ISSN: 2224-0616
Int. J. Agril. Res. Innov. Tech. 12(1): 39-44, June 2022 Available online at https://ijarit.webs.com
DOI: https://doi.org/10.3329/ijarit.v12i1.61030 https://www.banglajol.info/index.php/IJARIT

How do youth innovate to make agriculture gainful? Challenges and youth entrepreneurs in mid-western Uganda

Dorcas Elizabeth Loga*, Paul Kibwika and Florence Birungi Kyazze

Received 13 January 2022, Revised 10 February 2022, Accepted 25 June 2022, Published online 30 June 2022

A B S T R A C T

The global population is expected to increase to 9 billion by 2050, with the youth accounting for 14 per cent of this total. While the world's youth population is expected to grow, employment and entrepreneurial opportunities for youth, particularly those living in low and middle-income countries remain limited, poorly remunerated and of poor quality. The Ugandan population, in particular, is largely comprised of a high youthful population with 78 percent below the age of thirty. Evidence reveals that youth engagement in agriculture is declining, and in recognition of the agricultural sector's potential to serve as a source of livelihood opportunities, this study assesses the factors impeding youth engagement and the drivers of innovation among the youth engaged in agricultural enterprises in Mid-Western Uganda. Anchoring in the Agricultural Innovation System (AIS), cross-sectional survey and case study research designs were employed to establish the innovativeness of youth, and the factors impeding engagement in agricultural enterprises from the youth's perspective. A pairwise ranking of the factors was also independently done. The findings reveal that the significant factors restraining youth engagement in agricultural enterprises as enhancing soil productivity, access to relevant technical knowledge and information, and access to land for production. The major innovations for successful youth engagement in agriculture are irrigation to reduce risks of dependence on rain, mechanization to reduce labour struggle, and market linkages. The case studies' innovation index portrays a high potential of innovativeness of youth to revolutionize and make agriculture gainful and attractive to the youth.

Keywords: Agricultural Innovation System (AIS), Innovation Matrix, Innovation Index, Youth

College of Agricultural & Environmental Sciences, Makerere University, P.O. Box. 7062, Kampala, Uganda

*Corresponding author's email: dorcaslokello@gmail.com (Dorcas Elizabeth Loga)

Cite this article as: Loga, D.E., Kibwika, P. and Kyazze, F.B. 2021. How do youth innovate to make agriculture gainful? Challenges and youth entrepreneurs in mid-western Uganda. *Int. J. Agril. Res. Innov. Tech.* 12(1): 39-44. https://doi.org/10.3329/ijarit.v12i1.61030

Introduction

Over the last decade, there has been a groundswell of policy and research interest in youth livelihoods (Sunberg and Hunt, 2019) and yet the challenge of full integration of youth in economies and production systems seems to be growing. For decades to come, the youthful population is envisaged to increase (UN, 2019), which will exacerbate the challenge. There is interest [from both government and non–government actors] in how to engage youth in agriculture based on the facts that agriculture is, and will remain, a "sector of opportunity" for youth (Kimaro *et al.*, 2015), especially in the LMICs.

With proactive programs, innovations, and investment that support job growth in the food sector, a booming youth population has the potential to transform LMICs, making them more prosperous, stable, and secure (Sunberg and Hunt, 2019). According to the National Youth Policy of Uganda, a youth is an individual between 18 and 30 years (NYP, 2001). It is expected that the youth will deploy their innovative minds to embrace and harness new agricultural production technologies to increase productivity, and apply Information and Communication Technology (ICT) to engage better with market systems to transform agriculture and food systems in general.

This study assesses the factors impeding youth engagement, and the drivers of innovation among the youth to gainfully engage in agricultural enterprises in Mid-Western Uganda. Specifically, the study identifies the challenges that constrain youth engagement in agriculture; describes the innovations that some youth apply to gain from agricultural enterprises; and the drivers for their innovativeness.

Materials and Methods

The Agricultural Innovation System (AIS) thinking provides a framework for understanding the complexity of innovations in farming systems. Klerkx *et al.* (2010) explain that innovations entail alignment of tangible products or a well-defined set of practices and technologies (hardware), new modes of thinking and corresponding practices and learning processes (software), and new institutions and social-organizational arrangements (orgware). Therefore, appropriate innovations need to be situated in systematic learning and knowledge exchange processes (Chindime *et al.*, 2017).

