


*Abstract*

# Agriculture through Industry 4.0: Management, Challenges, and Opportunities in Hostile Environment: The Case of Iraq<sup>†</sup>

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**Abstract:** This paper reviews the future trends, the present situation and the prospects facing the application of Industry 4.0 technologies (e.g., Drones, texting technologies, GPS, etc.) in Iraq's agricultural sector in general and small agribusiness industries in particular. Iraq struggles with chronic structural and emerging challenges that have hindered its food production over the years. In 2019, Iraq's population had increased to around 39 million people, compared to 23.5 million Iraqis in 2000. This shift amounts to a 66% increase in population in 20 years. Food supply, whether locally produced or imported, has been struggling to catch up with the population growth, and Iraq has become increasingly dependent on food imports to meet domestic demand. Between 1985 and 2017, food imports increased from USD 2 billion to USD 11 billion, growing from 19 to 21% of total imports. Iraq's economy has been highly dependent on the oil sector; with declining oil prices, politicians and international communities have emphasised that modern and smart agriculture that applies Industry 4.0 technology can increase productivity and be a source of job creation, income generation and self-reliance. Nonetheless, evidence obtained via this exploratory study using unstructured interviews (3 out of 33) via an interpretive approach and conducting thematic analysis of the interviews with farmers and agri-entrepreneurs indicate that there is a long journey ahead before Iraq can rely on agriculture and new technologies, instead of oil, for its economy and to improve its food system. Moreover, Iraq's political turmoil and uncertainty, the cyclical conflict and wars, and the corruption and mismanagement of state resources exacerbate this problem. Indeed, farmers face many challenges, such as a lack of infrastructure and security, the dominance of state-owned enterprises, and financing issues, with many farm owners struggling to access finance since there is no clear banking or credit system. On top of that issue, the diminishing of tacit knowledge among the farmers and the labour shortage issue in the agricultural sector hinders application of smart technology, as the majority of workers remaining in the market are unskilled labour. This study contributed to the literature on the application of smart technologies in agriculture and its socioeconomic effects. The exploratory nature of this study identifies areas for future research. Additionally, the arguments presented in this research highlight the challenges farmers and agri-entrepreneurs face in adopting new technologies and the tactics that they use to survive in a hostile environment like Iraq. It will also offer suggestions to help policymakers and international communities focus on intervention to help farmers and agri-entrepreneurs in Iraq to improve their performance.

**Keywords:** agricultural technologies; Industry 4.0; Industry 5.0; smart technology and agri-entrepreneurs; food system; Industry 4.0 in a war zone



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