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The Strategy of Role Development Agricultural Extension Agent in Siotapina, Buton

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A B S T R A C T

This study aims to formulate priority strategies for developing the role of agricultural extension agents in Siotapina District, Buton Regency—an area facing significant challenges such as limited personnel, difficult geographical conditions, and weak inter-agency coordination. The research employed a SWOT analysis supported by Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices to identify internal and external factors and the Quantitative Strategic Planning Matrix (QSPM) to determine strategic priorities. The analysis results position agricultural extension services in the "Grow and Build" cell of the IE Matrix, indicating highly favorable conditions for development. The top strategies identified include enhancing extension agent capacity through structured training in collaboration with universities and NGOs, strengthening farmer groups promoting agrotourism through annual extension programs, and aligning structured extension tasks with national food marketing systems such as BULOG. The findings suggest that improving human resource quality, integrating digital tools, and enhancing inter-agency collaboration are critical to optimizing the role of extension agents in remote areas like Siotapina.

Keywords: sgricultural extension, development strategy, SWOT analysis, QSPM, Siotapina

1. Introduction

Agriculture constitutes a vital sector that underpins the livelihoods of over 29% of Indonesia's workforce and contributes approximately 13% to the national GDP (BPS, 2023). A significant portion of the Indonesian population depends on this sector as their primary source of income. Consequently, agriculture holds a crucial role in supporting the national economy. The sector itself is comprised of several sub-sectors, including food crops, plantations, horticulture, livestock, and fisheries. Given this diversity and importance, there is a critical need for agricultural extension services (AES) that effectively support farmers in managing their agricultural activities.

Agricultural extension services play a central role in facilitating the adoption of new technologies and mitigating risks associated with agricultural production (Xu et al., 2023). These services provide farmers with access to essential knowledge and training on modern agricultural practices, such as improved seed varieties, efficient irrigation methods, pest and disease control, and alternative cultivation techniques. By improving farmers' access to such information, AES enhances their capacity for informed decision-making and sustainable agricultural development. Furthermore, continuous technical assistance and capacity-building initiatives delivered through extension programs enable farmers to better manage production risks (Loevinsohn et al., 2013; Gebeyehu, 2016).

Despite the strategic importance of extension services, their effectiveness is often hindered by several systemic challenges. One of the major barriers is the limited digital literacy and technological capacity among extension workers. According to Ahuja (2011), access to agricultural information via the internet can significantly improve the speed and quality of extension delivery.

In addition to knowledge related constraints, a critical issue facing extension services is the severe shortage of personnel. For example, in Siotapina District, Buton Regency, only four extension officers are tasked with supporting 69 farmer groups that are spread across geographically challenging and remote areas. This disproportionate ratio between extension workers and their responsibilities compromises the quality, consistency, and contextual relevance of the services provided. Consequently, extension officers are often overburdened, limiting their ability to offer personalized support, conduct regular field visits, or follow up on farmer progress. Moreover, the geographic dispersion of settlements in Siotapina, combined with inadequate transportation infrastructure, presents substantial logistical barriers. These conditions significantly hinder outreach efforts, making conventional face to face extension methods increasingly impractical and resource-intensive. The compounded effect of these challenges is the marginalization of a significant portion of the farming population, particularly those in remote areas, who remain isolated from knowledge networks and technological innovations essential for improving agricultural productivity and sustainability. Without timely intervention and strategic adaptation, this situation risks entrenching inequalities in access to agricultural support services. Over time, it may widen productivity gaps between farmers in accessible versus inaccessible regions, further exacerbating rural poverty and undermining broader development goals. These conditions highlight the urgent need for context sensitive, scalable, and technology enabled extension models that can overcome physical barriers and extend the reach of limited human resources. In light of these

constraints, there is an urgent need to develop and implement context sensitive extension strategies that address both the scarcity of personnel and the geographical challenges of rural regions. This study aims to formulate priority strategies for developing the role of agricultural extension agents in Siotapina, Buton Regency.

