Disseminating Scientific Information to Rural Communities: Communication Strategies Used to Support Peasants' Comprehension and Use of Written Information

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Abstract

Agriculture has begun to accept communication as a strategy instrument to promote agricultural production. However, handful of research delved into the effectiveness of the ways of disseminating agricultural knowledge to farmers whose home language is different from the language used to present the information. This paper reports the findings of the analysis of the communication strategies used to disseminate scientific information to farmers from multilingual societies drawing from rural peasants in Tanzania. Informed by the Text Comprehension Theory, analysis was made on the leaflets distributed to peasants in Misungwi District of Tanzania. Communication strategies were extracted and analysed from eight agricultural leaflets collected from the peasants and TARI offices in the district. The study uncovered several strategies that are employed to support peasants' understanding of written scientific information. These include translanguaging, amplified statements, synonyms, reminders, examples, images, and definitions. However, the analysis uncovered a variation of communication strategies in some leaflets, which caused misinterpretation of the intended scientific information.

Keywords: *Agriculture, peasants, scientific information, communication strategies, comprehension, agricultural production, language specialists*

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Background to Language and Communication in Agriculture

Agriculture is beginning to accept communication as a major factor for improved farming and production (Agunga & Manda, 2014; Amusat, Fadairo, & Dauda, 2020; Fallys, 2019; Mandapati, 2018; Raouf & Bello, 2018; Series Conference, 2019; and World Bank, 2019). Scientists and agriculturalists have for a long time engaged in doing research to improve farming but scaling up the knowledge of their discoveries has been limited by communication challenges. The potential of agriculture has attracted diverse interests in research as it touches the nerves of every nation from smaller to bigger ones (FAO, 2017). However, comprehension of scientific information is thwarted by communication characteristics of both the senders and receivers; i.e., researchers and farmers, respectively. This shall be clear as we consider peasants in Tanzania whose language of home communication is not one of the dominant languages used in the country; i.e., Kiswahili or English. Tanzania is bestowed by more than 150 ethnic community languages while agricultural information is communicated in Kiswahili and English languages. For a majority of peasants, Kiswahili is a second language and only a few can read and understand English (Kioko, & Rugemalira, 2022; I.P.R Policy Brief, 2022; Qorro, 2013; Rubagumya, 1991). Kiswahili is used for communicating in public spaces and outsiders. Like most Tanzanian societies, Sukuma, the subject of this article, predominantly uses their home language for communication and Kiswahili is sparingly used to communicate with outsiders. Most Sukuma people learn Kiswahili when they join primary education at ages 6 or 7 and before they have mastered it well, due to education policy in the country (URT, 1995), they start to learn English at Grade III. Put simply, a large majority of Sukuma peasants do not have native-like fluency in Kiswahili. Insufficient proficiency in Kiswahili is, however, not peculiar to Sukuma. A study by Mapunda and Gibson (2022) reveals that a majority of Tanzania rural dwellers have their Kiswahili characterised by poor grammar, phonology, and low comprehension. Yet, Kiswahili

and English have been the dominant languages for disseminating agricultural information in Tanzania. TARI pointed out the language as a barrier to the attainment of its goals to improve agriculture in Tanzania (TARI, 2019a:13). Until recently, little focus has been put to analyse how scientists communicate agricultural information to peasants and ensure scientific messages are comprehended correctly, especially in multilingual communities. Discussions among researchers (Alehegn, Ogola, & Spielman, 2010; Lonyangapuo, 2015; Rabiah, 2012; Tenzer & Schuster, 2017) have pointed out the role of communication in comprehending agricultural-related information to farmers.

The problems emanating from language, according to the aforementioned scholars, hinder farmers' comprehension of the intended message. Research by Mafu (2001) asserts that agricultural terminologies are not only difficult for rural peasants to comprehend but also to students who specialize in agriculture. They face challenges in comprehending agriculture terminologies both in spoken and written information. According to Matalu (2018), the assumed agriculture translation experts in Tanzania fail to render relevant messages to farmers because most of them lack knowledge that some concepts are polysemous and thus their interpretation is contextual. Xu (2013) elaborates on this with an argument that an utterance or a word's meaning depends on the context of use. Therefore, comprehension of vocabulary must consider the context of its use.

In Tanzania, TARI is a government research institute with the mandate to unleash agricultural innovations to farmers and other stakeholders. Their research depends on the types of crops predominantly cultivated in particular areas of the country. TARI Ukiriguru Centre is vested with the power to research root tubers and cotton for improved agricultural production. Based on this fact, TARI deploys various techniques to reach the intended audience to disseminate agricultural information through, for example, newspapers,

newsletters, brochures, flyers, posters, radio and television documentaries, talk shows, and mobile SMS, to mention a few (TARI, 2019a).

This research analysed the communication strategies that TARI uses in leaflets to communicate agricultural information and discusses their relevance in communicating the intended messages to peasants. This knowledge is significant to inform policy and practitioners about the communication strategies used to disseminate information to peasants in multilingual communities, with geographical and cultural diversities. Communication strategies help receivers obtain the intended information without difficulties. These communication strategies are what some authors termed contextual clues (for example, see Bush, 1998; Katemba *et al.*, 2017; Reardon, 2011; Watanapokakul, 2021; Xu, 2013).

