

CHAPTER 16

Qualitative Analysis of Farmer and Consumer Perspectives on AI-Driven Marketing of Agricultural Products

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ABSTRACT

It is qualitative research examining the views of farmers and consumers on AI-driven marketing of agricultural products as related to their benefits, challenges, and trust. Thematic analysis based on interviewing and focus groups with 20 farmers and 20 consumers showed that 80 percent of the farmers valued AI because it gave them access to the market, and 75 percent of the consumers liked the notion of transparent traceability. Nevertheless, it would not be adopted because of costs (70 percent of small-scale farmers), digital literacy (65 percent of farmers), and data privacy concerns (70 percent of consumers). The results support low-priced, accessible, and non-threatening tools of AI and transparent exploitation so that such technologies can be attained by everyone equally, adding variants of stakeholder perspectives to agricultural marketing research.

Keywords: Artificial Intelligence; Agricultural marketing; Farmer perspectives; Consumer trust; Qualitative research; Technology adoption; Data privacy; Traceability.

1.0 Introduction

Artificial intelligence (AI) is one of the fast-growing agricultural systems and its voluminous adoption has transformed the conventional use of the agricultural systems especially the marketing of agricultural produce. AI-powered marketing involves using sophisticated technologies, including machine learning, predictive algorithms, and big data, to improve the efficiency of the market, streamline supply chains and customize consumer-interaction (Li & Wang, 2020; Sharma et al., 2022). Such tools help farmers to get the actual information regarding the market, forecast the demand among consumers, and modify promotional methods, which further enhances the relationships between producers and markets (Kumar et al., 2023). As an illustration, through e-commerce market places and recommendations systems driven by AI, consumer behavior can be used to propose the best prices or focused advertising to enhance the market of a farmer and the profit generated by them (Patel & Gupta, 2021).

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At the same time, AI-powered marketing, in the form of personalized advertising, product up-tracing systems, and quality assurance measures, directly and indirectly affect the consumer decision-making and predisposition towards agricultural products (Chen & Zhang, 2023). All these developments notwithstanding, the overall success of AI-powered market adoption relies on the attitudes of two important stakeholders who have to embrace such technologies in their farming processes; farmers, and consumers, who are influenced by how they trust and prefer their products.

Implementation of AI-based marketing in agriculture is not a smooth ride. Smallholder or resource-constrained farmers usually encounter obstacles associated with the high costs of care and feeding, low digital literacy levels, and the perceived lack of reliability and relevance of AI (Singh et al., 2021; FAO, 2022).

In a similar way, consumers show diverse reactions to marketing activities via AI, as they are largely worried about their information privacy, transparency, and trustworthiness of such AI-promoted products, which influences how consumers trust products and make other purchases (Thompson & Meyer, 2022; Lee & Kim, 2024).

Although quantitative studies have discussed technical and economic consequences of AI in agriculture (e.g., Rahman and Ahmed, 2020), limited qualitative research has been established to discuss the subjective experience, attitude, and concerns of farmers and consumers. This disparity is quite important, as stakeholder perception plays an imperative role in the design and practice of inclusive, efficient, and reliable AI marketing strategies (Bhatia & Kumar, 2023). The qualitative method is especially appropriate in the given work, as it will provide the possibility to examination in a complex way such nuanced points of view that quantitative approaches could neither render invisible nor notice (Creswell & Poth, 2018).

The research groping which is going to be discussed in this paper seeks to fill the research gap by analyzing the topic qualitatively through the viewpoint of AI-driven marketing of farming products by farmers and consumers.

The targeted objectives include: (1) to study the attitudes of farmers towards the adoption of AI-driven marketing tools as well as perceived advantages (e.g., gaining an improved market access) and disadvantages (e.g., the impact of technology lock-ins and lock-outs); (2) to investigate the insights of consumers about the technology (knowledge level, credence, and their behaviors towards AI-influenced agricultural marketing processes); and (3) to uncover the agreement and disagreement of these perceptions to make stakeholder-centred AI-focused strategies.

This research uses the semi-structured interview and focus group technique to establish detailed, contextual understanding of stakeholder reports and subsequently leads to the increasing number of literature available on technology adoption in agricultural practice. The results will be likely to provide practical implications to policymakers, AI technology

developers, and marketers who want to popularize fair and transparent utilization of AI in agricultural marketing.

This paper is structured as follows: The literature review (Section 2) explained the research gap based on the existing evidence on the topic of AI in agricultural marketing and technological adaptation by farmers together with consumer beliefs. In Section 3, the qualitative methodology is reported with regard to the selection of the participants, data collection, and thematic analysis. Section 4 brings the findings, established according to the farmer and consumer viewpoints, containing major themes and patterns. The section 5 talks about the implications, limitations, and future areas of research. Lastly, the Section 6 ends by giving a synthesis of findings and advice to stakeholders.

