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ARTICLE

Driving Agricultural Investment through Government Policies, Human Resources, Infrastructure, and Technology: An Empirical Analysis of Tay Ninh Province, Vietnam

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ABSTRACT

This study investigates the influence of government policies, human resources, infrastructure, and investment promotion programs on technological adoption and investment mobiliyzation in the agricultural sector of Tay Ninh Province, Vietnam. Employing Partial Least Squares Structural Equation Modeling (PLS-SEM), the research analyzes survey data from 269 agricultural investors to assess how these factors drive technology integration and capital inflows. The findings reveal that government policies, including subsidies and regulatory support, significantly enhance both technological adoption and investment attraction by creating a conducive environment for innovation and reducing investment risks. Human resources and expertise are critical, as a skilled workforce facilitates effective technology use and increases investor confidence. Infrastructure development, encompassing reliable transportation and communication networks, supports the implementation of advanced agricultural technologies and lowers operational costs, making the sector more appealing to investors. Investment promotion programs, through financial incentives and partnerships, play a pivotal role in fostering technology adoption and attracting capital. Notably, technological advancements mediate the relationship between these factors and investment mobilization, underscoring the role of technology in enhancing agricultural productivity and investment appeal. While the study offers actionable insights for policymakers and stakeholders to promote sustainable agricultural development in Tay Ninh, its regional focus may limit its generalizability. Recommendations include strengthening policy frameworks, investing in workforce training, improving infrastructure, and expanding promotion programs to drive technological innovation and capital mobilization, thereby supporting Tay Ninh's agricultural growth and economic resilience.

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1. Introduction

Tay Ninh Province, located in the economically significant southern region of Vietnam, functions as a vital agricultural hub owing to its strategic position linking Ho Chi Minh City and Cambodia. Agriculture is the cornerstone of Tay Ninh's economy, employing a significant section of the population and contributing substantially to the province's GDP. According to the 2023 data from the Tay Ninh Statistical Office, agriculture accounted for over 25% of Tay Ninh's gross regional domestic product (GRDP) and provided sustenance for more than 50% of the local populace [1]. The province is distinguished for its cultivation of vital crops like cassava, sugarcane, and rice, with its thriving cattle industry. The agricultural sector's potential is limited by outdated farming techniques and inadequate access to capital, hindering its ability to attain optimal production and economic returns.

Facilitating the allocation of financial resources is crucial for the progression of Tay Ninh's agricultural sector, allowing the shift from traditional methods to a contemporary and efficient industry. Acquiring money is essential to improve infrastructure, implement advanced agricultural technologies, and advocate for sustainable farming practices that can increase productivity and reduce environmental impacts. Studies indicate that regions with higher agricultural capital investment have significant improvements in crop yields and economic growth [2]. Nonetheless, Tay Ninh has faced ongoing difficulties in securing sufficient investment, especially in the agricultural sector, where capital investment lags behind that of other industries. Between 2016 and 2020, just 15% of the province's total development investment was directed towards agriculture, highlighting the urgent necessity for measures to enhance capital mobilization [3].

The utilization of technology and its widespread acceptance have shown to be a powerful means of enhancing the mobilization of financial resources in the field of agriculture. Technological progress and acceptance can offer remedies for numerous obstacles encountered by investors and farmers, including enhancing transparency in financial transactions, facilitating lending accessibility, and enabling more effective risk management through data analytics. According to a study, the integration of sophisticated technological tools in financial operations can result in a significant reduction in transaction costs and improve the efficiency of capital allocation [4]. The utilization of technological advancements and the establishment of agricultural financing in Tay Ninh can effectively tackle the obstacles related to insufficient infrastructure and bureaucratic inefficiencies. This will enhance the movement of funds from both local and international investors into the industry. Moreover, advancements in technology and its widespread acceptance can enable the development of digital platforms that connect farmers with investors, thereby establishing a more dynamic and readily accessible investment environment.