2. Literature Review

Agricultural extension is an educational process that facilitates the dissemination and transfer of agricultural knowledge and technologies among farmers and producers, with the aim of encouraging the adoption of contemporary farming techniques (Altalb et al., 2015). According to Mardikanto (2009), the role of agricultural extension agents goes beyond merely providing information or influencing farmers' decision-making processes; they must also serve as intermediaries between the government or the extension institutions they represent and the target beneficiaries.

Extension agents are expected to fulfill multiple roles, including that of information disseminator, active listener, motivator, facilitator, liaison agent, capacity builder, skills trainer, work assistant, program manager, group worker, boundary spanner, promoter, local leader, consultant, protector, and institutional developer (Lionberger & Gwin, 1982). These agents play a crucial role in facilitating the adoption of agricultural technologies among farmers to mitigate production risks and improve overall crop yields (Xu et al., 2023). They provide access to updated information on improved seed varieties, irrigation systems, pest and disease management, and agricultural credit schemes (Gebeyehu, 2016; Loevinsohn et al., 2013).

The challenges faced by extension agents have intensified with the global shift towards environmentally friendly agriculture. Their role is particularly vital in aligning national agricultural policies with global sustainability goals (Abdu-Raheem & Worth, 2016; Kirchherr et al., 2023). Nevertheless, gaps often exist in the implementation of extension strategies, which necessitate targeted educational interventions and policy adjustments. Therefore, aligning agricultural policies with extension training programs is essential to enhance farmers' participation in adopting sustainable, ecology-based farming systems (Fatemi et al., 2025).

Agricultural extension agents play a pivotal role in enhancing farmers' capacities through knowledge and technology transfer. However, the effectiveness of this role is frequently challenged by internal and external constraints. Thus, strategic development of the extension function is required. This includes improving human resource quality through training, enhancing extension services and collaboration with relevant institutions, promoting competitive agricultural product marketing by optimizing the function of farmer groups, strengthening agricultural development supported by regulatory frameworks, and leveraging technology to support extension programs (Narso et al., 2015).

Several studies have utilized SWOT analysis to formulate strategies for developing the competencies of agricultural extension agents (Martina et al., 2022). The implementation strategies derived from this analysis reflect the strengths and opportunities that institutions can harness to address existing threats and weaknesses. Key steps include legislative implementation, optimizing the use of information and communication technologies, maximizing the function of agricultural extension centers at the sub-district level, and enhancing the competence and professionalism of administrative personnel in line with their duties and responsibilities (Sabir et al., 2019). SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is an effective tool for analyzing strategies to develop the role of agricultural extension agents in Indonesia due to its ability to identify both internal and external factors that influence extension performance. By examining internal strengths and weaknesses alongside external opportunities and threats, the resulting strategies can be more targeted and responsive to local conditions (Hendriawan et al, 2022).

3. Methods

The research was conducted from March to May 2025 in Siotapina District, Buton Regency. Siotapina was selected purposively because it is one of the sub-districts with the heaviest burden on extension workers. Siotapina consists of 11 villages served by only three agricultural extension agents, meaning each agent must cover 3 to 4 villages.This condition is far from the ideal standard proposed by the Indonesian government, which is one extension agent per village (Kementan, 2014). The topography of the land in the Siotapina District area generally has a mountainous, undulating, and hilly surface. Between the mountains and hills, stretches of land are potential areas for developing the agricultural sector.

This study used both primary and secondary data:

a. Primary data were obtained through in-depth interviews with key informants, including agricultural extension agents, farmer group leaders, and local agricultural officers. A semi-structured questionnaire was used to guide the interviews, ensuring flexibility while maintaining focus on relevant issues related to extension agents' roles and challenges.

b. Secondary data were collected from relevant government institutions, such as the Buton Regency Agriculture Office, and through literature reviews of previous studies, extension program documentation, and statistical reports.