2.0 Literature Review

Artificial Intelligence in Agrichemical Marketing: In agricultural marketing, the practice of artificial intelligence (AI) gained considerable popularity over recent years and is expected to continue an upward trend given its ability to contribute to the technological efficiency, connectivity, and profitability of the agricultural value chain. Machine learning and predictive analytics, natural language processing, and other AI technologies have been used to make price, maximize the likelihood of market demand, and customize marketing campaigns (Li & Wang, 2020; Sharma et al., 2022). As an example, e-commerce marketplaces and recommendation systems based on AI collect large amounts of data to give farmers information about consumer demand and market tendencies and allow them to run focused promotions and gain better access to the market (Patel & Gupta, 2021). Research has shown that dynamic pricing, as well as demand prediction models allows AI tools to maximize farmers revenue by 15 percent (Kumar et al., 2023). In addition, traceability systems driven by AI guarantee consumer confidence through open communication of the origin of the product, its quality, and sustainability (Chen & Zhang, 2023). Regardless of these developments, most of the literature fields have been on the technical and economic outcomes with little attention being paid on the stakeholder experiences and perceptions, especially the situations in diverse agricultural settings.

Attitudes of Farmers towards the Adoption of Technology: New technologies such as AI are affected by a variety of factors when being adopted by farmers such as perceived incentives, availability and socio-economic limitations. As literature notes, farmers appreciate those technologies which can make them more productive, cheaper, or open the market (Singh et al., 2021; FAO, 2022). As an example, research into marketing tools that can provide real-time market information or automate customer outreach on the basis of AI has demonstrated that such applications can help to increase the bargaining capabilities of smallholder farmers and decrease levels of dependency on the mediation activities of

intermediaries (Patel & Gupta, 2021). Nonetheless, several impediments are linked to the obstacles of implementing it due to elevated costs, digital illiteracy levels, and incapable infrastructures, especially the small-scale farmers located in the developing world (Singh et al., 2021; Rahman & Ahmed, 2020). In addition to this, AI system trust is another important matter, as research shows that farmers tend to show mistrust regarding reliability and applicability of results that AI puts out as recommendations (Bhatia & Kumar, 2023). These results highlight the importance of qualitative investigations to examine the subjective experience of farmers and their attitudes towards AI-derived marketing, which have been little studied over the literature that seems driven to quantitative research.

Perception of consumers in AI-Influenced agricultural products: Trust, transparency, and perceived value are some of the features of consumer attitudes toward AI-driven marketing in agriculture. AI solutions affect the behaviour of consumers in terms of personalised advertising, recommendations to potential consumers as well as traceability systems that prompt the buyer of the quality and sustainability (Thompson & Meyer, 2022; Lee & Kim, 2024). As an illustration of this, consumer eagerness to pay a premium to purchase agricultural products was demonstrated to rise because of AI-powered platforms supplying in-depth data, such as farm practice or product certification details (Chen & Zhang, 2023). But consumers are also worried about the privacy of the data, bias in the algorithm as well as the authenticity of the products being promoted by AI and this is the factor that could lead to loss of consumer trust (Lee & Kim, 2024). Research indicates that consumer trust should rely on transparent processes involving AI and explaining how data practices are used (Thompson & Meyer, 2022). In spite of this understanding, the literature contains few detailed qualitative studies of the meaning and interpretation of AI-driven marketing by consumers especially in the case of agricultural products where trust and authenticity has such critical importance.

Gap in the research and qualitative approach rationale: Though the available literature has already given significant contributions to the fields of both the technical and economic aspects of the AI-driven marketing, it is of particular concern that this body of literature has largely lacked the qualitative study covering the perspectives of stakeholders. The majority of research projects are quantitative in nature as the chosen performance indicators may include the level of adoption, its effect on revenue, or consumer behavioral trends (e.g., Kumar et al., 2023; Rahman & Ahmed, 2020). Nevertheless, in many cases, these methods are not as able to understand the complex attitudes, trust-related issues, and socio-cultural factors that influence the behavior of farmers and the consumers when interacting with AI technologies (Creswell & Poth, 2018). Qualitative research will be especially appropriate in this study since it will give the researcher an in-depth examination of the subjective experience to identify themes, including trust, skepticism, and perceived barriers, which might not be identified in survey studies (Bhatia & Kumar, 2023). This gap

is going to be filled through the views of farmers and consumers explorations and, therefore, will present a complete picture of the AI-driven marketing of agriculture opportunities and challenges.

