

Innovation in Agriculture: An Alternative to the Migration of Rural Youth

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ABSTRACT

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Migration of rural youth to cities has turned out to be a big developmental problem in a lot of countries particularly in developing ones. Young people are looking at agriculture, which had been the primary source of rural employment, as unprofitable, risky, and socially less rewarding. The present study tries to find out how the innovation in agriculture can be a sustainable alternative to the rural youth migration. The paper discusses the technological, digital, institutional, and entrepreneurial innovations in agriculture and their impact on the betterment of rural lives. Through the use of secondary data and literature review, the paper contends that the migration of rural youth can be reduced through the driving force of innovation-led agriculture which will create jobs, increase income, and uplift the social status of farming as a profession.

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1. INTRODUCTION:

The migration of young people from rural areas to cities is an increasing socio-economic and demographic if not economic phenomenon and has been caused by many factors such as unemployment, low-income from agriculture, climate difficulties and changing desires (Leavy & Smith, 2010). The shift of youth from countryside to city has greatly increased over the last few decades thus creating huge and mixed problems that urban and rural areas have to deal with. The Food and Agriculture Organization (FAO, 2014) reports that about 70% of the total youth population of 15-17 years who live in rural areas are from less developed countries, but on the other hand, the agricultural sector is losing its attractiveness to this age group more and more. Many young people view agriculture as a sector with low productivity, manual work, and unstable income which are the major reasons why they are moving away from farming and looking for other professions (White, 2012).

The World Bank (2018) claims that rural-urban movement has been more pronounced in the past decades leading to major decreases in the number of people living in the countryside in many less developed countries as the cities get more populated yearly. The people leaving their rural homes create a situation with two pronged crises quickening the downfall of both the places they leave and those they migrate to. The countryside goes through isolation of working hands and thus decreased output of farm produce along with loss of the traditional knowledge systems, cities, on the other hand, go through congestion, joblessness, and overburdening of infrastructure and services (Tacoli, McGranahan & Satterthwaite, 2015). According to census data India is the case in point where nearly 18 million rural youngsters migrate to urban areas every year just in search of better prospects (Census of India, 2011).

Various researchers have pointed out the restricted availability of land, the inability to get loans, the lack of modern technology, and poor infrastructure as fundamental reasons for the rural youth migration (Kosec et al., 2018). Due to the inheritance process, landholdings have become smaller, and at the same time, land prices are increasing, and there are insecure tenure arrangements which make it harder for the youth to get access to productive agricultural land. As agriculture is considered a high-risk area, the financial institutions are not willing to provide loans to young farmers who do not have any collateral and credit history (Fletschner & Kenney, 2014). On the other hand, pull factors like perceived higher wages, better educational facilities, modern amenities, and urban lifestyle attractions attract youth to cities (De Brauw & Mueller, 2012).

The stigma connected to agriculture, where farming is considered a low-status job only for the uneducated and unsuccessful people, makes the situation worse (Proctor & Lucchesi, 2012). It is common in many cultures to associate agricultural work with poverty and backwardness, while urban employment is seen as progressive and modern. Parents tend to push their children towards getting education and finding urban jobs as a sign of family success and upward mobility (Bezu & Holden, 2014).

Agriculture, despite facing such hurdles, still holds its ground as a major factor in the list of the developing countries' employees, food security, and economic growth (OECD, 2020). Among these, the sector of agricultural innovation has been notably the strongest and most influential of the transformative forces in the recent past by technologically, digitalizing, and creating new agribusiness models (Klerkx, van Mierlo & Leeuwis, 2012). The introduction of such technologies like mechanization, biotechnology, and precision farming not only leads to the increasing quantity of the products but also to the alleviation of the hardships that farmers used to endure with the old-fashioned methods (Pretty et al., 2018). The use of digital technology in farming like mobile apps, online shopping, and farm consultancy over the internet is opening up the doors of knowledge and market access for all the users (Trendov, Varas & Zeng, 2019). The formation of institutions like farmer producer organizations and cooperatives is a way of putting the individual farmers' strengths together so that they become powerful and can take lesser risks (Markelova et al., 2009). The developments of farm processing and marketing, value addition, and agri-tourism are providing the rural area with a variety of jobs and thus reducing the out-migration rate of the rural poor (Wilkinson & Rocha, 2009).