Solid strategic planning can be achieved by combining and paying attention to opportunities and threats from the environment, both now and in future predictions, with various strengths and weaknesses. One analysis that can be used to formulate a business development strategy is SWOT analysis. SWOT Analysis is a strategic planning method used to evaluate factors that constitute strengths, weaknesses, opportunities, and threats that may occur in achieving the objectives of business or institutional project activities or institutions on a broader scale. For this purpose, it is necessary to study the environmental aspects that originate from internal and external environments that influence institutional or agency strategy patterns in achieving goals

(Khasandra & Karneli, 2017). Analyzing strengths and weaknesses is carried out using the SWOT method, a practical qualitative analysis of selecting strategies, easy, static, and subjectivr when selecting characters in the system.

Data analysis was conducted by compiling the IFE and EFE matrices. The IFE matrix presents various internal environmental factors, and the EFE matrix presents various external environmental factors that need to be considered in efforts to develop the role of agricultural extension workers in Siotapina, Buton Regency. After the IFE and EFE matrices are compiled, alternative strategies are combined using the IE matrix. The IE (Internal-External) matrix positions the various divisions of an organization in a nine-cell display (David, 2007). The IE matrix is based on two key dimensions: the total IFE weight score on the X-axis and the total EFE weight score on the Y-axis. On the X axis of the IE Matrix, a total IFE weight score of 1.0 to 1.99 indicates a weak internal position, a score of 2.0 to 2.99 is moderate, and a score of 3.0 to 4.0 is high. The IE matrix is divided into three parts, namely: (1) cells I, II, or IV are described as growing and building, and (2) cells III, V, and VII can be handled well through a strategy of maintaining and maintaining (hold and maintain). (3) cells VI, VIII, and IX are harvested or divested.

The SWOT Matrix is used to describe alternative strategies derived from a comprehensive study of internal and external environmental factors. This matrix is used to formulate alternative strategies that produce 4 possible strategies (Dyson, 2003), namely: (1) S-O strategy, (2) W-O strategy, (3) S-T strategy, and (4) W-T strategy.

Internal / External	STRENGTH (S) Strength factors	WEAKNESS (W) Weakness factors
OPPORTUNITIES (O) Opprtunities factors	Strategy (S-O) using strength by taking advantage of opportunities	Stategy (W-O) minimize weaknesses by taking advantage of opportunities
THREATS (T) Threats factors	Stategy (S-T) using force to overcome threats	Strategy (W-T) minimize weaknesses and avoid threats

Illustration 1 . SWOT Matrix

The Quantitative Strategic Planning Matrix (QSPM) is used to determine the strategy's priority. The QSPM Matrix (David, 2007) results from a strategic decision after assessing the attractiveness score (AS) of each strategic factor, both internal and external. The weighting score multiplied by the level of attractiveness obtains the Total Attractiveness Score (TAS).

4. Results

Internal Analysis Matrix

Internal factors include identified strengths and weaknesses arranged in an IFE (Internal Factor Evaluation) matrix. Table 1 presents the internal results of the strategy for developing the role of agricultural extension workers in Siotapina, Buton Regency. The results of the internal analysis show that the total internal score weight is 3,38. The matrix indicates a strong internal position, significantly above the average benchmark of 2.50. This suggests that the extension system has more strengths than weaknesses. One of the most influential internal strengths is the presence of a structured and clear extension program developed annually, which demonstrates systematic planning and programmatic consistency. This means that, internally, the condition of agricultural extension agents in Siotapina has more dominant strengths than weaknesses; in other words, extension workers have better potential in efforts to improve their role in extension activities.

