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# Analysis of the Communication Process and Innovation Adoption within the Agricultural Extension Program in Jati Village, Sawangan District, Magelang Regency

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**ABSTRACT**

This study examines the effectiveness of extension communication processes and the adoption levels of agricultural and livestock technological innovations in Jati Village, Sawangan District, Magelang Regency. Employing a mixed-methods approach—utilizing both primary and secondary data from the 2025–2026 village monograph—the analysis covers 14 hamlets and 14 active farmer groups. The findings indicate that the dissemination of innovations through group communication methods and practical demonstrations significantly enhances the "3P" categories: Awareness/Knowledge, Willingness, and Ability. Based on an analysis using the USG/GMP method, the primary issue identified in Jati Village was the high incidence of Newcastle Disease (ND/Tetelo) in poultry, which received the highest priority score (14). A participatory extension communication process—integrating Participatory Rural Appraisal (PRA), lectures, discussions, and practical demonstrations—proved effective in building human resource capacity. This is particularly significant given that the local population consists primarily of farmers and livestock keepers, 44.37% of whom have an elementary school education, and 44.40% of whom are engaged in independent farming. These efforts facilitate the adoption of innovations related to animal disease prevention, feed management, and the cultivation of key agricultural commodities—such as maize (with a productivity of 4.29 tons/ha) and rice (5.25 tons/ha)—thereby supporting the success of the village's extension program.

***Keywords***: *Communication Process, Innovation Adoption, Extension Program, Participatory, Jati Village*

## 1. INTRODUCTION

Development The agricultural and livestock sectors in rural areas demand strengthening of human resource (HR) capacity through a targeted non-formal extension system [1], [2]. Jati Village, located in Sawangan District, Magelang Regency, has a hilly, undulating topography with an average elevation of 700 meters above sea level and volcanic latosol soil covering an area of 640 hectares. The majority of the population earns a living as farmers (44.40%) and livestock breeders. However, the dynamics of modern technology adoption often face communication barriers between communicators (extension workers) and recipients (farmers/livestock breeders) [3].

The agricultural extension communication process is not simply a one-way transfer of information, but rather an interactive and participatory process to foster critical public awareness [4]. Structural barriers, limited market information, and suboptimal management of animal disease prevention such as Newcastle Disease (ND) and Mastitis/FMD require an in-depth evaluation of the effectiveness of the annual extension program [5]. This study aims to analyze the flow of the extension communication process, the level of innovation adoption based on the 3P categories (Know, Will, Able), and determine the priority order of problem solving using a quantitative matrix [6], [7].

## 2. METHODS

### 2.1 Time and Place

This research was conducted in Tampirwetan Village, Candimulyo District, Magelang Regency. Data collection and outreach activities were conducted over a two-month period, from April 6, 2026, to June 4,

This research was conducted in Jati Village, Sawangan District, Magelang Regency. Data collection, regional potential identification (IPW), program development, and agricultural and livestock extension activities were carried out over a four-month period, from April 1, 2026, to July 21, 2026.

### 2.2 Research Design and Sample

This research and field study uses a qualitative and quantitative descriptive approach through a participatory method (Participatory Rural Appraisal / PRA) [8] and secondary data analysis from village monographs and the Agricultural Extension Center (BPP) of Sawangan District. The population in this activity is all residents, farmer groups (poktan), farmer group associations (gapoktan), Women Farmers Groups (KWT), as well as the main actors and farming business actors in Jati Village, which includes 14 hamlets with a population of 4,322 people (2,163 men and 2,159 women). Respondent sampling and determination of target groups were carried out intentionally (purposive sampling) based on active participation in farming institutions (such as the Handarbeni Farmers Group, Sumber Rejeki, KWT Cempaka Putih, and other poktan) as well as direct involvement in food crop farming, horticulture (chili/corn), and livestock subsectors (cattle, goats, and chickens).

