

JUrnal 2.pdf

by M. I. Rias

Submission date: 04-Apr-2023 01:16PM (UTC+0800)

Submission ID: 2055378041

File name: JUrnal 2.pdf (788.6K)

Word count: 4233

Character count: 21236

Research article
Sustainable agriculture

Prospective Analysis of Laying Hen Farming System in Limapuluh Kota Regency in West Sumatra, Indonesia

Dwi Yuzaria, Nuraini, Elfi Rahmi, M. I. Rias

(Department of Social Economics, Faculty of Animal Husbandry, Universitas Andalas, Padang, 25163, Indonesia)

Abstract: This study aims to develop a policy for developing a sustainable poultry farming system through the preparation of a sustainability index drawing on the rapid appraisal approach to poultry farming. In Limapuluh Kota Regency, livestock sub-sector is developed in the form of an agropolitan area for laying hens. This area is located in three selected subdistricts: Payakumbuh, Mungka, and Guguak as the areas with the most populations of laying hens. However, there has been a decline in production in the last five years due to lack of agro-industry or agricultural products processing mechanisms. The method use is the analysis of dependence among factors drawing on prospective analysis resulted in seven key factors that influence the development of the poultry farm system. These include: (1) the price of eggs, (2) carrying feed, (3) feed industry, (4) use of farm waste, (5) nature of the work, (6) development of cooperatives, and (7) institution finance (bank/credit). Sustainability index calculation results showed the number 61.04, which indicates that the sustainability index of the laying hens farming system in the Agropolitan Area in Limapuluh Kota falls within the "fairly sustainable" category. The development of a sustainable poultry farming system can be done by applying the "moderate-optimistic" scenario.

Keywords: laying hen farming system; sustainability; agropolitan area

印度尼西亚西苏门答腊利马普鲁科塔摄政产蛋鸡养殖系统的前瞻性分析

Dwi Yuzaria, Nuraini, Elfi Rahmi, M. I. Rias

(安达拉斯大学畜牧业学院社会经济系, 巴东, 25163, 印度尼西亚)

摘要:

这项研究的目的是制订一项政策,通过编制一个可持续性指数,利用对家禽养殖的快速评价方法,发展一个可持续的家禽养殖系统。在利马普鲁*科塔摄政,畜牧业子部门以产蛋鸡的阿格罗波利坦地区的形式发展。该地区位于三个选定的分区: Payakumbuh, 蒙德卡和古瓜克,是蛋鸡数量最多的地区。然而,由于缺乏农产工业或农产品加工机制,过去五年的产量有所下降。该方法利用前

Received: June 8, 2022 / Revised: July 17, 2022 / Accepted: August 1, 2022 / Published: August 30, 2022

Out the authors: Dwi Yuzaria, Nuraini, Elfi Rahmi, M. I. Rias, Department of Social Economics, Faculty of Animal Husbandry, Universitas Andalas, Padang, Indonesia

Corresponding author: Dwi Yuzaria, Department of Social Economics, Faculty of Animal Husbandry, Universitas Andalas, Padang, Indonesia, E-mail: dyuzaria@ansci.unand.ac.id

This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)

瞻性分析法对因素间的依赖性进行分析，得出了影响禽场系统发展的七个关键因素。这些措施包括：(1) 鸡蛋的价格，(2) 携带饲料，(3) 饲料工业，(4) 农场废物的使用，(5) 工作性质，(6) 合作社的发展，以及(7) 机构融资(银行/信贷)。可持续性指数计算结果显示数字6 1.04，这表明五十个城市的阿格罗波利坦地区蛋鸡养殖系统的可持续性指数属于“相当可持续”类别。可持续家禽养殖系统的发展可以通过应用“温和乐观”的情景来完成。

关键词：蛋鸡养殖系统；可持续性；阿格罗波坦地区

1 Introduction

The Limapuluh Kota Regency area has great potential in the laying hen sub-sector. This large-potential fact, the development of farm-based agropolitan laying chicken, is the right choice as the concept of balanced rural-urban development, by adjusting the potential and characteristics of the area concerned. Therefore, the effect of depletion (backwash effect), both depletion of natural and human resources in rural can be avoided. According to Rustiadi et al.^[1], the development of the agropolitan will encourage the decentralization of development and authority in the area, villages and cities can be mutually reinforcing, and local resource-based economic development can occur through the empowerment of local communities.