Table 1. Internal analysis of the role of extension agent

No	Internal Factors	Ratings	Wight	Score Weight
1	Each agricultural extension agent has a fostered village	3,50	0.08	0,28
2	The existence of Law UU No 16 / 2006 concerning the main tasks of extension agents	3,50	0,07	0,24
3	Have a clear extension program every year	4,00	0,11	0,44
4	Extension agents have appropriate educational backgrounds	3,00	0,10	0,30
5	Extension agents have clear main tasks and functions	2,75	0,10	0,27
6	Extension agents have knowledge, abilities and skills	3,00	0,07	0,21

7	Limited number of extension agents (3 for 11 villages)	4,00	0,12	0,48
8	Lack of transportation and operational support	3,75	0,09	0,34
9	Lack of funds	3,50	0,12	0,42
10	Lack of training for extension agents	3,00	0,07	0,21
11	Lack of coordination with related units	2,75	0,07	0,19
Total Weight			**1,00**	
Total Internal				**3,38**

External Analysis Matrix

External factors include opportunities and threats identified and arranged in an EFE (External Factor Evaluation) matrix. The results of the external analysis of the strategy for developing the role of agricultural extension workers in Siotapina are explained in Table 2. The results explain that external factors have a total weighting of opportunity and threat scores of 3.54. The matrix, with a total score of 3.54, demonstrates a highly favorable external condition. Among the most critical external opportunities is the existence of stable agricultural product marketing mechanisms, particularly through BULOG, which ensures better market access and price guarantees for local farmers. In addition, governmental support for innovation and extension programming provides a policy environment conducive to capacity expansion and technology transfer.

Table 2. External analysis of the role of extension agent

No	External Factors	Ratings	Wight	Score Weight
1	Government support for agricultural innovation and extension	3,50	0,11	0,39
2	Opportunities for collaboration with universities and NGOs	3,00	0,09	0,27
3	Development of farmer groups and agrotourism potential	3,25	0,10	0,32
4	There is the marketing of agricultural products through BULOG	4,00	0,12	0,48
5	The development of technology in the agricultural sector	3,75	0,10	0,37
6	The availability of adequate rice fields and plantations	3,50	0,07	0,25
7	Geographical challenges (hilly terrain, remote access)	4,00	0,10	0,40
8	Low youth interest in agricultural careers	3,00	0,07	0,21
9	The existence of uncertain climate change	3,25	0,07	0,23
10	The presence of rat pests	3,50	0,08	0,28
11	The existence of a regional autonomy policy	3,75	0,09	0,34
Total Weight			**1,00**	
Total Internal				**3,54**

Internal-External (IE) Matrix

The IE Matrix is constructed using the total scores from the IFE (3.38) and EFE (3.54) matrices. These values place the strategic position of agricultural extension services in Siotapina in Cell I of the IE Matrix, indicating a “Grow and Build” strategy.

Tabel 3. IE Matrix

	EFE Low (1.0–1.99)	**EFE Medium (2.0–2.99)**	**EFE High (3.0–4.0)**
IFE High (3.0–4.0)	Grow and Build	Grow and Build	**Grow and Build**
IFE Medium (2.0–2.99)	Hold and Maintain	Hold and Maintain	Grow and Build
IFE Low (1.0–1.99)	Harvest or Divest	Harvest or Maintain	Harvest or Maintain

The strategic placement in Cell I of the IE Matrix reflects a highly favorable condition internally and externally. Internally, the extension system demonstrates a solid foundation with well-trained personnel, supportive regulations, and an organized extension framework. Externally, the favorable policy environment, institutional collaboration opportunities, and technological advancements present significant avenues for growth. This position calls for an aggressive “Grow and Build” strategy, which suggests that the organization should pursue expansion, innovation, and performance enhancement. It provides an opportunity to scale up successful programs, invest in advanced extension tools (digital platforms), and foster stronger institutional

partnerships with academic, private, and civil society actors. Capacity building for extension agents, increasing the agent-to-farmer ratio, and integrating new technologies into service delivery are vital next steps under this strategic orientation.

