

### Retraction

# Retracted: Development Management of Infant Dairy Industry Integrating Internet of Things under the Background of Family Planning Policy Adjustment

#### Security and Communication Networks

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation. The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

#### References

 Q. Chen, H. Shi, and J. Chen, "Development Management of Infant Dairy Industry Integrating Internet of Things under the Background of Family Planning Policy Adjustment," *Security* and Communication Networks, vol. 2022, Article ID 3018374, 12 pages, 2022.



### Research Article

## Development Management of Infant Dairy Industry Integrating Internet of Things under the Background of Family Planning Policy Adjustment

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To promote the healthy and stable development of infant dairy industry, this work starts from the background of family planning policy adjustment. Based on the Internet of Things (IoT), fertility policy, and other related theories, this work analyzes the population size changes and fertility willingness of Chinese women of childbearing age between 20 and 39 years old from 1980 to 2020. Additionally, this work discusses the current development of infant dairy industry and the willingness of residents in the first, second, third, and fourth tier cities to purchase domestic or imported milk powder. Finally, the IoT technology is introduced into the farm and infant dairy processing links for analysis. The results show that the population of women of childbearing age in China is shrinking year by year, and the willingness to bear children is also declining. From 2016 to 2021, the number of women of childbearing age will decrease by an average of 2.85 million every year. Women in rural areas are more willing to give birth than those in urban areas. Compared with Vietnam and India, China has the lowest population growth rate, followed by Vietnam and India. At present, the development of domestic infant dairy products is facing many setbacks due to the reduction of the birth population, the impact of foreign brands, and the "melamine" incident. Fortunately, due to the strict supervision of the market by the government, a certain proportion of the market has been gradually achieved in recent years. However, residents of the first, second, third, and fourth tier cities are still more willing to buy foreign milk powder. Introducing the IoT technology into the development of infant dairy industry can monitor the content of relevant additives and record the production information through radio frequency identification technology, which improves the quality of dairy products to a certain extent. Therefore, the research on the management of infant dairy industry integrated with the IoT under the background of family planning policy adjustment will have a certain beneficial impact on the subsequent development of the industry.

#### 1. Introduction

Infant dairy products concern newborns' health and life safety. It also relates to economic development and social stability [1]. The Communist Party of China (CPC) Central Committee and the State Council have always put the protection of people's health and life safety first and attached great importance to Food Safety Supervision (FSS). The quality chain of dairy products involves many links, mainly including the quality control of milk sources by dairy farms, the transportation of milk sources, the control of product production process and product quality by dairy factories, and the preservation of products by sales intermediaries until the use of end customers [2]. For people to drink milk safely, relevant departments must supervise and control all links of dairy products and ensure safety and quality [3].

Kenaria and Bahramimianroodb believed that the direct risk factors affecting the final infant dairy product safety and quality were the production and supply of raw milk and processing and circulation [4]. Chapman et al. analyzed the current situation of China's dairy supply chain. They pointed out that the weakest link leading to dairy product safety and quality problems in the dairy supply chain was the production and supply of raw milk [5]. Chen et al. contended that China's food industry had its unique characteristics, so it was necessary to analyze the risks of the whole industry chain according to its particularity. They proposed that quality, market, and logistics risks were common in the chain, and the Internet of Things (IoT) technology could alleviate risk to a certain extent [6]. Cechura and Kroupova provided technical support for the green sustainable development of the dairy industry by generating electrical energy and heat from the waste discharged from the dairy production process [7]. Kocabas et al. used the Strength Weaknesses Opportunities Threats (SWOT) analysis method to sort out dairy enterprises' opportunities, threats, advantages, and disadvantages. The research helped the dairy enterprises recognize their position in the industry. Consequently, enterprises could effectively adjust resources to develop strengths and makeup weaknesses and promote sustainable development [8]. Lv introduced how to choose the financing mode and path of Mengniu Dairy Industry and related financing theories and briefly summarized and deeply studied the existing financing theories of Mengniu Dairy Industry and its related literature, especially the positive impact of IoT technology on Mengniu [9].

To sum up, this work starts with the fertility policy in recent years and studies the factors such as the population size and fertility willingness of Chinese women of childbearing age. Moreover, it analyzes the current development status of China's infant dairy industry, and finally applies the IoT technology to farms and processing links. The innovation and contribution lies in: starting with the actual data, analyzing the development status of infant dairy industry under the background of family planning policy adjustment, and applying the fashionable IoT technology to dairy farms. This not only enriches the theoretical basis of this field but also provides a methodological reference for the development of dairy industry in the future.

#### 2. Research Theories and Methods

2.1. IoT Technology. The IoT is an important part of the new generation of information technology. It connects any item with the Internet for Information Exchange (iEx) and communication through Radio Frequency Identification (RFID) technology, infrared sensor, Global Positioning System (GPS), laser scanner, and other information sensing equipment according to the agreed protocol. It realizes the intelligent identification, positioning, tracking, monitoring, and management of items [10, 11]. The IoT theoretical model is shown in Figure 1.

