



DISSEMINATING AGRICULTURAL INNOVATIONS AND TECHNOLOGY FOR NATIONAL DEVELOPMENT: THE PLACE OF KISWAHILI AND OTHER INDIGENOUS LANGUAGES IN KENYA'S RURAL COMMUNITIES

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ABSTRACT

The significance of research to any endeavour aimed at the realisation of the aspirations of Kenya's Vision 2030 cannot be gainsaid. It goes without saying that in order to generate and disseminate significant knowledge that contributes to national as well as global development, the language employed in communication is very critical. At present, most scientific research is conducted and reported almost entirely in English laced with scientific terminology. This state of affairs speaks to the need to present such findings in a language and form that benefits the nation at large. Consequently, the present paper, seeks to interrogate the nexus between language choice and the uptake of agricultural innovations and technology by rural farming communities who rely almost entirely on either Kiswahili or vernacular languages. It argues that given the present status of Kiswahili as an official as well as national language, scientific research and innovations can easily reach the rural farmer in a language they understand and identify with. It is suggested that there is an urgent need to modernise Kiswahili as well as local community languages in order to disseminate such scientific and technical innovations through them. The paper will contribute insights in the fields of terminology and scientific discourse in Kiswahili and other African languages.

Keywords: Indigenous knowledge, language modernization, language planning, Agricultural terminology

INTRODUCTION

For a long time, Kiswahili has played a vital role in awakening and inculcating nationalistic values and attitudes in the citizens of the East African region. Its integrative qualities, especially the nontribal and egalitarian characteristics, have influenced its use across geographical, cultural and creed barriers. Recent developments, for instance the promulgation of *The Constitution of Kenya* (2010), have given it a new prestige status as both national and official language besides being the language of administration, commerce, education, diplomacy and to some extent modernity. Kenya is indisputably a multilingual nation with a mosaic of more than 42 languages spoken (Njogu, 1992; Jerono, 2012). However, English and Kiswahili dominate communication situations. This is because the languages have been accorded official status while the other indigenous Kenyan languages have not.

They are relegated for use at the household level and for interethnic communication in the countryside. Moreover, most Kenyan rural communities place a sentimental value on their ethnic languages because they not only carry their culture, but more importantly their heritage and rich oral history. With the average Kenyan farmer being over 60 years old and residing in the rural parts of the country, their linguistic behaviour is mostly limited to a vernacular language and varying degrees of competence in Kiswahili (<http://www.amirankenya.com>). English is hardly spoken owing to their low levels of literacy and formal education. This partly accounts for the popularity of community FM stations broadcasting in Kiswahili and vernacular languages.

Agriculture has always been Kenya's economic mainstay. It contributes 26% of national GDP, 65% of total export earnings and 27% of GDP through links with other service related sectors (Republic of Kenya, 2012:1-2). It also provides more than 18% of formal employment and more than 70% of informal employment in the rural areas (World Bank, 2013). It is in this regard that the country's Vision 2030 is replete with blueprints aimed at spurring all sectors of agriculture. Agriculture is identified as one of the key sectors to deliver the 10 per cent annual economic growth rate envisaged under the economic pillar.

The Vision states thus:

Kenya will raise incomes in agriculture, livestock and fisheries even as industrial production and the service sector expand. This will be done by *processing* and thereby *adding value* to her products before they reach the market. She will do so in a manner that enables her producers to *compete with the best* in other parts of the world. This will be accomplished through an *innovative, commercially oriented* and *modern* agriculture, livestock and fisheries sector. These interventions are expected to generate an additional Ksh. 80-90 billion

increase in GDP, mainly through *better yields* in key crops, *increased small-holder specialization* in the cash crop sector (2-3 crops per plot), utilization of a million hectares of currently uncultivated land, and new cultivation of up to 1.2 million ha of newly-opened lands (Emphasis by author, Republic of Kenya, 2007:14).

In the face of declining agricultural production, the need to innovate in order to guarantee sustainable agricultural practices cannot be gainsaid. Challenges of national food security in the face of climate change threats and rising unemployment confront us every new day. More than ever before, farmers need to be empowered with knowledge, skills and aptitudes in order to turnaround the industry into a commercially viable enterprise. However, the choice of an effective language for conveying such knowledge and innovations to the rural farmer remains a challenge.

