

# Implementing IR 4.0 Technology in Oil Palm Plantation

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## ABSTRACT

*This article discusses the potential of Industry Revolution 4.0 (IR 4.0) technologies in revolutionising the oil palm industry by increasing efficiency, productivity, and precision in the plantation while reducing costs and environmental impact. Examples of IR 4.0 in the oil palm plantations include the use of sensor-based precision farming, automation in planting and harvesting processes, and the use of drones for crop monitoring and management. However, the implementation of these technologies in the oil palm plantations faces several challenges including lack of awareness and understanding of the benefits and potential of IR 4.0, lack of infrastructure and investment in the necessary technology and equipment, and lack of skilled personnel and data management capabilities. To overcome these challenges, it is important to invest in educating and training the stakeholders on the benefits and potential of IR 4.0, as well as providing financial and technical support for the implementation of IR 4.0 technologies and to foster collaboration between government, industry, and academic institutions to drive the development and adoption of IR 4.0 in the oil palm plantation industry. All the above is emphasised and discussed in this article.*

## INTRODUCTION

The Fourth Industrial Revolution or Industry Revolution 4.0 (IR 4.0), is the term used to describe the present trend of automation and data sharing in manufacturing technology, including advancement in artificial intelligence, the Internet of Things, and cloud computing (Figure 1) (ABS Global 2022). The goal of IR 4.0 in agriculture is to increase efficiency, productivity, and precision while reducing cost and environmental impact. It is characterised by increasing

use of automation, connectivity, and data-driven decision making in industrial processes (The Economist Intelligence Unit, 2015).

IR 4.0 has the potential to revolutionise the way industrial processes are organised and managed, leading to increased efficiency, flexibility, and responsiveness to changing market conditions. It also enables the creation of smart factories, where machines and systems are interconnected, allowing for real-time monitoring, control, and optimisation of the production process (South, 2017). One example of IR 4.0 in agriculture is the use of sensor-based precision farming, which uses real-time data to optimise crop growth and yields (TMR Research, 2020). Another example is the use of drones for crop monitoring and management (Bryceson *et al.*, 2018). The potential in applying IR 4.0 technologies in oil palm plantations is enormous.



Source: ABS Global, (2022).

Figure 1. IR 4.0 Internet of Things (IoT) technology setup in oil palm plantation.

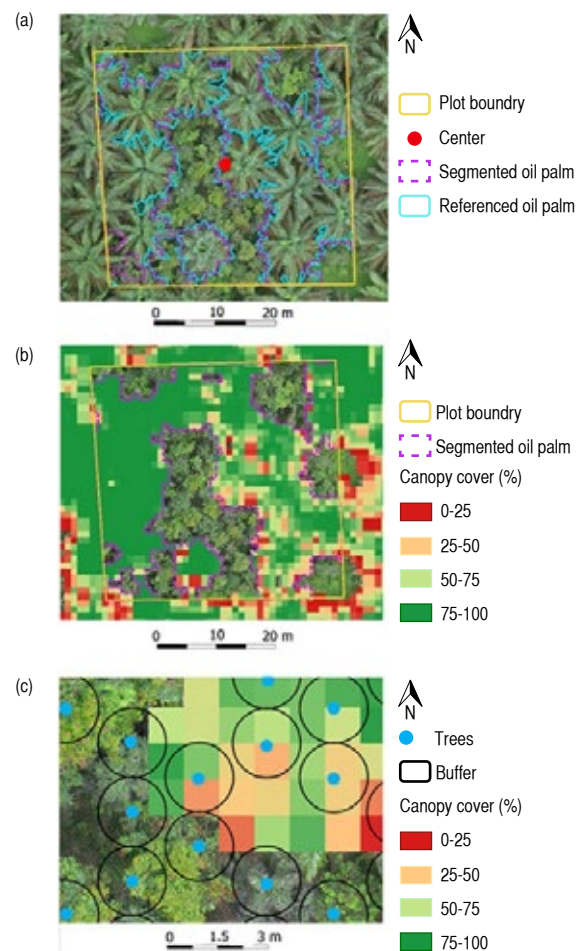


Source: Balqis, (2018).