Communication becomes important in agriculture as we consider the fact that the sector is the mainstay for most developed and developing countries. It is estimated to have employed 1.3 billion in developing countries (ILO & UNCTAD, 2013). The number of Africans who depend on agricultural activities for their living ranges between 70 and 75 percent of the total population (Lopes, 2014; Van Lennep, 2012). However, agricultural production in Africa has not kept pace with population growth. As a result, it has failed to meet internal demand for 80% of food requirements. Food demand projected at $313 billion is mounting and diversifying (Lopes, 2014; Van Lennep, 2012). Tanzania Agriculture Cencus (2019/20, 2021) acknowledges how vital is the agricultural sector to the economy of Tanzania and that it contributed 26.9 percent of the National GDP in 2020.

Theoretical Framework

The analysis was made on the data extracted from leaflets drawing inferences from the Text Comprehension Theory. The theory describes text comprehension as a complete reading process that involves recognising words used in a text to construct the meaning of the text, store it in memory, and later

on use the information presented. The theory operates under three main arguments, which are (i) verbatim representation of the text: this has to do with the memory representations of exact words, numbers, and pictures. Verbatim memory is a symbolic, mental representation of the stimulus, not the stimulus itself. (ii) Semantic representation that describes the meaning of the text and (iii) situational representation: this is the representation of the situation to which the text refers (Farina, 2014). The three arguments create a complete cycle of comprehension when a reader of a particular text engages in the reading to use the information. The first stage leaves a blueprint of what was learnt; the second retains the meaning of the text while the last stage acts as a response to what was acquired in the process of text comprehension. Therefore, to effectively comprehend scientific information, peasants must have mental conceptualisations of the information, and be able to comprehend and lastly practice the acquired information accordingly.

Methods

Data Sources and Analysis Techniques

This study was conducted in Misungwi District in Mwanza Region whereby informants in four wards in the District were consulted. The area was selected because peasant agriculture is their mainstay. Their dominant language is Kisukuma which is one of more than 150 ethnic community languages in the country. Sukuma is a dominant ethnic group in the country that strongly holds and boasts their cultural etiquette and language. As pointed out earlier, in this article, a large majority of Sukuma peasants do not have native-like proficiency in Kiswahili, which is the language predominantly used to disseminate agricultural information in Tanzania. It was, thus, important to analyse and learn the effectiveness of the communication strategies used in the leaflets to disseminate agricultural information to this rural ethnic society.

A case study design coupled with the qualitative approach was employed. Strategies used to disseminate agricultural information were collected from leaflets before an in-depth qualitative analysis was done. The strategies presented were extracted from TARI leaflets that communicate numerous agricultural technologies which were distributed to farmers by TARI to inform them about better agricultural practices. Eight leaflets were collected from peasants and the TARI office in Ukiriguru Mwanza, Tanzania. Later, peasants, TARI officials, extension officers, WEOs, and Misungwi agricultural department officials were interrogated to get their opinions on the communication strategies used in the leaflets.

Table 1 Informants Involved in Interviews in Misungwi District

Occupation	Sex	Frequency
Peasants	Male	22
	Female	8
Agriculture extension officers	Male	2
	Female	1
TARI officials	Male	2
	Female	2
WEO	Male	2
	Female	2

Data analysis focused on the underlying ideological and cultural assumptions of a text in the process of depicting the correct sense that may hold to the readers' minds (Arya, 2020 & McKee, 2005). Content analysis was employed in the analysis of the extracted strategies to establish their significance in farmers' comprehension of the message. The leaflets helped to analyse and unearth the usefulness of the strategies used in improving peasants' comprehension of various scientific terminologies used for communication. Only leaflets containing instructional agriculture information were included. For analysis purposes, these leaflets were labelled as leaflets one through eight.

Data Analysis

This study found translanguaging between the dominant and ethnic languages, images, reminders, definitions, amplified statements and synonyms as major communication strategies employed by TARI in leaflets to communicate agricultural information to peasants in Tanzania. The analysis delved into exploring the importance of these communication strategies used by TARI in supporting peasants to comprehend scientific information in Misungwi District. This section is focused on the six main strategies used in leaflets to communicate various agricultural breakthroughs to farmers.

Translanguaging between the Dominant and Ethnic Languages

Of the eight leaflets analysed, three of them used translanguaging between Kiswahili and the ethnic language (Kisukuma). Translanguaging is employed when a terminology from the dominant language would imply a different meaning to peasants, or there is a lack of equivalence. Terms from ethnic languages are used to express various agricultural innovations to strengthen the understanding of the message. The technique is relevant given that Misungwi is predominantly inhabited by the Sukuma people whom Kiswahili is not the first and their best language. In this case, translanguaging is used to ensure that every user of the leaflets comprehends the message effectively. This is observed as Kiswahili vocabulary is used to classify various types of soils and at the same time, vocabulary from the home language is used to support comprehension of the information. The use of Kisukuma terminologies such as *"Itogolo, Luseni, Kikungu, Mbuga, somi and mabingobingo"* (see extracts 1, 2, and 3) to explain the types of soils and other agricultural practices resonate with the language characteristics of the readers. Hence, farmers are likely to comprehend the information clearly and with less effort. The terms in brackets are cultural names for different names related to agriculture in Kisukuma.

