

## **‘ADOPTION OF ARTIFICIAL INTELLIGENCE IN AGRICULTURE AND ITS IMPACT ON QUALITY OF WORK LIFE OF FARMERS IN PUNE DISTRICT’**

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**Abstract:** Indian farmers labour day and night to enhance productivity of farm. The overall agriculture sector in India is characterised by low productivity, rain fed agriculture and traditional methods of production. The advancements in technology are enabling farmers to overcome these challenges. Government of India promoting the adoption of technology, especially the Artificial Intelligence based products in agriculture through various schemes and subsidies with an intention to improve economic conditions and ease in agriculture operations.

The present paper attempt to study the adoption level of Artificial Intelligence based products by farmers and obstacles in their adoption. Also, the impact of adoption of Artificial Intelligence based products on quality of work life of farmers is explored. The primary data is collected from 650 farmers of Western Maharashtra using structured schedule. The finding reveals that the adoption of Artificial Intelligence based product is significantly low in selected farmers and positive change in Quality work life of farmers who have adopted these products have been observed.

**Key Words:** Advancement in Technology, adoption, Artificial Intelligence, Quality of work life.

**Introduction:** World population is expected to grow from 7.7 billion in 2020 to 8.5 billion in 2030, according to OECD-FAO Agricultural Outlook 2021-2030. This will result in extra food demand, which can only be met from enhanced crop productivity. Therefore, modernization of the agricultural sector becomes the need of the hour. The conventional Farming method needs to improve by the integration of technologies such as Artificial intelligence (AI). The AI is becoming more prevalent because of its robust applicability in the issues that cannot be solved by conventional methods. Such an area of extreme importance is agriculture, about 70% of the rural household depends on agriculture. It faces several challenges from sowing to harvest. The Artificial Intelligence based products help farmers to overcome several shortcomings like labour shortage, disease inspection, crop monitoring, soil fertility, weed control, weather predictions, irrigation system and so on. The Artificial Intelligence based products such as AI powered drones, smart irrigation, smart spraying, driverless tractors, GIS software, vertical farming software paving their way in agriculture. Artificial intelligence is an emerging technology which enables farmers to take proactive steps in various agricultural operations. The adoption of Artificial Intelligence based products in agricultural operations is in early stage due to many factors such as high illiteracy rate,

lack of access to information platforms, lack of trust in technologically driven solutions etc. The government has under taken various activities to incorporate Artificial intelligence in agriculture. It includes Technology Innovation Hubs (TIH), incentive, schemes, Farmer's Production Organisation, Custom Hiring Society, Co-operative Society of Farmers etc. Hence, the overall crop productivity using Artificial intelligence is likely to enhance. Additionally, where the Artificial Intelligence based products paving its way in agriculture, government is also establishing a strong foundation in order to boost the adoption of these products.

The Artificial Intelligence for Agriculture Innovation (AI4AI) initiative was launched in August 2020 by the World Economic Forum's Centre for the Fourth Industrial Revolution India, (C4IR) in active collaboration with the Government of Telangana and support from the Ministry of Agriculture, the National Institution for Transforming India (NITI) Aayog and the Ministry of Electronics and IT. The report published by World Economic Forum significantly discuss about the integration of emerging technologies such as Artificial Intelligence in agriculture has impact on agricultural productivity and efficiency at all stages of the agricultural value chain. Telangana became the first Indian state to adopt a framework for scaling up innovative technologies and enhancing productivity, efficiency, and sustainability in the agriculture sector. The Saagu Baagu pilot was introduced through AI4AI in collaboration with the Government of Telangana. Ag Next, Krishitantra, and Kalgudi are three agricultural technology companies working with C4IR India, the Government of Telangana, and Digital Green to lead the pilot programme. By January 2023, over 7,000 farmers had signed up for the trial programme, which mostly targeted growers of chilli. These farmers are receiving assistance in the form of several AI technologies, including crop health monitoring, sowing quality testing, soil testing as well as access to new clients and suppliers in various regions.

The Government of Maharashtra has signed a memorandum with IVADO and Next AI, Artificial Intelligence accelerator firms in Canada for soil management and eradication of crop diseases. Additionally In January 2018 the Government of Maharashtra and World Economic Forum signed a MoU to set up 'Centre for the Fourth Industrial Revolution' in Mumbai which focuses on accelerating the growth of adoption of Artificial Intelligence. A project named Maha Agri Tech project-based in Maharashtra which utilizes AI for reducing the various risk involved in agriculture as Maharashtra is very prone to weather alterations.