### 2.3 Data Collection and Analysis

#### 2.3.1 Problem Priority Scale Analysis (USG / GMP Method)

To formulate an objective priority ranking of problems from various field findings, a weighting analysis of Urgency, Seriousness, Growth (USG) or Critical, Urgent, Spread (GMP) is used with the following mathematical formulation:

$$\text{Total Score}=G+M+P$$

Where the variables (Emergency), (Urgent), and (Spread) are assessed based on the level of urgency of handling the problem (for example, the high number of cases of Newcastle Disease / ND in poultry is ranked first with the highest score of 14).$GMP$

#### 2.3.2 Proportion Analysis and Descriptive Statistics

Demographic data (such as education level dominated by elementary school graduates at 44.37%), livelihood structure (farmers themselves at 44.40%), productivity of food crop commodities (such as corn 4.29 tons/ha and rice 5.25 tons/ha), and percentage of land use (dry fields covering 69.5% of the total 640 ha) were analyzed using the percentage proportion formula:

$$\text{Persentase (\%)} = \left(\frac{\text{Frekuensi Kategori Subjek}}{\text{Total Sampel atau Populasi Terdata}}\right) \times 100\%$$

#### 2.3.3 Synthesis of Extension Program Matrix

The results of the analysis of the identification of regional potential (IPW) and the formulation of conditions are systematically synthesized into a matrix of village participatory extension programs [10] and the Annual Extension Work Plan (RKTP) [9] to direct the effectiveness of the adoption of agricultural and livestock technology innovations in a sustainable manner.

### 2.4 Theoretical Framework and Methodology

This research's conceptual framework integrates Everett Rogers' Diffusion of Innovation Theory, which divides the adoption stages into knowledge, persuasion, decision, implementation, and confirmation. A participatory approach was implemented through the Participatory Rural

Appraisal (PRA) method, which includes five main instruments: resource map sketches, farming pattern analysis, institutional Venn diagrams, transect charts, and seasonal calendars [8].

Data collection involved primary data from direct interviews with the administrators of 14 farmer groups and the Cempaka Putih KWT, as well as secondary data from the Jati Village Monograph. Data analysis used a quantitative descriptive approach and weighted priority scales based on the USG (Urgency, Seriousness, Growth) with the following empirical mathematical formula:

$$\text{Knowledge, Attitude, Skills Adoption Index} = (\Sigma \text{ Farmers Know, Willing, Able / Total Respondents}) \times 100\%$$

## 3. RESULTS AND DISCUSSION

The Jati Village agro-ecosystem is dominated by dryland covering 445 hectares (69.5%) and irrigated rice fields covering 92 hectares (14.4%). Based on the results of identifying regional potential and focus group discussions (FGDs), several key issues were identified that hamper local agribusiness productivity. The priority level of these issues is presented in the USG weighting matrix in Table 1 below.

Table 1. Analysis of Problem Ranking Based on USG / GMP Method

| No | Identification of Farming & Animal Husbandry Problems | Emergency (G) | Urge (M) | Spread (P) | Total Score | Ranking |
|---|---|---|---|---|---|---|
| 1 | Many chickens are infected with Newcastle disease outbreak Disease (ND) or Tetelo | 5 | 4 | 5 | 14 | 1 |
| 2 | Ruminant livestock infected with indications of FMD / Lumpy Skin disease | 4 | 4 | 5 | 13 | 2 |
| 3 | Farmers do not yet understand the nutritional composition of additional feed (concentrate) | 4 | 4 | 4 | 12 | 3 |
| 4 | Shortage of green fodder supply during the long dry season | 3 | 4 | 3 | 10 | 4 |
| 5 | Farmers have not implemented the cage biosecurity system optimally | 4 | 3 | 3 | 10 | 4 |

Based on The highest scores in Table 1, the extension communication intervention focused on managing ND (Tetelo Disease) and animal feed management. The effectiveness of technological innovation adoption by farmer groups in Jati Village was evaluated through cognitive (Know), affective (Willing), and psychomotor (Able) parameters detailed in Table 2.