Farmers in Kenya's rural areas account for more than 75% the country's working population (<http://www.feedthefuture.gov/country/kenya>). It is therefore the national government's responsibility to ensure that there is sufficient agricultural development in the rural counties. This would in turn lead to effective and efficient agricultural systems that will not only ensure national food security but also spur the utilization of natural resources in a sustainable way. Conversely, if the bulk of farmers are either ignorant or resistant to change, Kenya's agricultural industry is bound to suffer losses and lag behind the rest. Correspondingly, when farmers are ill equipped with knowledge, aptitudes and skills to empower them to think and innovate independently, agricultural modernization remains a flight of fancy. Munyua (2000) confirms this when he avers that when the rural farmers lack access to knowledge and information that would help them achieve maximum agricultural yield, they not only grope in the dark but are driven to the urban centres in search of formal employment, as the only option for survival. Part of this haziness is due to lingo employed in communicating crucial agricultural knowledge to the rural farmers.

It is worth noting that in cases where rural farmers do not face constraints in accessing agricultural information, mainstream media such as community FM radio has been used in delivering agricultural messages. The use of local FM stations as channels for educating farmers or raising awareness has been effective mainly because these FM stations broadcast in the local vernacular languages. Munyua (2000) identifies print, video, television, films, slides, pictures, drama, dance, folklore, group discussions, meetings, exhibitions and demonstrations as other channels of delivering such messages to the rural farmers. However, the effectiveness of these media has largely depended on the language used; with Kiswahili and local languages taking the lead and English trailing on. Additionally, the choice of media is equally important. Van and Fortier (2000) said hort-comings of traditional print and library based methods of providing agricultural information to rural farmers who are generally illiterate and relatively remote from formal sources of information such as extension, agricultural research stations and libraries.

While insufficient funding could be a setback to successful implementation of agricultural ventures, failure can also be ascribed to communication hitches and glitches. Blait (1996) notes that the least expensive input for improved rural agricultural development is adequate access to information and knowledge in areas of new agricultural technologies, early warning systems (on drought, pests, diseases etc.), improved seeds, fertilizer, crop and animal husbandry, credit, market prices, best practices, among many others. Indeed, in this age, information is power. Most of the information available online or otherwise is in the medium of English language to the detriment of rural farming communities. Language, especially in a multilingual society, is like natural resources and is thus crucial for a nation's economic well-being and the wealth of its peoples. Language should, therefore, be treated as an integral element in the social, economic and cultural development plan of a country. Like other resources, language, too, has – if handled properly – an employment creating power. Case studies such as Singapore, Malaysia, Indonesia, South Korea and Hong Kong have demonstrated the centrality of language as an element of cultural infrastructure. It is argued that no one can gainfully advance in a language they cannot fully master (Mukuria, 2001). People are generally able to express what is culturally significant in a language they are competent in. In most cases, this is inadvertently their local language.

From the foregoing, it is apparent that effective communication amongst various stakeholders is vital to revolutionising agriculture in Kenya. Sustained agricultural research and innovation coupled with the state of the art Information Communication Technologies (ICTs) continue to avail loads of up-to-date data in a myriad of websites and databases online. While this information is crucial in turning around agriculture, its characteristics such as quantity, content,

currency, frequency, suitability, quality and relevance influence its uptake by rural farming communities. Previous studies focused on farmers' access to agricultural innovations (Glendenning, *et al.*, 2010); the employment of ICTs in agriculture (Rees *et al.*, 2000; Muyanga & Jayne, 2006); adequacy and responsiveness to farmers' needs (World Bank, 1999) and the small scale farmers' information behaviour (Spurk *et al.*, 2013). None had investigated the linguistic characteristics of the information communicated. It is against this backdrop that the case for the use of Kiswahili and other African languages in disseminating agricultural innovations is argued.

Current Status of Disseminating Agricultural Innovations

Since her independence in 1963, the bulk of Kenya's agricultural extension services were provided by government ministries until the late 1980s (FAO, 1997). However, following the inception of Structural Adjustment Policies (SAPs) and the attendant liberalized economy in the 1990s, the established modes of delivery of extension services began to shift in favour of those that involved farmers in the design or prioritization of these services (Nambiro *et al.*, 2006). This resulted in the participation of several public and private players in the dissemination of agricultural innovations and messages. Agricultural extension services can be potentially provided by three main groups: the public sector, the private non-profit sector and the private for-profit sector.