Figure 1 shows that the IoT model is that human beings publish their various needs on the network. According to the needs, the network will use sensors, RFID technology, infrared sensors, general wireless packet services, laser scanners, and other equipment or technologies to complete the needs of human beings, and finally present them on the IoT. In addition, the operation law of the IoT is shown in Figure 2.

Figure 2 presents that the operation law of the IoT is to use perception means to convert the attributes of "things" and carry out the circular process of processing and transmission control. The IoT collects the original data of the "things" of the entity, transforms it into information, transfers it to the terminal, and enters the operating environment. "Information" is the core of the operation process of the IoT. After processing it, effective information can be obtained. The effective information needs to follow certain standards and norms, and finally be transmitted to "people" through network transmission. Through the corresponding operation of the above effective information, people realize the centralized control and adjustment of things and put the information into the operating environment again, thus forming a loop of "people"-"things"-"operating environment"-"people" [12, 13].

The architecture of the IoT is usually divided into three layers: perception layer, network layer, and application layer [14], as in Figure 3.

As an emerging information network, IoT provides a basic platform for automatic tracking and traceability in the Supply Chain [15]. Tracking and tracing goods in the logistics Supply Chain is of great significance for realizing efficient Supply Chain Management (SCM) and commercial operation. The analysis of relevant information on goods is helpful to the effective decision-making of production control, inventory management, and sales plan [16, 17].

RFID is one of the key technologies of the IoT [18]. In the RFID system, the received signal strength is one of the outputs of the reader. The unit is dbm, and the specific calculation reads:

$$RSS = 10 \lg \left(\frac{P_r}{1mW}\right). \tag{1}$$

In (1),  $P_r$  represents the received signal strength of the antenna. According to the frith function, (2) shows the relationship between the received signal and the transmitted signal:

$$P_r = P_t T G_r^2 G_t^2 \left(\frac{\lambda}{4 \pi d}\right)^4.$$
 (2)

In (2),  $P_t$  represents the strength of the transmitted signal and d is the distance between the antenna and the tag. Because of the physical characteristics of the antenna and tag, the circuit produces a loss to the signal, and  $G_r$  becomes  $G_t$ . T is the loss of signal during transmission. In actual operation, because the reflection process of the RFID link leads to the doubling of the distance, it can be adjusted finally, as shown in (3).

$$RSS = 10 \lg \left( \frac{P_t}{1mW} TG_r^2 G_t^2 \left( \frac{\lambda}{4 \pi d} \right) \right).$$
(3)

In (3), the letters share the same meaning as the above equations. Although the received signal strength technology can help the RFID technology to a certain extent, it still has some defects. The Doppler effect can fill these holes. Doppler shift reflects the change in the frequency domain of the

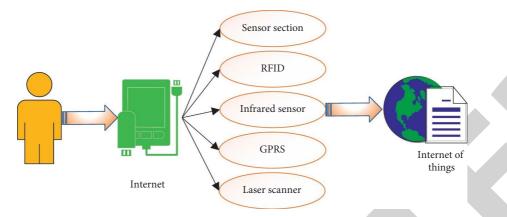
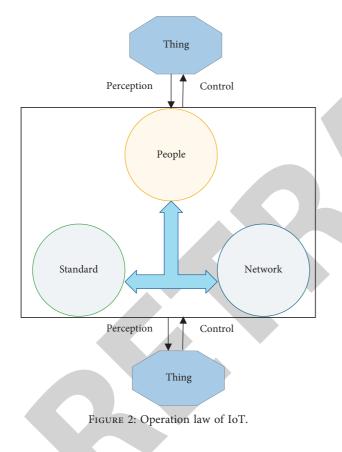


FIGURE 1: Theoretical model of IoT.



waveform from the transmitter to the receiver. Suppose the object moves from the reader antenna at a speed v and an angle  $\alpha$ . In that case, the Doppler frequency shift calculation is shown as follows:

$$\Delta f = \frac{2\nu}{\lambda} \cos\left(\alpha\right). \tag{4}$$

In Radio Frequency (RF) signals, the phase is a periodic signal with a period of  $2\pi$ . The phase calculation method is demonstrated as follows:

$$\varphi = 2\pi \left(\frac{\mathrm{d}}{\lambda}\right) \mathrm{mod}\,(2\pi). \tag{5}$$

In (5), *d* represents the distance between the sender and the receiver.  $\lambda$  indicates the wavelength of the signal at this frequency. Since the RF signal is transmitted from the antenna, its phase can be represented again by

$$\varphi = 2\pi \left(\frac{2d}{\lambda}\right) + \varphi_{t} + \varphi_{r} + \varphi_{tag}.$$
 (6)

In (6),  $\varphi_t$  represents the transmitting circuit of the reader.  $\varphi_{rag}$  indicates the phase rotation caused by the reflection characteristics of the tag. RFID technology divides each node into multiple subnodes and sends instructions "a" and "b" to Node 1 and Node 2, respectively. "a" will enter Node 1 and "b" will enter Node 2. Meanwhile, the subnodes will continue to fork according to "a" and "b." The communication cycle is reflected as follows:

$$C(E = E_a) = E - 2^n \cdot E \cdot \frac{1}{2^n} \left(1 - \frac{1}{2^n}\right)^{E-1}.$$
 (7)

In (7), C(E) represents the communication cycle.  $E_a$  is the tag.  $2^n$  indicates the number of time slots. E signifies the total number of tags.