Extr. 1: *Kwa nini udhibiti bungua wa mabua (**Somi**)? Bungua wa mabua ni wadudu waharibifu wa mahindi* [Why should you control the stalk borer (Somi)? The stalk borer is a maize pest]. (TARI Ukiriguru leaflet 1)

Extr. 2: *Mahindi yaliyozungushiwa (mabingobingo) kukingwa na kutokana na upepo mkali* [Maize protected from strong winds by enclosing the field with Napier grass]. (TARI Ukiriguru leaflet 2)

Extr. 3: *Udongo wa Kichanga (Luseni), Udongo wa kichanga chekundu (Kikungu), Udongo wa mfinyanzi mwekundu (Nduha), Udongo wa mfinyanzi mweusi (Mbuga), na Udongo wa kichanga chenye tabaka gumu katika kina (Itogolo)[Sandy soil (Luseni)*,[Red sandy soil (Kikungu), Red clay soil (Nduha), Black clay soil (Mbuga), and Sandy soil with a hard layer in depth (Itogolo)]. (TARI Ukiriguru leaflet 3)

The use of **"*luseni*" and "*kikungu*"** to mean *'sandy soil'* and *'red sandy soil'* respectively helps peasants to comprehend the types of soil well using the knowledge they already have in their home language. Soil classifications in Kiswahili such as ***Udongo wa kichanga chekundu*** 'Red sandy soil' and ***Udongo wa Kichanga*** 'Sandy soil' do not resonate with the soil classification in Kisukuma hence encumbering the intended competence by peasants. The two classifications in Kiswahili pose a comprehension threat as one refers to general classification while the second is specific. Translanguaging therefore, offers an opportunity for farmers to comprehend the message since common terms comprehensible to them are used for soil classification. This observation is supported by the affirmations made by most peasants, WEOS, TARI officials, extension officers, and Misungwi agricultural department officials who were interrogated through this study. They claimed that translanguaging helps peasants to connect the information to the knowledge they already acquired through Kisukuma, which is their first and best language. The following quotes were taken to illustrate the significance of

translanguaging in comprehension of agricultural information:

> *Ndiyo nilielewa haraka kwasababu mimi ni msukuma, ndio maana nilielewa haya maneno kwa haraka* [Yes, I understood it quickly because I am a Sukuma, that is why I understood the terminologies quickly]. *(*Interview with peasant at Kijima Ward on 9th December 2023)

> *Ndio, kama ndago naijua, mbuga naijua, luseni naijua. Nilifurahi maneno ya kisukuma kutumika* [Yes, I know nut grass, sandy soil and black clay soil. I was glad to see Kisukuma words are used] (Interview with a farmer at Bulemeji on 8th September 2023)

> *Ndiyo kwangu mimi naelewa kwa urahisi. Matumizi ya misamiati ya kisukuma itasaidia kuelewa kwasababu watu wengi tunaelewa sana lugha mama kuliko Kiswahili* [Yes, I understand easily. The use of Sukuma vocabulary will help to understand because many people understand their mother language better than Kiswahili] (Interview with a peasant at Mamaye on 9th August, 2023)

> *Kwa kweli lugha mama ni muhimu kwasababu teknolojia hizi tunaziandaa zimsaidie mkulima; haijalishimana uelewa wa Kiswahili au lugha gani* [In fact, the mother tongue is important because we are preparing these technologies to help farmers comprehend the message in any language they understand better] (Interview with TARI official at Ukiriguru on 20th September 2023)

Amplified Statements

Most leaflets used amplified statements to convey agricultural information to farmers and other stakeholders. Amplified statements like "*Kilimo mseto kwa mavuno zaidi*", "*Tumia mbinu ya sukuma-vuta ili upate mavuno mengi ya mahindi*" and "*Tumia kanuni kumi za kilimo bora cha pamba kwa mavuno*

zaidi" were observed in five leaflets out of eight. Though their use in the leaflets is somehow exaggerated and sounds like a business strategy, they are significant in that they draw the attention of the readers and anticipation. This has an impact by convincing the peasants to put into practice the information acquired with the anticipation of yielding high. This technique is used when disseminating information on various agricultural practices. The following are examples of amplified statements extracted from TARI leaflets, which are observed to be significant in communicating agricultural information.

Extr. 4: ***Tumia mbinu ya sukuma-vuta ili upate mavuno mengi ya mahindi*** kwa kuzuia mabuu (funza) wa mabua pamoja na kiduha [Use the push-pull method to get high maize yield by preventing the stalk worms]. (TARI Ukiriguru leaflet 2)

Extr. 5: ***Kilimo mseto kwa mavuno zaidi*** [Mixed farming for more yield]. (TARI Ukiriguru leaflet 4)

Extr. 6: *Yatambue magonjwa ya hatari ya pamba na udhibiti wake* ***kwa mavuno mengi zaidi*** [Identify the dangerous cotton diseases and their control for more yields. (TARI Ukiriguru leaflet 5)

Extr. 7: *Tumia kanuni kumi za kilimo bora cha pamba* ***kwa mavuno zaidi*** [Use the ten principles of good cottoncultivation for more yields]. (TARI Ukiriguru leaflet 6)

Extr. 8: *Kweli mpunga uliowekewa mbolea* ***unazaa sana. Pata mavuno mengi ya mpunga*** *kwa kutumia mbolea* [Indeed, fertilized rice is very productive. Get high yields of rice by using fertilizers]. (TARI Ukiriguru leaflet 7)

Extr. 9: *Kilimo mseto humpatia mkulima uwezekano* ***wa kuzalisha mazao mengi katika eneo dogo*** [Mixed agriculture gives the farmer the possibility to produce more crops in a small area]. (TARI Ukiriguru leaflet 4)

