Study of Factors Influencing the Development of Artificial Intelligence in Agribusiness Based on Multiple Linear Regression Modeling

Jiashu Xu*

Tsinglan school，Dongguan, 523808, China

*Corresponding author's e-mail: kenneth.xu_26@tsinglan.org

Abstract. The artificial intelligence sector is an evolving industry. The agricultural sector is one of the most important and ancient industries. Given the expanding global population, the two sectors possess prospects for integration to meet the escalating demographic demands. With annual technological advancements, persons' daily lives have improved relative to past decades. Artificial intelligence has infiltrated multiple areas, including manufacturing, characterised by extensive automation, and agriculture, where it aids farmers in improving both the quality and yield of crops. This investigation focused on Mengniu and Yili as the subjects of study. The study examined the variables of CPI, currency rate, and gold price from three perspectives: the domestic market, the foreign market, and significant capital markets. The implementation of artificial intelligence in agriculture has the capacity to transform food production, management, and growing techniques, improving efficiency and quality. Nonetheless, it necessitates investment and training, and governments must evaluate its implications for employment to tackle the challenge of satisfying the increasing demand for food resulting from population expansion.

Keywords: Multiple Linear Regression Model; Artificial Intelligence; Agricultural Industry; Influencing Factors

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1 Introduction

Artificial intelligence is a contemporary advancement; a decade prior, the concept of AI predominantly manifested in popular culture as a nefarious force seeking global supremacy. In 2023, OpenAI's Chat GPT surfaced suddenly, yielding significant earnings for the company and its affiliates. Chat GPT has become an essential component of daily life for many demographics, rendering it indispensible. Artificial intelligence is utilised throughout multiple fields, from developing complex models for addressing particular scientific issues to assessing the durability of various materials under different stresses. Artificial intelligence is a tool that can be employed to improve global conditions, such as optimising land utilisation to augment agricultural production for the growing worldwide population. Artificial intelligence is presently omnipresent in multiple fields, such as economics, healthcare, and computer programming. Artificial intelligence, being a human-engineered system, have the capacity to aid us across multiple disciplines. Researchers utilise AI to replicate diverse environments and situations, enhancing research by obviating the necessity for repetitive recreations and permitting experimentation in both severe and regulated settings. Artificial intelligence can be utilised in analysis to distil a lengthy text into a few concise assertions. This would save considerable time, enhancing productivity within the same duration. In a large firm, management could analyse consumer data to determine ideal delivery locations and favoured products among diverse regional clients. The management may assign tasks to personnel across different departments, optimising time and improving the company's responsiveness to current trends by implementing adjustments promptly before substantial modifications arise. In agriculture, AI may replicate the results of cultivating a specified quantity of plants on a designated acre of land. It may also be applied to oversee robots utilised in greenhouses or agricultural fields, potentially replacing human labour in the gathering of crops or fruits. This will alleviate the strain for farm owners and potentially lower their expenses by obviating the necessity to compensate labourers for harvesting. Consequently, this will lead to reduced employment opportunities for individuals, as humans require greater wages than robots, thereby intensifying difficulties for the government due to a rising number of unemployed workers, which adversely affects the general economy.

2 Literature Review

2.1 Industry Applications of Artificial Intelligence

Currently, AI is permeating many aspects of individuals' lives, from entertainment to daily tasks, impacting everyone from students to retirees. Pritchard (2021) posited that AI in vehicles operates by identifying specific objects, such as pedestrians or other cars, and executing predetermined protocols based on these detections. Additional capabilities that could assist a human driver include emergency braking, wherein the vehicle autonomously applies the brakes upon detecting specific impediments or objects, as machines respond more swiftly than humans. Myers (2022) stated that automotive manufacturers employ AI in several aspects of vehicle production and market introduction. Artificial intelligence is employed to assess the safety of the vehicle in terms of protecting the driver and passengers in the event of a collision. It might also reduce costs for the manufacturer, as they would not need to utilize the actual car model for many crash tests. Gupta (2022) elucidated that AI recognition in Human Activity Recognition (HAR) models operates by capturing an image from a specific perspective, subsequently processing the data contained within the image. Based on the model's prior training, it outputs the processed information, indicating the actions of the person or object being tracked. Yu (2023) stated that Chat GPT is "propelling the innovative advancement of intelligent technology into a new historical phase." Nevertheless, there are significant drawbacks as well. Students have been utilizing Chat GPT not only as a learning aid but also as a means to engage in academic dishonesty and assist in composing their assignments. This presents numerous challenges for the teacher and offers no benefit to the pupil.