The time complexity is calculated by (8).

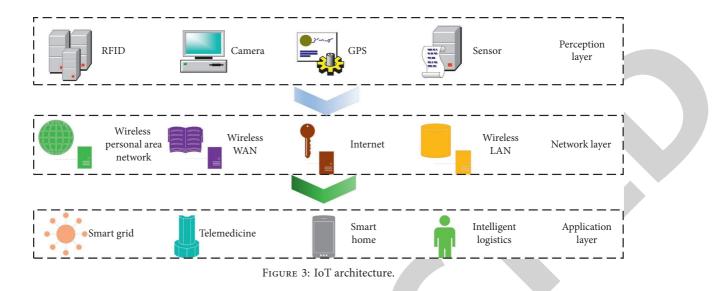
$$D(E = E_a) = \frac{E - 2^n \cdot E \cdot (1/2^n) (1 - (1/2^n))^{E-1}}{E}.$$
 (8)

In (9), D(E) represents the time complexity and the remaining letters share the same as the above equations. The throughput of the RFID system is counted by

$$T = \frac{E}{C(E)} = \frac{E}{E + (E/\ln 2) \cdot (1 - (\ln 2/E))^{E} - 1}.$$
 (9)

In (9), T represents the system throughput and the remaining letters are the same as the above equations.

This work mainly applies the IoT technology to the Supply Chain of infant dairy products. In a specific dairy Supply Chain, the dairy products, through the control of information flow, logistics, and capital flow, start from dairy farming and raw milk production, follow the subsequent processing of dairy enterprises, through distributors, retailers, and finally to consumers. The specific flow of the dairy Supply Chain is unfolded in Figure 4.



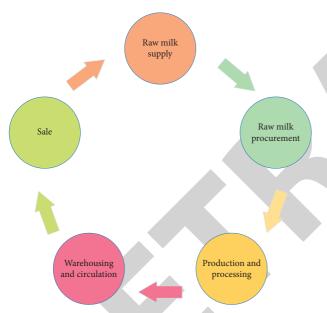


FIGURE 4: Dairy supply chain structure.

The optimal dairy product inventory level of businesses without IoT technology and IoT technology is exhibited in (10) and (11), respectively.

$$S_D = F^{-1} \left( \frac{p+g-c}{p+g-s} \right), \tag{10}$$

$$S_D = F^{-1} \left( \frac{p + g - c - t}{p + g - s} \right).$$
(11)

In (10) and (11),  $S_D$  represents the optimal inventory level, p is the commodity price, and g denotes the cost that the enterprise will lose when the commodity is out of stock. Meanwhile, c means the demand for the commodity in the market, s refers to the supply of the commodity, F stands for a cumulative function, and t explains the time required to sell the commodity. The calculation of the expected profit of the whole Supply Chain with and without RFID technology is given as follows:

$$\pi_D = (w - c)S_D = \gamma S_D, \tag{12}$$

$$\pi_D = (w + \partial t - c - t)S_D = (w - c - (1 - \partial)t)S_D, \quad (13)$$

$$\pi_D = (w - c - (1 - \partial)t)S_D - (w - c)S_D.$$
(14)

In (12)–(14),  $\pi_D$  represents the expected profit of the enterprise.  $\gamma$  refers to the profit of the enterprise unit product.  $\partial$  denotes the RFID tag. w stands for the wholesale price provided by the product manufacturer for retailers. t means the RFID tag cost, and the remaining letters share the same meaning as in other equations. Based on expected profit, the average value of enterprise commodity demand is calculated by

$$\pi_{C} = (p+g-s)\theta\mu\left(\frac{S_{C}-\theta\mu}{\sqrt{\theta}\,\sigma}\right) - (p+g-s)\sqrt{\theta}\sigma.$$
(15)

In (15),  $\pi_C$  represents the normal distribution of enterprise demand.  $\mu$  is the mean.  $\sigma$  stands for variance.  $\theta$ indicates the ratio between the efficiency of retailers replenishing empty shelves without RFID tags and the efficiency of replenishing empty shelves after adopting RFID tags. The remaining letters share the same meaning as the above equations.

In special cases, the Supply Chain is decentralized, so the calculation of the optimal inventory level of businesses with and without RFID technology is expressed as follows:

$$S_D = F^{-1} \left( \frac{p + g - w}{p + g - s} \right),$$
 (16)

$$S_D = F^{-1} \left( \frac{p + g - w - \partial t}{p + g - s} \right).$$
(17)

The letters in (16) and (17) share the same meaning as the above equations.

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Dairy products have strong freshness and perishability and have extremely high requirements on temperature, humidity conditions, storage environmental conditions, and storage and distribution conditions. The dairy Supply Chain has many links. In a certain link, the unattended quality and safety risks will spread and accumulate along the Supply Chain and then break out at some point. Therefore, applying IoT technology can mitigate losses to a certain extent. Additionally, the basic features of the dairy Supply Chain are demonstrated in Figure 5.

