The Contribution of Engineering to Agricultural Transformation and Food Sustainability in Nigeria: A Literature Review

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Introduction

Food security remains one of the most pressing challenges of the 21st century, exacerbated by rapid population growth, climate change, resource limitations, and inefficient agricultural practices (FAO, 2021; IPCC, 2021). Projections indicate that the global population could rise to 9.7 billion by 2050. This calls for innovative approaches to boost agricultural efficiency and productivity (FAO, 2021; World Bank, 2022). This paper explores the various engineering innovations that are driving agricultural transformation and their role in ensuring food security. It also examines national food security challenges, the technological advancements revolutionizing food production, and the policies needed to facilitate widespread adoption of engineering solutions. By addressing these issues, agriculture can transition toward a more resilient, efficient, and sustainable model, ensuring that food security is achieved for present and future generations.

Background of the Research

Agriculture remains a critical sector in Nigeria, contributing significantly to economic development, employment, and food security (FAO, 2020). However, despite its importance, the sector faces several challenges, including low productivity, climate change, post-harvest losses, and inefficient farming practices (Adesina, 2019). Over the years, engineering innovations have played a significant role in agricultural transformation by introducing mechanization, automation, irrigation systems, and precision farming techniques (Odeyemi & Adekunle, 2021).

In Nigeria, integrating engineering solutions into agricultural practices has been a strategic approach to improving food production, minimising waste, and ensuring long-term sustainability (Umar et al., 2020).

Research Objectives

The study seeks to:

i. Examine the role of engineering innovations in improving agricultural productivity in Nigeria.
ii. Identify key engineering technologies that have been adopted in the Nigerian agricultural sector.
iii. Highlight challenges hindering the integration of engineering solutions in agriculture.
iv. Provide recommendations for enhancing engineering contributions to agricultural transformation.

Conclusion

Engineering plays a pivotal role in agricultural transformation and food sustainability in Nigeria despite its numerous challenges. With strategic investments and effective policies, Nigeria can achieve a modernized, resilient, and sustainable agricultural sector, ensuring food security for its growing population and reducing dependence on food imports.

Keywords: Engineering solutions, Global food security, Agricultural transformation, Sustainable agricultural practices, Engineering innovations.