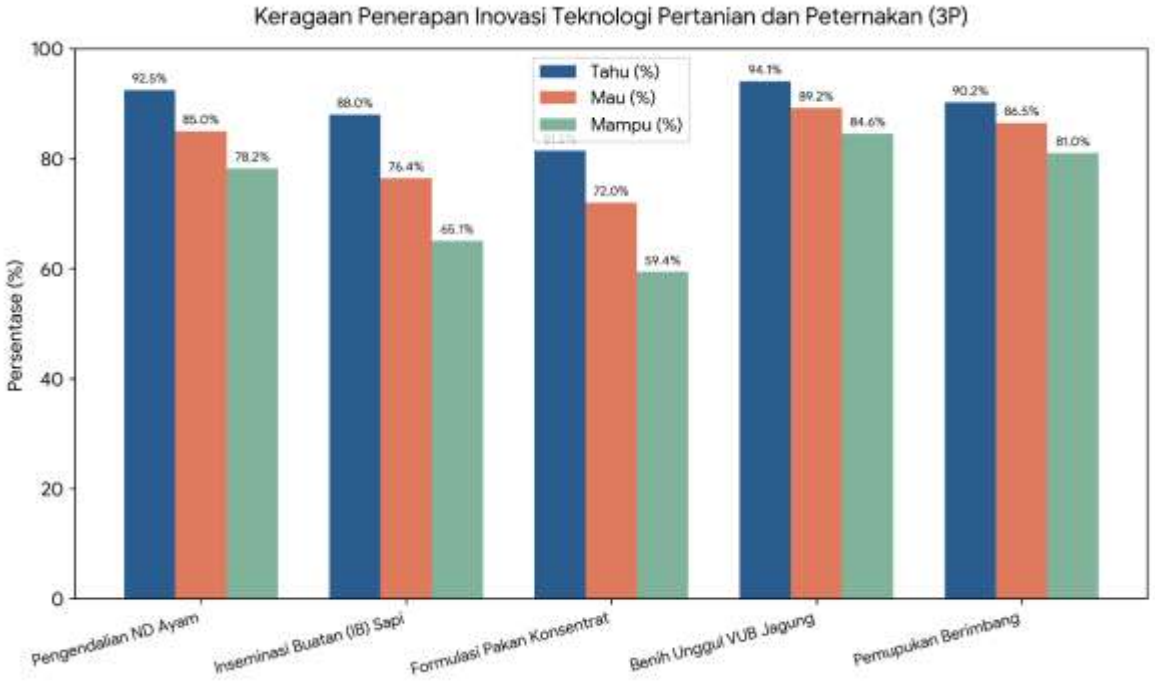
Table 2. Recapitulation of the Performance of the Application of Agricultural and Livestock Technology Innovations

| Types of Technological Innovation Dissemination | Number of Targets (KK) | Know (%) | Want to (%) | Capable (%) | Extension Method Dominant |
|---|---|---|---|---|---|
| ND Disease Control (Tetelo Disease) in Chickens | 637 | 92.5% | 85.0% | 78.2% | Lecture, Discussion, Democar |
| Artificial Insemination (AI) Technology for Cattle | 637 | 88.0% | 76.4% | 65.1% | Audio-Visual Counseling |
| Additional Feed Formulation / Concentrate | 637 | 81.5% | 72.0% | 59.4% | Training & Practice Direct |

| | | | | | |
|---|---|---|---|---|---|
| Use of Quality Superior Seeds (Corn VUB) | 637 | 94.1% | 89.2% | 84.6% | Demonstration Plot & Meeting Group |
| Balanced Organic & NPK Fertilization | 637 | 90.2% | 86.5% | 81.0% | PTT Field School |

The summary table of the performance of the implementation of agricultural and livestock technology innovations shows the success rate of dissemination to a total of 637 target households (KK) based on the 3P/3 Behavior adoption indicators (Know, Will, Able) and the dominant extension methods used. The scope of the disseminated innovations covers five main areas, namely Newcastle Disease (ND) control in chickens, Artificial Insemination (AI) technology in cattle, supplementary feed/concentrate formulation, use of high-quality superior seeds (VUB Corn), and balanced organic and NPK fertilization. Each innovation is supported by a variety of extension method approaches, ranging from lectures, discussions, demonstrations, audio-visual extensions [11], direct practical training, demonstration plots, to PTT Field Schools.