Amplified statements are used to make conceptualization into readers' minds and ensure the instructions are properly implemented. This follows from the reason that the informed agricultural practices are new to peasants and often different from their usual traditional practices. Thus, amplification is a technique to convince peasants to take action. For example, Extract 9 *"Kilimo mseto humpatia mkulima uwezekano wa* ***kuzalisha mazao mengi katika eneo dogo*** [Mixed farming ensures the farmer more production using a small area], provides a clue into farmers' minds that with appropriate farming practices, only a small chunk of land suffices for enough yields. This amplified statement compels farmers to abandon traditional farming that requires cultivating a huge chunk of land to meet the demands that could be obtained from a small area. One of the peasants was quoted saying the following about the use of amplified statements:

> *… kauli hii inahamasisha na kweli mbolea inatoa mavuno mengi.* [Yes, the statement motivates and, indeed, application of fertilizer contributes to a lot of yields] (Interview with a peasant at Idetemya Ward on 15th August 2023)

One extension officer had the following remark on the usefulness of amplified statements:

> *Inasaidia kukufanya wewe usome zaidi lakini pia ina mvuta mkulima atumie mbolea kwa mavuno zaidi.* [It attracts you to read more and motivates the farmer to apply fertilizer for more yields] (Interview with extension officer at Kijima Ward on 8th September 2023)

> *… unapotaka kufikisha kitu unaangalia kitu amabacho kinaweza kumfanya mtu awe excited* …[…when you want to convey something, you look at something that can make someone excited ...] (Interview with TARI official at Ukiriguru on 8th August 2023)

Concurrent Use of Terminologies and Their Synonyms

The use of different terminologies with their synonyms was observed in two leaflets. These strategies were used to supplement the text for easy comprehension. The synonyms used in examples (10, 11, 12, and 13) were extracted from two TARI leaflets for more clarification

Extr.10: ***Rutuba (naitrojeni)*** *huongezeka kwenye udongo hivyo hupunguza gharama za mbolea* [Fertility (nitrogen) increases in the soil, thus reducing the cost of fertilizers]. (TARI Ukiriguru leaflet 2)

Extr.11: *Baada ya wiki 3 mpaka sita kata desmodium ili* ***isibanane (isiingiliane)*** *na mimea ya mahindi* [After 3 to 6 weeks, cut the desmodium so that it does not grow close to the maize plants]. (TARI Ukiriguru leaflet 2)

Extr.12: *Tumia mbinu ya sukuma-vuta ili upate mavuno mengi ya mahindi kwa kuzuia* ***mabuu (funza)*** *wa mabuu pamoja na kiduha* [Use the push-pull method to get high maize yields by preventing the larvae (maggots) as well as the weevil. (TARI Ukiriguru leaflet 2)

We observed that TARI employed both strict and loose synonyms to improve the peasants' and other stakeholders' comprehension of the information. Strict synonyms are words that can substitute for each other in all contexts whereas loose synonyms are words that show overlapping meanings but cannot be used interchangeably in all contexts (Petcharat, 2017). Examples of loose synonyms observed in the leaflets are ***"funza"*** 'maggots' and ***"mabuu"*** 'larvae', ***"isibanane"*** 'close to each other' and ***"isiingiliane"*** 'overlap' and ***"naitrojeni"*** 'nitrogen' and ***"rutuba"*** 'fertility'. ***"Changanya"*** 'mix' and ***"vuruga"*** 'stir' are an example of a strict synonym. The use of synonyms is however not given great weight only in a few of TARI's leaflets. This may slow down the rate at which readers

comprehend information. The following are some of the remarks about the use of synonyms as they were made by the interviewees consulted during this study.

> *Yananisaidia kuelewa haraka. Mfano ile rutuba na naitrojeni, hiyo naitrojeni si ni mbolea* [They help me to understand quickly. For example, fertilizer and nitrogen, signify that nitrogen is a fertilizer (*Interview with a peasant at Kijima Ward on 8th September 2023)*
>
> *Mimi yalikuwa yananisaidia kwamba napewa hadi na ufafanuzi wake* [They helped me because they gave me some clarifications] (Interview with a peasantat Idetemya Ward on 15th August, 2023)
>
> *Pengine kufafanua kwa lugha stahiki wanaoijua wao inaweza kupelekea wao kuelewa zaidi.* [Perhaps explaining it in a proper language they know can lead them to understand more] (Interview with an extension officer at Idetemya Ward on 15th August 2023)

Further analysis of the use of synonyms in the leaflets revealed that strong synonyms are effective but loose synonyms may misinform peasants in some cases. For example, the terms ***isibanane*** *and* ***isiingiliane*** "*rutuba"* and "***naitrojeni****"* do not communicate the same message. While ***isibanane*** literary translates as not coming close to each other, ***isiingiliane*** implies not overlap. As well, the term ***rutuba*** is literary translated as soil fertility which is an umbrella term whereas ***naitrojeni*** is just one component among the many which make up soil fertility.

Faida za kutumia mbinu ya Sukuma-vuta

Ukitumia mbinu ya Sukuma-vuta utapata:

- Mavuno mengi ya mahindi
- Desmodium na mabingobingo hutumika kulishia mifugo.
- Rutuba (naitrojeni) huongezeka kwenye udongo hivyo hupunguza gharama ya mbolea.
- Huhifadhi ardhi kwa kuzuia mmomonyoko.
- Hutunza unyevu nyevu kwenye udongo.
- Huongeza kipato kwa kuuza mbegu za desmodium pamoja na maziwa.
- Hupunguza kazi ya palizi kwa kuwa hutahitaji kung'oa kiduha.
- Mahindi yaliyozungushiwa mabingobingo kukingwa kutokana na upepo mkali.