2.2. Fertility Policy and Fertility Rate Changes. Family planning is a basic national policy of the People's Republic of China (PRC), namely family planning according to the population policy [19-21]. It was set as the basic national policy in September 1982 and written into the Constitution in December of the same year. The main content of the plan is to promote late birth, late childbearing, and late birth control [22]. Since the basic national family planning policy was formulated, its positive role in China's population and development issues are meritable. However, it also brings the problem of population aging [23]. By the beginning of the 21st century, China's Family Planning Policy (FPP) had made some adjustments. Since the first batch of only children born in the 1980s has reached the marriageable age, the FPP has been relaxed to a certain extent in many regions, especially in economically developed regions [24, 25].

From 1999 to 2011, the Chinese government issued and implemented a strict "two child" policy. Only those who meet the requirements of the policy can apply for a second child [26]. From 2013 to 2014, local governments gradually implemented the policy of "having only two children" (couples with single child families have two children) [27]. In 2015, the "universal two-child policy" replaced the existing policy. At that time, industry practitioners were optimistic that relaxing the fertility policy would bring dividends [28]. The new policy will increase the birth rate, expand the new population base, and bring more market opportunities to the industry. However, the previous adjustment of fertility policy has not changed the basic trend of population development. The low birth rate and aging problems have become increasingly prominent [29]. According to the statistics of the China Bureau of statistics and the former National Health and Family Planning Commission, the number of births in 2016 was 17.86 million, an increase of 1.31 million over 2015 [30]. In 2017, China's birth population was 17.23 million, with more than two children accounting for 51%. Compared with 2016, the birth population in 2017 decreased by 570,000. In other words, since the complete opening of the national two-child policy in 2016, the birth population in China has not increased but has decreased. The sharp population decline is a very terrible trend [31]. The Total Fertility Rate (TFR) of China from 1970 to 2020 is plotted in Figure 6.

Apparently, China's TFR has declined in the 50 years from 1970 to 2020. After 2000, the fertility curve fluctuated little, probably caused by the proposal of a "family planning" policy and the renewal of people's fertility concept.

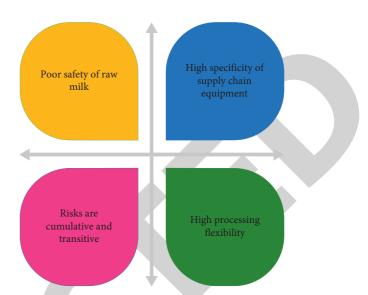
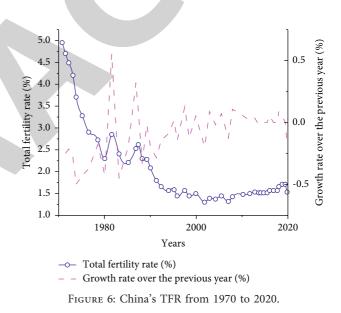


FIGURE 5: Basic characteristics of the dairy supply chain.



#### 2.3. Proposed Research Methods

- (1) Comparative analysis: to study the development of infant dairy industry, it is necessary to discuss the factors such as population growth and changes in previous years, sales of dairy products, and import volume. Therefore, comparative analysis is one of the important research methods.
- (2) Questionnaire survey method: through getting help from the mother infant platform of a city in Guangdong Province, 200 first-born mothers in various cities in the province were contacted to fill in the questionnaire, analyze the current development status of the infant dairy industry, and then propose future development suggestions.
- (3) Literature method: consult the literature in related fields and enrich the basic theory through channels

such as CNKI, forums, and libraries, thus better contributing to the subsequent research [32].

#### 3. Results and Analysis

3.1. Changes in Population Size and Fertility Intention of Women of Childbearing Age in China. The change in population size of women of childbearing age will have a certain indirect impact on the development of the infant dairy industry. The change in population size of women childbearing aged 20–39 in China from 1980 to 2020 is depicted in Figure 7.

In Figure 7, the proportion of women of childbearing age and the proportion of the population of childbearing age in China aged 20~39 have always shown a downward trend. Besides, the average number of women of childbearing age decreased by 2.85 million every year from 2016 to 2021. This undoubtedly hinders the development of the infant dairy industry.

Next, a QS is conducted on 200 women with one child about whether they are willing to have a second child. The results are described in Figure 8.

In Figure 8, with the increase in age, more and more women are unwilling to have a second child. The reasons can be summarized as follows. (1) Childbirth risk rise with age. (2) Concern over who can look at the baby is still high. (3) Family financial situation might not be supportive of a second child. Relatively speaking, women willing to have a second child are younger. The reasons behind their will-ingness can be explained as follows. (1) The change of national policy encourages childbirth. (2) They believe more children can take on more family responsibilities. Additionally, from the registered residence location of the respondents, women in rural areas are more willing to have a second child.

The natural change trend of China's population from 2000 to 2020 is presented in Figure 9.

The vertical coordinate in Figure 9 represents the population change rate of China, which is the birth rate, mortality rate, and natural population change rate, respectively. As from Figure 9, under the dual effects of reducing fertility subjects and weak fertility willingness, China's TFR and natural population rate have entered the downward channel. At the same time, the continuous decline of fertility willingness of women of childbearing age results in the continuous decline of TFR. Such as the deepening of the aging population, many factors hinder the development of the domestic infant dairy industry.