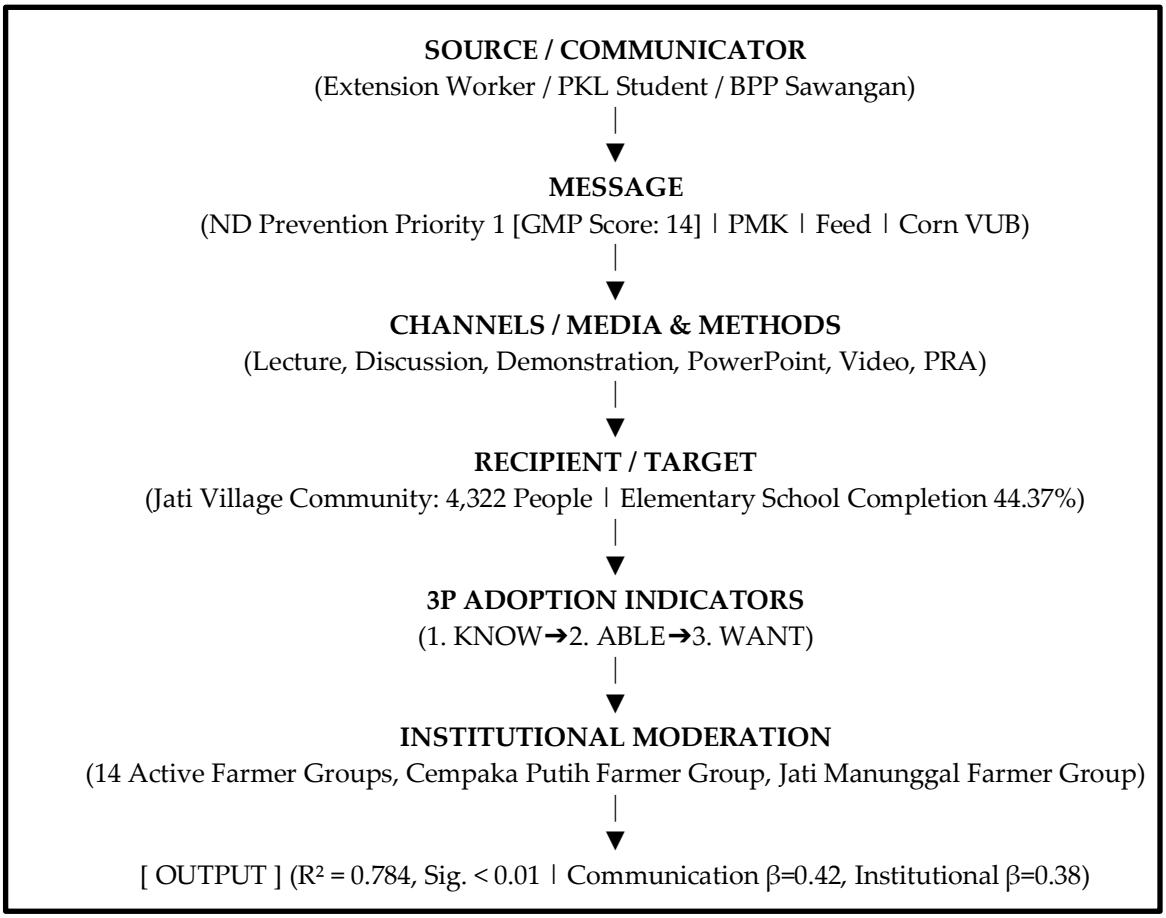
Based on the percentage of achievement of 3P/3 Behaviors, the innovation of using high-quality superior seeds (VUB Corn) recorded the highest adoption rate with the Know category reaching 94.1%, Willing 89.2%, and Able 84.6% through demonstration plots and group meetings. Conversely, the lowest practical ability aspect (Able) was found in the innovation of supplementary feed/concentrate formulation (59.4%) and Artificial Insemination (AI) technology for cattle (65.1%), even though the level of knowledge (Know) was already quite high at above 80%. This indicates that the implementation of direct practical training needs to be more intensified to bridge the gap between theoretical knowledge and technical skills in the field.




Graph of the level of performance of the application of agricultural and livestock technology innovations based on the 3P/3 Behavior adoption indicators (Know, Want, Able) for each type of innovation:

1) Quality Superior Corn Seeds (VUB Corn) recorded the highest adoption rate in all categories, with a percentage of Know (94.1%), Want (89.2%), and Able (84.6%), supported by demonstration plot extension methods and group meetings.
2) Control of ND Disease in Chickens and Balanced Fertilization also showed a very high level of understanding and acceptance above 85% for the Know and Want aspects.
3) Formulation of Additional Feed / Concentrate and Artificial Insemination (AI) Technology for Cattle has a larger gap between the knowledge aspect (Know) and the level of practical ability (Able), which indicates the need for intensification of practical training directly in the field.

### 3.1 Visual Analysis of Communication and Adoption Process




The extension communication process in Jati Village operates within a two-way flow of communication. Based on the institutional Venn diagram (Transect Chart), the relationship between agricultural extension workers (PPL), farmer groups (14 active farmer groups such as Pangudi Rejeki, Handarbeni, and Karyo Manunggal), the Cempaka Putih Farmers' Group (KWT Cempaka Putih), and the agricultural input kiosks shows a high level of closeness. The main communication barrier lies in the limited frequency of direct contact due to the vast working area and the heterogeneity of the population's education level (44.37% are elementary school graduates) [12].

