimkuu, Bigwa, Kilakala, Kichangani, Boma, Sultan Area, Kihonda, Mazimbu, Mafiga and Mbuyuni. Morogoro Urban was selected due to it being Urban and Peri-Urban, practising small-scale horticultural farming due to limited access to urban land for agricultural activities as compared to significant population increase. While Morogoro Urban has an area of 260sq.kms only its population has kept on growing from 74,114 in 1978 to 117,760 in 1988, to 227,921 in 2002, to 315,866 in 2012 (URT, 2012; NBS, 2015) and 440,109 in 2022 (NBS, 2022). Small-scale farming becomes ideal for the district in its search to optimize output per unit of land and, to improve its people's wellbeing. Available data

indicated that urban agriculture in Morogoro Municipality employed 32% of the population (URT, 2012).

While urban horticulture production is considered a survival strategy in Tanzania (Mhango et al., 2014), Morogoro is advantaged when compared to numerous other regions in Tanzania. Being endowed with fertile land, numerous water sources, irrigatable areas and low population density, makes it an attractive area for horticultural investments for pro-poor growth. The available data indicated that Morogoro region and Morogoro district in particular accounts for about 2% of the national production of horticulture, with vegetable growing offering about the only major possibility for a cash crop (Lynch, 1999). Yet, while small-scale farming comprises the majority of horticultural production in Tanzania, scant studies have investigated small-scale horticulture farmers' information needs, and sources used by small-scale horticulture farmers. Understanding of information needs and information sources used by small-scale horticultural crop farmers in Morogoro Urban has positive implications for making farming sustainable in the area for the improvement in the livelihood of the farmers and the country's economy (Mntambo, 2021; Jalango *et al.*, 2020; Ng'atigwa *et al.*, 2020).

The population of this study comprises small-scale horticulture farmers and agricultural extension officers. These were considered information-rich on the topic under study. Based on the nature of a particular problem and on the time and resources available along with the desired degree of accuracy, a mixed method research design was adopted for data collection combining both qualitative and quantitative techniques. The approach was considered positive and it could generate confidence in conclusions because data collection complemented each other. The used methods included questionnaires, interviews, observation as well as focus group discussions (FGDs). In the study, 112 respondents answered the questionnaire. Among them, 3 respondents were agricultural extension officers selected for interviews and 18 respondents participated in FGDs. In total, the study used 133 respondents.

Open and close-ended questionnaires were used as the main data collection methods from the small-scale horticultural crop farmers. A convenience sampling technique was used to select a sample of 112 respondents who answered the questionnaires. The reason for using this technique is that horticultural crop production farmers are always busy with their farming activities, such that it was easy to conveniently select respondents using this method. For the case of small-scale horticultural crop-production, farmers in Morogoro urban are situated within the Ngerengere, Kikundi and Kichangani river basins. So, it was easier to be given questionnaires and easy to administer. This technique was also considered cheap and time-saving (cf Kothari, 2019). Purposive sampling was also used to select the 3 agricultural extension officers (AEOs) as key informants from Mazimbu, Kichangani and Mbuyuni wards which are horticultural crop production areas. The AEOs were selected for in-depth inquiry during the in-depth interview based on their possession of rich experience and information on the subject of investigation.

FGDs with 18 farmers (6 farmers from each of the three villages namely Ngerengere, Kikundi and Kichangani) were involved in discussing issues related to information needs, sources of information, access to the mentioned sources, the challenges they face and suggestions for improving access to relevant and up-to-date horticultural farming activities). Observation was used to supplement the information

given by small-scale horticultural crop farmers and extension officers. The researcher visited and spontaneously observed onsite horticultural farming activities and information sources such as radios, magazines, newspapers, television, libraries, etc. used for small-scale horticultural farming in the study area. This particular method was able to provide information that could not be offered directly from respondents. To ensure the validity of the instrument, a questionnaire pre-test was conducted to clarify any instrument's ambiguity problems. The finding from the pilot study was the basis for modifying questions and improving clarity. Together with triangulation, the data gathered was considered valid (cf Aina, 2002). Mixed method is strong in data gathering; it validates other data sources and focuses on reality.