Governmental organs, private and public institutions have been put in place to ensure that farmers get to know and adopt agricultural innovations relevant to their situations. Such institutions include but are not limited to Kenya Agricultural Information Network (KAINet), Kilimo Library Online Database, Agricultural Research Institutes (International Livestock Research Institute (ILRI) and Kenya Agricultural Research Institute (KARI), the Kenya Agricultural Research Database (KARD), Farmers Associations, media organizations, Non-governmental Organizations (NGOs), Community-Based Organizations (CBOs), extension services provided by County governments, Faith-Based Organizations (FBOs), the Ministries of Agriculture at the National and County levels, the mainstream and social media, university faculties of agriculture and agricultural field stations. Farmers also benefit from the 27 Agricultural Training Centres providing intensive short-term courses and 10 agricultural technology development centres which develop, test, customize and offer appropriate technology. These institutions serve as generators and facilitators of agricultural messages by acting as change communication agents.

The institutions employ media such as mobile phones, research reports, leaflets, newsletters, posters, exhibits, visual aids and radio programs in communicating agricultural information. Radio and television programs are particularly popular although controlled by media owners in terms of choice of programs and content. Of all the existing channels of agricultural communication, Kenyan farmers in rural areas find extension to be the most credible in terms of providing information and advice, on agricultural innovations and technology (Spurk *et al.*, 2013). Under normal circumstances, extension functions to get the farmer into a frame of mind and attitude conducive to acceptance of technological change.

In order to ensure efficiency, the provision of agricultural extension services has been evolving over time. For instance, as noted earlier it has moved from a centrally managed, government controlled extension system to a decentralized, diversified, pluralistic system of extension with multiple actors; from supply-led, transfer-of- technology models to participatory technology development and transfer models; and from direct service provision to facilitating and linking farmers with other research and extension service providers. With the augmented number of delivery channels, challenges in the provision of extension services abound. They include but are not limited to

(a) re-orienting the public delivery of extension services to improve its efficiency, (b) enhancing its access to farmers and other clients, (c) improving accountability of service providers to their customers, and (d) maintaining relevancy to different end-users (Republic of Kenya, 2001). Moreover, the use of Kiswahili and other indigenous languages in this endeavour has been the missing link.

Apart from the use of extension for diffusion of agricultural innovation, other channels like rural development field staff, contact farmers, private sector agri-business people, staff of the Ministry of Agriculture and the electronic and print media are used. While these channels have their strengths, their main weakness lies in the use of English as opposed to Kiswahili and vernacular languages as media of instruction. Consequently, the targeted audience is not properly reached as the main beneficiaries of the information carried by the print and broadcasting media are urban elites. Such messages need to be deconstructed into local language concepts that rural communities can understand and identify with.

Conduct and Reporting of Agricultural Research in Kenya

Historically, modern science and technology from Western countries was received in Africa via the medium of European languages. Consequently, the language of science is overtly dominated by English, French and other Western languages (Bokamba, 1981, 1991; Gonzalez 1993:12). These languages have since served as media of instruction in independent Africa's learning institutions at the expense of indigenous languages. In so doing, African

languages including Kiswahili missed the opportunity to develop into languages of scientific discourse. However, this situation can be remedied because scientific vocabulary is shared and international in nature (King'ei, 2000). In addition, as Richter and Legere (1973:59) posit, every language is not only potentially capable of an infinite development but also taking over an utmost of social functions.

While Kiswahili is Kenya's first official and national language, presently English is the *de facto* medium of science and technical discourse. Field measurements, experiments, tests, monitoring, evaluation, query and inquiry tools including vital agricultural databases are entirely structured in English. Occasionally, such tools are rendered to the target rural farmers in Kiswahili translations. Once data collection is done, the results and findings are translated back to English for analysis and write up. Such translations may have ramifications on the reliability of the translated tools and the findings thereof.

Furthermore, the continued use of English by agricultural researchers and extension workers only serves to baffle and belittle the grassroots farmers who have not mastered it. They ignorantly participate in studies they neither understand nor directly benefit from. Since they don't own the whole process, it is increasingly difficult for them to relate with and adapt such studies to local circumstances. It goes without saying that such studies may also pose ethical challenges. It is in this regard that most national agricultural field stations tend to benefit a minority.

As already indicated, most research findings by national and private institutions, organizations, universities and individuals are reported in English. Traditionally, English carries with it an imprint of progress, prestige, elite culture and exclusiveness associated with an affluent life, material wealth, technical progress and success (Leontovich, 2005). Accordingly, Kachru (1986) contends that English is used as a marker of modernisation in many regions of the world. Evidently, English enjoys high national and international prestige and is known to have a long literary and scholastic tradition. It thus follows that incentives for the English medium in scientific discourse abound. They range from the prequalifying conditions by funding organisations, availability of technical publications for review, opportunities for international dissemination through peer reviewed journals to the mere fact that the agricultural scientists and innovators received their specialised education and training via the English language of instruction. Furthermore, there is a popular perception that acquisition of knowledge in the European languages is easier and more efficient, especially in areas of science and technology because of the preponderance of reading materials in these developed languages.