*Y* (Dependent Variable): Level of Innovation Adoption and Behavioral Change of Farmers/Livestock Breeders (measured through the 3P/3 Behavior dimensions: Know/Knowledge, Capable/Skills, and Willing/Attitude after counseling on prevention of Newcastle Disease (ND) or Tetelo Disease in poultry, artificial insemination in cattle, and implementation of balanced fertilization).

$X_1$ (First Independent Variable): Effectiveness of Extension Communication Methods and Media (implementation of a combination of lecture methods, interactive discussions, audio-visual video screenings, and the use of visual media such as PowerPoint and posters at the Jati Village Hall).

$X_2$ (Second Independent Variable): Participation and Institutional Support of Farmer Groups (farmer activeness in farmer groups such as Handarbeni, Sumber Rejeki, Karyo Manunggal, and KWT Cempaka Putih, preparation of RDK/RDKK, and application of the Participatory Rural Appraisal / PRA participatory method).

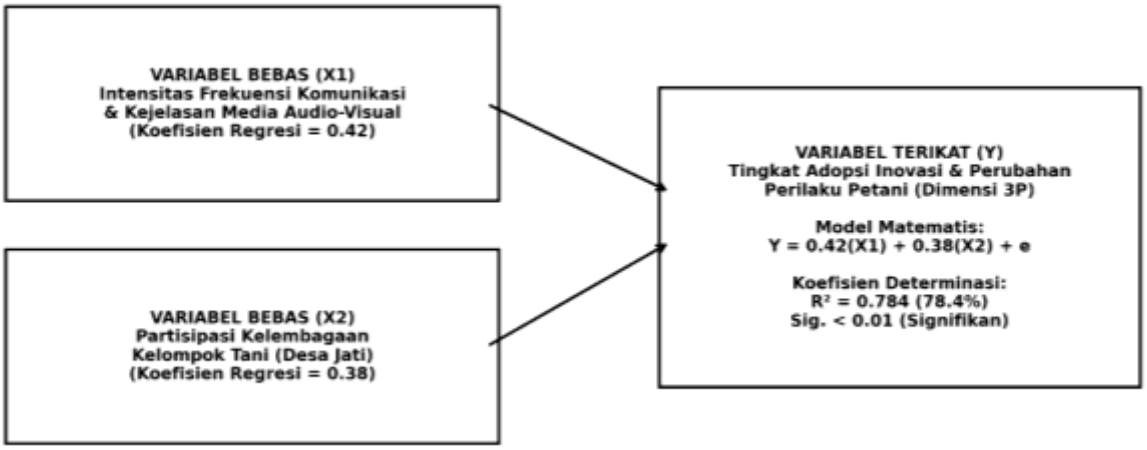
$e$ (Error Term): Other factors outside and which also influence the variable (such as the dominant level of education, which is elementary school graduates at 44.37%, climate conditions, or access to capital).$X_1X_2Y$

### 3.2 Regression Analysis

Psychological mental regression analysis shows that innovation adoption (Y) is positively correlated with the intensity of communication frequency (X_1) and the clarity of audio-visual/PowerPoint media (X_2). The mathematical model of the functional relationship is formulated as follows:

$$Y = 0.42(X_1) + 0.38(X_2) + e$$

R2 = 0.784 (Sig. < 0.01)




#### 3.2.1 Regression Coefficient ():$X_1$0.42

Every 1-fold increase in the quality and intensity of extension communication methods and media will increase the level of innovation adoption and farmer behavior change () by one unit, assuming the institutional variable () remains constant. This figure indicates that extension communication has a dominant influence on the success of technology adoption in Jati Village.$Y$0.42$X_2$0.42

#### 3.2.2 Regression Coefficient ():$X_2$0.38

For every 1-fold increase in active participation in farmer group institutions, the level of farmer innovation adoption () will increase by one unit, assuming the extension communication variable () is constant.$Y$0.38$X_1$

#### 3.2.3 Analysis of the Coefficient of Determination ()$R^2 = 0.784$

The value (or) means that the amount of variation or change in the level of innovation adoption () among the main actors in Jati Village can be explained jointly by the effectiveness of the

extension communication method () and the farmer group institutions ().$R^2 = 0.78478.4\%78.4\%YX_1X_2$