2.2 The Integration of Agriculture and Artificial Intelligence

Agriculture, as one of the largest global businesses, consumes substantial resources annually. AI could reduce resource utilization, enabling farmers to significantly reduce risk mitigation expenses. Javaid (2023) asserted that agriculture is among the most ancient and significant sectors globally. With each population expansion, agricultural methods must be enhanced to accommodate the growing numbers. Artificial intelligence enables farmers to optimize water and pesticide usage, conserving global resources while reducing costs and time for agricultural producers. Wakchaure (2023) noted that contemporary agriculture requires greater time,

resources, and land than agriculture utilizing artificial intelligence. AI enables farmers to receive essential information for maximizing agricultural yield within the same timeframe, including data on weather, climate, crop health, and soil conditions, at their convenience. AI could enhance the efficacy of pesticides utilized by farmers while minimizing their detrimental impact on crops. Liu (2020) estimated that the global population will exceed 9 billion by 2050. The rapid population growth, coupled with diminishing farmland and severe climate changes in recent years, has made it increasingly challenging for farms worldwide to meet the demands of the expanding population. To enhance crop yields, scientists and researchers are employing AI to evaluate land planning, planting schedules, pest and disease management, and the administration of water and fertilizers. Artificial intelligence has the potential to simplify human labor and enhance efficiency. Chowdhary (2020) asserted that the world contains a vast amount of natural language text, encompassing diverse information from many domains. Throughout a human's lifetime, only a minuscule quantity of information may be acquired; however, machines can assimilate it significantly more rapidly than humans. Utilizing various methods, information can be retrieved from textual sources across all aspects of life and the internet, thereafter delivered as a summary to humans within only seconds.

3 Research Methods in Artificial Intelligence-Related Industries

Numerous scholars engage in the analysis and investigation of the artificial intelligence sector, employing diverse research methodologies throughout the analysis process. According to Bengio (2007), the ultimate objective of machine learning is to enable AI to synthesize solutions for intricate issues and perform difficult jobs. Researchers in the field of AI algorithms must identify methods that can enhance the efficiency of machine learning, acquire intricate functions, and operate without requiring any prior knowledge or significant human involvement. Shi (2020) asserted numerous significant advancements in several segments of the economy. Primarily, artificial intelligence (AI) is employed to enhance the productivity of computers and, through machine learning, to gather data from the internet and assist individuals in the completion of tasks. Some artificial intelligence systems used in devices such as smartphones and smart cars require the capability to connect to a server located hundreds of kilometers distant in order to effectively meet the requirements of the

owner. According to Yaqoob (2019), there has been a notable surge in the proliferation of autonomous driving motor vehicles on the road in recent years. Thus, it is plausible that there will be a surge in the quantity of self-driving cars in the foreseeable future. To sufficiently accommodate the increasing number of autonomous vehicles in the future and effectively mitigate accidents, it is imperative to enhance the technology for autonomous driving. The vehicles must possess the capability to perceive and identify all the vehicles in their vicinity, therefore preventing mutual collisions. Additionally, they must maintain a specific distance from other vehicles. Furthermore, the cars must possess the capability to perceive the alteration of the traffic signals in order to prevent any congestion. To facilitate the data processing for the car, it is necessary to achieve a significant improvement in the network signals. However, the introduction of the 5th generation of network coverage has the potential to address this issue.

4 Analysis of the Current Status of the Integration of Artificial Intelligence and the Agricultural Industry

4.1 Analysis of the Current Status of AI Industry Applications

Over 30 million cars are predicted to be sold by 2023 as sales climb. New energy automobiles will number 9.5 million. Pre-pandemic, autonomous vehicles were scarce. Since 2023, Red Flag's self-driving cars and Radish Express have been joined by more intelligent driving cars. Tesla and other new energy carmakers are studying autonomous driving and other technologies. Autonomous driving lets drivers do other things. Autopilot technology may minimize road accidents since humans react slower than machines. AI will regulate all vehicles, eliminating the risk of cars not driving and lowering traffic. If connected to the same network/server, AI-driven cars can obtain real-time data. It can set a control distance so other cars can anticipate and respond to the leading car's acceleration, deceleration, or lane change. Emergency vehicles, fire engines, police cars, and other specialist vehicles arrive faster. It can speed up ambulances, fire engines, police cars, and other emergency vehicles, as well as those in a hurry.