Finally, the Population Growth Rate (PGR) in China, India, and Vietnam from 1962 to 2019 is compared in Figure 10.

Figure 10 suggests that with the growth of years, the population growth rates of China, Vietnam, and India are declining. In 1963, the Chinese government encouraged people to have more and better children, so the population growth rate was the highest among the three countries. Around 1970, due to the rapid population growth in previous years, the family planning policy had to be implemented, and the population growth rate began to decline

sharply at this time. By 2019, the population growth rate was still relatively slow, and China became the country with the smallest growth rate. Newborns are "big consumers" of dairy products. The slowdown of population growth rate and the outbreak of "melamine" incident have made some women choose breast milk to feed their children.

3.2. Development Status and Trend of China's Infant Dairy Industry. According to the monitoring and data analysis of relevant markets, the changes in domestic infant milk powder sales and imports from 2014 to 2018 are charted in Figure 11.

Figure 11(a) suggests that affected by the Melamine Incident, relevant domestic departments have strengthened industry rectification and implemented normative policies. Although the market share of domestic infant dairy products is still lower than that of imported brands, the sales volume of milk powder has been growing steadily from 2014 to 2018. Figure 11(b) implies that Chinese residents' use of imported milk powder has been growing. The increase in imports is caused by various reasons, the most important of which is the health awareness of infant parents. Parents believe that the quality of the imported formula is higher than that of domestic formula. Due to the increasing import volume, China's domestic infant dairy industry has also suffered losses.

The proportion of domestic and imported milk powder brands in China from 2007 to 2020 is compared in Figure 12.

According to Figure 12, the proportion of domestic brands shows a trend of decline first and then rise, while the milk powder of imported brands has been rising. At the beginning of 2007, domestic brands accounted for 60% of the total market, and imported brands accounted for only 40%. The Melamine Incident in 2008 made imported brands quickly occupy market share, and domestic brands did not develop until recent years.

The purchase intention of Chinese consumers for imported/domestic infant milk powder in 2019 is analyzed in Figure 13.

In Figure 13, consumers in the first, second, third, and fourth tier cities are investigated about which channels to buy milk powder. Apparently, consumers from all-tier cities are more inclined to buy imported milk powder brands. Consumers in first-tier cities have the strongest purchase intention, and consumers in fourth-tier cities have the lowest purchase intention. Such uneven purchase intention was strongly related to the economic situation of families and parents' concept of childcare. Srivastava and Rogers put forward the concept of "key supply chain risk" and believed that as dairy enterprises emphasized their core competitiveness and outsource production and services to suppliers, effective procurement cost management had become a key factor for enterprises to succeed. In the whole process of dairy production, changes in product design restrict the productivity and productivity of suppliers, which may lead to quality problems, and the internal operation of suppliers has become the key risk points of the supply chain [33]. Chen et al. (2020) believed that China's dairy industry was relatively special, and the risks of the whole industry chain should be analyzed according to its particularity, pointing out

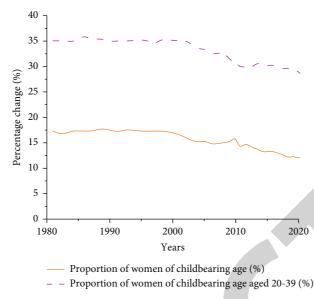


FIGURE 7: Changes in population size of women of childbearing age in China.

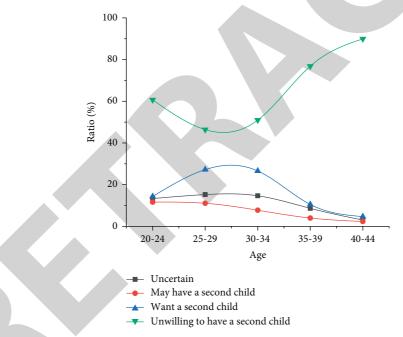


FIGURE 8: Willingness of women of childbearing age to have a second child in 2020.

that quality risks, market risks, logistics risks, and so on are common risks in the chain [34]. This provides some support for the research here. In contrast, this work first describes the current fertility situation in China, and then applies the IoT technology to dairy farms, which is comprehensive and logical.

3.3. Development of IoT Technology in the Infant Dairy Industry. The breeding of dairy cows is the source of the whole dairy Supply Chain. The application of IoT technology in dairy farms is introduced in Figure 14.

Figure 14 reveals that the IoT can closely monitor and manage all processes of dairy farming from birth, growth,

feeding, fitness, and milk production using RFID technology. The intelligent control system of the dairy farming environment is mainly composed of environmental monitoring equipment, environmental control equipment, remote wireless communication equipment, intelligent control equipment, and a cloud decision management system. Among them, the environmental monitoring equipment can perceive and monitor the environmental information of the cow production environment in real-time and send it back to the cloud platform. The cloud platform can make intelligent decisions according to the most suitable breeding environment and send the decision instructions to the

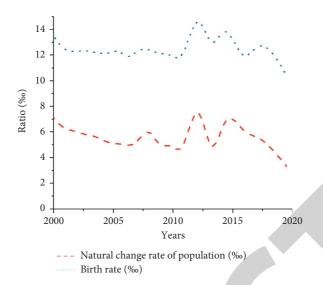


FIGURE 9: Natural change trend of China's population.