The research is done as a part of the project on the role of agricultural innovation in the rural youth's sustainable livelihoods and its potential to be one of the most comprehensive methods to address the migration issue. The project also intends to outline the main areas of the modernized agriculture capable of providing solutions to the basic reasons that drive the youth to leave the countryside. The paper eventually comes to a conclusion that with the right

government policy and measures, agriculture and innovation can not only stop the migration of people from rural areas to cities but can, in fact, reverse it by luring educated youth back into the farming sector by presenting it as a lucrative profession.

2. Research Methodology:

The research utilizes secondary data that has been gathered from various sources, including books, academic journals, conference reports, policy papers, and the publications of both local and international organizations like FAO, World Bank, and OECD, among others. To explore the link between agricultural innovation and rural youth migration, a descriptive and analytical research strategy has been deployed. The work involves the systematic review of literature that is already existing and that deals with rural youth migration patterns, agricultural innovation frameworks, and case studies of successful interventions coming from different countries. Qualitative data analysis has been employed to detect and identify the trends, patterns, and correlations between the use of innovations and the retention of young population in rural localities. The research presents and uses empirical evidence from Asia, Africa, and Latin America to back its arguments and suggest policy changes.

3. Causes of Rural Youth Migration:

To the children of farmers quitting their parents' agricultural-based livelihoods, rural youth migration is caused by different but at the same time closely related interrelated push and pull factors which are hard to classify (Tadesse & Zacher, 2020). There is no doubt that economic reasons were the main reasons for migration. Uncertain and low income from agriculture still is a major issue, as the agricultural profits are very unstable since they are dependent on the weather, prices and market uncertainties (Barrett et al., 2017). Millennial farmers face "the reality" of farming being dictated by small-scale landownership and fragmented farms, which have resulted in the lack of economies of scale thus making it non-viable for a number of young people to be engaged in the agriculture sector (Jayne et al., 2016).

The economic hardships that rural youth suffer from are intensified by their limited access to land, credit, and modern technology. In traditional inheritance areas, young generations usually have less of a chance to hold or to use productive lands (Yeboah & Jayne, 2018). Young farmers are not given loans by banks because of the absence of collateral or credit history which they cannot provide (Aker, 2011). The price of modern agricultural technology is still too high for most rural youngsters.

The social and cultural factors are equally significant in the matter of youth migration. The social perception of farming as a low-status job has a strong psychological effect that prevents young people from getting involved in this sector (Bezu & Holden, 2014). The lack of educational and skill development opportunities in the countryside drives young people to move to towns and cities for schooling and training, and most of them do not go back after the education is done (Christiaensen & Todo, 2014). The rural areas' infrastructure and service inadequacies contribute a lot to the low living standard, which consists of very bad road access, unreliable power supply, difficult access to health care, and lack of modern facilities (Chamberlin & Jayne, 2020).

On the other hand, the factors that draw youth to cities are very strong as well. The urban areas are thought to be the places where the employment prospects are better over a wide range of sectors (Gindling, 2009). The cities are where the good education and the comfortable lifestyle are. The urban jobs may be shaky and poorly paid, but

the bright future expected in the city, along with the thrill of urban life, will still lure people to migrate and keep them away from moving back to rural areas.

4. Innovation in Agriculture: Types and Dimensions:

Agricultural innovation refers to the help of technology, digital tools, and social shifts that are all good for the environment, and are also more profitable and productive (World Bank, 2012). Tech innovations have changed agriculture practices completely and have made them more effective and fruitful (Pretty et al., 2018). The use of machines has made it possible for fewer workers to be needed in the farms and has also got rid of physical hard work (Daum & Birner, 2017). The application of precision farming technologies gives room for different treatments of the same field, thus, using the fertilizers and water in a proper way and getting the largest possible production (Gebbers & Adamchuk, 2010). The breakthroughs in biotechnology not only improve the productivity of crops but also make them more resistant to adverse weather conditions (Qaim, 2009). Climate-smart agricultural practices have enabled farmers to cope with the irregularity of weather patterns (Lipper et al., 2014). Drones and sensors come along with the latest technology and perhaps that is the reason why young people who are into tech are being drawn to agriculture (Zhang & Kovacs, 2012).