Cross-sectional survey and case study research designs were employed. A survey was used to establish the factors impeding engagement in agricultural enterprises from the youth's perspective. A pairwise ranking of the factors was independently done with 107 youth groups, while the case study was used to understand the innovations practiced. Quantitative data was gathered through pairwise ranking, while Qualitative data were gathered through key informant interviews from the cases. Qualitative data was collected to identify the number and nature of innovative practices that were successful. Based on this data, an innovation matrix was tabulated, and the determinants for the innovations determined. Data were also generated to establish the innovation index, which indicates the level of innovativeness for the entire enterprise. Following the Oslo Manual of innovation indicators, the following data were collected: production, processing, and marketing. Data analysis was performed in three successive steps:

Step 1: Developing Innovation Matrix

The observed innovations (N_1, N_2 & N_3) for each case were characterized as hardware, software, and orgware (Ariza *et al.*, 2012). The overall innovation (No) is the sum of the respective innovations in the various categories. Thus;

$No = N_1 + N_2 + N_3$ .....

Step 2: Computation of Innovation Index (II)

Innovation Index (II) is a single number computed to obtain the degree of innovation of each case.

The innovations considered were of three types: Innovation Type 1 = Production Innovations (H, S, O), Innovation Type 2 = Processing Innovations (H, S, O), and Innovation Type 3 = Marketing Innovations ((H, S, O). Note: H= Hardware (technologies and tangible products), S= Software (knowledge, processes, training, and learning), O= Orgware (social organization, integrated service arrangements, advocacy, promotions, and marketing).

Innovation Index (II) is computed by:

$$II = \sum_{j}^{n} 1_j f_j^k$$

Where; II = innovation index (The minimum value of the Innovation Index is 0, for a case with no innovations. The maximum value of innovation index is 1 if in extreme cases where the case implements all possible innovations), j = jth innovation in the Innovation Matrix, n = total number of innovations among the studied youth cases, 1_j = indicator function that points where there are innovations or no innovations, f_j = relative frequency/ how regular the youth practices the jth innovation, k = is the power of the sub innovation category of the innovations practiced. The frequency is measured in the interval (0, 1).

Step 3: Content Analysis of the Benefits and Determinants for Innovation

Content analysis was done for qualitative data based on deductive approaches to identify the broad themes that showed the determinants of innovativeness, and the benefits obtained from innovative practices as perceived by the youth entrepreneurs.

Results and Discussion

The prioritized list (through pairwise ranking) of the factors impeding youth engagement is presented in Table 1, showing scores and ranks for each factor.

Table 1. Factors impeding youth engagement in agriculture.

Factor	Government		Non-Government		T-Statistic
	Mean Score (n= 47)	Rank	Mean Score (n= 60)	Rank	
Soil Exhaustion	9.72	1	10.38	1	1.149
Limited Access to Land	9.40	2	7.98	5	-2.024**
Insufficient Inputs	8.60	3	8.38	3	-0.409
Returns on Investment	8.47	4	7.63	6	-1.585
Low Prices	8.28	5	7.20	8	-2.449**
Risks and Uncertainties	8.26	6	6.27	11	-2.946***
Lack of Technical Guidance	8.15	7	8.97	2	1.169
Lack of Market	7.83	8	6.68	10	-2.313**
Lack of Knowledge	7.21	9	8.15	4	1.659
Insufficient Capital	7.15	10	7.33	7	0.308
Lack of Insurance	5.74	11	6.08	12	1.807
Lack of Credit	5.21	12	4.77	14	-0.707
Poor Storage Facilities	4.49	13	6.97	9	3.678***
Labor Intensive	4.04	14	4.78	13	1.329
Respect	2.45	15	3.42	15	1.653

**** and ** indicate statistical significance level at 1% and 10%, respectively.*

The results show that soil fertility was the most important (ranked No. 1) factor impeding youth engagement in agriculture for both Government and Non-Government Organizations (NGO) supported groups. The ranking of the factors differed as shown in Table 1. Whereas the NGOs supported groups valued and ranked technical guidance as their second most important constraint, the second most important constraint for the Government-supported groups was access to land. This reflects a difference in perspective between the two groups; the Non-Government supported groups depicting a more entrepreneurial view where knowledge and skills offer a more competitive edge in terms of productivity and other processes in the value chain, while the Government supported groups focus more on physical constraints such as limited access to land.