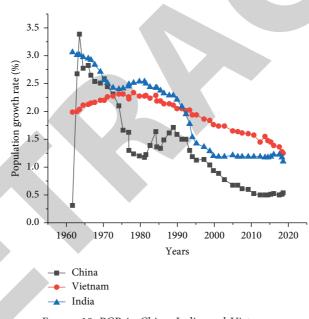


FIGURE 10: PGR in China, India, and Vietnam.

intelligent control equipment. The cow can produce milk safely in such an environment. The staff of the breeding plant can remotely monitor the environmental conditions and control the breeding farm through mobile phones anytime and anywhere. The remote control technology reduces the investment of human costs. It avoids the problem of the untimely response of manual control.

In addition, the application of IoT technology in dairy Supply Chain processing is portrayed in Figure 15. Figure 15 denotes that IoT technology in dairy processing is mainly concentrated before, during, and after processing. The RFID tag, before processing, can realize the one-to-one correspondence between the product information and the dairy product. If there are problems in the subsequent links, farmers can find the tag on the package for processing. Using IoT technology in processing can comprehensively monitor the types and measurement of chemical additives in the processing of dairy products. After processing, the RFID tag can write all the dairy product information into the chip. Consumers can

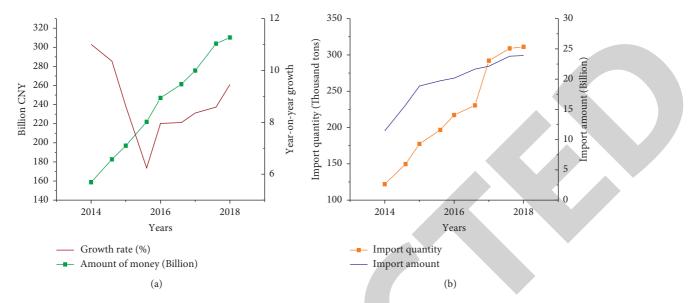


FIGURE 11: Changes in infant milk powder sales: (a) domestic milk powder sales and (b) milk powder imports.

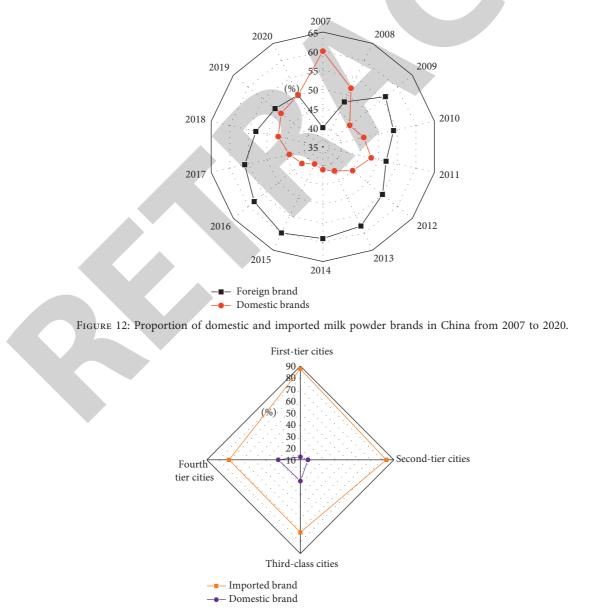


FIGURE 13: Purchase intention of Chinese consumers for imported/domestic infant milk powder in 2019.

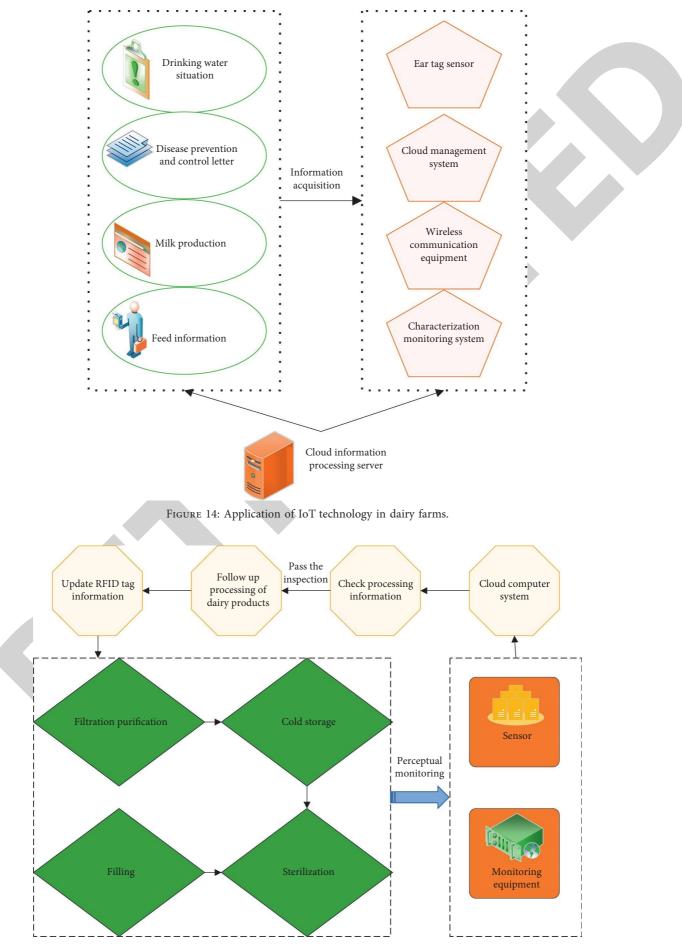


FIGURE 15: Application of IoT technology in dairy supply chain processing.

scan the code for information traceability to know all the product information.