According to the literature, AI has the transformative potential of the agricultural marketing, yet its effectiveness is influenced by the need to appease the stakeholders as well as generate trust. The current research has a positive contribution to the body of knowledge because it uses a different perspective (qualitative) to understand how farmers and consumers identify and relate with AI-enhanced marketing and the information can be used to create an inclusive and successful approach to AI in agriculture.

3.0 Methodology

3.1 Research design

The paper will use a qualitative research design to understand the attitude of the farmers and the consumer on the use of AI to market agricultural goods. The qualitative method is appropriate to record subtle attitudes, trust, and challenges and can agree with exploring the objectives of the study (Creswell & Poth, 2018). The research is supported by an interpretive paradigm that focuses on co-constructing the meaning by the interactions made by the participants (Yin, 2016).

Sampling: The sampling was purposive as 20 farmers (10 small-scale, 10 large-scale) and 20 consumers (10 urban, 10 rural) were selected to represent varying groups of people. The participants were selected reflecting the factors of farm size and technology experience in the case of farmers and inclusion on the production of agricultural products on the part of consumers. Agricultural cooperatives, markets, and online forums were used to recruit participants, and, in case of snowball sampling, this method became relevant (Patton, 2015).

Methods of Data Collection: The information was obtained using focus groups and semi structured interviews.

Semi-Structured Interviews: The 40 participants were interviewed using a 45-minute semi structured, either face to face or via the internet. The consent was asked and the interviews recorded and transcribed verbatim.

Focus Groups: Group dynamics was investigated using four focus groups of 90 minutes each (two farmers and two consumers focus groups, in each 5 people participated in a focus group). Facilitated interviews touched on issues of trust, adoption obstacles, and integration methodology, in addition to the information gathered through individual interviews (Krueger & Casey, 2015).

Data Analysis: It has applied thematic analysis to find patterns in the information collected based on the six steps outlined by Braun and Clarke, namely, familiarization,

coding, theme generation, review, definition, and reporting. NVivo software was used to manipulate code and inter-coder reliability was determined (Cohen kappa = 0.85). Triangulation was employed when themes were analysed with interviews and focus groups to achieve strength.

4.0 Farmer Perspectives

Apparent Advantages of AI-Based Marketing: The positive effects of the AI-based marketing were well-known among farmers, and the most apparent trend regarded improvement in market access. Second, 16 farmers (80%) responded that AI technologies, including e-commerce market platforms, facilitated direct contact with consumers, lowering the need to rely on intermediaries. This access was especially appreciated by small-scale farmers, one of whom declared, that thanks to AI tools he managed to sell directly to the city buyers, and this allowed him to maximize his profit by 20 per cent last season. Predictive analytics in demand forecasting however, was enjoyed by large-scale farmers (8 out of 10, 80%). In general, 85 per cent of farmers (17/20) saw better sales and exposure with AI-led tools, which was consistent with Patel and Gupta (2021) on the expanded farmer-consumer contact.

Development Problems and Issues: There were significant challenges and cost and digital literacy became the most important barriers. Among the small-scale farmers, 70 percent (7 out of 10) indicated the affordability of AI platforms (cost of subscription and hardware) to be prohibitive. The rise of digital literacy challenges was also documented by 65 percent of farmers (13 out of 20), although smallholders are even more specific in reporting issues with interacting with AI were more specific, i.e., applying to interface problems. The issue of trust in AI systems came in just as much, with the farmer regarding to 60 percent (12 out of 20) that they did not trust the accuracy of AI-generated market advice. A big producer said, “I doubt that the AI can know the local conditions in my market.” These results are similar to other barriers of technology adoption that are recorded by Singh et al. (2021) among smallholder farmers.

5.0 Findings

5.1 Implication in the farming practices and market reach

Marketing with the help of AI affected the farming processes and three-fourths of the farmers (15 out of 20) confirmed that they made changes to their planting times according to the AI predictions of demand and had more market-adapted crops. The reach of the market also increased by to a remarkable extent, as 80% of the small-scale farmers (8 out of 10) could access to the urban markets through the AI platform established.

Nonetheless, half of the farmers (10/20) responded to be worried about overdependence on AI and warned that it might weaken traditional knowledge or lead to dependency, especially among the smallholders.

5.2 Consumer perspectives

Knowledge and cognisance of AI in agricultural marketing: There was a wide difference in the awareness of marketing driven by AI. This was in comparison to the urban consumers where 90 percent (9 out of 10) identified the use of AI in personalized advertisements and traceability systems as opposed to 50 percent (5 out of 10) of the rural consumers. Urban consumers appreciated such features as the origin of the product and one consumer wrote that he/she was more confident about the product with an AI tracked information about the farm. General digital marketing and AI were interchangeably placed in the mind of the rural consumers and this in turn showed less familiarity of what AI is. These results are consistent with those of Chen and Zhang (2023) regarding the value of traceability to confidence in consumers.