Emerging technologies driven by the fourth industrial revolution, such as the internet of things (IoT), artificial intelligence (AI), machine learning (ML), big data, drones and blockchain, are disrupting many industries, bringing rapid and large-scale change. Until now, the agriculture sector has been slow to harness the power of these technologies. Low adoption levels of Agriculture Intelligence based products in agriculture are due in large part to the complexity of the sector, which features small farm sizes, lack of telecoms infrastructure in rural areas, high regulatory burdens which raise costs, and revenues constrained by customers' limited ability and willingness to pay.

**Literature Review:**

AI-enabled devices forecast weather conditions by combining ML algorithms, satellite and drone imagery, temperature, precipitation, wind speed, and sun radiation data. Analyse the sustainability of the crops and assess farms for pests, diseases, and poor plant nutrition. Using AI apps, farmers with Wi-Fi connectivity can get a customized farm plan. AI solutions can potentially bring about significant changes indifferent farming areas, such as using image sensing to createmaps of crop yields, predicting yields, managing the workforce, and providing decision assistance to farmers and producers (Bhagat et al., 2022). This development provides a viable and long-lasting solution to the increasing world population. Artificial intelligence (AI) technologies have the potential to enhance sustainable and efficient farming systems, leading to higher agricultural productivity and sustainability (Rathor, 2023). The incorporation of artificial intelligence (AI) methods in agricultural operations has demonstrated potential in enhancing irrigation systems, promoting crop and soil health, detecting crop diseases, managing weed growth, and fostering sustainable agrarian practices (Lakshmi & Corbett, 2020).

**Research Gap**

The review signifies that AI has great potential to transform the agriculture sector in India. The acceptance and use of AI products is higher in countries like US, China, Brazil, Argentina. India is witnessing crawling adoption of AI in agriculture sector. Despite of the various promotional schemes launched by central government for faster adoption of AI in agriculture, it is very bleak especially in the rural and remote areas. There are various obstacles and challenges to increase the faster adoption of AI technologies in India. The current research paper attempts to explore the adoption level of AI by farmers in Pune district. The obstacles and socioeconomic benefits of adoption of AI for farmers are explored in this study.

**Methodology:**

The research is based on analysis of primary data collected from farmers in Pune district. The farmers who are growing fruit crops and having land holding of min 5 acre are considered as a sample for this study. The primary data is collected using semi structured interviews from 450 such farmers using purposive sampling. The 23 items work related Quality of Work Life scale designed by Simon Easton & Darren Van Laar (University of Portsmouth, Portsmouth, UK) is used to collect the data of quality work life of farmers whereas the adoption of artificial intelligence is studied with the help of 10 product adoption metrics viz. Product adoption rate, Customer retention rate, Customer churn rate, Activation rate, Time to value, Average session duration, Usage frequency, Product stickiness, Feature adoption rate, & Net Promoter Score (NPS). The impact of AI adoption on quality work life is explored using correlation analysis. The impact of extraneous variables on study results are controlled by keeping the other variables viz. Land holding, Rainfall, quality of soil, electricity supply & family income as constant across all sample units.

**Empirical Results:**

The correlation analysis was run for composite score of AI adoption level and composite of Quality of Work Life of Farmers. The results of correlation analysis are depicted below.

### Descriptive Statistics

	Mean	Std. Deviation	N
QoWL	3.4946	1.12781	450
PAL	3.7858	.84367	450

### Correlation Between AI Adoption Level (AIAL) & Quality Of Work Life(Qowl)

		AIAL	QoWL
QoWL	Pearson Correlation	1	.673**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	824.231	414.750
	Covariance	1.272	.640
	N	450	450
AIAL	Pearson Correlation	.673**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	414.750	461.230
	Covariance	.640	.712
	N	450	450

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Above table depicts that the Pearson correlation coefficient between quality of work life of farmers and adoption of Artificial Intelligence is 0.673 which shows positive impact of AI adoption on quality work life of farmers in Pune District.

### Conclusion:

Farming is considered as one of the noble professions as it serves basic need of population across the globe. India is known as a agrarian country as major portion of its working population is in to agriculture. In terms of workforce around 42.86% workforce is engaged in farming in India. The farmwork in India is characterised by traditional methods and labour-intensive work arrangements. The number of farm accidents due to heat stress, chemical exposure, noise related hazards have severe impact on health of farmers and farm workers. The agricultural electricity supply is majorly available during night times which increases the incidences of snake or insect bites. The overall quality work life of farmers is deteriorated. The adoption of AI in agriculture seeks to improve the overall quality of work life of farmers. The result reveals that AI adoption has positive impact on overall wellbeing and easiness' for farmers in agriculture operations. The remote assess and control has made Agri operations seamless. The AI has positively impacted overall socioeconomics of farmers in Pune district.

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