The data gathered from questionnaires, interviews, FGDs and observations was organized in broad themes, labelled, coded described and analysed based on the objectives of the study. The data collected through questionnaires was analysed using descriptive statistics through SPSS Version 23, while content analysis was used for the analysis of collected qualitative information from interviews and FGDs. Using descriptive analysis, the data was presented in frequencies, percentages, mean and standard deviations. The tables for mean were used to show differences across subgroups from which inferences and conclusions were made. For content analysis, the data was organized into themes and sub-themes. The analysis noted emerging patterns from the data. Then, a cross-case analysis was carried out, comparing and contrasting emerging patterns from the three cases. The cross-case analysis helped to generate the external validity of the results (see also Yin, 2018). For qualitative data, data collection and analysis often proceeded simultaneously. As per Saunders et al. (2009), the process of making sense of data collected started as soon as little information was available and continued as the data collection exercise continued. The data analysis was supported with descriptive statistics emanating from the questionnaires and compared with the literature to establish patterns and themes (Yin, 2018).

Findings and Discussion

Demographic Information

For the questionnaire, a total of 112 respondents equivalent to 62.2% of the respondents successfully filled in and returned the questionnaires. Demographic-wise, the age category of respondents showed that 14.3% of the respondents were aged below 20 years, 42.9% were aged between 20 and 29 years, 19.6% aged 30-39 years, and 17.9% were aged 40-49 years, while 5.4% were aged 50 years and above. The responses show that most respondents were aged between 20 and 49 years. This implies that the respondents were an economically productive age which is between 16 and 64 years (Skirbekk, 2008). The findings further indicate that all respondents had attained formal education, ranging from primary education to postgraduate education. The findings show that 48.2% of respondents had attained primary education, 16.1% respondents had attained secondary education, 3.6% had attained adult education, and 16.1% had attained first degree, and 16.1% had attained postgraduate education. This means that all the respondents have adequate capacity to seek information compared to people who have never attended formal education. Understanding the education level of the respondents would enable the repackaging of agricultural information in the Swahili and English languages (books,

leaflets etc.) so can be used successfully by the farmers in the study area. Table 1 details the demographic profile of respondents.

Table 1: Demographic profile of respondents

	Response	Frequency	Percentage
Age	Below 20 years	16	14.2
	20-29 years	48	42.9
	30-39 years	22	19.6
	40-49 years	20	17.9
	50 years and above	6	5.4
	Total	112	100.0
Gender	Male	64	57.1
	Female	48	42.9
	Total	112	100.0
Education	Primary	54	48.2
	Secondary	18	16.1
	adult education	4	3.6
	first degree	18	16.1
	Postgraduate	18	16.1
	Total	112	100.0

The FGDs, involved 18 farmers (6 farmers from each of the three villages namely Ngerengere, Kikundi and Kichangani). The interviews involved 3 extension officers from Ngerengere, Kikundi and Kichangani, one from each village.

Findings based on objectives

The study findings are presented following the objectives of the study which are to examine the information needs by respondents, information accessible to respondents, sources of horticultural farming information, challenges facing horticulture farmers in access to information, and suggestions on the strategies to be used to improve access to information on small-scale horticultural farming. Information presented in Table 2 is the summary of the descriptive analysis of the findings. The responses given are non-mutually exclusive responses that allowed one respondent to give more than one response at the same time for one question.

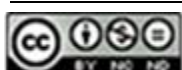
Information Needs of Small-Scale Horticulture Farmers

The first objective of the study was to assess information needs of horticulture farmers in the study area. The findings as presented in Table 2 show that 70% of the respondents needed information on disease and pest control, followed by 48.2% of the respondents who needed information on prices, 44.6% of the respondents who needed information on markets, followed by 35.7% of the respondents who needed information on storage of harvests, then 32.1% of the respondents who needed information on time of sowing and harvesting, and lastly 23.2% of the respondents needed Information on erosion control. A further probe through focus group discussion revealed that these types of information needed are directly related to their day-to-day horticultural production activities. The findings show that ensuring that farmers' efforts towards expansion of horticultural production are not hampered by the outbreaks of diseases and pests is important, while

information on good prices motivates increased production by the farmers for more profits.