The introduction of digital technology has changed the game completely as far as agricultural information services and market access are concerned (Trendov et al., 2019). One of the most significant impacts of mobile applications is that they are able to provide farmers with important timely information which in turn refers to the power of traditional roads. The informant goes on to elaborate that online advisory services have broken the wall around the agriculture knowledge and now everybody can access it (Fabregas et al., 2019). Instantaneous weather report is one of the major factors that helps farmers make right decisions and eventually it leads to the situation where climate-related risks are not imposed on them (Hansen et al., 2011). The use of E-marketing platforms gives farmers the right to be in contact with the end consumers and buyers directly thus reducing intermediaries to zero and consequently leading to better price realization (Mittal & Mehar, 2016).

The issue of organizational innovations is closely related to such structures that enhances farmers' collective bargaining power and access to resources (Markelova et al., 2009). According to Trebbin & Hassler (2012), Farmer Producer Organizations help smallholder farmers to realize economies of scale. Agricultural cooperatives offer joint facilities and collective marketing routes (Bijman et al., 2012). Contract farming gives farmers guaranteed markets and prices set in advance (Bellemare, 2012). Public-private collaborations promote the transfer of technology and development of infrastructure (Spielman et al., 2010).

Proctor and Lucchesi (2012) argue that entrepreneurial innovations in agriculture cause the transition from a subsistence activity to a business one. Louwaars and de Boef (2012) state that agri-startups are responsible for providing a lot of job opportunities for rural youngsters. Food processing companies not only provide job opportunities but also help in decreasing the amount of food that goes to waste due to harvest (Wilkinson & Rocha, 2009). Organic farming practices give the producers the opportunity to sell their products at higher prices (Willer & Lernoud, 2019). Agri-tourism activities bring new sources of income (Phillip et al., 2010). Farmers providing agricultural services can recruit the youth and train them in agriculture without the need for land (Oya, 2013).

5. Role of Innovation in Reducing Rural Youth Migration

By various interrelated channels, agricultural innovation approaches to the root causes of rural youth migration (Sumberg et al., 2012). The innovative agriculture creates a wide range of job prospects not just in the field of crop production but also in the areas of input supply chains, food processing, technological support for agriculture, and the establishment of agricultural enterprises (FAO, 2014). Agriculture powered by technology provides knowledge-based employment for young people with education who can work as precision farming experts, drone operators, and agricultural data analysts (Nambiro et al., 2006).

The income from agriculture directly benefits from and is maintained by innovations. The introduction of new technologies and reforms in institutions lead to the adoption of better seeds, production methods, and the use of machines which together boost agricultural productivity (Kassie et al., 2011). Farmers engage in activities that not only add value to the product but also allow them to get a bigger share of the consumer prices through (Mittal & Mehar, 2016). The diversification of crops and other strategies help farmers to have steady incomes since they will be less affected by the fluctuations in prices and demand for their products (Shiferaw et al., 2014). On the other hand, farmers who adopt climate-smart practices and rely on insurance schemes will experience less income fluctuation due to weather (Lipper et al., 2014).

Technical and digital skills are increasingly required in modern farming, thus the activity of farming is no longer associated with physical hard labor but rather it is considered as mentally stimulating work (Leavy & Hossain, 2014). The combination of digital farming technologies and precision agriculture opens up avenues for the younger generation to put their tech-savviness to use in the agricultural field. The training programs on the modern agricultural methods not only upgrade but also equip the young people with the professional identity they are longing for.

Innovations are the main drivers of agriculture income and vice-versa. The adoption of better seeds, production techniques, and machines all at once has resulted in the increase of agricultural productivity (Kassie et al., 2011). Farmers are not only taking part in producing high-value goods, but also through farmer cooperatives, they are getting a bigger share of the consumer prices (Mittal & Mehar, 2016). The farmers' diversification of crops and other techniques, such as selling in different markets, help them to maintain stable incomes as they will be less affected by the price fluctuations and demand for their products (Shiferaw et al., 2014). On the other hand, a farmer using climate-smart methods and insured against losses will experience a more steady income than one who is not due to the variable nature of weather (Lipper et al., 2014).

There is a growing trend in modern agriculture that farmers need more technical and digital skills, hence, farming is no longer considered as a physical stressful activity but rather a mentally engaging one (Leavy & Hossain, 2014). The merging of digital farming technologies with precision agriculture has created a new generation of farmers that are tech-savvy and ready to conquer the agricultural field with their skills. The modern agricultural training programs don't just upgrade but also provide young people with the professional identity they desire.