The laying hens farming business in Limapuluh Kota Regency has been entrenched since the 1070s and has grown until now, although, recently, it has experienced a slight setback. The development potential of laying hens in this area is quite high. It can be seen from the five facts in the field:

- 1) The market demand for eggs is quite high. This is reflected in the number of broiler eggs that are sent out of the region every week;
- 2) The available land potential and the availability of feed sources are very favorable to the development of the livestock business;
- 3) The culture of the community and workforce in this area is sufficient to support the development of laying hens;
- 4) The suitability of agro-climatic conditions;
- 5) Local government support for the laying hens' sector is quite good.

The government of Lima Puluh Kota has implemented an agropolitan policy, beginning with the release of the Decree (SK) Regent Limapuluh Kota No. 398/BLK/2005 dated June 6, 2005, which establishes Payakumbuh, Mungka, and Guguak sub-districts as an agropolitan area based on laying hen agribusiness. At the beginning of this agropolitan policy was implemented, Limapuluh Kota District showed strong economic development.

However, recently, the development of the agropolitan area has faced several problems that threaten the sustainability of regional development. Input prices continue to increase, causing this business to experience significant disruption. This is indicated by the fact that many of these livestock businesses have gone out of business because they cannot afford production inputs such as DOC, feed, and other equipment, while egg prices stagnate. This causes a decrease in the livestock and breeder populations. Other problems include the limited availability of feed raw materials, groundwater sources, and infrastructure that does not support sustainable livestock systems^[11]. According to Saragih and Sipayun^[2], sustainable development should be applied to ensure the sustainability and benefits of laying hen farms that can harmonize economic interests and environmental sustainability.

One possible solution to overcome this problem is the concept of sustainable development in the form of structuring the agropolitan area. The concept of development that harmonizes environmental, economic, and social interests is a development concept accepted by all countries in the world. The goal is to create a sustainable condition because of the development process. This concept is similar to the concept of the development trilogy, which was implemented during the New Order government. The development trilogy requires that development is not only limited to creating economic growth but must also pay attention to aspects of equity and the creation of national stability.

According to Budiharjo and Sudjarto^[3], the notion of sustainable development is a city that, in development, can meet the needs of its present society, compete in the global economy by maintaining the harmony of its social, cultural, political, and defense vitality environment without ignoring or reducing the ability of future generations to fulfill their needs. Sustainability is most often defined as meeting the needs of the current generation without compromising on those of the next generation. It has three main pillars: economic, environmental, and social^[4].

These three pillars are informally referred to as people, planet, and profits.

The concept of sustainable development creates a balance between economic growth (economic dimension), environmental preservation (ecological dimension), equity (socio-cultural dimension). Some opinions include a technology-infrastructure dimension (development and application of technology to better infrastructure), legal-institutional (legal compliance and institutional functioning) for the implementation of sustainable development. The application of the concept of sustainable development to real systems requires a strong commitment from the main system actors (stakeholders) to ensure development. The key principle of sustainable development is the integration of environmental, social, and economic concerns into all aspects of decision making. All other principles in the Sustainable Development framework have integrated decision-making at their core^[5].

In practice, sustainable development requires the integration of economic, environmental, and social objectives across sectors, regions, and generations. Therefore, sustainable development requires the elimination of fragmentation; that is, environmental, social, and economic issues must be integrated throughout the decision-making process to move toward truly sustainable development^[6,7]. Mersyah^[4] claims that the criteria for sustainable development include five dimensions: (1) ecology, (2) economics, (3) socio-cultural, (4) legal-institutional, and (5) technology. In its development, the technological dimension is associated with the infrastructure dimension. Thus, the criteria for sustainable development in this study include five dimensions, including (1) ecology, (2) economy, (3) socio-culture, (4) legal-institutional, and (5) technology-infrastructure.

