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The Role of Research and Findings Dissemination in Industry Development in Kenya: The Floriculture Industry in Perspective.

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ABSTARCT
This paper provides an incisive look at the link between research findings dissemination and industry development. The focus is precisely the floriculture industry in Kenya. The large flower growers (who dominate flower business) are private companies who are interested in keeping trade secrets to ensure their survival and competitiveness in the market. On the other hand, the local research system consists mostly of public institutions, such as, Kenya Agricultural Research Institute (KARI) and the universities whose mandate includes service to the nation and are obligated to disseminate any information that would help improve the livelihoods of the general populace. The public research system therefore considers such information, knowledge and technologies as public goods. This divergent approach to information and knowledge acquisition, sharing and use undermines a close interaction and sharing of knowledge and information between the industry and the public research institutions. Moreover, the slow, bureaucratic procedures in the public research institutes undermine their ability to respond to urgent farmers' requests. Farmers' needs (such as disease outbreaks) are usually urgent and require immediate solutions. The delays from the local public research system forces farmers to seek solutions from international research establishments. More often, research priorities in public institutions are set by the scientific community with little attempt to involve the beneficiaries in priority setting. This tendency has led to research institutions being isolated from the immediate needs of society. This approach is often motivated by the assumption that the scientists and researchers know what the farmers want. As such, research often ignores farmers' perceptions hence the outcome often does not satisfy farmers' needs. The paper concludes by highlighting the need for more focused research and direct dissemination of findings to farmers, more so those in the SME sector who are often disadvantaged when it comes to adoption of new ideas.

1.0 INTRODUCTION

Though Kenya has the requisite technical and human capacity to serve the floriculture industry, they are not adequately financed to respond effectively to the farmers' needs. This has been attributed to lack of funds and operating facilities. The Kenya Agricultural Research Institute (KARI) based in Thika Kenya, had introduced some flower varieties (such as mobydick, lilies, gerbera, gladiolus amongst others) which had been tested in parts of Nairobi, Eastern and Central provinces. These varieties proved popular with the small-scale farmers but the farmers lacked the capacity to continually produce these flowers and tended to rely heavily on KARI-Thika to support their enterprises through provision of seed (Bolo *et al*. 2006).

It was established that there was over-reliance on imported varieties such as roses, carnations, lilies, alstromeria amongst others for which farmers have to pay royalties. Kenya is rich in biological diversity and research should be conducted on Kenya's flora to identify and develop indigenous flower varieties for commercialization. The KARI case of mobydick is an example of how local research could be targeted to harness the country's biodiversity. Farmers have also been trying to domesticate some wild flowers such as papyrus (*Cyperus Papyrus*) on their own and have called upon the researchers to support their efforts to introduce new flowers in the market.

Closely related with the need to develop indigenous flowers, farmers have also strongly recommended the breeding of new flowers that could be "branded Kenyan" (Awuor, 2012.) The farmers have raised concern that even though Kenya is the largest exporter of cut flowers in Africa and command a huge share of the EU market, the country had not bred its own flowers and still relied heavily on growing imported flower varieties.

Research in crop management technologies has concentrated on determination of spacing and nutrition requirements for a variety of flowers, while major insect pests and diseases have also been identified and documented. Integrated pest management (IPM) options for the control of soft rot disease in flowers was developed as was a tissue culture propagation protocol for lilies. Floriculture research is being done in various Kenyan Universities including: the University of Nairobi, Egerton University, Moi University, Maseno University, Jomo Kenyatta University of Agriculture and Technology (JKUAT) and Kenya Methodist University (Awuor, 2012).

A brief survey on current and on-going research work at the universities revealed that some of the research projects carried out in various universities includes (Bolo *et al* 2006):

i) Effect of neem and aloe extracts on powdery mildew on roe plants (Egerton University);

ii) Effect of gibberellic acid, shade and vernalization on productivity of Ranunculus asiaticus (Persian buttercup) grown in the Kenyan Highlands (Egerton University);
iii) Intercropping roses and spider plant to control spider mites on rose plants (Thesis; Egerton University);
iv) Survival of propagated roses (*Rosa Hybrida*) as affected by age and storage periods of cut-wood (Maseno University);
v) The effectiveness of glyphosates as an inhibitor of tropic responses in cut roses (Maseno University);
vi) In vitro culture on lilies-Project (JKUAT);
vii) Control of Erwinia Soft Rot in Zantadeschia (JKUAT);
viii) Calla Lily in vitro culture for Hatabor Rainbow Bloom – Limuru (JKUAT);
ix) Evaluation of different propagation media and techniques for ornamental crops (Moi University);
x) Domestication of indigenous plants for use as ornamental crops for both small- and large-scale farmers (Moi University);
xi) In vitro propagation and gene manipulation or ornamental crops (Moi University); and,
xii) Proposed research: The use of medicinal plant extracts as biopesticides (Kenya Methodist University).