T-statistics were run to check whether the supporting body (Government or Non-Government) influenced the scoring. The negative sign on some of the T Values (Table 1) implies an inverse relationship; an increase in the factor leads to a decrease in engaging in agricultural enterprises. Limited access to land, risks and uncertainties, lack of market, low prices offered, and inadequate storage facilities were significant. This implies that the kind of support given to youth has a bearing on their outlook on the impeding factors. Therefore, considering the youth's view of what they think are the factors impeding their engagement in agriculture before intervention is crucial.

Table 1 further reveals that youth were impeded by insufficiency in farming inputs due to the high costs of farming inputs associated with poor road networks in rural areas that tend to increase transportation costs. With increased transportation costs, the price of inputs in rural areas is likely to be high relative to urban areas with better road networks.

The findings also indicate significant differences noted in the factors impeding youth engagement in agricultural activities. Such factors included lack of appropriate storage facilities, low prices, risks and uncertainties, lack of market, and low access to land. This can be attributed to the different modes of engagement and support services rendered to the youth, as discussed in the earlier sections of this chapter. In lieu of the above, some cases of youth are engaging innovatively, and their innovations and innovativeness are discussed in the subsequent sections of this paper.

Innovations deployed by some youth

Amidst the prior discussed constraints, some youth innovate and benefit more from their agricultural enterprises than others benefit. These could serve as role models to inspire and assure other youth of the possibility of decent livelihoods from agriculture. The case studies exhibited innovations at different nodes of the agricultural value chain (production, processing and marketing). These innovations are characterized with regard to hardware, orgware, and software (Table 2).

Production innovations comprised practices and technologies that enhanced productivity namely: use of improved seed, fertilizer, pesticides, acquisition and use of machinery. Proper application of these practices requires access to knowledge/information, which is regarded as part of the software element of innovation. Processing innovations comprise all activities that add value to what is produced, such as sorting and grading, preservation, extraction of juices, and packaging. Marketing innovations comprised of the acquisition of packaging material, possession of contracts with buyers, means of transport available, integration of ICTs in marketing such as online marketing.

The number of innovations (Table 2) is the total possible number of activities the firm (case) could have practiced. It is obtained by summing up the total number of activities per each element of innovation along the production, processing and marketing nodes of the agricultural value chain. The percentage of innovation is the extent to which a particular firm practiced that attribute of the innovation. The more the number of innovations practiced, the higher the innovative index, hence the more innovative the concerned youth are. As indicated in Table 2, Tusubira Enterprises exhibited the highest (58.3%) number of attributes of innovations across the value chain. Possession of a motorcycle and packaging materials for their produce contributed most to the score on the hardware element of marketing innovations.

Level of Innovativeness

An innovation index was used to determine the level of innovativeness of the cases. Innovation index is measured through a weighted combination of adopted components of innovations: hardware, software, and orgware investments (Renwick *et al.*, 2014).

Case 2 had the highest (0.633) innovation index, arising from the number of innovations exhibited. They practiced machine-supported irrigation to reduce dependence on rain; had some labor saving mechanization; had exposure and networks with people who came to train at the firm; had stable labor (4 permanent workers) and 12 part-time workers; they proactively sought for knowledge through attending various training and exposure visits to other successful farms; and acquired a motorcycle to ease their transport.

Table 2. Typology of innovations by the youth along the value chain.

Innovation along the Agricultural Value Chain	Elements of Innovation	Attributes of the Innovation	Number of Innovations Practiced	Percentage of Innovations Practiced per Case		
				Case 1 Art planet	Case 2 Tusubira	Case 3 Sunrise
Production Innovations	Hardware	• Acquisition of machinery • Use of improved seed • Use of fertilizer • Use of improved pest management	4	50	75	75
	Orgware	• Hiring labor – social organization • Credit arrangement for access to inputs	2	100	50	50
	Software	• Trainings in better processes • Acquisition of knowledge • Extension service provision	3	100	67	33
Processing Innovations	Hardware	• Acquisition of machinery • Acquisition of improved storage facilities • Value addition	3	0	67	0
	Orgware	• Collective processing • Integrated service management	2	50	50	0
	Software	• Integration of ICTs • Acquisition of knowledge	2	50	50	50
Marketing Innovations	Hardware	• Acquisition of means of Transport • Acquisition of packing material	2	0	100	0
	Orgware	• Possession of contracts with buyers • Hiring labor for professional marketing • Partnership with external actors	3	67	33	0
	Software	• Monitoring quality of produce • Use of ICTs • Input provision to producers	3	67	33	33
			24	54.2%	58.3%	33.3%