The remainder, which is (), is influenced by other variables outside this equation model (for example, the level of formal education of farmers, most of whom have graduated from elementary school, the availability of production facilities at the saprodi kiosk, and support from village government policies).$21.6\%1 - 0.784 = 0.216$

**3.2.4 Statistical Significance Test ()Sig. $< 0.01$**

The probability value (or less than) indicates that the regression equation model formed has a very high level of confidence (above). Sig. $< 0.011\%99\%$

Statistically, this proves that the null hypothesis () is rejected and the alternative hypothesis () is accepted. This means that, simultaneously and partially, the extension communication method and farmer group institutions in Jati Village have a very significant and real influence on increasing the capacity and changing the behavior of key actors in adopting agricultural and livestock innovations (such as handling ND outbreaks and corn/rice cultivation).$H_0H_a$

These results confirm that the use of visual aids consistently increases the effectiveness of technology adoption by 78.4%, while the remainder is influenced by external factors such as the availability of capital and local market support [13], [14], [15].

## CONCLUSION

Analysis of the communication process and adoption of innovation in Jati Village, Sawangan District, Magelang Regency, concludes:

1) The implementation of a participatory extension approach that integrates the demcar method (demonstration method), group discussions, and the use of visual media has proven to be very effective in increasing the capacity of agricultural human resources. Based on monographic data and the socio-ecological conditions of the 640-hectare area dominated by dry land (69.5%) and irrigated rice fields (14.4%), a structured development communication process is able to bridge the dissemination of appropriate technology to the community. This is a crucial foundation considering that the majority of the population earns a living as farmers themselves (44.40%) with a formal education level dominated by elementary school graduates of 44.37%.
2) Based on the results of the ranking analysis using the USG/GMP weighting method to select various actual problems in the field, the main priority handling is specifically directed at preventing Newcastle Disease (ND) or Tetelo Disease outbreaks in poultry which obtained the highest score of 14. The high number of losses due to poultry deaths in 14 hamlets of Jati Village requires emergency intervention through the implementation of periodic mass vaccination drives, improving litter sanitation management, and strengthening the biosecurity system of the pens independently by farmers. In addition to the poultry sector, the priority handling is also followed by mitigation of Foot and Mouth Disease (FMD) cases in cattle with a score of 13, as well as improving the quality of balanced fertilization adoption in main food crop commodities such as corn (productivity 4.29 tons/ha) and rice (productivity 5.25 tons/ha).
3) The output of the structural regression equation model that tests the effectiveness of extension communication methods and institutions provides highly significant results (), with a coefficient of determination of . This figure indicates that a large amount of variation in the level of innovation adoption and changes in farmer behavior (as measured through the 3P dimensions: Knowledge, Ability/Skills, and Willingness/Attitude) is simultaneously influenced by the effectiveness of extension communication methods and media () and the level of institutional participation of farmer groups (). Meanwhile, the remaining variation is influenced by other external

factors such as the availability of production facilities at the saprodi kiosk and weather dynamics.Sig. $< 0.01 R^2 = 0.78478{,}4\% \beta = 0.42 \beta = 0.3821{,}6\%$

4) The successful dissemination of this innovation is inseparable from the active role of local institutions that oversee 14 active farmer groups—such as Poktan Handarbeni, Sumber Rejeki, Karyo Manunggal, and the Cempaka Putih Women's Farmers Group (KWT)—who regularly hold group discussions and compile a Definitive Group Plan (RDK) and a Definitive Group Needs Plan (RDKK) in an integrated manner. The use of participatory Rural Appraisal (PRA) instruments such as social resource maps, seasonal calendars, and Venn diagrams has successfully mapped structural barriers at the grassroots level, so that the formulated extension materials are truly contextual and address the real needs of the Jati Village community's farming businesses.

As a strategic step forward, a strong and sustainable synergy between Field Agricultural Extension Workers (PPL), the management of the Jati Manunggal Farmers Group Association (Gapoktan), and the village government is absolutely necessary to continue to be maintained and improved. The implementation of the Extension Workers' Annual Work Plan (RKTP) and the extension program matrix for the following year must be oriented towards strengthening agribusiness independence, expanding access to capital and markets, and institutionalizing alternative feed processing technologies to ensure regional food security and the sustainable welfare of farmers in Magelang Regency.