The large flower growers (who dominate flower business) are private companies who are interested in keeping trade secrets to ensure their survival and competitiveness in the market. On the other hand, the local research system consists mostly of public institutions, such as, Kenya Agricultural Research Institute (KARI) and the universities whose mandate includes service to the nation and are obligated to disseminate any information that would help improve the livelihoods of the general populace.

The public research system therefore considers such information, knowledge and technologies as public goods. This divergent approach to information and knowledge acquisition, sharing and use undermines a close interaction and sharing of knowledge and information between the industry and the public research institutions. Moreover, the slow, bureaucratic procedures in the public research institutes undermine their ability to respond to urgent farmers' requests. Farmers' needs (such as disease outbreaks) are usually urgent and require immediate solutions. The delays from the local public research system forces farmers to seek solutions from international research establishments.

More often, research priorities in public institutions are set by the scientific community with little attempt to involve the beneficiaries in priority setting. This tendency has led to research institutions being isolated from the immediate needs of society. This approach is often motivated by the assumption that the scientists and researchers know what the farmers want. As such, research often ignores farmers' perceptions hence the outcome often does not satisfy farmers' needs. Interview findings thus highlight the need for more focused research and direct dissemination of findings to farmers, more so those in the SME sector who are often disadvantaged when it comes to adoption of new ideas.

2.0 DESCRIPTION OF UNSUCCESSFUL LINKAGES

A list of the types of unsuccessful links that involved the university is provided in table 1.0, revealing that 8 (47.1%) of the 17 unsuccessful interactions at the university were with subsidiaries of MNCs and 6 (35.3%) were with large-scale firms (IDRC, 2010). There was only one unsuccessful link involving an informal-sector entrepreneur. Three of the projects were carried out by individual members of staff in their capacities as individuals.

Table 1.0. Description of unsuccessful interactions at the University of Nairobi.

Description of project	Department or unit	Company (category)[a]
Research-support mechanisms		
Research collaboration on *Matricaria chamomilla* L. project	Chemistry	Dawa Pharmaceuticals Ltd (MNC)
Proposed research project on salt and soda quality	Industrial Research and Consultancy Unit	Magadi Soda Plc. (MNC)
Extension of research project on sand analysis for	Civil Engineering[b]	Bamburi Portland Cement Co.

cement production		Ltd (MNC)
Knowledge-transfer mechanisms		
Kenya car project	Central administration	Naciti Engineers Ltd (LSE)
Student attachment, participation in 2nd Conference on University–Industry Cooperation Workshop in Chemistry	Chemistry	Dawa Pharmaceuticals Ltd (MNC) CPC Industrial Products Ltd (MNC) East Africa Industries Ltd (MNC) Kenya Breweries Ltd (LSE) Magadi Soda Plc. (MNC)
Technology-transfer mechanisms		
Energy auditing in a large dairy	Food Technology and Nutrition[b]	Kenya Cooperative Creameries (LSE)
Foundry technology for local enterprises project	Mechanical Engineering	African Marine and General Engineering Works (LSE)
Engineering consultancy on refurbishment of existing foundry	Mechanical Engineering[b]	African Marine and General Engineering Works (LSE)
General-cooperation mechanisms		
Attempts to form a national forum for university–industry interactions	Central administration	Kenya Assn of Manufacturers (NGO)
Co-opted membership of the University–Industry Links Committee	Central administration	Naciti Engineers Ltd (LSE)
General cooperation on Unesco-sponsored projects	Chemistry	Dawa Pharmaceuticals Ltd (MNC)
General cooperation on the development and dissemination of low-cost building materials	Housing and Building Research Institute	Undugu Society, Metal Workshops (NGO) Shelter Works (ISE)

Source: Field survey, 1991/92.
[a] ISE, informal-sector entrepreneur; LSE, large-scale enterprise; MNC, (subsidiary of) multinational company; NGO, nongovernmental organization.
[b] Interaction undertaken at the individual level.

(*Source: IDRC, 2010*)

3.0 SIGNIFICANCE OF IMPEDIMENTS TO INDUSTRY–RESEARCH INTERACTIONS.

According to industry, the chief obstacles to negotiating projects with national research institutes include (IDRC,2010): (1) their lack of understanding of what industry needs; (2) conflict of interest — institutions are interested in basic research and industry is interested in new and improved products and processes; (3) attitudinal factors; and (4) industry's lack of in-house research capabilities. The results are shown in Table 2.0.

The critical obstacles identified by research institutes were more or less the same as those identified by industry, although they rated the significance of these hindrances differently and for different reasons: (1) industry's reluctance to support basic research — many researchers felt they restricted themselves by agreeing to follow industry's direction on what research to conduct and when to conduct it; (2) attitudinal factors and lack of mutual understanding — researchers believed that industry was uninterested in their work, just as industry tended to see

nothing offered by research institutes; (3) conflict of interest; and (4) industry's lack of in-house research capabilities.

Table 2.0. Barriers to institute–industry interactions (mean responses).