TUMIA MBINU YA SUKUMA-VUTA

ili upate mavuno mengi ya mahindi kwa kuzuia mabua (funza) wa mabua pamoja na kiduha

Figure 1: An Extract Showing the Use of Synonyms to Disseminate Scientific Information

Source: TARI leaflet 2

Use of Images to Supplement Written Texts

The study found that seven out of eight leaflets employed pictures to deliver the information to peasants. Some of the pictures are of good quality, and they can help farmers to comprehend the information with ease. The usage of pictures offers an imperative clue for comprehending the intended messages. The images in Figure 2, for example, show the affected maize plant and how it can be treated. The images are accompanied by descriptions of what an affected maize plant looks like. The image in Figure 3 explains mixed farming and shows evidently how it should be conducted. The image in Figure 4 expresses how a cotton plant can be affected. It gives an actual condition of how an affected cotton plant appears by presenting features that can be easily observed by peasants in their farming activities. This provides an exciting picture to the readers which may guarantee knowledge transfer into actual practice. Images can help readers figure out the meaning of the written information even if they face some language constraints in the process of comprehending the information. The remarks below taken from peasants demonstrate how images are significant in communicating scientific information.

Hizi picha zinaonekana vizuri na hili ni tunda la pamba. Hizi picha zinanipa maelezo mazuri [These pictures look good; for example, this is a cotton fruit. These pictures give me a good explanation]. (Interview with a farmer at Idetemya Ward on 15th August 2023)

Hii picha ina maanisha mche wa mhindi umepata shida, mbegu za mahindi zimepata shida na hapa ndipo pa kuweka dawa.[This picture means that the maize plant is affected; the maize seeds are affectedand you put pesticides at this part of the plant]. (Interview with a peasant at Bulemeji Ward on 3rd September, 2023)

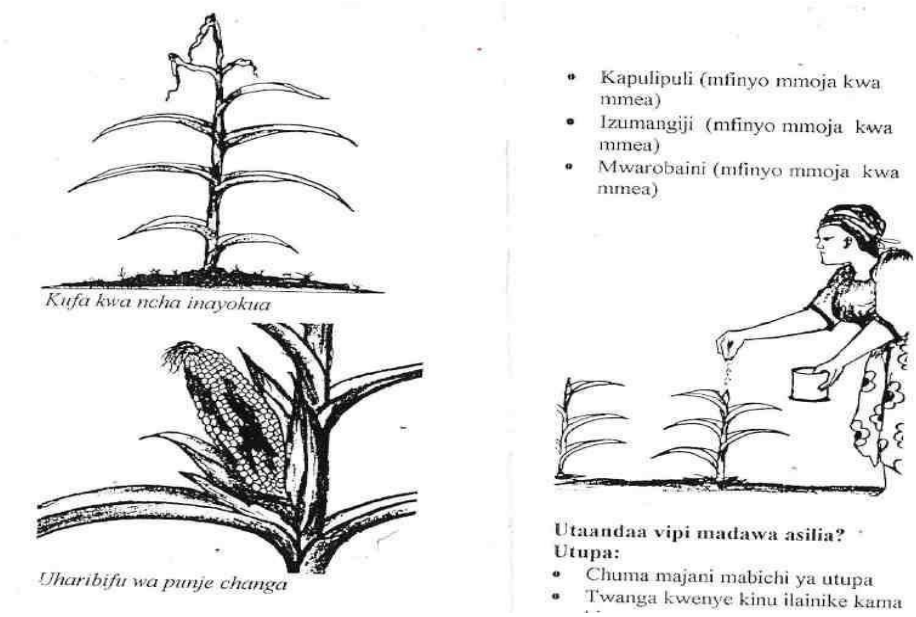

Figure 2: A Leaflet Picture Showing a Maize Plant Affected by Pests and how to Treat

Source: TARI Leaflet 1

The images in Figure 2 give a deeper understanding of the effects of pests on maize and how the affected maize would appear when it is affected and finally, a practical way of treating the pests is demonstrated. This generally creates a mental image in the readers' minds and contributes to easy comprehension of the intended information.

Figure 3: A Leaflet Picture Showing Mixed Farming Practice

Source: TARI's Leaflet4

The image in Figure 3 offers a clear understanding of what mixed farming may be. It allows the readers to have a self-reflection on what is seen in the picture and understand the information with less effort. However, extract 4 below is observed to contain blurred images that may impede the understanding of the message as intended by the sender. It is difficult for the reader to explicitly grasp the message communicated by referring to the the extract. For instance, in Figure 4, **"desmodium"** cannot be recognised though the leaflet was meant to help peasants understand it through the image.