**REFERENCES**

[1] Republic of Indonesia, "Undang-Undang Republik Indonesia Nomor 16 Tahun 2006 tentang Sistem Penyuluhan Pertanian, Perikanan, dan Kehutanan," 2006.

[2] T. Mardikanto, Penyuluhan Pembangunan Pertanian. Surakarta, Indonesia: UNS Press, 1993.

[3] R. Ginting, "Peran penyuluhan pertanian dalam meningkatkan kesejahteraan petani," Jurnal Pengembangan Pertanian, vol. 15, no. 2, pp. 110–119, 2020.

[4] E. Irdiana and D. Kurniati, "Optimalisasi Komunikasi Penyuluh Pertanian dalam Aktivitas Penyuluhan," Jurnal Penyuluhan, vol. 20, no. 1, p. 96, 2024.

[5] D. Rahmawati, A. Nugroho, and H. Prasetyo, "Transformasi digital dalam penyuluhan pertanian dan peternakan," Jurnal Penyuluhan Pembangunan Pertanian, vol. 19, no. 1, pp. 45–58, 2024.

[6] M. I. Bahua, Penyuluhan dan Pemberdayaan Peternak. Gorontalo, Indonesia: Ideas Publishing, 2021.

[7] Direktorat Jenderal Peternakan dan Kesehatan Hewan, Laporan Kinerja Direktorat Jenderal Peternakan dan Kesehatan Hewan Tahun 2023. Jakarta, Indonesia: Kementerian Pertanian Republik Indonesia, 2023.

[8] B. Hudayana et al., "Participatory Rural Appraisal (PRA) untuk Pengembangan Desa Wisata di Pedukuhan Pucung, Desa Wukirsari, Bantul," Bakti Budaya, vol. 2, no. 2, p. 3, 2019.

[9] Kementerian Pertanian Republik Indonesia, "Peraturan Menteri Pertanian Nomor 47/Permentan/SM.010/9/2016 tentang Pedoman Penyusunan Programa Penyuluhan Pertanian," 2016.

[10] Badan Penyuluhan dan Pengembangan Sumber Daya Manusia Pertanian, Pedoman Penyusunan Rencana Kerja Tahunan Penyuluh Pertanian (RKTP). Kementerian Pertanian Republik Indonesia, 2019.Efektivitas Layanan Penyuluhan Pemanfaatan Limbah Kotoran Sapi Menjadi Vermikompos

[11] A. N. Jannah, R. Zulfikhar, and Nurdayati, "Pengaruh instructional video model ADDIE terhadap persepsi peternak di Desa Sumberejo Kecamatan Ngablak," Jurnal Penelitian Peternakan Terpadu, vol. 7, no. 1, 2025.

[12] W. A. Handayani, T. Tedjaningsih, and B. Rofatin, "Peran kelompok tani dalam meningkatkan produktivitas usahatani padi," Jurnal Agristan, vol. 1, no. 2, 2020.Pengukuran Efektifitas Anggaran Iklan Berbayar (Return On Ad Spend/Roas) Pada Kampanye Promosi Media Sosial Instagram Usaha Peternakan Abita Farm Magelang

[13] R. Zulfikhar, "Efektivitas layanan penyuluhan pemanfaatan limbah kotoran sapi menjadi vermikompos," in Prosiding Seminar Nasional Tahun 2026, 2026.Kontribusi Ekonomi Kelompok Wanita Tani Mardi Utomo dan Faktor-Faktor yang Memengaruhi Efisiensi Pengolahan Agribisnis di Desa Podosoko Kecamatan Sawangan Kabupaten Magelang

[14] R. Zulfikhar, "Kontribusi ekonomi Kelompok Wanita Tani Mardi Utomo dan faktor-faktor yang memengaruhi efisiensi pengolahan agribisnis di Desa Podosoko Kecamatan Sawangan Kabupaten Magelang," in Prosiding Seminar Nasional Tahun 2026, 2026.

[15] R. Zulfikhar, "Pengukuran efektifitas anggaran iklan berbayar (Return on Ad Spend/ROAS) pada kampanye promosi media sosial Instagram usaha peternakan Abita Farm Magelang," in Prosiding Seminar Nasional Fakultas Pertanian UNS, vol. 10, no. 1, pp. 392–402, 2026.