# Chapter 6
# Cost–Benefit Analysis of Smart Pest Control Technologies

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## ABSTRACT

*The global concern encompassing the impact of pesticides on both human health and environment highlights a pressing need for their comprehensive solutions. The proposed sustainable use regulation emphasizes environmentally friendly options while promoting the use of integrated pest management. In this chapter, the authors will discuss the application of cost-benefit analysis, which is essential to determining whether traditional and smart technology-based pest management solutions can be implemented. With regard to crop protection, pest reduction, and financial returns, this framework of analysis compares the benefits of different pest management*

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*methods with the expenses that go along with them. In recent times, eco-efficient pest-smart ways have become more prevalent, combining cutting-edge technologies with ecologically sound pest management techniques. Precision agriculture, biological management, pheromone-based monitoring, remote sensing, and other approaches are all included in this broad category. In this chapter, the authors will explore how technology aids contemporary pest control methods.*

## INTRODUCTION

Recently there has been a growing concern, about the effects of pest control activities on both the environment and human health. One proposed solution to address these issues is through eco efficiency as suggested by Wang et al. (2022). Eco efficiency involves weighing the costs of pest management against the benefits derived from production with a focus on sustainability that extends beyond the immediate impacts but also looks at broader implications. According to Andre Leu adopting eco practices in agriculture can lead to positive outcomes than negative repercussions. Aligning with the EUs Food to Fork Strategy policymakers have set targets to reduce chemical and highly hazardous pesticides by 50% by 2030 to enhance Europes eco efficiency (Lykogianni et al., 2021). Under the Use Regulation, farmers and professionals using plant protection products are encouraged to implement Integrated Pest Management (IPM) which encourages utilizing a variety of environmentally friendly methods for pest prevention and control. It is crucial to consider not the impacts but also any potential social, environmental or cultural consequences when applying pesticides, in specific land areas where communities are involved.

Pesticides are substances, whether chemical or natural that are used to eliminate manage or shield plants from the effects of pests, insects and weeds. These compounds are classified based on how they work, their chemical makeup, potential dangers and how they are applied (Ahamad et al., 2023). The global demand for pesticides has been on the rise since the mid-1940s, mainly driven by commercial agriculture (Umapathi et al., 2022). Unfortunately, the unregulated overuse of pesticides has resulted in significant food and environmental pollution, affecting both agricultural and aquatic ecosystems (Cech et al., 2023). This situation is clearly dangerous to human health, disrupts pollination services, endangers species; thus, makes it a global concern (Ali et al., 2021).

Pesticides are widely found in food horticulture products particularly fruits and vegetables, processed foods, water, air, and soils. This contamination causes health problems particularly in the developing world where farmers in the course of their activities and the population comes across pesticides used in agriculture. Chemical

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