2 Materials and Methods

This prospective analysis attempts to explore future possibilities. The results of the analysis will provide information about the key factors and strategic objectives that play a role in the development of a sustainable layer livestock farming system in the agropolitan area of Limapuluh Kota Regency according to the needs of the actors in the livestock farming system. These key factors are used to describe the future possibilities for developing the agropolitan area. The determination of key factors and strategic objectives is critical and is entirely the opinion of the competent parties (experts) in the field of laying hen's agribusiness. The determination of

key factors is done by prospective analysis. The research method used is a descriptive method using multidimensional scaling (MDS). The index and sustainability status were assessed using the rapid assessment for the laying hen system, which was adopted from the Rapid Assessment Techniques for Fisheries. The analysis that needs to be carried out is to identify key factors in the future. At this stage, the important factors obtained from the leveraging factors of the MDS analysis are collected and then assessed by selected experts. The influence between factors is given a score by the selected expert as follows: score 0 has no effect; 1 has little effect; 2 moderate effects; 3 has a strong effect. The assessment of the influence between factors is arranged using a matrix based on the level of influence and dependence between factors.

3 Results

3.1 Sustainability Analysis of Agropolitan Areas Based on a Laying Hen System

Regency 50 Kota is a regency in the West Sumatra province of Indonesia that is well known as a producer of chicken eggs. The area is located at 7,035°S–7,044°S latitude and 11,3030°E–11,4042°E longitude at an altitude of 110–2,261 meters above sea level. The topography of the area is largely flat and lowland with a small hilly region. The climatic conditions in regency 50 Kota are consistent across the entire region. The temperature is approximately 24.7°C–27.9°C, with an average rainfall of 313.25 centimeters per year, meaning the area is classified as having high rainfall^[8]. The climatic and topographic conditions of the Limapuluh Kota regency are very supportive of laying hens. Soribasya^[9] claims that the low-lying areas have an altitude range of 0–250 meters above sea level, and the higher areas range from 250 to 750 meters above sea level.

The results of the analysis of the sustainability of agropolitan areas, based on using laying hens, for the three subdistricts of the Limapuluh Kota regency are presented in the kite diagram in Fig. 1. The analysis of sustainability is measured by the Rappfish index and shows a sustainability index of 61.04, which is considered "quite moderate." The sustainability index is generated based on a set of the attributes using the five dimensions of sustainability:

- The ecological dimension (seven attributes);
- The economic dimension (six attributes);
- The sociocultural dimension (three

attributes);

- The institutional legal dimension (seven attributes);
- Technology infrastructure (four attributes).

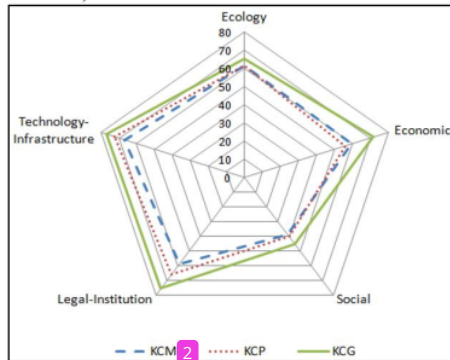


Fig. 1 Kite diagram of the sustainability index of the laying hen business in Limapuluh Kota

Fig. 1 also shows the results of the multidimensional analysis of the sustainability of laying hens in the three individual subdistricts. The results show a moderate and varied sustainability index between subdistricts. The Guguak subdistrict has the most potential for further development because it has the highest sustainability index compared with the other two subdistricts. The dimension that has the lowest sustainability index is the sociocultural dimension. This low value indicates that there are sensitive issues that hinder the development of using laying hens, such as people who are disturbed by the smell of the chicken coop and the low income of small-scale farmers, causing them to leave their businesses and choose to work in the big cities^[10]. So there is often a conflict of interest between the people involved in such projects. This situation shows that although Guguak has an overall multidimensional sustainability index of “moderate,” some dimensions have a lower sustainability index than others. This is because, to obtain moderate sustainability status using a multidimensional index, all dimensions will influence the sustainability index of a subdistrict. Therefore, it is necessary to develop and improve not only those dimensions with a low sustainability index but all dimensions, in a holistic way, so that the overall value of the multidimensional sustainability index increases.