This study aims to investigate the influence of government policies, human resources, infrastructure development, and investment promotion programs on technological adoption and capital mobilization in Tay Ninh's agricultural sector, providing evidence-based recommendations to enhance investment inflows and promote sustainable agricultural development.

It is crucial to do a study on how technological improvements and the use of applications might facilitate the mobilization of investment capital in Tay Ninh's agriculture industry in order to tackle these difficulties. This study seeks to analyze the convergence of technology and finance in order to offer evidence-based suggestions for improving the inflow of capital into agriculture. This, in turn, will contribute to the province's overall economic development objectives. This study will expand upon previous research that examined investment strategies in the region [5,6]. However, these studies did not comprehensively investigate the impact of technical breakthroughs and adoption on capital

mobilization. The results will be of great value to policymakers, investors, and agricultural stakeholders in Tay Ninh. They will provide a clear plan for utilizing technology to promote sustainable development in the province's agricultural industry.

Agricultural capital investment is crucial to enhancing productivity and ensuring food security in agriculture-dependent regions like Tay Ninh. Technologies such as mechanization and improved farming techniques not only boost productivity but also enhance resource utilization efficiency, which is essential for increasing agricultural output [7,8]. Investment in agricultural technology allows farmers to optimize inputs like seeds, fertilizers, and irrigation systems, enabling them to maximize yield while minimizing waste. Studies indicate that investments from both public and private sectors significantly influence the growth and modernization of agricultural practices, and that mechanization has rejuvenated agricultural capital, benefitting multiple cropping systems, which are essential in addressing food shortages [7,9].

Furthermore, investment in human capital, particularly through education and skill development, supports agricultural productivity and fosters acceptance of new technologies [10,11]. There is a demonstrated relationship between farmers' awareness of technological advancements and their willingness to invest in related equipment and practices [10]. Given that Tay Ninh Province features diverse agricultural activities, understanding the local context and tailoring investments to this context is vital for maximizing impact [12].

Recent evidence emphasizes the need for robust policies that encourage the integration of technological advancements into the agricultural sector. Beyond direct technology investments, these policies should also promote rural human capital development through education and training, allowing for a comprehensive approach to maximizing productivity [13,14]. For instance, foreign direct investment has been identified as crucial for enhancing local agricultural growth by supplying capital and facilitating access to advanced techniques and machinery, along with the requisite local labor training [15,16]. The interface of local governance, investment frameworks, and technological acceptance fosters an environment conducive to sustainable agricultural progress.

In Tay Ninh, regional characteristics, such as demographic changes and labor market fluctuations, necessitate targeted assessments aimed at fostering farmer participation in investment activities [11,17]. The agricultural investment landscape is often challenged by financial limitations, regulatory hurdles, and inadequate infrastructure. Recognizing these factors is essential for effective intervention. Research indicates that customizing financial products and initiatives to meet the specific demands of agricultural stakeholders can significantly improve investment environments, and access to financial resources correlates with greater willingness to invest in capital-intensive technologies and practices [10,18].

Moreover, effective agricultural investment frameworks frequently involve innovative resource management strategies that incorporate climate-resilient practices. Current discussions on agricultural sustainability advocate for integrating environmental considerations into investment decisions, promoting resilience against climate variability. Initiatives rooted in sustainable practices, like climate-smart agriculture, enhance farmers' capability to adapt to changing climate conditions and market dynamics, thereby attracting investment interest [11,13,19]. The literature presents a critical examination of the balance between yield maximization and ecological sustainability, challenging historical perspectives that view agricultural growth purely through a quantitative lens [11,20].

The problem statement encompasses a multitude of factors—technological innovation, human capital investment, and systemic investment challenges—shaped by local economic considerations in Tay Ninh Province. Addressing agricultural investment requires a multi-faceted approach: promoting technological adoption, defining pathways for sustainable financial influx, enhancing education initiatives, and integrating ecological sustainability as foundational elements for long-term agricultural resilience and food security.