#### 4. Conclusion

The "melamine" incident in 2008 has brought a certain impact on the development of China's infant dairy industry. Starting from the background of family planning policy adjustment, this work studies the development of China's infant dairy industry by integrating IoT technology, and mainly draws the following conclusions. (1) With the increase of years, the population size and fertility willingness of women of childbearing age are constantly declining, while in contrast, women in rural areas are more willing to have a second child. (2) Affected by the "melamine" incident, more and more residents are more willing to let their children eat foreign dairy products, especially residents of first tier cities. As the government continues to strengthen the control of the dairy industry, the domestic milk powder market has improved in recent years. (3) IoT technology can have a beneficial impact on the development of infant dairy supply chain. In the breeding farm, the IoT can use RFID technology to closely monitor and manage all the processes of dairy farming from birth, growth, feeding, physical fitness monitoring to milk production. In the processing link, RFID technology can mark and record the information of products.

Although this work studies the development of infant dairy industry integrated with the IoT under the background of family planning policy adjustment, it has not yet described the specific storage methods and sales links of dairy products in detail. In addition, the development of dairy products can also drive the development of poultry, vegetables, and fruits to a certain extent. Therefore, in the follow-up research, the analysis of this aspect should be strengthened to promote the development of infant dairy industry and the development of related industries.

### **Data Availability**

All data are fully available without restriction.

### **Conflicts of Interest**

The authors declare that they have no conflicts of interest.

#### References

- J. Gao, X. Li, G. Zhang et al., "Probiotics in the dairy industry Advances and opportunities," *Comprehensive Reviews in Food Science and Food Safety*, vol. 20, no. 4, pp. 3937–3982, 2021.
- [2] R. C. d Silva, H. L. Colleran, and S. A. Ibrahim, "Milk fat globule membrane in infant nutrition: a dairy industry perspective," *Journal of Dairy Research*, vol. 88, no. 1, pp. 105–116, 2021.
- [3] H. Nozari, A. Szmelter-Jarosz, and J. Ghahremani-Nahr, "The ideas of sustainable and green marketing based on the internet of everything—the case of the dairy industry," *Future Internet*, vol. 13, no. 10, p. 266, 2021.
- [4] Z. D. Kenaria and B. Bahramimianroodb, "Selection of factors affecting the supply chain and green suppliers by the TODIM

method in the dairy industry," Sustainable Development, vol. 56, no. 11, pp. 63-65, 2021.

- [5] D. F. Chapman, D. E. Dalley, G. R. Edwards et al., "Production, profit and nitrogen flows in irrigated dairy systems representing different industry development pathways: the Pastoral 21 experience in Canterbury," *New Zealand Journal* of Agricultural Research, vol. 64, no. 1, pp. 3–35, 2021.
- [6] Y. Chen, S. Hu, H. Mao, W. Deng, and X. Gao, "Application of the best evacuation model of deep learning in the design of public structures," *Image and Vision Computing*, vol. 102, Article ID 103975, 2020.
- [7] L. Cechura and Z. Žáková Kroupová, "Technical efficiency in the European dairy industry: can we observe systematic failures in the efficiency of input use?" *Sustainability*, vol. 13, no. 4, p. 1830, 2021.
- [8] D. S. Kocabaş, J. Lyne, and Z. Ustunol, "Hydrolytic enzymes in the dairy industry: applications, market and future perspectives," *Trends in Food Science & Technology*, vol. 89, no. 10, pp. 30–50, 2021.
- [9] Z. Lv, "Security of internet of things edge devices," Software: Practice and Experience, vol. 51, no. 12, pp. 2446–2456, 2021.
- [10] M. Majid, S. Habib, A. R. Javed et al., "Applications of wireless sensor networks and internet of things frameworks in the industry revolution 4.0: A systematic literature review," *Sensors*, vol. 22, no. 6, p. 2087, 2022.
- [11] B. B. Sinha and R. Dhanalakshmi, "Recent advancements and challenges of Internet of Things in smart agriculture: A survey," *Future Generation Computer Systems*, vol. 126, pp. 169–184, 2022.
- [12] K. O. M. Salih, T. A. Rashid, D. Radovanovic, and N. Bacanin, "A comprehensive survey on the Internet of Things with the industrial marketplace," *Sensors*, vol. 22, no. 3, p. 730, 2022.
- [13] A. Koohang, C. S. Sargent, J. H. Nord, and J. Paliszkiewicz, "Internet of Things (IoT): From awareness to continued use," *International Journal of Information Management*, vol. 62, Article ID 102442, 2022.
- [14] H. Wu, M. Dyson, and K. Nazarpour, "Internet of Things for beyond-the-laboratory prosthetics research," *Philosophical Transactions of the Royal Society A*, vol. 380, no. 2228, Article ID 20210005, 2022.
- [15] E. E. Cranmer, M. Papalexi, M. C. tom Dieck, and D. Bamford, "Internet of Things: Aspiration, implementation and contribution," *Journal of Business Research*, vol. 139, pp. 69–80, 2022.
- [16] H. Tran-Dang, N. Krommenacker, P. Charpentier, and D. S. Kim, "The Internet of Things for logistics: Perspectives, application review, and challenges," *IETE Technical Review*, vol. 39, no. 1, pp. 93–121, 2022.
- [17] D. Kumar, R. K. Singh, R. Mishra, and S. F. Wamba, "Applications of the internet of things for optimizing warehousing and logistics operations: a systematic literature review and future research directions," *Computers & Industrial Engineering*, vol. 28, Article ID 108455, 2022.
- [18] M. Z. Rafiquea, M. Haidera, A. Raheema, M. N. Ab Rahmanb, and M. S. Amjada, "Essential Elements for Radio Frequency Identification (RFID) adoption for Industry 4.0 Smart Manufacturing in Context of Technology-Organization-Environment (TOE) Framework-A Review," *Jurnal Kejuruteraan*, vol. 34, no. 1, pp. 1–10, 2022.
- [19] R. Yin, L. Yin, L. Li, J. Silva-Nash, J. Tan, and Z. Pan, "Hypertension in China: burdens, guidelines and policy responses: a state-of-the-art review," *Journal of human hypertension*, vol. 36, no. 2, pp. 126–134, 2022.

