Chapter 34
Adoption of Digital Solutions for Agriculture in Africa

Charles Ochieng Odhiambo
Jomo Kenyatta University of Agriculture and Technology, Kenya

Titus Pkukat Kaprom
Jomo Kenyatta University of Agriculture and Technology, Kenya

David Kipngetich Chepkangor
Jomo Kenyatta University of Agriculture and Technology, Kenya

ABSTRACT

This chapter explores the digital innovations in the financial services sector relevant to sustainable agricultural production, the extent of their availability to the farmers and impact on productivity. It also assesses application of digital solutions on knowledge management and delivery of agricultural extension services to the farmers. Digital transformation in agricultural projects has also been covered in this chapter covering the entire project life cycle; production tasks are currently delivered as projects. Lastly, this chapter also looks at the digital innovations in marketing agricultural products.

INTRODUCTION

According to world population prospects of 2019 by the United Nations, World Food and Agriculture Organization projects the suitable and sustainable global food production to grow by 70% to effectively feed 9.1 billion world population and Africa's projected population of 2 billion by 2050. Farm productivity must thus accelerate faster than the global average to mitigate against mass hunger by 2050. Africa currently faces a myriad of challenges threatening to aggravate food insecurity. These include a rapid population growth rate; more than half of global population growth between now and 2050 is expected to occur in Africa. The population of China is expected to decrease by 2.2% between 2019 and 2050. The population of most European countries is expected to reduce by more than 15% by 2050. This high population growth rate in Africa puts pressure on the current food production and the production techniques.

DOI: 10.4018/978-1-6684-5352-0.ch034

The second challenge to food security is change in weather patterns with low amounts of rainfall being experienced during long rains season. This prematurely leaves the crops at a stage they are not fully developed for optimum production. On the same note, extremely harsh weather conditions like very high temperatures reduce crop and animal yields. Thirdly, rural-urban migration has led to mass movement of young energetic population from the rural farmlands to urban areas; the consequence of this is that the farms are deprived of the much vital factor of production-the labor. Clearly, high food demand together with decreasing yield potential of farmlands warrants a redesign of the agricultural sector for better food security, more sustainable employment opportunities and foreign income for the continent from export of agricultural produce. The advent of digital innovations has produced a lifeline to the vision of having a food sufficient continent.

Agenda 2063-The Africa we want published in the year 2015 aspires for a prosperous Africa based on inclusive growth and sustainable development. Fundamental to this is modern agriculture for increased production, productivity and value addition for national prosperity and Africa's collective food security. Separately and more relevantly, the Sustainable Development Goals of the UN (2015) cites famine and drought among other issues as daunting cities, towns and villages of the 193 countries of the world that met. The second of the seventeen Sustainable Development Goals is ***zero hunger by the year 2030;*** this goal focuses on ending hunger, achieving food security & improved nutrition and promotion of sustainable agriculture. Digital technologies available for application in agriculture are cloud computing, computing systems, connectivity, open source software among others. Entrepreneurs can now deliver solutions to smallholder African farms at cost models that farmers can afford. The specific practical applications of digital technology in agriculture include weather forecasts, soil sensors, satellite aerial images that make it possible to manage crop growth in real time. Automatic systems are programmed with normal parameters from which any deviations trigger early warning. This reduces waste and improves productivity. Another significant practical application of digital technology is on large data analysis that transforms farmers into a knowledge-based community designed to provide learning from each other and from experts. Digital solutions also focus on farmers' finances; this is by connecting the unbanked and underserved smallholder farmers to credit, the banks and financial institutions that offer these credit facilities also benefit from the increase in their agricultural loan portfolios cost effectively.

According to an article by Ndubuisi Ekekwe on *'How Digital technology is changing Farming in Africa' (*extracted from Harvard Business Review), there are notable examples of both mobile based and web-based technologies making significant contribution to sustainable agriculture in Africa now. Farmerline and AgroCenta are Ghana-based mobile and web-based technologies respectively that bring farming advice, weather forecasts, market information and financial tips to farmers who are traditionally out of reach due to barriers in connectivity, literacy or language. He further contributes that major global corporations have tried to advance digitalization of African agriculture by launching payment system, credit platforms and digital insurance.

Digital Financial Solutions in Agriculture

Digital financial solutions in agriculture play an important role in providing a more cost effective and secure innovative methods for financial transactions particularly rural small holder farmers that are underbanked. Improved access to digital finance in agriculture creates new market opportunities, access to flexible and valuable credit facilities, and most importantly increased production output. This leads to food sufficiency, better quality of life and improved income for both individual farmers and