Chapter 6

The Application of Big Data and Cloud Computing Among Smallholder Farmers in Sub-Saharan Africa

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ABSTRACT

Big data and cloud computing technologies have become popular technologies for information processing across different sectors of the economies including agriculture. This chapter aims to examine the usage of big data and cloud computing in Sub-Saharan African agriculture. According to literature, agriculture in Africa generally faces production challenges and this is attributed to limitations in information access and processing, coupled with farmers' reluctance to adopt new farming practices and digital technologies. After a review of literature on the use of these technologies in Africa, the chapter proposed an integrated model for supporting agriculture through big data and cloud computing.

INTRODUCTION

The growing demand for increased agricultural production to fulfil the United National Sustainable Development Goals to eliminate hunger, eradicate poverty and achieve food security requires farmers to adopt new technologies for communication. The need to adopt these technologies has also been necessitated by big data farming environments that make it difficult for farmers to make on-farm decisions because of their limited computational capabilities. To address these challenges, digital platforms called big data and cloud computing exist, that offer computing services, storage services, and application-hosting services. Research on the applications of these technologies in agriculture has been gaining momentum in the 21st century. However, in the developing world context, there is low usage of these technologies, particularly in the Sub-Saharan African (SSA) regions. Firms that adopt information and communica-

Figure 1. Sub-Saharan countries (Source: Swiss Federal Department of Foreign Affairs, 2021)
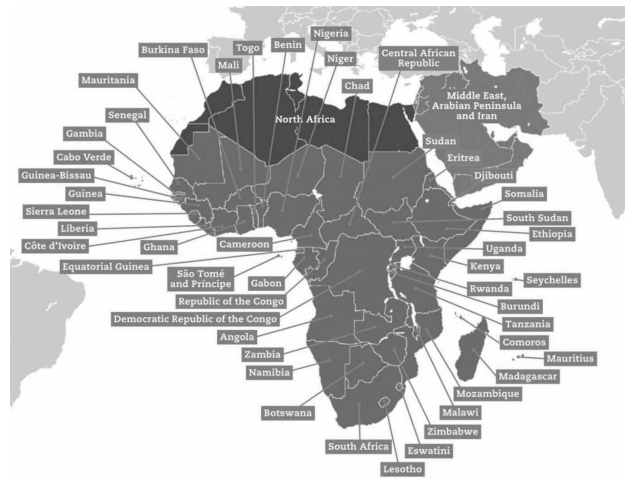
tion technologies (ICTs) are more likely to foster important organisational changes, with these changes having a significant impact on their performance and growth (Adenubi, Temeso & Abdulaleem, 2021).

This chapter highlights how big data and cloud computing can be harnessed to facilitate information processing among smallholder farmers in the SSA region. Key issues to be addressed in the chapter are big data and cloud computing concepts, their applications in agriculture and challenges in adopting big data and cloud computing in SSA agriculture.

BACKGROUND

As indicated in Figure 1, the SSA region consists of 49 countries. Because of its vulnerability to natural and climate-related calamities, this region has attracted international attention. On the other hand, opportunities appearing in this region in the areas of natural resource exploitation and agricultural development have been positive attractions to this location.

Agriculture and mining are two of the most prominent economic activities in these SSA countries. The bulk of the population in these nations lives in rural regions and relies on agriculture either directly or indirectly (Organisation for Economic Co-operation and Development/Food and Agriculture Organisation, 2016). Despite that, reduced agricultural output in SSA has resulted in hunger for the majority of the people, making agricultural production and food security a serious concern for this region. Raidimi and Kabiti (2019) advised effective knowledge dissemination to farmers for enhanced decision making using big data and cloud computing as viable instruments for improved on-farm decision making in an assessment of agricultural extension systems in South Africa.

MAIN FOCUS OF THE CHAPTER

The obstacles that SSA farmers experience in their farming activities are the topic of this chapter. The chapter also delves into big data and cloud computing principles and their applications in agriculture,

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