Case 1 had an innovation index of 0.592 attributed to creating linkages with farmers to provide extension services, and had the demonstration garden serve as an access point for information and knowledge (extension services). For all the training offered, each individual who attended paid and seedlings were sold at the end of the training. With such guaranteed income, they had access to inputs on credit, and payment would be deducted from their revenues over an agreed period. Besides sharing knowledge, possession of contracts with potential buyers is an innovative way to assure the market for one's produce.

Case 3 had the lowest (0.383) innovation index because they practiced the least innovations along the nodes of the value chain. Besides exchange visits to other successful farms within and beyond the district, practicing integrated pest management and acquisition of processing knowledge, not much was done to add value to their produce, a package for marketing or even acquire machinery. Most of the activities within their enterprises were done with minimal effort to integrate new aspects compared to their counterparts.

All the cases integrated ICTs in their marketing systems, indicating the relevance and value of ICTs. They mainly used mobile phones to look for

substantial market information, especially concerning the trending product prices, and availability of buyers for their products. Although all cases had access to knowledge on how to process, processing of agricultural products remains expensive to the youth, especially without a credit arrangement system fueled by the lack of collateral.

The overall computed innovation index for the three cases was 0.536. This performance is considered high in agricultural value chains in the African context. Other scholars such as Chindime *et al.* (2017) found the innovation Index to be 0.37 for Malawi Dairy farmer's innovation satisfactory, despite the substantial investment made by the government of Malawi in dairy farmers' innovations. In this context, even the lowest index (for case No.3) of 0.383 is good, while case No. 1 with the highest index of 0.633 could be described as highly innovative. Even in developed industries in countries like Ireland have been found to have an innovation index as high as 0.64. Given the context of the cases studied, the overall index of 0.536 is considered high and depicts youth's potential to maneuver the challenges to make agriculture a decent employment.

Determinants for Youth Innovativeness

The study explored the factors that supported the level of innovativeness of some youth, as explained above. A synthesis (using content analysis) of the determinants for innovation among the youth revealed the key drivers to be: partnership with other actors, access to relevant knowledge and information, access to credit, access to improved inputs, access to labor and prices of agricultural products.

a) Partnerships and Networks

Partnership with other actors in this study referred to the youth's ability to network with other organizations or individuals that were not directly involved in their groups. The cases where this was displayed had a higher innovation index than those that did not. These results correspond well with Bragdon and Smith (2015), who established that innovation takes place through social interaction, and in the process, individuals build, learn from each other and strategically adapt to new tools and techniques to suit their particular circumstances. Therefore, it is important to promote and strengthen effective networking by improving youths' network sizes, and interactions (Meijer *et al.*, 2014) for more benefits among innovative youth engaged in agricultural enterprises.

b) Knowledge

Results showed that access to expertise knowledge contributed to youth's innovativeness. Previous studies have shown that knowledge is paramount and is the heart of innovation (Chindime *et al.*, 2017; Bragdon and Smith, 2015; Läpple *et al.*, 2015). The available avenues for expertise knowledge acquisition were advisory services from extension workers and training mainly organized by Non-Government agencies. Exchange visits and demonstration plots also provided a platform for peer learning among the youth.

c) Credit

Availability and affordability of credit increased youth's innovativeness, although most did not have the required collateral. One of the cases accessed credit in kind through the acquisition of inputs, and payment was made at the end of the season after harvest. As expected, this increased its innovativeness in comparison to other cases. Affordability of credit eases financial constraints among the youth engaged in agriculture (Shahin, 2004). These results were consistent with Ndunda and Mungatana (2013), who found out that increased access to credit enhanced innovativeness.

d) Quality Inputs

All agricultural enterprises need quality inputs to engage in production. Availability and affordability to improved inputs contributed to innovative engagement in agricultural enterprises. Inputs needed include improved seed, fertilizer, pesticides, and herbicides, feeds, among others. The cases that had access to improved inputs had a higher innovation index. The youth's main avenue for acquiring inputs was through private acquisition by cash and occasionally Government provision in kind. The youth further pointed out the need to improve the quality of inputs and delivery of the Government provided inputs.