2. Literature Review

2.1. Review of Relevant Studies

In reviewing relevant studies on technological developments and acceptance in agricultural capital investment, several themes emerge about the factors influencing technology adoption and the resultant impacts on agricultural productivity. These studies provide empirical evidence and theoretical insights into how technology acceptance models (TAM) and related frameworks apply to various facets of agriculture, particularly in developing contexts like Tay Ninh Province, Vietnam.

One prominent theme is the correlation between technological acceptance and the attitudes of stakeholders toward agricultural innovation. It was found that factors such as trust in farmers and general education levels significantly influence public attitudes toward agricultural robots [21]. This aligns with findings that explored technology adoption among Australian cotton farmers, emphasizing that the engagement of the current workforce in digital transformation is crucial for successful technology integration [22]. Moreover, the acceptance of technology not only impacts the decision-making process on farms but also relates to the broader socio-economic context in which farmers operate.

Studies addressing precision agriculture offer a lens into the behavioral intentions of agricultural professionals and farmers toward adopting innovative practices. A study highlighted the gap in literature regarding the perspectives of agricultural extension professionals on promoting precision agriculture, pointing to a lack of research on their behavioral intentions which could influence broader adoption rates [23]. Concurrently, it was documented that the framing of precision agriculture within contemporary agri-food discourses asserts its potential role in promoting sustainability through digital tools [24]. This suggests that a clearer understanding of stakeholders' perceptions can foster supportive policies that encourage investment in technological advancements.

The issue of age and digital literacy is also crucial when examining agricultural technology acceptance. It was revealed that generational disparities in the adoption of Internet of Things (IoT) technologies among Brazilian agriculturalists argue that enhanced educational opportunities can bridge these gaps [25]. This is echoed in the work that presented social capital as a vehicle influencing farmers' willingness to adopt low-carbon agricultural technologies [26]. Their findings suggest that fostering social networks and trust among farmers and technology providers can enhance acceptance rates.

Another critical aspect is the economic implications of technology adoption. A study explored barriers to adopting ICT in agricultural extensions in Indonesia, shedding light on how economic constraints can hinder technology acceptance [27]. Similarly, research indicated that more experienced farmers, although more comfortable with current technologies, are less open to adopting new innovations, which can be attributed to the perceived risk associated with financial investments in new technologies [28]. This presents a complex relationship where economic limitations and past experiences can influence future investment decisions.

Furthermore, the role of external support mechanisms, including government policies and extension services, can significantly impact technology acceptance in agriculture. Although a study primarily focused on virtual reality and e-learning, the insights can be extended to agricultural technology acceptance, emphasizing the importance of external factors such as social influence and environmental support when assessing these dynamics [29].

Digital transformation in agriculture, specifically regarding automation and AI, presents another layer of complexity in technology acceptance. For instance, a study addressed the socio-political challenges of deploying cultured meat technologies, drawing parallels with the acceptance of other agricultural innovations [30]. This highlights the need to approach technology introduction holistically, addressing socio-cultural and economic barriers through tailored communication strategies.

In sum, the synthesis of various studies underscores the multifaceted nature of agricultural technology acceptance and investment in capital. Factors such as farmers' trust in new technology, educational background, economic constraints, and supportive external policies play significant roles in facilitating or hindering technology adoption. Understanding these dynamics is crucial to effectively promote agricultural capital in-

vestment and ensure that technological advancements contribute to sustainable agricultural practices.

2.2. The Mobilization of Capital Investment

Capital investment pertains to the financial resources allocated to a firm or project for the purpose of procuring durable assets, such as machinery, land, buildings, and technology. These investments play a vital role in the development and enlargement of businesses, as they facilitate the procurement of resources that produce future revenue and enhance operational effectiveness [3]. Capital investment is crucial in economic development since it significantly contributes to productivity growth, stimulates innovation, and strengthens the competitive edge of sectors. In the agricultural industry, capital investment refers to the allocation of funds towards the purchase of sophisticated farming machinery, irrigation infrastructure, high-productivity seeds, and state-of-the-art agricultural technologies. These investments are crucial for enhancing agricultural production, minimizing expenses, and guaranteeing the adoption of sustainable farming methods.