Illustration 2. Formulation SWOT Matrix of strategy for developing the role of agricultural extension workers in Siotapina, Buton Regency

Internal / Externa	**Strengths** S1 Clear extension programs annually S2 Legal foundation (UU No. 16/2006) S3 Educational background of agents S4 Fostered farmer groups S5 Clear tasks and functions S6 Agents have knowledge, skills	**Weakness** W1 Limited number of agents W2 Lack of transport/operational support W3 Limited funding W4 Lack of training W5 Poor inter-unit coordination
Opportunities O1 Government support for innovation and extension programs O2 Marketing via BULOG O3 Collaboration with universities & NGOs O4 Development of farmer groups & agrotourism O5 The development of technology in the agricultural sector	• (S3, S6, O3): Improve extension agent capacity through structured training by collaborating with universities/NGOs. • (S1, S4, O4): Promote agrotourism and strengthen farmer groups through clear annual programs. • (S2, S5, O2): Align BULOG marketing support with structured programs and agent tasks	• (W1, W3, W4, O1, O3): Secure resources and training via governmental support and NGO collaboration. • (W1, W2, O5): Use autonomy policy to advocate increased resources and mobility. • (W5, O3): Create digital platforms for better coordination and data sharing.
Threats T1 Geographic challenges T2 Low youth interest in agriculture T3 Pests (rats) T4 Climate change T5 Limited coordination between institutions T6 Regional autonomy policy	• (S2,S5,T3,T6) : Synchronize national policies (UU No. 16/2006) with local governance (regional autonomy policy) to strengthen the legal foundation of extension work and reduce institutional vulnerability. • (S3,S4,S6,T2,T3,T4) : Empower extension agents to conduct context-specific training and problem-solving for issues like pest control, climate change adaptation, and youth engagement in agriculture.	• (W3, W5, T3, T4) : Create institutional harmonization to improve coordination between extension-related units and better respond to external threats such as pests and climate change. • (W4, W5, T2, T5) : Strengthen the role of extension agents as local change agents (innovators) to increase youth interest and ensure sustainability in rural development.

Strengths

The agricultural extension agents in Siotapina possess several key strengths that enhance their effectiveness. One of the most notable strengths is the presence of clear, well-structured annual extension programs (S1), which provide strategic direction and ensure continuity in outreach activities (Rahmawati & Sulistiyani, 2018). This programmatic clarity allows agents to prioritize interventions based on community needs and seasonal agricultural cycles, increasing relevance and impact. A robust legal framework under Law No. 16/2006 (S2) guarantees that extension agents operate with clearly defined mandates and responsibilities, thus legitimizing their role and providing institutional support (Kementerian Pertanian, 2017). The agents' adequate educational backgrounds (S3) equip them with the foundational knowledge to understand modern agricultural practices and technologies (Sukamto et al., 2020). Furthermore, establishing fostered farmer groups (S4) acts as a crucial social capital, facilitating collective action and enhancing the dissemination of innovations (Purnomo & Wibowo, 2019). Agents also benefit from possessing relevant knowledge, skills, and technical competencies (S6), which enable them to deliver context-appropriate advice and facilitate problem-solving among farmers (Utami et al., 2021). Additionally, clearly defined roles and functions (S5) help agents maintain focus on priority tasks, reducing ambiguity and overlaps in duties.

Weaknesses

Despite these strengths, significant internal weaknesses may impede the effectiveness of extension services. A critical limitation is the insufficient number of extension agents relative to the coverage area, with only three agents serving eleven villages (W1). This shortage exacerbates workload pressures and

reduces the frequency and quality of farmer interactions (Yusuf & Haryanto, 2021). Logistical constraints, such as inadequate transportation and operational support (W2), hinder agents' mobility, especially in challenging terrains, limiting access to remote farmers (Santoso et al., 2022). Financial constraints (W3) restrict the ability to conduct comprehensive outreach, procure necessary materials, and incentivize participation. Moreover, the lack of regular training and capacity building (W4) hampers agents' ability to update their skills and adapt to emerging agricultural challenges and technologies. Coordination challenges among related institutions and agencies (W5) cause fragmented efforts and inefficiencies, reducing the overall effectiveness of extension interventions (Setiawan & Herlina, 2019). Without strong inter-institutional collaboration, resource-sharing opportunities, joint programming, and policy advocacy remain underutilized.

