ANALYSIS OF INCOME AND INTERNET OF THINGS INTEGRATION IN BROILER CHICKEN FARMS (STUDY IN MANGKURAWANG VILLAGE, TENGGARONG DISTRICT, KUTAI KARTANEGARA REGENCY)

ABSTRACT

The Internet of Things (IoT) concept in animal husbandry can produce an effective and efficient monitoring system and can reduce chicken mortality rates and production costs to increase income and management efficiency of broiler chicken rearing. This research aims to find out how much revenue and income the IoT-based broiler chicken farming business has and analyze the R/C Ratio whether this livestock business is efficient or not to continue running. The research was carried out from November 2022 to December 2022 in one of the breeder pens in partnership with the Mutiara Sinar Abadi company in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency. This research uses a case study method and sampling is carried out using a purposive sampling method. The research results show that (1) the total income obtained by livestock businesses during the two periods was IDR 358,678,199 the average income was IDR 179,339,100/period and the total amount of income obtained was IDR 43,243,486 with an average income of IDR 21. 621,743/period; (2) the results of the calculation of livestock business efficiency analysis using the R/C Ratio obtained a value of 1.14, which means that IoT-based livestock businesses are efficient and feasible to develop and show that the income generated is higher than the related production costs, implying that the business being run is profitable; and (3) the use of the Internet of Things (IoT) in broiler chicken cages is an effort to increase production efficiency in increasing food availability. It is hoped that production will be higher thanks to IoT technology and can increase the supply of chicken meat in the local market.

Keywords: Income Optimization Using IoT in Broiler Chicken Production

INTRODUCTION

The agricultural sector is one of the leading sectors in national development. This is because the agricultural sector is the largest contributor to the national economy after the processing industry. The development of the processing industry sector of course also partly depends on and even requires support from the development of the agricultural sector because agricultural products can then be processed and generate income [1].

Livestock farming is one of five subsectors of agricultural development. Animal husbandry is the activity of keeping livestock for cultivation and making a profit from this activity. The livestock subsector itself is divided into large livestock, namely cows, buffalo, horses, and small livestock consisting of goats, sheep, and pigs as well as poultry [2]. The livestock subsector has an important role in meeting the need for animal protein in the form of meat, milk, and eggs which have high nutritional value, increasing farmers' income as well as increasing foreign exchange and expanding employment opportunities [3]. Providing food in the form of meat to the community in sufficient quantities with good quality is one of the development goals of the agricultural sector, in addition to increasing the income of livestock farmers and increasing the role of agriculture in the national economic system, especially the livestock sub-sector. To achieve this target, the role of chickens is one of the national assets that helps support the social and economic life of the community [4] (Supartini et al., 2010).

Nowadays, farms in various countries, one of which is Indonesia, are starting to apply technology that makes chicken production activities easier. This technology is the Internet of Things (IoT) which refers to a network of physical devices that are connected and integrated via the internet. IoT combines sensors, electronic devices, software, and internet connectivity to create intelligent systems that can communicate with each other.

One of the applications of IoT technology in the livestock sector can be implemented in the broiler chicken farming business because in raising poultry such as broiler chickens, IoT technology can help monitor the proper provision of feed and water and also regulate the right room temperature so that the growth of broiler chickens can grow smoothly. Well, to fulfill animal protein requirements, farmers are trying to utilize livestock commodity sources [5]. Broiler chickens are one of the biggest contributors of animal protein. When viewed from the nutritional value, broiler chickens are no less than other livestock

meat. The price of broiler chickens is relatively cheap and easy to obtain, this is because broiler chicken maintenance is quite short, namely between 35-40 days [6]. The broiler chicken farming business is a business that is growing rapidly in line with large consumer demand. So currently there are many broiler chicken farms spread throughout Indonesia, from urban areas to rural areas [7].

According to data from the Central Statistics Agency (BPS), broiler chicken meat production in 2021 in East Kalimantan reached 58,479.82 tons. The high production figures indicate that chicken farming is a business that is of interest to the majority of people because of its promising profits. However, the chicken care process also needs to be developed to improve the quality of the livestock. The development of Internet of Things (IoT) technology is now able to reach all aspects of life, with IoT all objects can communicate with each other via the internet, including in terms of animal husbandry. The IoT concept in animal husbandry can produce an effective and efficient monitoring system because it is not constrained by distance so that the owner can carry out monitoring quickly so that his work is made easier and chicken care becomes more optimal and can reduce production costs that need to be incurred [8].

