ARTIFICIAL INTELLIGENCE TECHNOLOGY IN LARGE-SCALE DATE PALM POLLINATION IN MIDDLE EAST

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Abstract:

1.1 Problem Statement

There is a problem in the agriculture sector. Pollination of date palm is carried out manually in the major date palm plantation. This study addresses the problem of labor-intensive date palm pollination in large farms and proposes the integration of artificial intelligence (AI) technology with drones to enhance efficiency and reduce costs. The research aims to measure the effectiveness of AI-assisted pollination, explore its impact on labor costs and crop quality, and determine suitable locations for its implementation. A mixed-method approach, including primary and secondary data collection, was employed to gather insights from farmers. The findings indicate that drones and AI have the potential to save labor costs, improve crop quality, and minimize environmental impact. However, further research and development are required to address concerns and maximize the benefits of this technology. The problem arises mainly in big farms because it requires many farmers to pollinate all the palms. Farmers take weeks to pollinate all the palms; this was and still is a problem for farmers. Moreover, it is inefficient to let a vast number of farmers do such a simple task; farmers would rather carry out more beneficial tasks. Some research has been done regarding this issue, and the solution was using a drone to pollinate the palm. To solve this problem, our team managed to integrate AI into drones. Also, the drone will be able to recognize the palm fields and pollinate palms one by one in an efficient way. If the issue isn't resolved quickly, farmers will waste money, time, and effort. To determine whether this idea is feasible, how much it will impact farms, and how urgently it needs to be implemented, we will speak to farmers and distribute a questionnaire for them to fill out.

1.2 Research Aim & Objectives

1) To measure the effectiveness of Integration of Artificial Intelligence Technology in large scale date palm pollination in Oman.
2) To explore the potential impact of AI-assisted pollination on labor cost and efficiency.
3) To determine quality & quantity of palm tree crops.

1.3 Research Method

We have used the mixed approach method to achieve the research objectives. This is the best way to achieve our objectives because there are many farmers that we can ask about pollination and how the combination of AI and drones would help them in future pollination. Their answers, their point of view and experience will be valuable. Because good-quality pollen is more likely to result in a high yield, it was critical to test pollen vitality before the pollination process. Also, we have used both primary and secondary data. Obviously, this is descriptive research because we are depending on statistics and people's views at the same time.

1.4 Research Findings

The analysis of responses provides valuable insight into the perception of using drones and AI for palm tree pollination compared to traditional methods. The preliminary results show that drones and AI have the potential to save labor costs, improve crop quality, and reduce the need for manual labor. However, there is a growing awareness of the benefits of using drones and AI for palm tree pollination, with 48% of respondents being aware of it.

Efficiency, cost, and environmental impact were emphasized as key factors in evaluating drones and AI for palm tree pollination. Efficiency was emphasized by 45.8% of respondents, highlighting the need for technological solutions that optimize pollination processes, leading to increased productivity and resource efficiency. Cost was acknowledged by 16.7%, and environmental impact by 37.5%. Concerns about the potential negative impacts on traditional pollinators were evident, with 39.1% expressing high levels of concern.

The majority of respondents agreed that using drones and AI for palm tree pollination is still in its early stages of adoption and exploration, highlighting the need for ongoing research and development to address concerns, optimize practices, and maximize the potential benefits of this technology for agricultural productivity and sustainability.

Keywords: Artificial Intelligence, Pollination, Palm-tree, Drones