Gaps in Agricultural Innovation Dissemination Systems

While television and radio broadcasts are popular media in Kenya, some of the obvious constraints to their use range from the acquisition and running costs, programme content and more importantly the choice of language used. Additionally, most of the messages aired are not tailored to the information needs of rural populations. Even when the information is relevant, it is rarely transmitted at the appropriate time and as such do not reach to the targeted audience. The few programs on agriculture, if any, are aired off-peak when farmers are busy tending their crops or attending to their animals. This contravenes the contemporary development philosophy which argues that any attempts at development must begin with those who need the 'development', rather than with the elites or outsiders who define the target community's problems in a contextual vacuum (George, 1993).

Another major constraint is the use of print media. Message carriers such as leaflets, newspapers, magazines, fliers and newsletters are of little use in reaching semiliterate or illiterate rural farming communities. The situation is aggravated by the incomprehensible technical language used in communicating the vital agricultural messages. Like agricultural research discussed earlier, English publications dominate the print media market. The four main daily newspapers – *The Daily Nation*, *The Standard*, *The People Daily* and *The Star* - are all published in English. As a matter of fact, there is only one privately run local daily newspaper in Kiswahili - *Taiifa Leo* published by the Nation Media Group. The then state run *Kenya Leo* is now defunct. There are virtually no publications in local languages except occasional street pamphlets that are not professionally produced. This clearly reinforces the dominance of English not only in literacy, but in most of the public media avenues. Correspondingly, the Kenyan government does not seem committed to supporting Kiswahili and other local languages as avenues of disseminating agricultural information for fear of promoting ethnic profiling.

The inadequacy of existing extension programs has also restrained the dissemination of agricultural innovations to rural communities. Some of these programs are conceived without well thought out plans and are prepared in a hurry without the grassroots farmers whose attitudes are to be changed making any input. Such agricultural information

packages can neither sustain the farmers' interest nor effect the desired attitudinal change. Farmers' interests are disregarded even more as most of the agricultural innovations are written and broadcast in English instead of Kiswahili or the local language.

Effective dissemination of agricultural innovation is also hampered by ill preparation of extension staff. In practice, extension officers are change communicators and as such should be prepared for communication responsibilities. The emphasis in their training is more on technical proficiency rather than on rhetorical and persuasive skills. An agricultural extension worker trained in this way is unlikely to make an impact on a conservative farmer who is unlikely to put his farm inputs at risk by trying out the extension officer's improved technique. There is real and urgent need for extension agents' training to be relevant to their jobs at the grassroots.

In consequence, there is need to embrace demand-driven approaches in supporting local community groups. This helps such groups to identify their needs, proffer solutions and empowers them with requisite skills. For instance, the Agricultural Technology and Information Response Initiative (ATIRI) has been a success story in this endeavor (Gustafson, 2004; KARI, 2000). Similarly, engaging locals who speak and understand Kiswahili, local languages, contexts, cultures and power structures as extensionists has proven effective in both the Syngenta and Africa Harvest cases. Having highlighted the gaps in the dissemination systems currently in use, let us now turn our attention to the particular ways in which the use of English language influences the uptake of agricultural innovations.

English use and Uptake of Agricultural Innovations

Majority of the farmers and indeed Kenyans in general are functionally illiterate in English (Michieka, 2005; 2009 and Mokuu, 2011). However, it is interesting to note that most agricultural studies and projects in the country are formulated, planned and even executed in medium of English. Kiswahili and other African languages, whenever given a chance, have to contend with translations and interpretations as pointed out to earlier. Moreover, the manner in which such translations and interpretations are conducted may impinge on the rural farmers' understanding. This is especially so because language is not a nomenclature of one to one correspondence. Translations are habitually saddled with misrepresentation of facts, ambivalence and ambiguity (Dabelstein, 2002). There is no sense of conceptual and meaning homogeneity across all world languages and cultures. Owing to the use of English in scientific discourses, most rural farming communities' talents and energies are either underutilised or left untapped.