Starting from this, the Merdeka Belajar Kampus Merdeka (MBKM) internship program was formed with collaboration between Mulawarman University (Lecturers and Students), Kedaireka, and PT. Habibi Digital Nusantara and the owner of a broiler chicken farming business that aims to apply Internet of Things (IoT) technology to one of the farms in Mangkurawang Village with the theme "Digitalization of Smart Chicken Coops Based on Internet of Things (IoT) in East Kalimantan". Through this program, this broiler chicken farming business has become the first IoT-based farm in Kutai Kartanegara Regency, especially in Mangkurawang Village.

The IoT system that will be implemented in the livestock business is monitoring the temperature and humidity of the cage to maintain the temperature intensity from the time of chicken breeding to harvest to reduce the high level of chicken mortality caused by the temperature of the cage and also providing water and medicine to chickens automatically. With sensors, as well as installing blowers in cages automatically and installing smart cameras which can increase the farmer's efficiency in running or monitoring his business remotely through applications used on smartphones. Implementing the IoT system can certainly increase the time efficiency of farmers and is expected to reduce chicken mortality rates and production costs so that they can achieve optimal income and quality of broiler chicken production. However, the application of IoT systems in broiler chicken farming is still not widely developed. This is because studies regarding IoT-based livestock businesses are still very limited.

2. RESEARCH METHODS

2.1. Time and Place

This research was carried out from November to December 2022. The research location was in one of the chicken coops in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency.

2.2. Method of Collecting Data

a. Field research was carried out to obtain primary data, namely by observing and interviewing the parties involved in marketing broiler chickens using questionnaires.
b. Library research is carried out to obtain secondary data, namely through reading books, articles/journals, previous theses, as well as literature studies from other related agencies.

2.3. Sampling Method

This research uses a case study method on IoT-based Smart Chicken Coop Farmers. Case studies are used as a comprehensive data collection method so that the information needed for analysis is explored in detail. The sampling method in this research was carried out using a purposive sampling method. Determining the research location and breeders was carried out purposively with the consideration that the desired information could only be obtained from certain sources.

2.4. Data Analysis Methods

2.4.1. Total Production Costs (Total Cost)

Total costs are the sum of total variable costs and total fixed costs. According to [9] the formula for the total cost was:TC = TFC + TVC

Information: TC = Total Cost/Total Cost (IDR); TFC = Total Fixed Cost/Total Fixed Cost (IDR); and TVC = Total Variable Cost/Total Variable Cost (IDR)

2.4.2. Total Revenue

Total farming is the product of the amount of production and the selling price. According to [9] the total equation for farming was:TR = P × Q

Information: TR = Total Revenue/Total Receipt (IDR); P = Price/Selling Price per Unit (IDR/kg); and Q = Quantity/Total Production (Kg)

2.4.3. Income

According to [9] total farming income is the difference between total revenue and total costs. Mathematically it was:I = TR – TC

Information: I = Income (IDR); TR = Total Revenue/Total Receipt (IDR); and TC = Total Cost/Total Production Cost (IDR)

2.4.3. Revenue Cost Ratio (R/C Ratio) Analysis

Whether a farming business is feasible or not can be measured using the R/C ratio approach. According to [10], mathematically it was :R/C Ratio = TR/TC

Information: TR = Total Revenue/Total Receipt (IDR); TC = Total Cost/Total Production Cost (IDR)

Provided that:

- R/C ratio > 1, then the business makes a profit and is worth pursuing
- R/C ratio = 1, then the business makes no profit and does not experience losses (break-even), meaning the business experiences a break-even point (BEP)
- R/C ratio < 1, then the business experiences losses and is not worth running.

3. RESULTS AND DISCUSSION

3.1. General Description of the Research Area

Mangkurawang Village is one of the sub-districts in Tenggarong District, Kutai Kartanegara Regency with a population of 7,850 people with a composition of 3,178 men and 4,032 women and has 20 Neighborhood Units. The area of Mangkurawang Village is 2,237,000 Ha with geographical conditions at an altitude of 500–2,000 MDPL with an average rainfall of 2,000 - 4,000 mm. The territorial boundaries of Mangkurawang Village are: North: Rapak Lambur Village and Loa Tebu Village; East: Mahakam River; West: Panji Village and Maluhu Village; South: New Village.