6. Challenges, Policy Implications and Conclusion:

Certainly, the potential for change brought about by innovations in agriculture is still not enough to get rid of the challenges that innovation-driven agriculture has to fight with (Sumberg & Okali, 2013). The application of modern agricultural technologies involves a huge investment in capital which the majority of small farmers are unable to bear (Fletschner & Kenney, 2014). Digital divide problem continues with rural areas suffering from poor internet

connectivity and low digital literacy (Aker, 2011). There is a shortage of training institutions and extension services in rural areas which are dedicated to modern agricultural techniques. Policymakers may concentrate on small farmers as there are no inclusive policies in place (Spielman et al., 2011). Farmers are discouraged to invest in agricultural innovation for the long term due to insecure land tenure and policy uncertainties. The lack of proper market infrastructure reduces the profitability of agriculture that is driven by innovation.

In order to unlock the possibilities that agricultural innovation has for rural youth retention, a thoroughgoing policy support is needed. Governments are to make it a point to put money into rural infrastructural development such as, roads, electricity, and internet connectivity. Subsidized credit, training, and startup support provided by youth-focused agricultural programs can make the entry barriers less. A modification of agricultural education to keep abreast of the times and include technology training can win more students in agricultural education. Providing agri-startups with support through incubation centers and venture capital funds can prove to be a stimulus for youth-led innovation. The use of digital platforms in the strengthening of extension services can be a great way of knowledge dissemination. Land reforms that are aimed at youth access through leasing arrangements can be a way of allowing more people to take part in agriculture. The guaranteeing of market linkages through farmer producer organizations can result in improved farm profitability.

The research has come to the conclusion that technological advancements in farming can take the place of rural youth moving to cities as a dominant alternative. The agricultural sector expanded through innovations can not only revive rural areas and that would be a path to sustainable development but also make the entire process more environmentally friendly and sustainable. However, in order to unfold such a potential, it will not be sufficient just to have strong policy support but there would also need to be substantial investments, institutional backing and approaches that are participatory and serve the interests of everyone involved. Agriculture could be turned into a modern sector characterized by use of technology, driven by entrepreneurs and that would even change the way rural youth look at farming as a career and besides that it would also reverse the trend of rural-urban migration, thereby encouraging balanced regional growth and making rural areas sustainably prosperous for the coming generations.

7. Conclusion:

Agricultural innovation is a producer and environmental friendly alternative that transforms the young people living in rural areas and comes up with ways of attracting them back. The modern farm activities and other related practices are usually considered by young people to be a thing of the past, tedious and low class professions. It can be said that the application of technological, digital and entrepreneurial innovations can shift the perception of the sector fundamentally. After the agricultural sector moves from labor-intensive subsistence activities to high-tech knowledge-based agribusiness, it can become the provider of professional identity and economic stability that young people in the countryside seek in cities. The innovation of precision farming, biotechnology, drone operation, and digital market platforms has eased the discomforts of farmers on the ground. Moreover, it has created a large variety of job opportunities for people working in different sectors like input supply, food processing, and data analysis. The advantages of these innovations, besides the modernized lives of farmers, are that they are further securing and enhancing agricultural income through increased productivity and reduced dependence on market intermediaries via e-marketing, thus, making sure farmers get a good price for their products and also being able to stand the test of time against climate-related threats.

Nevertheless, the development of innovation-driven agriculture as a means to migration reversal would still need to be supported by proper technology, and educating the increasing number of farmers through training as well as providing specialized training facilities in rural areas. The digital divide, high capital requirements for modern technology, and a lack of specialized training facilities in rural areas were the major barriers for young smallholders to farmers. To make the countryside youth-friendly, a plethora of policy measures must be implemented. This would involve public investments in the rural infrastructure of power supply, roads, and high-speed internet as well as the provision of subsidized credit and incubation support for agri-start-ups. Besides, land reforms that make youth access through leasing and strengthening of Farmer Producer Organizations (FPOs) are also very necessary for obtaining economies of scale and market profitability. Last but not least, innovation in agriculture can regenerate rural areas economically and in terms of population but only if institutional support is strong and farmers' participatory approaches are inclusive. Once these conditions are satisfied, a rebranding of farming as a lucrative, tech-driven, and socially rewarding career that brings in sustainable wealth for the coming generations would be possible.

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