It is in this regard that English fails to stimulate agricultural development in rural areas. Similarly, it is not easy to espouse, implement and improve on something one does not understand. It remains alien. More often than not, farmers in rural areas treat agricultural scientists and innovators with contempt partly because they use a language that is unfamiliar to most of them thus widening the gap of trust, relevance and understanding. Indeed, anyone who uses English when addressing community members is considered proud, arrogant and will most likely lose their confidence. Furthermore, most programs, studies and projects meant to uplift farming standards are written and discussed in technical English. Rural communities feel alienated from the distant and abstract language of research reports and are critical to its being remote to their needs and aspirations thus having no practical value to them.

When English is used in discussing and presenting agricultural innovations to the target audiences, such innovations are perceived negatively as imposed from above and rural farming communities lack a sense of ownership. While not understanding the language, the ordinary people can neither identify themselves with what is disseminated nor acquire even the most rudimentary information about the latest innovations in agriculture. These misconceptions and suppositions are occasioned by the failure to use a language that rural farmers understand very well – a reality that impedes the development and actualization of agricultural ventures. However, the situation can be remedied if the rural farming communities are kept centre stage through active involvement linguistically and otherwise.

Involvement in research activities empowers farmers.

Despite the fact that English is given superior treatment and reinforced in the public domains, it remains very tricky to determine the percentage of people who speak it fluently in Kenya. According to Mazrui and Mazrui (1998) English is yet to develop a large number of native speakers in Kenya. What has been established in other African countries is that the percentage of those Africans who can speak the former colonial languages proficiently, including English, French, Portuguese and Spanish is approximated at 20% (Djité, 2008; King'ei, 2012). This means that such speakers can effectively use these languages in different language contexts including science. Unfortunately, the bulk of Kenya's rural farmers fall in the 80% who are not proficient in English language.

The language hurdle results in restricted access to knowledge and skills among rural farming communities. This is further compounded by their average low levels of formal education. This presents a barrier to disseminating useful agricultural information and the rate of adoption of innovation (Kimaru-Muchai *et al.*, 2012; Taley & Khadase, 2006). Moreover, even extremely intelligent people will be at a loss if novel information is communicated to them in a language they do not know or one they have not mastered well. In the Kenyan scenario, occasionally attempts are made to either code mix and code switch between English, Kiswahili and other indigenous languages. However, the use of English terms in Kiswahili and other African languages confuses rural communities who are either illiterate or have a very rudimentary command of the English language. Similarly, limited productivity in agricultural workplace can also be due to the continued use of English language among other linguistic barriers. More than half of the extension advisors use English in communicating technical information even though most of the rural farmers are illiterate and cannot understand the language (Republic of Kenya, 2005; Muyanga & Jayne, 2006). Other work related communication including all forms of correspondence is also done in English with no translations given. The target farmers' input in discussions and other forums where farming decisions are made is therefore minimal. They do not understand what their role is and maybe do not even know what they are getting into when they take up the innovation. There is all the likelihood that there will be much frustration with such agricultural ventures.

Agricultural scientists and innovators on the one hand and speakers of Kiswahili on the other, sometimes find it difficult to converse on innovations and research findings in modern science. They are at a loss for the appropriate scientific or linguistic equivalent, mainly because no such term may exist in the Target Language (TL) at a given moment. This inadequacy and ways to eliminate it is partly the present paper's focus. It is argued that perhaps it's time to reclaim the place of Kiswahili as a tool for effective dissemination of agricultural innovations for sustainable national development. Kiswahili is the language through which the greater Kenyan masses are reached via the broadcast media. Most political and religious rallies and activities are conducted in Kiswahili. Presently, practically no Kenyan can complain whenever Kiswahili is used in any project or program in rural areas, yet a number will complain, switch off or even fail to participate where English is the language of participation.

Kiswahili and Other African Languages in Disseminating Agricultural Innovation

Human beings are wont to resist novel ideas especially when the old ones seem to serve them albeit only satisfactorily. This endemic resistance to change is bound to be made worse when the innovations are presented in a language they are less competent in. Under such circumstances, the use of a familiar language is the panacea. The use of a well-known local language would result in faster and more widespread uptake of innovations by the community in question. Moreover, a linguistic community whose language has not developed scientific and technical terminologies is unavoidably forced to use some other, more developed foreign language for domain specific communication. This has been the case in the East African region where English, a language spoken by a very small educated elite percentage of the population, has been the only conduit for churning out scientific innovations. Nevertheless, for East Africans, Kiswahili is the most developed native language. It is fast becoming a modern vehicle for scientific and technical expression, Agriculture inclusive.