3.2. Partnership Company Profile

The Mutiara Sinar Abadi (MSA) Samarinda partnership company was founded in 2010, previously called Mitra Karya Bersinar under the auspices of PT. Berlian Sinar Abadi Banjarmasin In 2014, precisely in July, due to financial difficulties, MSA was acquired by PT. Rismawan Pratama Bersinar (PT. RPB) which is headquartered in Sukabumi, West Java. During its development, MSA was under the auspices of PT. RPB has 3 subsidiary companies in East Kalimantan, namely MSA Samarinda, MSA Balikpapan, and MSA Bontang.

3.3. Characteristics of Livestock Businesses

The characteristics of a livestock business are factors or means of carrying out broiler chicken production that need to be considered when running or developing an IoT-based broiler chicken farming business. Based on research results, the characteristics of livestock businesses in this IoT-based livestock business include partnership business systems, technical conditions, and marketing channels.

3.3.1. Partnership business system

The partnership business system implemented is a contract partnership business system, where the livestock business owner is obliged to provide cages, equipment, operations, and labor. Meanwhile, the MSA Samarinda company as a cooperation partner is obliged to provide livestock production facilities which include Day Old Chicken (DOC), feed, medicines, and vitamins. Meanwhile, the workforce carries out the production process from the beginning of DOC entry until post-harvest. This collaboration is written in a contract document agreed to by both parties. The contents of the contract document include contract prices for livestock production facilities, marketing channels, selling prices for chickens, time to

harvest or sell chickens, market bonuses, transportation costs for DOC expeditions, and ownership of a Taxpayer Identification Number (NPWP).

3.3.2. **Cage System**

The cage system applied in this livestock business is a closed house where the microclimate in the cage can be adjusted according to needs. The cage area of Mr. Zamroni's IoT-based broiler chicken farming business reaches a length and width of 8 × 40 m, with a cage height of 4 m. This livestock cage has a capacity of up to 10,000 animals/cage. Then the location of the cage chosen by the entrepreneur is quite strategic with good road conditions, making transportation easier for the distribution of feed, DOC, vitamins, and medicines as well as transporting the harvest. The electricity flow in this livestock pen has a clear and close electricity flow and the network availability is quite good, thus helping the production process and use of IoT technology run quite smoothly. The availability of water in this coop is obtained through existing drilled wells and then collected through reservoirs which are used for providing drinking water to chickens, washing chicken coops after post-harvest, and providing facilities such as labor guard houses.

3.3.3. Production process

The production process applied to this livestock business is taken from theory according to experts and the experience of livestock business owners themselves as breeders for quite a long time, which is then adjusted to the type of cage and the application of IoT (Figure 1).

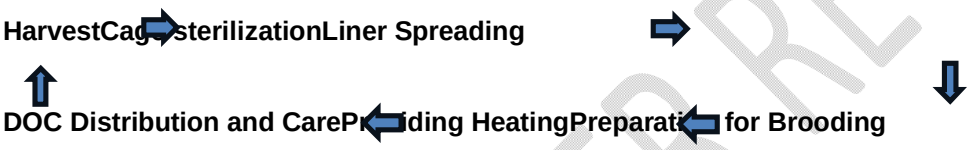

Figure 1. Stages of the Production Process

Cage sterilization is a cage-cleaning activity in the form of removing all the equipment in the cage, including dead chickens. The process of spreading litter using husks and newspapers where the use of husks in one cage reaches 90-100 sacks/cage with a thickness of 10 cm. Spreading litter into the cage was carried out 3 days before DOC was introduced and continued with fumigation treatment in the cage. Preparation for the brooding period aims to provide environmental conditions that suit DOC's needs. The preparation itself includes arrangements in the cage or layout of the cage so that the DOC does not experience stress and a heating system as well as drinking water installation and IoT equipment. Heating is carried out 2 – 3 hours before DOC is distributed into the cage. This aims to ensure that the DOC distributed into the brooding area can immediately adapt to the environmental conditions of the cage. After all stages of cage preparation have been carried out, the DOC is distributed into the cage according to the layout that has been arranged. At the treatment stage, so that they are not susceptible to DOC disease, they will be given vaccinations followed by the administration of vitamins and medicines. The workforce carries out feed management and maintenance recording. Harvesting broiler chickens is usually done when the chickens are 30 – 40 days old and weigh between 1.5 – 2.0 kg per chicken.

3.3.4. Marketing channels

Based on the research results, the cooperation agreement between the livestock business owner and the partnership company MSA (PT. RPB) Samarinda, the marketing channel for Pak Zamroni's IoT-based broiler chicken farming business is directly marketed to MSA (PT. RPB) Samarinda which is then marketed to brokers or collector (Figure 2).