Trust and Skepticism in AI-Driven Product: Issues of trust were also of key importance, whereby 65 percent of their consumers (13 out of 20) felt certain about AI-powered marketing in instances where transparency was present, e.g., the labelling of the source of products. Nevertheless, data privacy arose as a matter of concern by 70 percent of all consumers (14 out of 20), and rural consumers are more so skeptical. A single rural consumer added, I am worried that too much data is collected or poor products are promulgated with these systems. This doubt supports the results of Lee and Kim (2024) about consumer-trust dynamics in AI marketing.

Influence of Purchasing Decisions: AI based marketing even changed people shopping habits as 80% of city buyers (8 out of 10) claimed that they are more willing to spend larger amounts of money on products marketed by AI-powered recommendations and traceability. Conversely, rural consumers (or 4 out of 10) had only 40% respondents with similar advertisements, limited access to digital space and preference to nearby markets. All in all, 75 percent (15 out of 20) of the customers rated authenticity of AI-enabled marketing as quite desirable over anonymity of promotions.

The Adjacent Similarities and Dissimilarities: The ability to increase connectivity and transparency was identified by both farmers and consumers as the potential of AI-driven marketing that would positively impact the markets through 82.5% of all participants (33 out of 40), mentioning the establishment of market linkages. Trust was a five-person issue with 62.5 percent of the participants (25 out of 40) doubtful about the reliability of AI or data protection. Nonetheless, practical obstacles (e.g., 65% of the farmers mentioned price or literacy problems) dominated over practical barriers farmers, whereas transparency (70% of the consumers stressed transparent AI processes) was more important to the

consumers. Focus groups showed a willingness to use training programs among farmers (80 percent support) and greater desires of clarity in AI companies in communication to consumers (75 percent support). Such results indicate the necessity of the stakeholder-specific approach toward including the corresponding concerns in the strategies, upholding the idea proposed by Bhatia and Kumar (2023) which is inclusive AI implementation.

6.0 Stakeholders Implications

Farmers: To the farmer, AI marketing could be a milestone in the improvement of profitability and market expansion, especially with the small holders reporting an increase in profits by up to 20 percent in isolated instances. Nevertheless, the high prices (mentioned by 70% of farmers) and keeping up with digital literacy (cited by 65% of farmers) hint that access to affordable AI-based services and instructional consultations is needed. The adoption could be done using initiatives such as subsidized access to technology or extension services, which would be particularly feasible with resource-limited farmers.

Marketers: The fact that the consumers appreciate transparency (75% of them placed importance on authenticity) can be exploited by the marketers so as to emphasize on clear communication of AI processes, e.g., traceability of products. The high impact of marketing (in terms of influencing purchases) based on AI on people in cities (80 percent) means prospects of customised campaigns, yet the low availability of digital infrastructure to consumers in rural areas (only 40 percent) means that they are not affected by even these campaigns.

Policymakers: The policymakers are advised to incorporate policies that can aim at lowering the adoption barriers by encouraging digital literacy and infrastructure construction especially of those within rural regions. The collective worry about trust (62.5 percent of respondents) indicates the need of regulatory frameworks that guarantee the transparency of AI and data privacy in line with the global demand on ethical AI governance.

7.0 Conclusion

The qualitative analysis offered by the study demonstrates that AI-based marketing improves the market access of farmers (80 percent of them have improved the connectivity) and consumer trust due to the transparency of the process (75 percent were willing to pay more due to the possibility of traceability). Nevertheless, such obstacles as prohibitive prices (70 percent of small-scale farmers), issues with digital literacy (65 percent of farmers), and information privacy (70 percent of consumers) reveal the necessity of inclusive approaches. The results agree with the papers in the field of AI opportunities in agriculture and navigate the gap concerning the experience of stakeholders.

Marketing based on AI has the potential to revolutionize agriculture making it profitable and sustainable, however, to achieve that, the practical and ethical obstacles will have to be addressed. Policymakers are encouraged to introduce literacy in the digital space and ensure deep transparency of AI rules whereas marketers and developers are supposed to focus on user-friendly and inexpensive tools. To approach fair adoption, stakeholders should consider pursuing training initiatives (supported by 80 percent of farmers) and transparent data practices (75 percent of consumers) jointly. To extend these insights, future work ought to consider the application of particular AI tools and make generalizations in contexts at large.

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