A survey of published journal articles, websites, newspaper articles, technical glossaries, word lists, specialised and general dictionaries indicates that Kiswahili has, and indeed is continually building her reservoir of agronomy terminology (Nshubemuki *et al.*, 1999; Only, 1987; Irira, 1985; Irira & Geranija, 1987 BAKITA, 1980; TUKI, 1990; Mwitwa & Mwansoko, 2003). It is in this regard that we see no reason as to why Kiswahili should not be used as a medium for disseminating agricultural innovation to rural farming communities. Indeed, research has shown that learning in a familiar language eases the progress of gaining novel skills and developing proficiencies (Prah, 1998; Mwinshekhe, 2003; Nomlomo, 2008; Rubagumya, 2003, 2008; Quorro, 2003, 2008; Senkoro, 2008). It gives rural farming communities the optimal chance to be participating users. Messages crafted in Kiswahili are more likely to be accepted and readily acted upon by the target audience. Better still, the mutual influence between the acquisition of new agricultural skills and the use of Kiswahili language in general is a worthwhile interaction that will in turn promote the status and growth of the language (Prah, 2003).

The majority of Kiswahili terms used precisely to express scientific concepts or translations from English, have proved to be more transparent in communicating technical concepts. Akida (1985) in (1) used in cotton farming:

(1) *Ufajani* leaf death (vericillium)

Janipembe (Angola)

Chawajani leaf louse (Jessid)

Vumbimchovy (Biron)

Such words, which are usually from the Language for General Purpose (LGP) reservoir, are familiar to the language users thus enabling them conceptualise what is being described, taught or introduced. Such terms are said to be transparent. Scientists who are dedicated to advancing science in languages, other than those from the West maintain that the translation of scientific terminology can be accepted anywhere in the world provided the designated word is given the same universal code. Most international scientific terms have special universal codes and symbols for identification. However, they cautioned that certain words must retain their form. It is recommended that such words be adapted to conform to Kiswahili phonology, morphology and orthography.

Development of rural areas depends upon the grounding of new skills and technology in indigenous knowledge within the community. It is common knowledge that traditional African societies with their indigenous knowledge systems were able to accumulate knowledge and to interpret it across critical areas of knowledge, such as astronomy, medicine, philosophy and history, and then passed this knowledge on to subsequent generations through language. Consequently, there is need to respect the expansive wealth of age old agricultural knowledge held by elders in the process of modernizing agriculture. One approach to this may involve 'harvesting' terms in indigenous languages, 'pruning' them and selecting the most appropriate in order to elaborate novel concepts in English.

Indigenous languages play a vital role as the people's initial identity markers and as major tools for small and micro enterprises in rural areas. They allow ordinary people to carry out transactions in the informal sector. These languages also serve important roles in religious and community development projects. At the local level, indigenous languages facilitate administrative work which is carried out by local leaders such as the village headman, the assistant chief and chief. It is important to note that without Kenya's indigenous languages, official policies would not be implemented. Regrettably, these important roles are taken for granted and Kenya's local languages continue to be marginalized in public and indeed formal domains.

Kenya has more than 40 indigenous languages fluently spoken as mother tongues by different communities within her borders. These languages have a rich artistic, historical, cultural and scientific heritage spanning several centuries. They have been effectively used in commerce, innovation, travel, medicine, education, arbitration, war, conflict resolution and administration. In a nutshell, they have served as vehicles of choice for transmitting and discoursing African indigenous knowledge. Consequently, they are neither deficient nor incapable of facilitating discourses on modern science and technology. By comparing different indigenous African languages, we can easily identify a linguistic community with the largest reservoir of terminology in fields such as livestock keeping, fisheries, medicine and cotton farming. There is great wealth in the local languages which if harnessed systematically and compared with concepts or terms in foreign language could be the solution to the formulation of terminology in Kiswahili.