4 Discussion

4.1 Key Factors in Prospective Analysis

The prospective analysis explores future

possibilities based on predetermined goals by determining the index and sustainability status to provide an overview of actual business conditions of laying hens. This analysis prepares future strategic actions by determining key factors. These future variations are described in the form of scenarios for developing sustainable livestock systems.

4.2 Existing Condition Analysis

Based on the results of the leverage analysis, obtained 27 sensitive attributes from five dimensions of sustainability that indicate existing conditions, including:

1. *Ecological dimension*: (a) usage of chicken manure as organic fertilizer; (b) availability of waste/biogas storage installations; (c) quantity of livestock waste remaining in the pen per day; (d) sanitation of animal pens and equipment; (e) type of feed; (f) availability of feed; and (g) conditions of groundwater use.

2. *Socio-cultural dimension*: (a) the number of working households of laying hens; (b) alternative business; and (c) the frequency of conflicts.

3. *Legal-institutional dimension*: (a) livestock farmer groups; (b) microfinance institutions (banks/credit); (c) transparency of policies/information sharing; (d) agricultural extension institutions; (e) development of livestock cooperatives; (f) intensity of business activities that violate the law; and (g) suitability of land use zoning.

4. *Technology-infrastructure dimension*: (a) availability of agribusiness infrastructure; (b) use of vitamins and probiotics; (c) distribution of animal health center locations; and (d) feed technology.

The level of importance between factors in the existing condition of the laying hen agropolitan area in Limapuluh Kota Regency is illustrated in Fig. 2.

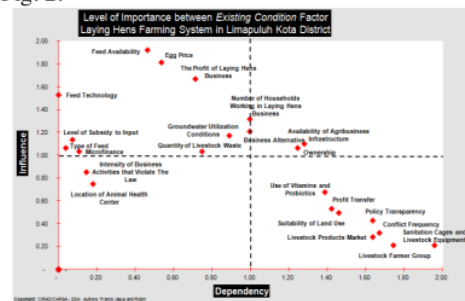


Fig. 2 The level of importance between factors in the existing conditions of the laying hen farming system in Limapuluh Kota Regency

Furthermore, sensitive attributes are assessed,

that the results of the assessment are in the form of grouping attributes in four-quadrant groups based on the level of influence and attribute dependence on the system. Based on the assessment of the 27 sensitive attributes (Fig. 1), 13 key factors that have a strong influence on the laying hens farming system were identified. These key factors have a low level of dependence but have a major impact on the system, including (1) feed availability; (2) the price of eggs; (3) profit from livestock cultivation; (4) feed technology; (5) number of households working in the livestock business; (6) the level of subsidy on inputs; (7) conditions of groundwater use; (8) alternative business; (9) type of feed; (10) microfinance institutions; (11) quantity of livestock waste; (12) availability of agribusiness infrastructure; and (13) ownership^[12].

4.3 Need Analysis

The next stage of analysis is the analysis of the needs of the main actors (breeders) or stakeholders. Based on this analysis, obtained 7 factors to create a sustainable laying hens farming system. These factors, among others:

1. Ecological dimensions: (a) feed carrying capacity; and (b) handling/utilization of livestock waste.
2. Economic dimensions: (a) egg prices; and (b) profit from laying hens cultivation.
3. Socio-cultural dimensions: (a) the number of laying hen breeders.
4. Institutional dimensions: (a) the amount of credit disbursement to laying hen farm;
5. The technology-infrastructure dimension: (a) the availability of agribusiness infrastructure.