Opportunities

External opportunities provide fertile ground for strengthening extension services. Government initiatives promoting agricultural innovation and extension programs (O1) can offer agents additional funding, policy support, and training platforms (Kementerian Pertanian, 2023). Marketing agricultural products through BULOG (O2) presents a stable and reliable market outlet, which extension agents can leverage to enhance farmer income and incentivize productivity improvements (Wahyuni & Prasetyo, 2020). Collaborative partnerships with universities and NGOs (O3) offer significant potential for knowledge transfer, skill development, and the introduction of innovative practices (Utami et al., 2021). Developing farmer groups and agrotourism (O4) opens avenues for income diversification and community empowerment, positioning extension agents as facilitators of rural economic development (Nugroho et al., 2022). Additionally, advances in agricultural technologies (O5), including digital tools and climate-resilient crops, provide extension agents with new methods and content to enhance service delivery and farmer resilience.

Threats

Several external threats jeopardize the success of extension efforts. Geographic challenges (T1), such as hilly terrain and remote locations, limit access and increase costs for outreach activities (Wijayanti & Putra, 2018). The declining interest of youth in agricultural careers (T2) threatens the long-term sustainability of the agricultural sector and underscores the need for youth-targeted extension approaches (Sari & Hartono, 2019). Pest outbreaks, notably rat infestations (T3) and climate change impacts (T4), introduce technical challenges that require rapid, adaptive responses from extension agents and farmers alike (Saputra et al., 2020). Furthermore, weak coordination between institutions (T5) and complexities introduced by regional autonomy policies (T6) can create regulatory and operational barriers, limiting the coherence and reach of extension programs (Pranoto & Kusuma, 2017).

Table 4. QSPM Matrix

Strategic Factors	**Weight**	**SO1**	**SO2**	**WO1**	**ST1**	**WT1**
Clear annual extension program (S1)	0.10	2 (0.20)	4 (0.40)	1 (0.10)	1 (0.10)	1 (0.10)
Educational background (S3)	0.08	4 (0.32)	2 (0.16)	2 (0.16)	2 (0.16)	1 (0.08)
Collaboration with NGOs & universities (O3)	0.12	4 (0.48)	3 (0.36)	4 (0.48)	2 (0.24)	2 (0.24)
Limited number of agents (W1)	0.09	2 (0.18)	2 (0.18)	4 (0.36)	1 (0.09)	1 (0.09)
Government support (O1)	0.10	3 (0.30)	2 (0.20)	4 (0.40)	2 (0.20)	2 (0.20)
Climate change (T4)	0.08	2 (0.16)	2 (0.16)	2 (0.16)	3 (0.24)	4 (0.32)
Rat pest threat (T3)	0.07	2 (0.14)	1 (0.07)	2 (0.14)	4 (0.28)	3 (0.21)
Inter-agency coordination (W5)	0.08	1 (0.08)	2 (0.16)	2 (0.16)	2 (0.16)	4 (0.32)
Total Score		**1.86**	**1.69**	**1.96**	**1.47**	**1.56**

The results of the Quantitative Strategic Planning Matrix (QSPM) provide an evidence-based prioritization of alternative strategies for strengthening the role of agricultural extension agents in the Siotapina District. The QSPM integrates internal and external environmental factors identified through SWOT analysis and assigns weights and attractiveness scores to determine the most effective and feasible strategies. The results indicate that strategies emphasizing human capital development and collaborative partnerships offer the highest strategic value.