- [20] S. Fan, Y. Qian, and A Koski, "Child Marriage in Mainland China," *Studies in Family Planning*, vol. 53, no. 1, pp. 23–42, 2022.
- [21] D. Zhu, X. Shi, S. Nicholas, S. Chen, R. Ding, and L. Huang, "Medical service utilization and direct medical cost of stroke in urban China," *International Journal of Health Policy and Management*, vol. 11, no. 3, p. 277, 2022.
- [22] W. Cao, "The regulation of reproduction in new China: seven decades on," *Feminist Legal Studies*, vol. 30, no. 1, pp. 97–106, 2022.
- [23] W. Cao, Q. Yun, C. Chang, and Y. Ji, "Family support and social support associated with national essential public health services utilization among older migrants in china: a gender perspective," *International Journal of Environmental Research and Public Health*, vol. 19, no. 3, p. 1610, 2022.
- [24] S. Xie, D. Wu, and L. Liang, "Family environment profile in china and its relation to family structure and young children's social competence," *Early Education and Development*, vol. 33, no. 3, pp. 469–489, 2022.
- [25] F. Wu, "Intergenerational support and life satisfaction of older parents in China: A rural-urban divide," *Social Indicators Research*, vol. 160, no. 2, pp. 1071–1098, 2022.
- [26] D. Wang and L. Feng, "De-standardization of trajectories to adulthood in China: a cross-cohort comparison," *Emerging Adulthood*, vol. 16, Article ID 21676968221091693, 2022.
- [27] S. Zou, W. Cao, Y. Jia et al., "Sexual and reproductive health and attitudes towards sex of young adults in China," *BMJ Sexual & Reproductive Health*, vol. 48, no. e1, pp. e13–e21, 2022.
- [28] I. C. M. Yang, A. S. Ismail, and J. A. French, "Reproduction as consumption: unravelling the sociological shaping of reproductive tourism market in China," *Journal of Marketing Management*, vol. 38, no. 5, pp. 515–543, 2022.
- [29] Y. Hu, "Toward a frigid body: minimalist fashion and the sinthomosexual in China," *Fashion Theory*, vol. 22, pp. 1–25, 2022.
- [30] X. Liu, H. Chen, L. Zhang, Q. Zhang, T. Feng, and D. Liu, "Advance care planning engagement among family members of community-dwelling elderly patients with chronic diseases in China: A mixed-methods study," *Journal of Hospice & Palliative Nursing*, vol. 24, no. 2, pp. E26–E34, 2022.
- [31] S. Lateef, N. Komal, M. Ghaffar, K. Zulfiqar, S. Minhas, and H. Mumtaz, "Assessing the use of contraceptive methods for family planning among married women of rawalpindi [urban]," *Middle East Journal of Family Medicine*, vol. 59, no. 10, 2022.
- [32] A. Burova, J. Mäkelä, H. Heinonen, P. B. Palma, J. Hakulinen, and V. Opas, "Asynchronous industrial collaboration: How virtual reality and virtual tools aid the process of maintenance method development and documentation creation," *Computers in Industry*, vol. 140, Article ID 103663, 2022.
- [33] M. Srivastava and H. Rogers, "Managing global supply chain risks: effects of the industry sector," *International Journal of Logistics Research and Applications*, vol. 25, no. 7, pp. 1091– 1114, 2022.
- [34] Q. Chen, H. Shi, and L. Jiang, "Comparative Study on QMS at Pre-Production Stage in China and UK Baby Dairy Product Industries," *Open Journal of Social Sciences*, vol. 10, no. 5, pp. 470–487, 2022.