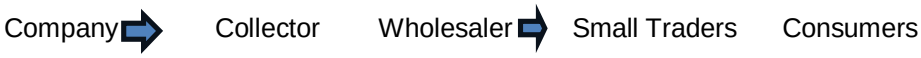

Figure 2. Marketing Channels

Based on the research results, the role of brokers is to have large capital to buy broiler chickens from companies and then supply them to collectors who will market them to the next marketing chain. Collectors are generally the term for direct intermediaries between breeders or brokers and chicken meat traders. When they have sufficient capital, collectors buy live chickens which are then marketed to chicken meat traders. Wholesalers only buy carcasses (chicken meat only) along with other parts in the form of offal. Small traders are the final marketing chain that sells chicken in the form of carcasses in small quantities directly to final consumers. In this case, the final consumers are people who buy chicken meat in the form of carcasses from small traders.

3.4. Internet of Things (IoT) Based Broiler Chicken Farming Business Income Analysis

Income analysis is a method of evaluating and analyzing finances obtained by individuals or organizations. The goal of income analysis is to understand the sources of income, the level of income earned, and how income is distributed among various categories. Income analysis in this research consists of production costs, receipts, and income.

3.4.1. Production Costs

Costs for companies are the value of production factors used to produce output, costs for producing companies are defined as the value of inputs used to produce output. Production costs in this livestock business include fixed costs and variable costs.

a. Fixed costs

Based on the research results, the fixed costs incurred from the broiler chicken farming business consist of cage rental costs and equipment depreciation costs.

Cage rental costs incurred by broiler chicken entrepreneurs in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency are IDR 4,250,000, while equipment depreciation costs are IDR 1,934,713 where cage rental costs and equipment depreciation are calculated over 3 months according to the production time in twice a period. So the total fixed costs for this IoT-based broiler chicken farming business are IDR 6,184,713. There are two categories of tools used by broiler chicken farming business owners in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency, namely conventional tools and IoT-based tools.

b. Variable costs

Variable costs include the costs of seeds, feed, husks, chemical medicines and vaccines, disinfectants, vitamins, electricity, and labor. With this, the researchers processed the variable costs of the IoT-based broiler chicken farming business separately between the variable costs for the first and second periods.

Based on the research results, the total first and second variable costs incurred by IoT-based broiler chicken breeders in Mangkurawang Village, Tenggarong District were IDR 165,355,000 in the first period and IDR 143,895,000 in the second period, with total variable costs for the two periods amounting to IDR 309,250,000 and average variable costs are IDR 154,625,000 for one period. The largest variable costs incurred by breeders in the first period and the second period were the same, namely the expenditure on Day Old Chicken (DOC) seeds.

c. Total production costs

Total production costs are a combination of total fixed costs and total variable costs incurred for production within two production periods. The total production costs for the IoT-based livestock business reached IDR 315,434,713 with the average production costs for two periods amounting to IDR 157,717,357.

3.4.2. Revenue

Revenue from the broiler chicken farming business itself refers to the amount of money or economic value received by the business owner from chicken farming activities. In the IoT-based broiler chicken farming business owned by the farmer, he earns his income through the sale of live chickens and chicken droppings.

Distribution of sales of broiler chickens in the first period took place from 9 - 20 November 2022. The total income received by farmers in the first period was IDR 167,459,685 with an average selling price of IDR 22,569/kg. The second period will take place from 4 – 15 January 2023. The total income obtained by breeders in the second period was IDR 158,358,650 with an average selling price of IDR 22,419/kg. Chicken sales are distributed in varying quantities and prices directly to brokers or collectors.

Revenue from the sale of 1,600 kg of chicken manure for the first period with a selling price of IDR 5,000/kg was IDR 8,000,000, while for the second period, 1,450 kg with the same selling price was IDR 7,250,000. The total revenue from sales of chicken manure during the two periods was IDR 15,250,000 with an average of IDR 7,625,000/period. Apart from that, revenue is also obtained through market bonuses received by farmers. In the first period, the market bonus obtained was IDR 9,112,446, and in the second period IDR 8,497,418. The total revenue for the two periods was IDR 358,678,199 with an average revenue of IDR 179,339,100/period.

It was found that the acceptance of IoT-based broiler chicken farming businesses was influenced by several factors. First, the volume of chicken sales plays an important role in determining the amount of revenue. The more chickens sold, the greater the income earned by the business. Second, the chicken mortality rate is low, the lower the chicken mortality rate, the greater the sales volume of chickens sold. Therefore, effective marketing strategies and competitive pricing can have a positive impact on business revenues. This livestock business itself has implemented a good marketing strategy by partnering with related companies, where through this partnership the marketing channels are channeled so that farmers do not need to look for their brokers or collectors to market their products.