Table 2: Findings from questionnaire

Treatment groups	Item description	Frequency	Percentage (%)	Mean	STD			
Horticultural information needs by respondents	Information on disease and pest control	78	70	47.3	16.5			
	Information on prices	54	48					
	Information on markets	50	45					
	Information on storage of harvests	40	36					
	Information on time of sowing and harvesting	36	32					
	Information on erosion control	26	23					
	Total (N)	112	100					
Information accessible to respondents	Information on weed control	56	50.0	35	18.6			
	Information on the use of fertilizers	54	48.2					
	Information on pest control	48	42.9					
	Information storage of garden harvests	26	23.2					
	Information on processing	18	16					
	Information on markets	8	7.1					
	Total (N)	112	100					
Horticultural information sources used	Friends	58	52	33.7	15.6			
	Agriculture Extension Officer (AEO)	52	46					
	Nanenane festivals	48	43					
	TV	45	40					
	Radio	40	36					
	Newspapers	32	29					
	Cooperatives	24	21					
	SNAL	18	16					
	National/regional/district library	16	14					
	Internet	8	7.1					
	Library	2	1.8					
	Total (N)	112	100					
Challenges facing horticultural farmers in access to information	Lack of library	66	59	27.4	19.4			
	Lack of visits by agricultural extension officer	30	27					
	Failure to get information on time	28	25					
	Long distance from agricultural library	24	21					
	Library has a shortage of materials	8	7.1					
	Outdated library materials	28	25					
	libraries have little information on vegetable growing	8	7.1					
		Total (N)	112			100		
	Suggestions on how to improve access to information on gardening	Agriculture Extension Officers should be closer to farmers	32			29	17.8	10.1
Public libraries should be equipped with adequate materials for gardening		24	21					
The number of extension officers		24	21					



should be increased		
Infrastructure (roads, electricity, internet networks) should be extended to the rural areas	10	18
Seminars to sensitize farmers should be organized more frequently	9	16
Mass media should increase coverage of better farming methods	8	14
Total (N)	112	100

Information Accessible by Horticulture Farmers

The respondents were further asked to state the type of information they used to access horticultural farming information. The findings as presented in Table 2, show that 50.0% of the respondents had access to information on weed control, 48.2% of the respondents had access to information on the use of fertilizers, 42.9% of the respondents had access to information on pest control, 23.2% of the respondents had access to information storage of garden harvests, 16.1% of the respondents had access to information on processing, while 7.1% of the respondents had access to information on markets. Information on weed control was mentioned as the most accessible type of information while information on markets is the least available and accessible information, yet very important to enable farmers to know where to sell their crops for better prices.

Sources of Information for Horticulture Farmers in Morogoro Urban

Investigation on sources of information for horticulture farmers in Morogoro urban indicates sources of information for horticulture farmers as presented in Table 2, which shows that the majority of respondents (51.8%) depended on their friends and peers for horticultural farming than any other source, followed by 46.4 % of respondents who got information from extension officers. Then, 42.9 % of respondents got information from Nanenane festivals. On the other hand, 35.7 % of respondents got information from radio, followed by 28.6% of respondents who got information from newspapers, then followed by 21.4% of respondents who got information from cooperatives. Moreover, 16.1% of respondents got information from Sokoine University National Agriculture Library (SNAL), 14.3% of respondents got information from the National/regional/district library, 7.1 % of respondents got information from the Internet, and lastly, 1.8 % of respondents got information from the library where they work.

Factors that Hinder Access to and Use of Information by Horticulture Farmers in Morogoro Urban

The respondents were asked to provide information on factors that hinder them to access and use of information. The findings as presented in Table 2, show that the majority (59%) indicated a lack of a library, followed by 26.8 % of respondents who mentioned a lack of visits by agricultural extension officers; with the majority (41%) reporting to have not been visited by an agricultural extension officer. Among others infrequent visits were

explained by an inadequate number of extension officers, being poorly equipped with transportation means that suit poor road conditions to meet farmers. Another challenge mentioned by 25.0 % of the respondents was failure to get information on time, and 21% considered long distance from agricultural libraries as an impediment. They also pointed out that shortage of materials in the library, outdated library materials, and libraries having little information on vegetable growing were problems mentioned by 7.1 % of respondents. The majority (41%) had not been visited by an agricultural extension officer, whereas 26.8 % of the respondents mentioned that they had been visited only once per every season of planting, and 25.0 % of the respondents mentioned having been visited 2-3 times every season of planting, while only 7.1 % of the respondents mentioned having been visited more than 5 times when the season was due.

Suggested Ways to Enhance Horticulture Farmers' Use of Information in Morogoro Urban

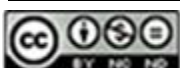
This study also sought to get the views of the respondents on ways of enhancing their access to and use of information. The findings presented in Table 2, indicate that the majority (57%) opined that AEOs should be closer to farmers, followed by 42.9% of respondents who mentioned that public libraries should be equipped with adequate materials for gardening, while 43% of the respondents mentioned that the number of AEOs should be increased, followed by 18% of the respondents who mentioned that infrastructure (roads, electricity, internet networks) should be extended to the rural areas, while 16.1% of respondents mentioned that seminars to sensitize farmers should be organized more frequently.