Thus, integrating AI with other businesses is important, but so is enforcing laws, protecting ethics, and ensuring fair competition. AI-powered cars are still evolving, generating traffic. Is the owner or seller accountable for AI-driven car crashes? Hotel

robots are capable of delivering takeout, but customers may become dissatisfied if the door accidentally closes or the transit pace is excessively slow. Problems will develop if the robot's program doesn't fulfill client needs. The customer's wants may prevent problem resolution and reduce income if the robot exceeds the agreed scope of service. Robot collisions may result in a high compensation cost and a safety risk for children who must follow a predetermined course.

4.2 Analysis of AI Applications in Agriculture

The global population is projected to reach 7.8 billion in 2020 and is anticipated to climb to almost 10 billion by 2050. Consequently, crop production has seen a 17 percent growth compared to 30 years ago. However, to adequately meet the demands of the expanding population, a 70 percent increase in crop production by 2050 is necessary. AI and other algorithms are now being used by US companies to simulate the yields of various cropping methods. By folding samples, the research cycle can be significantly reduced, eliminating the need for an additional plot of land for simulation. Instead, only computer maintenance is required, and the simulation can be conducted directly on the land that would have been used otherwise, resulting in a seamless simulation outcome. Furthermore, artificial intelligence can be employed to identify crop conditions and promptly address and resolve issues in both excessively wet and excessively dry scenarios. This minimizes the effort required and facilitates the efficient and expedited inspection of all crops, therefore minimizing the need for extra resources. Artificial intelligence (AI) can also be applied in the advancement of novel pesticides to mitigate environmental risks and enhance the efficacy of crop protection against pests and other creatures.

Currently, AI technology lacks developed capabilities to address any specific environment or problem. It may produce outcomes or solutions that are only applicable to a certain situation and may have the opposite effect if applied in different contexts. Furthermore, a server can utilize a substantial quantity of energy and produce a specific level of thermal energy, therefore posing potential environmental risks. Furthermore, adverse performance of the user's network and hardware can have an impact on the outcomes. Furthermore, the majority of farmers lack the financial resources to acquire a service or construct a platform for monitoring their fields, thereby imposing several constraints on AI.

5 Influencing Factors of Artificial Intelligence Applications in the Agricultural Industry

5.1 Factors Influencing the Domestic Market

The global agricultural sector is continuously progressing, updating the technology employed by farmers periodically. Currently, Chinese enterprises have already implemented artificial intelligence (AI) to assist in the administration of livestock and crops. Landowners utilize artificial intelligence (AI) and unmanned aerial vehicles (UAVs) to irrigate and apply agrochemicals to the crops, therefore saving time and resources. Artificial intelligence (AI) is also employed for the purpose of quantifying the consumption of water, power, and chemicals in the agricultural sector, with the aim of reducing waste generation and mitigating the environmental impact in the vicinity of cultivation areas. The agricultural sector offers investors a reduced level of risk due to the stock prices of agricultural companies being determined by their size. As long as there is no new company capable of quickly capturing a significant portion of the market, the agricultural sector remains relatively stable compared to the Internet industry. In the Internet industry, new companies have the potential for rapid growth or experience technological breakthroughs that enable them to outperform all other companies. Should the global situation remain constant, the pricing of agricultural enterprises would likewise be stable.

For the global agriculture market, the number of vegetarians is growing because more people think that it is not ethical to kill animals in order to fulfill our wants. There are also reasons for the environment for the growing number of vegan meats. Cattle creates a large amount of greenhouse gas every year, and reducing the amount of need for cattle by using vegan meat would bring great help to the environment. AI is used during the process to increase the quantity and quality of the plant and also to improve the flavor of the vegan meat. Vegan meat needs to be able to fulfill the human need for real meat, giving the minerals and basic nutrients that humans need to support standard living. By using AI, more experiments could be done in a quicker and more precise way than purely by humans, because robots generally have a less chance that an error would occur. AI could also be used to test the different flavors of vegetarian food in order to fulfill the different tastes of the vegetarian. With the growing amount of vegetarianism and the need to save the planet, AI could come in part by helping humans to do it in a more efficient way.