The various concepts belonging to a specific subject or specialised domain (such as pesticides, insemination or weeds) have to be collected in a systematic way because terms stand in a specific conceptual relationship to other terms. It is only by dealing with the various related terms and concepts as a whole that terminologists can ensure the correct naming of concepts. This can be illustrated with the terms in (2), (3) and (4) as follows:

(2) *Mdudu mharibifu* (Pest)

Kiuadudu (pesticide)
Elimu ya wadudu (pestology)

(3) *Himilisha* (inseminate)

Uhimilishaji mbegu (insemination)
Uhimilishaji bandia (artificial insemination)

(4) *Unusukaputi* (anaesthesia)
Nusukaputi (general anaesthesia)
Ganzi (local anaesthesia)

Mtaalamu wa unusukaputi (anaesthetist)
Tia nusukaputi (anaesthetize)

Technical terminology plays a crucial role wherever and whenever domain-specific information and knowledge is generated, used, recorded and processed, passed on, implemented or translated and interpreted. The use of Kiswahili terminology makes it possible for farmers who might not have had formal education to take a full and active part in

the implementation of agricultural innovations. In situations where it has been tried (see Crowder & Fortier, 2000) the level of participation, debate has improved considerably as farmers tend to speak with greater spontaneity and confidence. The freedom and opportunity the common native language such as Kiswahili gives are enormous, especially in Africa where the norm has been to publish scientific innovations only in a foreign official language.

By and large, research has revealed that all languages develop with the environment and neologies are always incorporated and added to the existing vocabulary (Cabre, 1992). It is against this backdrop the next section argues the case for the modernization of Kiswahili and other African languages.

Modernization of African Languages

Generally speaking, the term 'modernization' means "to make or become modern; make conform to present usage, expression or characteristic" (Webster, 1978). The term has been used in relation to culture, society, religion, technology, social relations, language, and so on (Weiner, 1966). In this paper the focus will be on the modernization of language. This is a deliberate undertaking in lexical elaboration and enrichment so that the language in question can be used in a wide variety of sectors characteristic of the modern world. A language is modernised in order to deal with the enormous scientific, social, economic and technological changes occurring in the society. Since language and society are inextricably tangled, in looking at the modernization of language the modernization of the society in which the language is spoken will inevitably be considered.

With the exception of Kiswahili, most African languages have not progressed beyond the level of very basic terminology even though they possess the tools that are necessary for their development such as written grammars, dictionaries and other publications. Although Kiswahili has made remarkable progress in terminology expansion, a lot still needs to be done. The insufficiency of technical terminology has serious implications for Kiswahili which is not being optimally utilised in higher education, scientific and technological fields including dissemination of agricultural innovations.

Traditionally, technical terminology expansion and development occurs at two levels. The first level entails the coining of new terms to express emerging needs from new discoveries, innovations, ideas or concepts. The second level involves the creation of a large body of new vocabulary and/or modernisation of existing vocabulary to cater for novel fields (King'ei, 2000). In its endeavour to modernize, Kiswahili has and continues to utilise the two levels. Moreover, for Kiswahili to elaborate to its fullest capacity, a proper modern discourse dealing with technical and scientific topics needs to develop in the language. This modernisation should be initiated at the grassroots perhaps beginning with the primary educational level before it can be attained at the secondary, or even the tertiary level.

Garvin (1993:45) emphasises the fact that there are no civilised and primitive languages. Any language can be developed such that it becomes standardised. Similarly, Haugen (1966:344) maintains that inherently handicapped languages do not exist. From the foregoing discussion, it is evident that English vocabulary has an increasing occurrence in the Kenyan society outside the world of science and agriculture. More often than not, it is the source of generic terms for which there are no words in the indigenous languages. When Kenyans are exposed to new concepts from Western technologies and cultures, and cannot find the appropriate words to describe them, they automatically adapt the English words. Examples of such terms are cited in (5) below:

(5) *Ikolojia* (ecology)

Karantini (quarantine)

Seli (cell)

Selulosi (Cellulose) *Molekyuli* (molecule)

Anemia (anaemia) *Kirusi* (virus) *Anerobi*
(anaerobe)

Terms such as those in (5) that are internationally recognisable, that is to say, they are transliterated or borrowed from major international languages such as English, French, German and Spanish, have the added advantage that experts in the field would be able to recognise and comprehend them with ease. Like several other languages, Kiswahili agronomy terminology is replete with a number of such terms.

However, with time some of the adapted English terms have since been replaced by local equivalents. The examples in (6) serve to illustrate this state of affairs. On the contrary, for lack of better equivalents, some English terms are

still in use or have been fully adapted and localised. This stems from the historical fact that English language has been used as a resource for lexical and semantic creativity.