e) Labor

Availability and affordability of expertise labor increased youth's innovativeness because most innovations along the agricultural value chain are intensive and require a lot of labor to be executed. The positive effect of labor availability and affordability is in line with general findings in the literature (Chindime *et al.*, 2017). Cases that could hire more laborers had more capacity to execute the activities in each element of the innovations.

f) Prices

The low and often fluctuating prices offered by buyers negatively affected the youth's innovativeness. As the demand for agricultural products increased, the youth were offered the same price irrespective of quality. Price differentiation was mainly due to the quantities one could produce. The uniform prices offered made the youth less innovative and focused more on quantities produced to attain more financial benefits.

Conclusion

In conclusion, this study sought to establish the factors impeding youth engagement in agriculture and the innovativeness of youth engaged in agricultural enterprises in mid-western Uganda. Based on the results discussed above, the following conclusions are made:

- The major factors impeding youth engagement in agricultural enterprises are enhancing soil productivity, access to relevant technical knowledge and information, and access to land for production.
- Amidst numerous constraints that the youth face to engage in gainful agricultural enterprises, some youth innovate and are more successful in agriculture. The major innovations for successful youth engagement in agriculture are irrigation to reduce risks of dependence on rain, mechanization to reduce labor drudgery, and market linkages. The case studies' innovation index portrays a high potential of innovativeness of youth to revolutionize and make agriculture gainful and attractive to the youth.

References

Ariza, C., Rugeles, L., Saavedra, D. and Guaitero, B. 2012. Measuring Innovation in Agricultural Firms: A Methodological Approach. *Electron. J. Knowledge Manage.* 11(3): 185–198.

Bragdon, S.H. and Smith, C. 2015. Small-scale farmer innovation. Quaker United Nations Office, Geneva. 17p.

Chindime, S., Kibwika, P. and Chagunda, M. 2017. Determinants of Sustainable Innovation Performance by Smallholder Dairy Farmers in Malawi. *Cogent Food Agric.* 3: 1379292. https://doi.org/10.1080/23311932.2017.1379292

Kimaro, P.J., Towo, N.N. and Benson, H.M. 2015. Determinants of Rural Youth Participation in Agricultural Activities : The Case of Kahe East Ward in Moshi Rural District, Tanzania. *Int. J. Econ. Comm. Manage.* 3(2): 1–47.

Klerkx, L., Aarts, N. and Leeuwis, C. 2010. Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. *Agril. Syst.* 103(6): 390–400. http://doi.org/10.1016/j.agsy.2010.03.012

Läpple, D., Renwick, A. and Thorne, F. 2015. Measuring and understanding the drivers of agricultural innovation: Evidence from Ireland. *Food Policy*. 51: 1–8. https://doi.org/10.1016/j.foodpol.2014.11.003

Meijer, S.S., Catacutan, D., Ajayi, O.C., Sileshi, G.W. and Nieuwenhuis, M. 2014. The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *Int. J. Agril. Sustain.* 13(1): 40–54. http://doi.org/10.1080/14735903.2014.912493

Ndunda, E.N. and Mungatana, E.D. 2013. Determinants of Farmers' Choice of Innovative Risk-Reduction Interventions to Wastewater-Irrigated Agriculture. *African J. Agril. Res.* 8(1): 119–128. http://doi.org/10.5897/AJAR12.1679.

NYP. 2001. The National Youth Policy: A Vision for Youth In The 21st Century. Ministry of Gender, Labour and Social Development, The Republic of Uganda. 19p.

Renwick, A., Läpple, D., O'Malley, A. and Thorne, F. 2014. Innovation in the Irish Agrifood Sector, University College Dublin, Ireland. pp. 1–63.

Shahin, A. 2004. Integration of FMEA and the Kano model. *Int. J. Quali. Reliabil. Manage.* 21(7): 731-746.

Sunberg, J. and Hunt, J. 2019. Are African rurak youth innovative? Claims, evidence and implications. *J. Rural Stud.* 69: 130-136. https://doi.org/10.1016/j.jrurstud.2019.05.004.

UN. 2019. *World Population Prospects 2019: Highlights*. Department of Economic and Social Affairs Population Division, United Nations, New York, USA. 39p.