3.4.3. Income

Income in the broiler chicken farming business is the difference between the income from the broiler chicken farming business and all production costs of the broiler chicken farming business during production. Total income is presented in Table 1

Table 1. Total Income

No	Description	Value (IDR)
1	Total Revenue (*TR)*	358.678.199
2	Total Production Cost (*TC*)	315.434.713
Total Income (*TR-TC)*		43.243.486
Average		21.621.743

Source: Primary Data (processed), 2023

Based on the table above, it is known that the total income of the IoT-based broiler chicken farming business for two periods in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency was IDR 43,243,486 with an average income of IDR 21,621,743/period. Based on this data, it shows that the total revenue is greater than the total costs incurred, which means that the revenue can cover all costs incurred in the production process of the farmer's IoT-based chicken farming business. The income has been profitable over the past two periods and is large enough to be used to cover living needs and support the farmer's household finances. According to information from farmers, before using the Internet of Things (IoT), the average income from broiler chicken farming was only IDR 18,378,481/period.

3.4.4. R/C Ratio Analysis

The calculation of the cost-income ratio is obtained by dividing the total income generated by the total costs incurred. In this study, the resulting ratio is expressed as a decimal with the statement, that a ratio greater than 1 indicates that the income generated is higher than the associated costs, implying a profitable business. A ratio equal to 1 indicates that the business does not experience profits nor does it experience losses, resulting in a Break Event Point (BEP). Then, a ratio of less than 1 indicates that costs exceed revenues, indicating potential losses. The results of the R/C ratio analysis are presented in Table 2.

Table 2. Analysis of R/C Ratio

No	Description	Value (IDR)

1	Total Revenue *(TR*)	179.339.100
2	Total Production Cost (*TC*)	157.717.357
3	Income (*I*)	21.685.141
4	***R/C Ratio* (*TR/TC)***	**1,14**

Source: Primary Data (processed), 2023

Based on Table 2 above, it can be seen that the R/C Ratio index value for this broiler chicken farming business is 1.14. The R/C Ratio index value of 1.14 is greater than 1 (R/C > 1) stating that the IoT-based broiler chicken farming business in Mangkurawang Village, Tenggarong District, Kutai Kartanegara Regency owned by Mr. Zamroni is efficient and feasible to develop and shows that the income is produced is higher than the associated production costs, thereby implying a profitable venture. Based on the R/C Ratio index value of 1.14, this livestock business can reduce the high level of chicken mortality and the total production costs that need to be incurred by farmers so that farmers can achieve total revenues that are greater than the total production costs incurred so that they reach the total quite promising income. This value also indicates that the profits the breeder will get will be higher as the business continues to run. The R/C Ratio value of 1.14 also interprets that if the production costs incurred by the breeder are Rp. 1,000,000 per unit, then the revenue obtained is IDR. 1,140,000.

Through an online monitoring and control system, farmers can monitor and control various important parameters such as temperature, humidity, and water quality in the chicken coop in realtime.

Based on the results of the interview with the owner of this IoT-based livestock business, it was found that installing IoT in his livestock business makes it easy to monitor the cage as well as the work of his workforce because from any location he can see via smart camera without having to come to the location of the cage because the farmer himself is domiciled. Samarinda. In interviews with workers, he also said that having these IoT tools helped his work in managing the cages.

With the Miara application as a connecting medium to automatically activate the blower, regulate temperature and humidity, and provide drinking water, workers do not need to regularly enter the cage within 24 hours to control these things. Through this, the application of IoT in cages reduces the involvement of humans continuing to enter the cage so that the potential for viruses entering to cause disease in chickens can be reduced. The IoT system can automatically activate the heater and blower system or trigger the provision of additional water to maintain optimal temperatures. By maintaining optimal environmental conditions, breeders can increase survival and growth rates. This has a direct impact on the health, mortality rate, and productivity of chickens, which in turn increases crop yields and farmer income.

The application of IoT also allows farmers to monitor and control drinking water, vitamins, and feed accurately. With integrated sensors and automation systems, farmers can measure the amount of feed given to chickens precisely, avoid wastage of feed and water, and increase the efficiency of using feed and drinking water. This can reduce production costs and increase revenue or profit margins.