In the agricultural capital market, investors are primarily motivated by the potential profit they might generate from their investments, and increased risk often accompanies greater profitability. In the agricultural sector, the level of risk is minimal, resulting in limited potential for significant profits. However, it is worth noting that both Yili and Mengniu have had substantial declines in their stock prices since three and a half years ago. The data for this study was gathered between January 2021 and June 2024. Over this time frame, the stock price of Yili declined from about 50 CNY to 25 CNY, resulting in a 50% loss for investors. Similarly, investors in Mengniu saw an even worse loss as the price of Mengniu's shares plummeted from 50 CNY in January 2021 to 14 CNY in June 2024. During this time frame, there is a moderate increase in the stock prices of both firms. However, the general trend is influenced by the growing number of competitors and the lack of significant product differentiation in the market, as well as the impact of the COVID issue. Considering that the customers of firms like Yili and Mengniu, who specialize in milk, are exclusively milk drinkers, the pricing of these companies would experience a substantial decline should alternative goods like oat milk become available as viable alternatives to milk.

6 Data Collection and Analysis

The entire dataset spanning from January 2021 to June 2024 was obtained from investing.com. The dataset was utilized to conduct a comparative analysis of the two primary milk suppliers in China, namely Yili and Mengniu. The dependent variable in this analysis was the price of the company's stock, while the independent variables included the cross-price index, global gold price, and the exchange rate between the Chinese yuan and US dollar.

The data collected in this paper were analyzed using SPSS software, and the results are as follows:

Table 1. The SPSS results of Yili

Influences	**Standardized Coefficients Beta**
CPI	-.048
Exchange rate	-.794
Gold price	-.111

Table 2. The SPSS results of Mengniu

Influences	**Standardized Coefficients Beta**
CPI	-.029
Exchange rate	-.740
Gold price	-.323

The standardised coefficient beta for CPI is -0.048 for Yili and -0.029 for Mengniu. The standardised coefficient beta for the exchange rate is -0.794 for Yili and -0.740 for Mengniu; the standardised coefficient beta for the gold price is 0.111 for Yili and -0.323 for Mengniu. All standardised coefficients beta are below 1, indicating that the three independent factors have a minimal impact on the dependent variable. The low standard deviation beta indicates that both companies exhibit reduced risk, which consequently suggests that investors in these companies can anticipate a modest expected return following their investments. Yili exhibits a more substantial influence than Mengniu on the CPI and the exchange rate of CNY and USD, however the standardised coefficient beta for gold price in Mengniu is about three times that of Yili.

Should the Consumer Price Index (CPI) rise, Yili's stock price would decrease owing to the inverse correlation between the CPI and Yili's stock. Likewise, an increase in the exchange rate or gold price would result in a fall in Yili's stock price, given that all coefficients linking these factors to Yili's stock price are negative. In the case of Mengniu, the scenario is similar, as all the coefficients of the three affecting factors are negative. Therefore, an escalation in these elements would lead to a decrease in the stock price.

Yili and Mengniu dominate most Chinese markets as two of the foremost milk producers in the nation. Nonetheless, those who frequent marketplaces like as Ole tend to prefer foreign-produced milk brands over Chinese labels like Mengniu or Yili. The inclination for multinational brands in China arises not from their greater quality, but from the aspiration of certain individuals to demonstrate their superiority over others. To penetrate the upper-class market in China, Mengniu and Yili should have provided a premium-priced milk to satisfy the preferences of this demography. Nevertheless, to maintain their market share, they continue to offer their milk at a price lower than that established by foreign brands.

7 Conclusion

The implementation of artificial intelligence (AI) in agriculture has the potential to transform food production, management, and cultivation practices. By employing AI technologies like predictive analysis for agricultural planning and automating farming procedures, we are simultaneously reducing resource consumption. These uses of artificial intelligence would improve land utilisation efficiency and augment crop quality and production, hence decreasing resource consumption. Nonetheless, a potential disadvantage of AI is the significant investment and training required for the successful implementation of the AI model. The government must consider the implementation of AI, as the current agricultural workforce is being replaced by AI technologies. Therefore, it is essential for these individuals to obtain employment to cover their daily needs. The increasing demand for food to support the growing population has rendered AI an essential instrument in tackling this challenge.

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