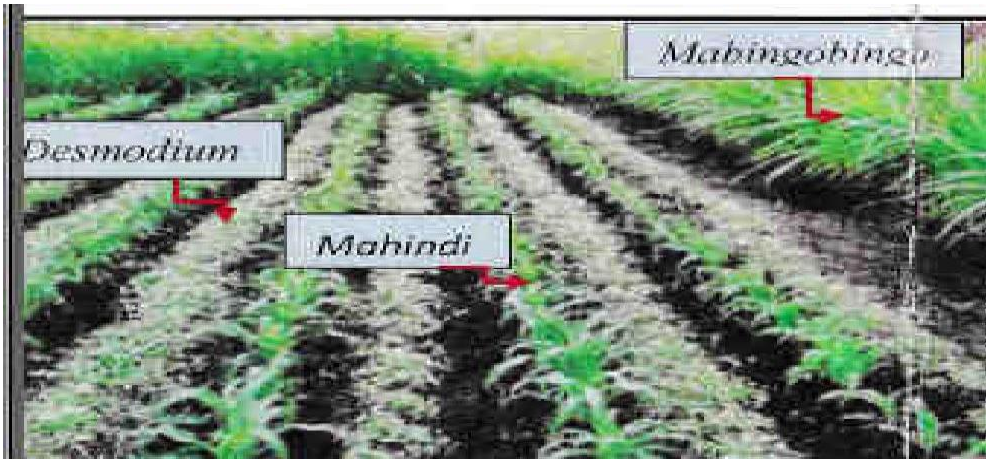

Figure 4: A Leaflet Picture Showing Blurred Image of a Desmodium Plant

Source: TARI's Leaflet 2

The following were the remarks from peasants about the quality of the images used:

> *Hii picha haifanani na udongo wa kichanga chekundu havina uhalisia* [This picture does not resemble the red sand soil, it is not realistic]. (Interview with a peasant at Mamaye Ward on 18th August 2023)

> *Hapa mtu akiona mara ya kwanza anaweza akafikiri kwamba hili shamba lipo kwenye magugu* [When someone sees the image he/she may think there are a lot of weeds in this farm]. (Interview with a peasant at Idetemya Ward on 3rd September, 2023)

Definitions

Five out of eight extracts used definitions to express different agricultural concepts. The analysis revealed that some concepts are defined to clear up any misinformation that a peasant might have. In the leaflets consulted, concepts like ***"bungua wa mabua"*** 'stalk beetles', ***"magugu"*** 'weeds', and ***"kilimo mseto"*** 'mixed farming' are adequately defined to provide the readers deep understanding of the matter. Most definitions are highly contextualised with appropriate diction and length of sentences. The vocabulary used in most definitions is simple to support compression with less effort. Extracts 13 to 17 are taken from TARI leaflets to illustrate the definition technique in disseminating scientific information.

Extr.13: ***Bungua wa mabua*** *ni wadudu waharibifu wa mahindi katika mikoa yote ya Kanda ya Ziwa* [Stalk beetles are maize pests around all Lake zone regions]. (TARI Ukiriguru leaflet 1)

Extr.14: *Udongo wa kichanga una kina kirefu, hadi kirefu sana, naunapatikana katika shemu zilizo chini ya mlima kuelekea bondeni…* [Sandy soil is deep, and sometimes very deep, which is found in the bottom slopes of a mountain towards a valley...]. (TARI Ukiriguru leaflet 3)

Extr.15: ***Kilimo mseto*** *ni aina ya kilimo kinachoweza kuhusisha upandwaji wa miti, mimea ya mazao nawanyama huku lengo likiwa ni utunzaji wa mazingira pamoja na kumuingizia mwananchi kipato au mkulima kipato* [Mixed farming is a type of agriculture that involves the planting of trees, crops, and keeping animals while the goal is to protect the environment as well as generate income for a citizen or farmer]. (TARI Ukiriguru leaflet 4)

Extr.16: ***Magugu ni nini?*** *Magugu ni mimea inayoota sehemu isiyo hitajika* [What are weeds? Weeds are plants that grow where they are not needed]. (TARI Ukiriguru leaflet 8)

However, the analysis revealed that some definitions did not effectively clarify the intended technical terms mainly because new terms were used in the definitions (see Extract 17) ***"mnyauko fuzari"*** 'bacterial wilt', "***baka bakteria"*** 'bacterial blight'. For example, the definition of ***"mnyauko fuzari"*** 'bacterial wilt', uses the vocabulary ***"kuvu"*** 'fungal pathogens', which is a technical term that cannot be easily comprehended by a reader. Definitions ought to provide an apparent help in understanding different concepts in a particular communication.

Extr.17: ***Mnyauko fuzari*** *ni ugonjwa unaosababishwa na vimelea vya Kuvu …****Baka bakteria*** *ni ugonjwa unaosababishwa na viini vya Bakteria* [Bacterial wilt is a disease caused by fungal pathogens. Bacterial blight is a disease caused by bacterial germs]. (TARI Ukiriguru leaflet 5)

One leaflet did not define important concepts which should have been defined. The term **desmodium** is used in the leaflet but its definition is lacking. Lacking this essential clue could directly impede the understanding of the communicated

information to them. Despite the definitions that were given in the leaflets, some peasants claimed that some of the definitions were not adequate to give the desired information. The following are some remarks from peasants regarding definitions that are used in leaflets.