In an interview with AEOs, they recommended that training to farmers on important farming methods should be provided. They also called for the establishment of more information centres in rural areas to enhance farmers' access to information. Public libraries should have up to date and relevant information related to gardening. They also recommended that they should be provided with transport facilities to enable them to be able to disseminate information to peasants, and also that the AEOs should be provided with training to update their skills.

Discussion of findings

While horticulture farmers' access to timely and appropriate farming information is a critical input for improving horticultural production (Ndimbwa *et al.*, 2019; World Bank, 1994), the provision of information based on their needs is even more critical. Identification of horticulture farmers' information needs, respective sources and how to improve access to these sources improves the provision of information to be desired. Moreover, the extent these needs are consistent over time is an instrument for particular information users and developers.

The findings revealed that horticulture farmers in Morogoro needed information throughout the horticultural crop production life cycle from seed preparation to produce marketing. The needed information included information on drought, pests and disease-resistant horticultural varieties, time of sowing and harvesting, information on erosion control and information on disease and pest control. Others are information on the



management of quality and health of plants, storage of harvests and information on horticultural produce markets and prices. These needs do not differ much from the already documented needs in the literature (Singh, & Malhotra, 2011; Singh, and Malhotra, 2011; Bachhav, 2012; Ng'atigwa *et al.*, 2020; Kaske, 2020). Based, on robust tests of equality of means, efforts are needed to answer the farmers' needs for information on the storage of harvests, information on the time of sowing and harvesting and information on erosion control since they are below the average of 47. The study results are specifically in line with findings by Kaske (2020) on information needs and seeking behaviour of farmers in Southern Ethiopia where information about diseases, pests and weather forecasts, crop production technologies, and market information were identified as the top three most important types of agricultural information. This is also noted by Bachhav (2012). Provision of information based on these needs is imperative if horticultural productivity is to be improved. Bennett *et al.* (2012) exemplify that farm gate prices are low since farmers have limited information on available markets and therefore are in a weak position to negotiate prices.

Findings have indicated that friends and peers ranked high as important sources of information farmers rely on, followed by Agricultural Extension Officers (AEOs), while other sources such as libraries, and mass media (radio and newspapers), ranked lowest as a source of information by the small-scale horticulture farmers. The results of this study are more or less similar to other studies such as Kaske (2020) and Bachhav (2012). Unlike this study, Kaske (2020) indicates that farmers used development agents as the first source of agricultural information, followed by local leaders, while neighbours, family, or friends were indicated as the third dependable sources of agricultural information. Like this study, TV and radio ranked fourth and fifth (Kaske, 2020; Bachhav, 2012). This study's findings are in line with what Lwoga *et al.* (2010) in Tanzania and Bachhav (2012) in Maharashtra, India who observed that, especially in the remote areas of developing countries, most information seekers mainly pursue to obtain knowledge and information from informal rather than formal sources.

According to Lwoga *et al.*, (2010), farmers rely on informal networks and, to a lesser extent, the mass media to meet their information needs. The findings are also in line with Madzingira (2001) who argues that interpersonal communication is a part of the traditional structure of most African communities that serve as communication networks for the kinds of contents that usually flow in a neighbourhood. Impliedly, as per (Masele, 2019), the more the colleagues/ peers/family members have access to proper information on a phenomenon, including that related to horticultural crop farming, the better. Information exchange among these farmers will affect subject norms and perceived behavioural control (Nguyen, *et al.*, (2021).

According to Salau *et al.*, (2013), awareness of the available information sources and how to access them improves access to information to be desired. Yet, a need to raise awareness of farmers about other sources is also revealed in the study. This is also theorized by Kisusi and Masele (2018) that a combination of strategies in any information and communication strategy is important. A combination of Television broadcasts, radio broadcasts, exhibitions, composed stories, songs, dance, poems, libraries and other methods used can offer positive results for a desired change (see also Masele, 2019). Yet, despite the libraries ranking low, they should not be forgotten in the mix as they are considered to be essential components of any strategy (IFLA/UNESCO,

2001). The adoption of an embedded librarianship model that moves librarians beyond the bounds of the library and into user spaces, classrooms, and online environments is encouraged. According to Luca (2019), embedded librarianship will allow librarians to focus on the needs of one or more specific groups (including small-scale horticulture farmers in this case), building relationships with those user groups, developing an understanding of their work, and provide information services that are highly customized and targeted to their greatest needs thus enhancing a user centric approach of library service delivery.