Based on these findings, the author can conclude that the application of IoT technology in broiler chicken farming has the potential to increase efficiency and income, this is in line with previous research. By using an online monitoring and control system, farmers can monitor and control environmental conditions in the chicken coop, as well as carry out more effective maintenance management. This contributes to increasing crop yields, reducing production costs and chicken mortality rates as well as increasing business income.

3.5. Obstacles in Implementing IoT Technology in Broiler Chicken Farming Businesses

In this research, the author also analyzes the obstacles that may be faced in implementing Internet of Things (IoT) technology in broiler chicken farming businesses. The results of data analysis collected secondary and based on previous research show that there are several general obstacles faced by farmers in implementing IoT technology in broiler chicken farming businesses.

Based on the results of interviews with livestock business owners and workers, information was obtained that the specific obstacles that occur in the field are the complexity of technology and the lack of understanding of workers in implementing IoT technology. In the early stages of adopting new technology, chicken farming businesses need to understand how to connect and integrate sensors, monitoring devices, and control systems with internet networks and data management systems. This requires an understanding of network configuration parameter settings, and troubleshooting unfamiliar technical problems.

Apart from technical complexity, a lack of understanding and knowledge of new technologies is also an obstacle to adopting them. Livestock business actors do not have a background or education related to the field of information technology or computer engineering and are quite old and less productive. So, there is a need for proper education and understanding of concepts. This obstacle causes an inability to optimize the potential of the new technology being adopted. Livestock business actors need to understand the benefits and potential of using this technology in their business operations.

3.6. Impact of IoT-Based Broiler Chicken Farming Business on Society

In general, the impact of using IoT technology in broiler chicken farming has the potential to have a quite significant impact on the community around the farm. Next, we can explain some of the impacts that may be felt by the surrounding community. First, increasing food availability where with higher production efficiency thanks to IoT technology, IoT-based broiler chicken farming can increase the supply of chicken meat in the local market. This has the potential to reduce dependence on imports and help meet society's need for animal protein.

Second, creating job opportunities for operating, maintaining, and monitoring IoT systems on farms requires technical expertise. This can create new job opportunities for local people who want to work in the agricultural and technology sectors.

Third, increasing technological education where the existence of IoT-based broiler chicken farms can be a means of education for the local community. The public can understand how modern technology is used in agriculture, inspiring the younger generation to learn more about technology and innovation in the agricultural sector.

Fourth, the economic impact which refers to the success of an IoT-based broiler chicken farming business can have a positive impact on the local economy. Well-developed livestock can contribute to regional income and support local economic activity. Fifth, environmental awareness increases with the application of IoT technology in animal husbandry which can help reduce negative impacts on the environment. More efficient use of resources such as feed and water, as well as careful monitoring of waste can reduce the negative environmental impacts that may arise from traditional livestock operations.

Based on the research results, there has been no special impact on this IoT-based broiler chicken farming business. The only significant impact on the surrounding community is millennial farmers who are interested in trying to adopt IoT technology as well as students who want to research related to the application of IoT technology. There are no people in Mangkurawang Village who are involved in running their businesses by implementing IoT technology in their livestock businesses.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusion

Based on the results of research and discussions carried out regarding IoT-based broiler Chicken Farming Business Income Analysis in Mangkurawang Village, the following conclusions can be drawn:

1. The use of the Internet of Things (IoT) in broiler chicken cages is an effort to increase production efficiency in increasing food availability. It is hoped that production will be higher thanks to IoT technology and can increase the supply of chicken meat in the local market.
2. The total income obtained by the livestock business during the two periods was IDR. 358,678,199 and the average income was IDR. 179,339,100/period and the total amount of income obtained was IDR. 43,243,486 with an average income of IDR. 21,621,743/period
3. Based on the calculation results of livestock business efficiency analysis using the R/C Ratio, the R/C Ratio value obtained is 1.14 so Mr. Zamroni's IoT-based livestock business is efficient and feasible to develop and shows that the income generated is higher than related production costs, implying that the business being run is profitable.

4.2. Suggestion

Suggestions that can be given in connection with this research are:

1. This research provides a good understanding of several factors that influence the income of IoT-based broiler chicken farming businesses and can be a guide in optimizing revenue and income for a business.

2. Implementing the Internet of Things (IoT) in the broiler chicken farming business is a step that has the potential to provide significant benefits. In this digital era, IoT technology can be an innovative and effective solution in increasing efficiency and income in broiler chicken farming businesses.
3. Livestock business actors can take part in training related to the technology they want to adopt and consult with experts to get guidance and support in adopting new technology, especially Internet of Things technology.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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