> *Ugonjwa wa kwanza ni mnyauko fuzari;wa pili baka bacteria ni ugonjwa unaosababishwa na viini vya bacteria akaliacha hivyo. Walipashwa kuingia ndani zaidi kumwelewesha huyu anayekwenda kusoma hiki kipeperushi* [The first disease is fusarium wilt; the second is baka bacteria which is caused by bacteria and they did not provide further elaboration. They had to go deeper to help the leaflet readers] (Interview with a peasant at Idetemya Ward on 15th August, 2023)

Reminder Strategy

One out of eight leaflets used a reminder strategy to explain the types of soils found in Sukuma land (see Extract 18). Reminder clues are meant to direct readers' attention toward something principally significant. Authoritative information like "***Kumbuka: Aina hizi kuu za udongo hufanyiwa utafiti kwa kuchunguzwa mashambani na katika maabara*** **(Note:**These main types of soil are researched in the fields and the laboratory**)***"* prompts trust about the subsequent information to be read. The strategy gives assurance to the readers about the authenticity of the information and that they are highly researched. The extract below was extracted from TARI leaflets during text analysis.

Extr.18: ***KUMBUKA****: Aina hizi kuu za udongo hufanyiwa utafiti kwa kuchunguzwa mashambani na katika maabara ili kubaini mapungufu na kutengeneza teknolojia sahihi za kuboresha mapungufu hayo ili kufanya kilimo kiwe endelevu na kutunza mazingira kwa ujumla* [**NOTE**: These main types of soil are researched by being examined in the fields and in the laboratory to identify deficiencies and

> develop appropriate technologies to improve these deficiencies to make agriculture sustainable and take care of the environment in general]. (TARI Ukiriguru leaflet 3)

In extract 18, peasants' attention is brought on board through a reminder strategy showing the authenticity of the information. This creates attention and trust that ultimately influence comprehension of the intended message. One extension officer, TARI official, and a peasant remarked the following when asked about the importance of reminder strategy to peasants:

> *…mkulima anajua kabsa kwamba hapo kuna taarifa muhimu inatolewa* […farmers understand that there is important information provided through the reminder note]. (Interview with an extension officer at Kijima Ward on 3rd September 2023)

> *…udongo ukiwekwa kwenye maabara na kupimwa inakupa usahihi wa kutumia mbolea inayotakiwa.* […if the soil is placed in the laboratory and tested, it gives you the accuracy of using the required fertilizer] (Interview with a peasant at Kijima Ward on 18th August 2023)

> *Hii inawapa ujumbe kwamba hivi vitu tunavyowambia vinaletwa kwao baada ya kufanyiwa uchunguzi wa kitaalam*. [This gives them a message that these things we are telling them are brought to them after a professional investigation] (Interview with a TARI official at Ukiriguru on 18th August 2023)

Use of Real-life Examples to Express New Concepts

Examples are used by three leaflets to help farmers and other stakeholders to comprehend new concepts. The leaflets offer examples to the readers for them to be inspired by mixed farming. The examples are contextualised and familiarised to

the readers by using facts and the peasants' prior knowledge about the concept. These examples are significant since they add some vital information to the reader. Extracts 19, 20, and 21 are taken from different leaflets to show the significance of examples in comprehending texts.

Extr.19: *Changanya unga wake na pumba laini za mpunga kwa uwiano wa1:1 (**Mfano**: Kikombe kimoja cha unga wamwarobaini, unachanganya na ujazo wa kikombe hicho hicho cha pumba laini za mpunga)* [Mix its flour with soft rice bran in a ratio of 1:1 (Example: One cup of neem flour, mix with the same cup of soft rice bran)]. (TARI Ukiriguru leaflet 1)

Extr.20: *Miti inaweza kutoa chakula, kivuli au majengo (**Mfano: miti ya kujengea, mbao, kuni, n.k.*** [Trees can provide food, shade, or buildings (for example, building materials, timber, firewood, etc]. (TARI Ukiriguru leaflet 4)

Extr.21: *Tumia kilimo mzunguko cha pamba na mazao ya nafaka au mizizi (**mfano**: Pamba-Mahindi au Mtama, Pamba-Mihogo au Viazi)* [Use crop rotation method by rotating cotton and grain or root crops (for example, Cotton-Maize or Millet, Cotton-Cassava or Potatoes)]. (TARI Ukiriguru leaflet 5)

The use of examples provides more information by building on the peasants' prior knowledge about farming practices. For example, if a peasant did not understand terminologies such as **"kilimo mseto"** *'mixed farming' or* **"kilimo mzunguko"** '*crop rotation*', it is easier for them to connect the examples given to decode and finally comprehend the message. Some quotes are taken from peasants to illustrate the point.

> *Mifano inanipa uelewa mzuri. Hata huu mfano wa majani ya mwarobaini wengine wanatumia kutunzianafaka* [Examples give me a better understanding. Even these examples of Neem leaves, some use them to store grains]. (Interview with a peasant at Idetemya Ward on 15th September, 2023)

> *Ndiyo mifano ilinisaidia pia kuelewa ujumbe huo* [Yes, the examples also helped me to understand the message] (Interview with a peasant at Mamaye Ward on 18thAugust 2023)

The extension officers had the following to add to the use of examples:

> *… inatija kwasababu wakitoa mifano ujue ni halisi* [Yes, it works because, the examples given are authentic (**Interview** with an extension officer at Mamaye Ward on 9th August, 2023)

> *… mifano hiyo inamjengea uelewa kama amesoma kipeperushi akashindwa kuelewa.* Yes, those examples build their understanding, especially when they read without understanding] (**Interview** with an extension officer at Kijima Ward on 3rd September 2023)