The findings further revealed that, while farmers are expected to use modern channels such as mobile phones, the Internet and social media to access horticultural information, challenges are related to underdeveloped infrastructure, cost and skills of use. Studies (e.g. Salau *et al.*, 2013; Ndimbwa *et al.*, 2019 Abebe *et al.*, 2019; Ng'atigwa *et al.*, 2020; Hoang *et al.*, 2022) considers use of modern channels such as mobile phones or the Internet to access agricultural information as an important milestone for enhancing agricultural information access by farmers. Unless farmers have information at their fingertips, they will also lose out on market opportunities for their produce. While there were already eight Mobile Service Providers in Tanzania by December 2020 including; Airtel, Tigo, Vodacom Tanzania, Zantel, Smart, Smile, TTCL, and Halotel (TCRA, 2020), serving more than 51 million by the end of 2020 (Tanzaniainvest, 2021), that would offer a good avenue for use of mobile phone for horticultural information to farmers. Regrettably, a good number is still inaccessible to ICT services. It is, therefore, imperative that the observed informational related challenges are addressed accordingly to improve intended horticultural crop productivity.

Conclusions and Study Implications

This study has examined information needs, sources, barriers, and strategies to enhance horticultural farmers' use of information in Tanzania. The findings have shown that small-scale horticulture farmers rely on friends/colleagues as their most important sources of information. Other sources, such as libraries, AEOs, and mass media (radio and newspapers) scored low in the respondents' list of used information sources. This implies that the more colleagues/peers/family members have access to proper information on a phenomenon, including that related to horticultural crop farming the better. Information exchange among these farmers will affect subject norms and perceived behavioural control. While the AEOs were expected to play a front role as providers of information to small-scale horticulture farmers, the study results have however shown several factors hinder farmers' access to AEOs, including inadequacy in their number, underdeveloped infrastructures and reach the farmers, being unequipped with working gears such as bicycle/motorcycles to enable them to have frequent visits to the farmers and lack of up-to-date skills and training on relevant horticultural production related problems. Others like being distant from the library, or having libraries with outdated/irrelevant library materials.

Guided by the Sense Making Theory and Information Seeking Behaviour model, this study has a number of practical, policy, and theoretical implications. Since the main source of information is interpersonal networks, farmers and the general public in Morogoro Urban must be accessible to proper information useful enough for small-scale horticultural farming. Unless the colleague farmers have the right information, the shared

information through interpersonal networks can be a source of misinformation, and risky for small-scale horticultural farming productivity. Education provision through training, seminars, workshops and symposium to sensitize farmers with more up to date knowledge and skills should be organized more frequently to shape the farmers' thinking, knowledge and attitude. The training will also improve farmers' awareness of the available information such as mass media; public libraries and exhibitions including user skills for optimal utilization of these resources.

The use of modern channels such as mobile phones, the Internet and social media supported by Web 2.0 to access horticultural information is strongly advocated. Horticultural development policy and decision makers in the country thus need to work on challenges related to underdeveloped infrastructure, cost and skills of use. This will not only increase farmers' access to information by improving exchange among themselves but also increase contact with AEOs through mobile phones or social media such as WhatsApp in addition to face-to-face contacts for various horticulture production matters. The study further recommends the need for the adoption of an embedded librarianship model that will make librarians close to farmers throughout, providing relevant and highly customized information to small-scale horticulture farmers' needs.

Mass media should increase coverage of better farming methods. Media firms must have skilled professionals who can appropriately convey horticultural farming information to needy farmers. Importantly the responsible ministry and agricultural extension officers make use of the available media channels to convey important horticultural information on time-to-time basis. Yet, as media practitioners can no longer operate alone, the adoption of a convergence culture that would offer users the ability to access horticultural news from a range of media platforms is important.

Limitations and areas for further study

This study has focused only on information needs by small-scale horticultural crop farmers in Morogoro Urban. There is a need to conduct a similar study in other parts of the country to get a wide perspective relating to a phenomenon under study. There is also a need to conduct a study in rural areas where people live in relative isolation as compared to urban areas.

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