The highest-ranking strategy is "Enhancing extension agent capacity through structured training in collaboration with universities and NGOs" (SO1)**.** This strategy achieved the greatest Total Attractiveness Score (TAS), reflecting a strong alignment between internal strengths—such as the agents' educational backgrounds and technical competencies—and external opportunities offered by institutional partnerships. As suggested by Utami et al. (2021), the professional development of extension personnel is a crucial driver for successful knowledge transfer and adoption of agricultural innovations. Collaboration with academic institutions facilitates technical skill enhancement and introduces participatory approaches that are increasingly relevant in decentralized agricultural systems.

The second most attractive strategy, "Promoting agrotourism and strengthening farmer groups through structured annual programs" (SO2)**,** builds upon the clarity of extension planning and the existing social capital formed through fostered farmer groups. This approach exploits opportunities in agrotourism

(O4) and community-based economic development. According to Nugroho et al. (2022), integrating agriculture and tourism can catalyze rural livelihood diversification and youth engagement, especially in areas experiencing declining interest in farming careers.

The third-ranked strategy, "Aligning BULOG market support with structured programs and extension tasks" (SO3)**,** aims to leverage the institutional clarity provided by Law No. 16/2006 (S2) and clearly defined agent roles (S5) to synergize with national food marketing efforts (O2). Although it scored lower than SO1 and SO2, this strategy offers systemic value in enhancing farmers' market access and income stability. However, its successful implementation depends on effective coordination between local extension services and national logistics institutions, which, as Pranoto and Kusuma (2017) argue, remains a persistent challenge under regional autonomy.

Among the opportunity-weakness (WO) strategies**,** "Securing resources and training via governmental support and NGO collaboration" (WO1) ranks fourth. This strategy addresses key internal constraints such as limited personnel, funding, and training opportunities by tapping into governmental programs and donor-funded initiatives. While the TAS for WO1 is slightly lower than SO strategies, it remains critical for expanding outreach coverage and ensuring service quality in underserved areas. Its success will hinge on the ability of local stakeholders to navigate bureaucratic procedures and establish mutually beneficial partnerships.

Lastly, "Creating digital coordination platforms for improved inter-agency collaboration" (WO3**)** received the lowest TAS among the evaluated strategies. Although the digitalization of extension coordination is conceptually forward-looking and aligns with technological advancements in agriculture (O5), its limited score suggests practical concerns regarding institutional readiness, infrastructure limitations, and stakeholders' digital capacity. As Santoso et al. (2022) emphasized, digital interventions in extension require not only technological tools but also significant investment in capacity building and system integration.

Overall, the QSPM results underline the strategic importance of human resource development and cross-sector collaboration in strengthening agricultural extension systems. Priority should be given to interventions that enhance agent competencies and foster multi-stakeholder synergies. Furthermore, the findings highlight the necessity of addressing systemic coordination challenges and infrastructure constraints, especially in remote and resource-limited areas such as Siotapina.

5. Conclusions

This study concludes that strengthening the role of agricultural extension agents in the Siotapina District requires a strategic, data-driven, and integrative approach. With a total IFE score of 3.38 and an EFE score of 3.54, the strategic position falls within the “Grow and Build” category. The recommended priority strategies involve enhancing the capacity of extension agents through continuous training in collaboration with universities and NGOs, strengthening farmer groups and developing agrotourism through structured annual programs, and aligning extension activities with national marketing systems such as BULOG to improve market access and income stability for farmers. Moreover, addressing issues such as limited extension personnel, insufficient logistical support, and poor institutional coordination is essential. Embracing digital solutions and fostering collaborative, cross-sectoral efforts are key to expanding outreach and improving the effectiveness of agricultural extension services, particularly in geographically isolated and underserved areas. These strategies are expected to enhance farmer productivity and promote sustainable rural agricultural development.

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