Chapter 7
Technological Application to Managing a Municipal Urban Garden

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ABSTRACT

The implementation of urban gardens, which are increasingly appearing in cities, aims to respond actively to the growing demand for urban spaces for the installation of urban gardens, creating conditions for the practice of sustainable agriculture in an urban context. Through these initiatives, it is intended to ensure that the needs of the population are met and to maximize the benefits arising from the practice of urban agriculture, both for the environment and for people's quality of life. Technology is a facilitating element in the process of acquiring and maintaining these urban gardens. This chapter presents an app that can be used by farmers to manage the production of consumer goods in this space, providing information about the status of crops, products to be grown, and types of required maintenance. This app simplifies the production process and also increases the sustainability of agriculture activities considering the economic, social, and logistical dimensions.

INTRODUCTION

The progressive global migration of the rural population to large urban centers has contributed to the emergence of environmental, social, and economic problems (Østby, 2016). With this migratory flow to

DOI: 10.4018/978-1-7998-8900-7.ch007

large cities, populations seek to improve their quality of life without considering the possible irreversible damage to the environment. A key concern in the planning and management of cities is to ensure sustainable development. Sachs and Ki-moon (2015) advocate that sustainable development seeks to respond to the ecological limits of the planet, which are not infinite, and it is also necessary to ensure the existence of natural resources for future generations.

Sustainable cities are those that align their living, production, and consumption patterns based on a combination of economic and socio-environmental aspects. As Cohen (2017) argues, instead of promoting disorderly growth and consumption, they adopt public policies and actions that positively impact sustainability. This can be realized in different areas of intervention in cities such as mobility, education, energy, and environment (Saad et al., 2017; Tafidis et al., 2017; Trindade et al., 2017). It becomes unequivocal that sustainability is a purpose for all humanities since consumption habits are driving natural resources to depletion, besides destroying flora and fauna species.

The rapid growth of cities has led to the massification and industrialization of production processes. This situation has led to the loss of food quality, which leads people to increasingly value the food from organic and healthy agriculture (Kearney, 2010). As a result of this process, urban agriculture presents progressively as an important alternative for feeding the population that allows ensuring sustainable development in urban space (Chumbler et al., 2016). Several differences can be found between urban agriculture and agriculture in rural areas, of which location stands out as an evident differentiating element between these two concepts, and a few improvements, where the objective of food production may be considered the most common element. Despite the differences between these types of agriculture, they can be seen as complementary. Rural agriculture provides food in large quantities, while urban agriculture exploits a few niche markets that are often overlooked in rural agriculture (Hamlin et al., 2016).

Agriculture has been enhancing the city with its multi-functionalities, which goes beyond food production and benefits other elements of the urban environment, such as services, green areas, buildings, leisure spaces, among others. Several authors have debated the benefits resulting from this activity. Heather (2012) mentions that at the environmental level, urban agriculture promotes the development of green spaces, the recovery of degraded areas, and the reduction of pollution. At the economic level, urban gardens contribute to the reduction of probity, because they enable the harvesting of food, of good quality and for personal consumption (Krikser et al., 2019).

Agriculture has gone through several phases of evolution since the introduction of mechanization, genetics and, more recently, information technology. Fourth revolution technologies (i.e., agriculture 4.0) have led to emerging technologies such as sensors, remote connection, statistics, and artificial intelligence being adopted in agriculture to improve product performance and to increase the visibility and efficiency of the entire value chain (Braun et al., 2018; Rose and Chilvers, 2018). Smartphones and tablets promise to revolutionize agriculture due to their wide range of functionalities and features. The adoption of these technologies turns possible to attract ordinary citizens to agricultural activity and there has been a progressive demand for the use of this equipment by new farmers and agricultural technicians through the use of applications that facilitate daily work on their farms. In this sense, this chapter presents the development process of a technological application for mobile devices that enables the management of a municipal urban garden. The developed application uses exclusively open-source software and provides users with advice on products to be produced, when they should be produced, production times and harvesting processes, which are fundamental for users who are not familiar with the production processes in agriculture. Throughout this work, the technological options and the added value that this project offers to the community will be discussed, especially for people living in cities,