Discussions

This study revealed that different communication strategies are employed in leaflets and they are significant in supporting understanding of scientific information when the language used is not the receivers' first and best language. These techniques varied depending on the nature of the concepts which are instructed. For example, translanguaging, examples, and strong synonyms are observed to be suitable when peasants have prior knowledge related to the new concept under discussion. Translanguaging is proven to be favourable in multilingual situations as it bridges a communication gap by moving between two languages to support understanding (Garcia, & Wei, 2014; Lopez *et al*, 2017). Translanguaging is centred on the belief that no language is sufficient in itself to express all concepts. Kisukuma, and so is any other language, language dominates the better part of prior knowledge which helps to simplify communication. Thus, translanguaging is a suitable technique to disseminate and scale up scientific information in communities. Lopez *et al.* (2017), Marrero-colón (2021), and

Park (2012) argue that translanguaging gives the flexibility to operate between languages available hence everyone is engaged in the conversation since two or more languages are used. Using language that has a cultural affiliation of the information consumers, establishes a great motivation towards comprehension of the information. Along with translanguaging, the use of examples that draw from prior knowledge and experiences is suitable in the multilingual situation and it gives relevant meaning and acceptance of the communicated scientific information. These assertions are supported by Halliday and Leech's remark that knowledge is shared in social contexts through relationships between people, such as those between parents and children, teachers and students, or peers, which are shaped by a culture's value systems and ideologies (Halliday, 1989; Leech, 1981). It is as well theorised by the Text Comprehension Theory that knowledge and experience are both crucial in creating a mental representation (Farina, 2014).Indeed; peasants affirmed to easily interact with the texts and understood the messages since new terminologies were accompanied by equivalent terminologies from their first and best language that draw from their prior experience.

Images, on the other hand, are used when further clarification is needed, particularly to show the appearance of a certain scientific phenomenon or demonstrate how to carry out a scientific procedure. Images offer a direct conceptualisation in peasants' minds and give them practical knowledge when they encounter the same scenario. A mental representation of what they already know facilitated them to conceptualise and internalize the scientific information. This, according to the Text Comprehension theory has a direct impact on the application of the intended actions (Farina, 2014).

Clear images guarantee readers' proper deciphering and comprehension of the information (Houts *et al.*, 2006; Kaur *et al.*, 2018; and Lavalle, 2017) who contended that images are vital in complementing written texts, and they facilitate easy comprehension of the message to readers. Baker and Adams

(2011), Devkota *et al*. (2020), and Paul (1956) assert that images increase attention and require a short time to evoke in the readers an instant emotionand understanding about the matter of communication The use of pictures to communicate scientific information minimised the guidance by agricultural extension officers in understanding the information since they are a language in themselves that peasants comprehend by seeing. The use of amplified statements is significant since people, especially in rural areas, tend to strongly hold certain traditional practices. This practice echoes the tenet by the Text Comprehension Theory that proposition as a unit of meaning can represent text not only at an abstract level, but can also be used to represent meaning at other levels including the perceptual, action, linguistic, and symbolic levels (Farina, 2014). Amplified statements offer a powerful message with a full motivation that influences farmers to withdraw traditional methods and apply modern ones. The reminder strategy is also observed to be significant in fetching the attention of readers on what follows in the text after the reminder strategy. The reminder strategy is strategically used with assurance to the readers about the credibility and reliability of the information under communication. The information on the reminder strategy tells about how scientific procedures were undertaken to produce the findings that will inspire farmers.

Definition is another significant technique used in communicating scientific information. They were employed as a device that ensures clarity of the concepts used by TARI in communicating with farmers. Defining words is an art that requires great care to communicate accordingly. Definitions were used properly for some concepts but some were not sufficiently defined to enlighten readers as they involved difficult vocabulary that could not be easily understood. Aronson (1996) and Jayantha *et al*. (2022) stress the importance of definition and that it should be appropriately stated and highly contextualized to serve the intended purpose. In this study, however, it was observed that new concepts like desmodium and baka bacteria were not properly defined. This calls TARI to consider defining every

single vocabulary that carries the core purpose of communication to aid the information consumers comprehend suitably.

The impact caused by the use of communication strategies is elaborated by Ali (2011), Katemba *et al.* (2017), Reardon (2011), Watanapokakul (2021), and Xu (2013) who argue that communication strategies are convenient in vocabulary learning, message comprehension and especially when a reader encounters unfamiliar words in the reading process. Generally, communication strategies help readers save time in comprehending and responding to scientific information. This implies that scientists should employ communication strategies to disseminate and scale up scientific information in communities. The weaknesses observed through this study in employing some of the scientific concepts could be addressed by collaboration between scientists and language specialists in preparing and disseminating the information in communities.

Conclusion

In this paper, we have analysed various communication strategies that are used in different leaflets by TARI to disseminate agricultural information to farmers and other stakeholders. The strategies of communication, as reinforced by various scholars, are vital in relieving farmers of understanding the communicated information. We have attempted to show how these communication strategies have a great impact on the comprehension of the information as they tend to attract the attention of the readers. The use of translanguaging, for example, is significant in helping peasants to comprehend the information as required. This is on the ground that most of the farmers use their mother tongue as the language of communication while TARI's language of communication (Kiswahili) comes second. We recommend scientists to use high-quality images to portray vibrantly the core concerns of communication. This is because an image can disseminate a lot of information at a go. Proper diction should also be observed, especially by consulting language specialists. If all these are

observed, peasants will practice good farming which will guarantee enough agricultural production. To be contacted at eliamacha2015@gmail.com

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