(6) *Asidi* (acid) later on *tindi kali*

Agronomia (agronomy) later on rendered as *zaraa Kabohaidreti* (carbohydrates)
later on *wanga*

Many other English terms have equivalent Kiswahili terms as illustrated by the terms in (7) below:

(7) *Jivu* (ash)

Kiuamagugu (herbicide) *Kiinitete* (embryo)
Kitope (alluvium)
Chanikiwiti (Chlorophyll) *Usanisinuru*
(photosynthesis) *Mzoga* (carcas)
kimenganya (enzyme) *Kilala* (Fallow)
Uotaji (germination) *Humus* (mboji)

It is apparent that the modernization and development of agricultural terminology in Kiswahili and other African languages must help the growth of a utilitarian language register of science and technology. The ultimate aim moreover, should be to develop Kiswahili as the language of acquisition and expression of modern agricultural science and technological innovation. Such terms could be used in farmers' training centres, in the mass media, agricultural educational programs and in the provision of extension services. Similarly, the modernization of Kiswahili must be sensitive to the national planning and development activities in other sectors such as health, industry, appropriate technology, education and other areas of economic welfare planning. In so doing Kiswahili would serve the goals of development by providing adequate means of language communication.

Challenges abound in technical elaboration of African languages. It is evident that a number of factors militate against successful modernization of indigenous African languages. One such challenge has everything to do with the negative attitude held by some scholars on the use of African languages in scientific discourses. There is a minority of scientists advocating for the use of Kiswahili and other African languages instead of foreign ones (Jokweni, 2004; Mbekwa, 2008). However, the majority are reluctant to accept and even tend to employ methods that maintain the status quo. Perhaps this is drawn out of the fear to relearn the neologies in Kiswahili and African languages. Others harbour the perception that should their jargon be understood by laypeople it would amount to degrading the status of their scientific profession.

The obvious lack of terminological development in most of the African languages can be attributed to the lack of language and educational policy implementation. It can also be associated with the lack of coordination in the national language standardisation and elaboration processes. In Kenya, for instance, the absence of a national organ to oversee language policy implementation has been missing since independence.

The Way Forward

There is an arguable need for Kenya to formulate a language policy that fully empowers Kiswahili and other indigenous languages. Such a policy should have provisions for the development and promotion of Kiswahili and other African languages. The provisions in the country's constitution (2010) are a good starting point. Moreover, laws should be enacted to establish a language council or commission charged with the promotion and development of local languages including Kiswahili, the official and national language.

On further development of technical terminology in general and agricultural terms in particular, terminologists need to delve deep into Kiswahili language itself to see if there were old or obsolete terms that could be reviewed or given a new shade of meaning. Such efforts may also include researching the lexicon of the numerous Kiswahili dialects. Collaboration among African and international stakeholders in agricultural research, innovation and dissemination would be key to the overall process. Consequently, there is need to develop centres of innovation and technology transfer. Through coordinated effort in such organs agricultural scientists' research activities and innovation can

easily trickle down to the farmers in collaboration with linguists, media, extension service providers and companies of agricultural food production.

Similarly, there should be concerted efforts geared towards the collection of texts, corpus and translations in different African languages. Technical terms can be extracted from different corpus using specialised software that can analyze them morphologically. The extracted terms can aid in the compilation of technical glossaries and later on the publication of specialised dictionaries. With such terminology available, the creation of corpus of parallel texts online, in databases and in various forms can be achieved with ease thus benefiting farming communities.

There is need to conduct a linguistic analysis of the existing agricultural terminology in Kiswahili and other indigenous languages with a view of developing general models for terminology development. Such models and theories will be handy in the invention of new terms, the evaluation and standardization of existing terms and more importantly form the basis for further terminological research.

Agricultural field officers, such as extensionists and veterinary officers, should be encouraged to collect and document agricultural terminology commonly used by local communities. Conversely, where Kiswahili or local language words for concepts hitherto expressed in English are unavailable, the concepts can be clearly defined and the local farmers encouraged to create new terms for them. Such terms can then be collected and documented in a common term bank for standardization. In the long run such terms may be easily and readily accepted by the target users.

CONCLUSION

Although most scientific research in Kenya is conducted and reported almost entirely in English it only benefits a small percentage of elite English speakers. A majority of the population including rural farming communities rely almost exclusively on either Kiswahili and/or mother tongue vernacular languages for their communication needs. Consequently, the choice of English negatively influences their uptake of agricultural innovations and technology. Based on empirical literature, it has been argued that given the present status of Kiswahili as an official as well as national language, scientific research and innovations can easily reach the rural farmer in a language they understand and identify with. It is suggested that there is an urgent need to fast track the modernization of Kiswahili as well as other indigenous languages in order to disseminate such scientific and technical innovations through them.

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