4.4 Key Factors Based on a Combination of Existing Conditions with Need Analysis

The combination of important factors from the prospective analysis of existing conditions and need analysis resulted in 20 factors influencing the laying hens farming system (13 factors came from existing conditions and 7 factors came from need analysis). Some factors have similarities and can be combined so that the combined factors that affect the system become 16 factors which are presented in the following table:

Tab. 1 Factors influencing the livestock system resulting from the combination of the existing conditions and need analysis factors

No.	Existing Condition	Need Analysis
Ecological Dimension		
1	Availability of feed	Feed carrying capacity
2	Feed type	
3	Water usage condition	
4	Waste quantity	
5		Handling/utilization of

livestock waste		
Economics Dimension		
1	Egg price	Egg price
2	Profit	Livestock Business Profit
3	Input subsidy	
4	Ownership	
Socio-cultural dimension		
1	Number of breeders	
2	Alternative business	
3		Number of poultry farmers
Legal-institutional dimension		
1	Microfinance Institutions	
2		Number of livestock business loans
Technology and infrastructure dimension		
1	Feed technology	
2	Availability of Agribusiness Infrastructure	Availability of Agribusiness Infrastructure

Factors resulting from the combination of existing conditions and need analysis then analyzed the level of importance between factors using prospective analysis. The results of the analysis are presented in Fig. 3.

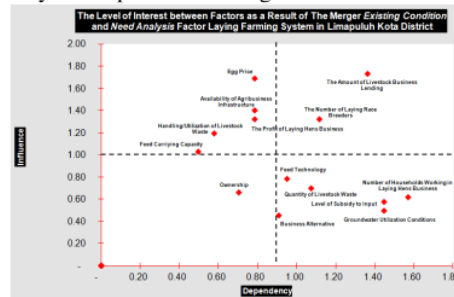


Fig. 3 Importance level between factors in combining existing conditions, with need analysis of laying hen farming systems

This figure shows that five important factors that have a high impact on system performance with a low level of interdependence between factors (eggs price, availability of agribusiness infrastructure, livestock farming profit, handling/utilization of livestock waste, and carrying capacity); and two important factors have a high influence on system performance with a high level of inter-factor dependence (amount of credit distribution for livestock business and the number of breeders). Seven important factors that influence the laying hens farming system need to be managed properly and in various states that may occur in the future to achieve the goal of creating a sustainable laying hens farming system.

The strategic objective and interests of the main actors in the laying hens farming system in Limapuluh Kota Regency is to realize a sustainable layer farming system. The laying

hens farming system is categorized as sustainable if the five dimensions of sustainability (ecology, economy, socio-culture, technology-infrastructure, and legal-institutional) can be met in a balanced position. Indicators that can be used to realize this concept include (1) usage of laying hens farm waste and improvement of feed carrying capacity (ecological dimension); (2) fixing the price of eggs, farmer incomes, and lending capital (economic dimension); (3) employment (socio-cultural dimension); (4) availability of agribusiness infrastructure (technology dimension); (5) the amount of the cattle business lending (law-institutional dimension).

5 Conclusion

Analysis of the sustainability of the system measured using the Rapfish approach shows the sustainability index quite moderately, which is 61.04. 13 key factors that have a strong influence on the laying hens farming system were identified. These key factors have a low level of dependence but have a major impact on the system. Indicators that can be used to realize this concept include (1) usage of laying hens farm waste and improvement of feed carrying capacity (ecological dimension); (2) fixing the price of eggs, farmer incomes, and lending capital (economic dimension); (3) employment (socio-cultural dimension); (4) availability of agribusiness infrastructure (technology dimension); (5) the amount of the cattle business lending (law-institutional dimension).