Impediments to interactions	University[a] (*n* = 12)	Industry[a] (*n* = 16)
The orientation of the institute's research toward basic research is a mismatch with industry's needs for new and improved products	2.53 (3)	2.53 (2)
The need for the institute to publish research results is in conflict with industry's needs for protection of its trade secrets	3.35 (7)	3.44 (9)
Research performed by institutes is generally more expensive than in-house research	3.65 (9)	3.44 (9)
The institute often does not understand what industry needs in the way of product-oriented research or industry's need to maximize profits as return on investment	3.29 (5)	2.39 (1)
Legal matters regarding the institute's research inhibit the commercialization of these innovations	3.77 (10)	3.59 (10)
National industrial property policies hamper relationships	3.82 (11)	4.06 (12)
National research institutes are unable to efficiently undertake industry-sponsored applied research	3.47 (8)	3.03 (5)
Collaborations could affect the normal research environment and processes	4.35 (12)	3.97 (11)
Industry is reluctant to support national research institutes in basic research	2.24 (1)	3.03 (5)
Industry lacks its own in-house research capabilities	3.06 (4)	2.83 (4)
Attitudinal factors create a generalized culture gap and lack of understanding	2.41 (2)	2.83 (3)
Distance is a factor — some activities depend on close proximity between collaborators	3.29 (5)	3.36 (8)

Source: Field survey, 1991/92.
Notes: *n*, number of respondents; numbers in parentheses refer to the ranking of the determinants by order of importance.
[a] Significance conversion table: 1.49 or less, dominant; 1.50–2.49, very significant; 2.50–3.49, significant; 3.50–4.49, occasionally significant; 4.50 or over insignificant.

Source :(IDRC, 2010).

4.0 FLORICULTURE INDUSTRY IN PERSPECTIVE.

For any research activity to be useful, it must be sensitive to local needs and priorities as well as allow ownership of its agenda by the intended beneficiaries. In the case of floriculture research, farmers and exporters are the key stakeholders and their views help inform research decision (Bolo *et al.* 2006).

The floriculture sub-sector has numerous institutions for collaboration with regard to research and development. This includes NGOs, research institutions and government agencies. The Kenya Agricultural Research Institute (KARI) has productivity research programs in horticultural and industrial crops as well as other food crops, livestock, land and water management (Hornberger *et al*. 2007).

Available information indicates that most of the exports of Kenya's floriculture have been to a limited range of export markets resulting in a concentration that expose the industry to systemic market risk (Muia, 2010). Whilst there is need for pro-active efforts to maintain and defend existing markets there. There is also a clear need to diversify into other markets especially those that have significant growth potential and whose economies are not closely correlated with those of the traditional Kenyan markets. Besides increasing the volume of sales, this development would greatly enhance Kenya's bargaining power in the global agricultural markets.

It is also critical to look at the range of products that are offered in the Kenya floriculture industry. It is vital that the floriculture industry devote time to increase its product depth and withdth. According to Muia (2010) the following questions need to be addressed by the industry:

i) Is there scope to grow scented plants in large scale?
ii) How about trying new varieties of fruits, vegetables and flowers that have never been grown before e.g. Cactus for breakfast vegetable and perfumes?
iii) How about trying Olives in Kerio Valley and Semi Arid parts of Kenya?

The government is keen on adopting a cluster strategy in dealing with this issue. This involves employing the triple helix concept which brings together government, private sector and researchers.

4.0 CONCLUSION AND RECOMMENDATIONS

Programmes such as Africa Knowledge Transfer Partnerships (AKTP) should be encouraged. AKTP seeks to bring together research centers, universities and private sector in specific company based partnership projects, and link these partnerships with UK higher educational institutions to tap into the global knowledge base in science and technology, social sciences, the natural sciences and engineering, adapting it to local needs and creating new knowledge (Ogada, 2010). The main emphasis under this project is for industry to come up with particular problems which can then be addressed by universities and research institutions.

The following table represents a summary on improving research and development in the flower industry:

Table 3.0: Improving Research and Development

Problem Area	Problem Description	Suggested Solution
Information Dissemination	- Farmers are not exposed to research findings. - Lack of information on flower varieties suitable for direct agro-ecological zones on the new innovation in products and farming techniques - Inaccessibility of information in rural areas. - Farmer's over-reliance on same flower varieties since the early 1990's.	- Disseminate research findings widely through non-technical brochure and in local languages. - Set up a floriculture centre with branches in major growing areas. - Set up information desks in the major growing areas. - Hold regular meetings/ interactions between researchers and farmers. - Tap, document and disseminate farmers' discoveries and indigenous knowledge. - Research should focus on identification and testing of different flora for potential use.
Development of new / indigenous varieties.	- The potential of local biodiversity is not being fully harnessed /exploited. - Kenya over-reliance on imported varieties yet the country is a key exporter of flowers	- Development of indigenous varieties for commercialization; collect local germplasm, improve them and test in overseas markets. - Harness indigenous knowledge on wild flowers within local communities, document and test them. - Breeders should be supported to come up with new varieties and get a "Kenyan Brand"

Source: (Bolo *et al.* 2006).

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