Figure 2. Drone application in oil palm industry.

Using cutting-edge automation technologies to boost production and efficiency of oil palm plantation is one possible advantage of IR 4.0. For instance, the use of drones to map and monitor crops (Figure 2) can significantly reduce the time and labour needed to complete these chores while simultaneously delivering more accurate and up to dated data (Shah, 2019; Balqis, 2018). Additionally, real-time monitoring and practise optimisation of irrigation, fertilisation, and pest management can be accomplished through the use of Internet of Things (IoT) sensors and other monitoring technologies (Hussin *et al.*, 2018).

Enhancing the sustainability and environmental effect of the business is another possible advantage of IR 4.0 in an oil palm plantations. For instance, using precision agriculture methods (Figure 3) such as variable rate irrigation and fertilisation can increase crop yields while consuming less waste and resources (Bryceson *et al.*, 2018; Khokthong *et al.*, 2019). AI and machine learning can also be used to improve crop management techniques and spot possible problems early on, enabling more proactive and preventative approaches to pest management and other difficulties (Zhang *et al.*, 2020).



Source: Khokthong *et al.*, (2019).

Figure 3. An example of plantation mapping using drone and artificial intelligence (AI) technology.

### CHALLENGES AND STRATEGIES

The stigma surrounding new technology and the associated implementation expenses are two major obstacles in the adoption of IR 4.0 in oil palm plantations. Organisations must inform stakeholders about the advantages of IR 4.0 and allay any fears or misconceptions they may have in order to overcome these obstacles. It may also be important to offer employees with training and support in order to ensure that they have the skills necessary to use the new technologies (Hussin *et al.*, 2018). Organisations can also employ other methods to promote the adoption of new technology (Zafar 2019):

- **Communicate the benefits:** Clearly communicate the benefits of the new technology to the employees, including how it will improve their work processes and make their jobs easier. The adoption process can also be simplified so that it can be more user-friendly.
- **Involve employees in decision-making process:** Involving employees in decision making to adopt new technology can help build buy-in and ensures that the technology meets their needs.
- **Offer incentives:** Consider offering incentives, such as bonuses or other rewards to encourage employees to adopt the new technology.
- **Demonstrate the technology in action:** Showing how the technology works and the positive impact it can have can help build excitement and interest in adopting it.
- **Gradually introduce the technology:** Instead of implementing the technology all at once, consider rolling it out gradually to give employees time to adjust and get comfortable with it. In some cases, it may be necessary to make the new technology a requirement or mandatory. However, it is important to consider the potential consequences of this approach, as it may be met with resistance.

### CONCLUSION

In conclusion, IR 4.0 technologies have the potential to revolutionise the oil palm plantations by increasing efficiency, productivity, and precision while reducing cost and environmental impact. Examples of IR 4.0 in the oil palm plantation industry include the use of sensor-based precision farming, automation in planting and harvesting processes, and the use of drones for crop monitoring and management.

However, there are several challenges that need to be addressed in order to encourage the adoption of IR 4.0 in the oil palm plantations. One major challenge is the lack of awareness and understanding of the benefits and potential of IR 4.0 among oil palm plantation stakeholders. Another challenge is the lack of infrastructure and investment in the necessary technology and equipment. Additionally, there are concerns about the lack of skilled personnel and data management capabilities to fully leverage the potential of IR 4.0.

To overcome these challenges, it is important to invest in educating and training the stakeholders on the benefits and potential of IR 4.0, as well as providing financial and technical support for the implementation of IR 4.0 technologies. Additionally, collaboration between government, industry, and academic institutions can help drive the development and adoption of IR 4.0 in the oil palm plantations.

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