References

参考文献

- [1] RUSTIADI E S S P D. *Perencanaan dan Pengembangan Wilayah*. Jakarta: Yayasan Pustaka Obor Indonesia, 2009.
 - [2] SARAGIH B, SIPAYUNG T. Biological utilization in developmentalism and environmentalism. In: Proceedings of the International Seminar on Natural Resources Accounting-Environmental Economics, 29 April 2002.
 - [3] SUJARTO, BUDI HARJO. *Mewujudkan suatu Kota yang Berkelanjutan di perlukan keberadaan penyeimbang dengan penyediaan Ruang Terbuka Hijau*, 2005.
 - [4] MERSYAH R. *Desain Sistem Budidaya Sapi Potong Berkelanjutan Untuk Mendukung Pelaksanaan Otonom Daerah di Kabupaten Bengkulu Selatan*, 2005. <https://repository.ipb.ac.id/handle/123456789/41605>
 - [5] CLUNE W H, ZEHNDER A J B. The three pillars of sustainability framework: approach for law and governance. *Journal of Environmental Protection*, 2018, 9(3), 211–240.
 - [6] DERNBACH J C. Achieving sustainable development: The Centrality and multiple facets of integrated decisionmaking. *Indiana Journal of Global Legal Studies*, 2003, 10(1), 247–285.
 - [7] STODDART H. *A pocket guide to sustainable development governance*. Lund: Stakeholder Forum, 2011.
 - [8] THE CENTRAL BUREAU OF STATISTICS. *Limapuluh Kota in numbers*, 2020.
 - [9] RACHEL E. *The concept of sustainable development: definition and defining principle*, 2015. https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf
 - [10] SORIBASYA S. *Dairy cattle: type, maintenance, and engineering*, 1980.
 - [11] YULIANTO A B, AL ARIF A, LOKAPIRNASARI W P. The potency of Bifidobacterium spp. as an alternative to antibiotic growth promoters on feed conversion ratio, feed efficiency, and nutrient intake in laying hens. *Journal of Southwest Jiaotong University*, 2021, 56(2), 281–290.
 - [12] HARTISARI H. *Panduan Lokakarya Analisis Prospektif*. Fakultas Pertanian, Jurusan Teknik Industri, Institut Pertanian Bogor, 2002.
-
- [1] RUSTIADI E S S P D. 领土的规划和发展。雅加达：亚雅桑普斯塔卡一带一路印度尼西亚，2009。
 - [2] SARAGIH B, SIPAYUNG T. 开发主义和环境保护主义中的生物利用。在：自然资源会计-环境经济学国际研讨会论文集，2002年4月29日。
 - [3] SUJARTO, BUDI HARJO. 实现一个可持续的城市需要存在一个平衡提供绿色开放空间，2005

- 年。
- [4] NATHANIEL R.
可持续肉牛种植系统的设计，以支持南本库鲁地区实施区域自治，2005。 <https://repository.ipb.ac.id/handle/123456789/41605>
- [5] CLUNE W H, ZEHNDER A J B.
可持续发展框架的三大支柱：法律和治理方法。环境保护杂志, 2018, 9(3), 211-240.
- [6] DERNBACH J C. 实现可持续发展：综合决策的核心和多方面。印第安纳全球法律研究杂志，2003, 10 (1) , 247-285。
- [7] STODDART H. 可持续发展治理袖珍指南。隆德：利益相关者论坛，2011年。
- [8] 中央统计局。50个城市，2020年。
- [9] RACHEL E.
可持续发展的概念：定义和定义原则，2015。 https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf
- [10] A.S. 奶牛：类型，维护和工程，1980。
- [11] YULIANTO A B, AL ARIF A, LOKAPIRNASARI W P.
双歧杆菌spp的效力。作为抗生素生长促进剂对蛋鸡饲料转化率、饲料效率和营养摄入的替代。西南交通大学学报, 2021, 56(2), 281-290.
- [12] HARTISARI H. 前瞻性分析研讨会手册。茂物农业大学工业工程系农业学院, 2002年。

ORIGINALITY REPORT

18%

SIMILARITY INDEX

3%

INTERNET SOURCES

16%

PUBLICATIONS

0%

STUDENT PAPERS

PRIMARY SOURCES

- 1 James Hellyward, Suyitman, Arif Rachmat. "The sustainability index of dairy cattle area in Padang Panjang City", IOP Conference Series: Earth and Environmental Science, 2019 7%
Publication
- 2 D Yuzaria, Nuraini, Elfi Rahmi, M I Rias. "Multi-dimensional Analysis of Laying Hen Farming System in Agropolitan Area of Lima Puluh Kota Regency West Sumatra Indonesia", Walter de Gruyter GmbH, 2022 7%
Publication
- 3 www.nyjxxb.net 3%
Internet Source

Exclude quotes On

Exclude bibliography On

Exclude matches < 3%