The allocation of financial resources towards the agricultural industry in Tay Ninh Province is crucial for various reasons. Agriculture plays a vital role in the province's economy, making a substantial contribution to both employment and income generation for the local population. Nevertheless, the agricultural industry encounters obstacles such as antiquated farming methods, restricted availability of cutting-edge technology, and insufficient infrastructure [5,6]. Tay Ninh can overcome these obstacles by attracting capital investment to support the implementation of cutting-edge agricultural technologies, upgrading infrastructure, and optimizing agricultural output efficiency. Consequently, this can result in amplified agricultural production, elevated incomes for farmers, and enhanced economic resilience for the province. Furthermore, the allocation of financial resources to agriculture might additionally enhance the sustainable progress of Tay Ninh by fostering ecologically conscious methods and guaranteeing the region's food security.

2.3. The Role of Technological Developments and Investment Strategies in Facilitating Agricultural Capital Investment

Technological advancements play a crucial role in enhancing agricultural productivity and investment attractiveness. The integration of modern technologies in agriculture has been shown to improve efficiency and yield, which is essential for attracting capital investment. For instance, the application of information and communication technologies (ICTs) in agriculture has been identified as a priority for supporting agricultural development in developing countries, including Vietnam [31]. Such technologies not only facilitate better management practices but also help in retaining farmers on their lands, thus preventing rural exodus—a significant concern in agricultural sectors [31]. Furthermore, investment in agricultural technology is linked to improved income structures for farmers, indicating a direct correlation between technology adoption and financial viability in agriculture [32].

In addition to technological advancements, the acceptance of these innovations by local farmers is critical for successful implementation. The literature suggests that the acceptance of new agricultural technologies is influenced by various factors, including the perceived benefits, ease of use, and the socio-economic context of the farmers [33,34]. For example, studies indicate that the involvement of small farm business entrepreneurs in agro-investments can catalyze rural development and enhance competitive participation in the agricultural value chain [33]. This underscores the importance of creating an enabling environment that fosters acceptance and adaptation of new technologies among farmers.

Investment strategies also play a vital role in facilitating agricultural capital investment. The literature emphasizes the need for integrated land use planning and governance to ensure that large-scale agricultural investments are sustainable and beneficial to local communities [35,36]. In Tay Ninh Province, where land use patterns and local governance structures are critical, the alignment of investment strategies with local needs and capacities is essential. Moreover, the role of public expenditure in agriculture has been highlighted as a

significant factor in promoting agricultural growth and ensuring equitable distribution of benefits [37]. This suggests that government policies and investments should focus on creating a conducive environment for private investments in agriculture.

Furthermore, the economic implications of agricultural investments are profound. Studies have shown that investments in agriculture can lead to increased competitiveness and productivity, which are crucial for economic development [38]. In the context of Tay Ninh Province, the potential for agricultural investment to contribute to local economic growth is significant, particularly when supported by appropriate technological innovations and investment frameworks. The concept of agriculture as a distinct asset class has emerged, attracting diverse investments aimed at improving productivity and sustainability [39]. This shift in perception can lead to increased capital inflows into the agricultural sector, further enhancing its development prospects.

The interplay between technological developments, acceptance, and investment strategies is pivotal in facilitating agricultural capital investment in Tay Ninh Province, Vietnam. The integration of modern technologies, coupled with supportive policies and investment frameworks, can significantly enhance agricultural productivity and economic viability. Future research should continue to explore these dynamics, focusing on empirical studies that assess the specific impacts of technological innovations and investment strategies in the local context.

2.4. Hypotheses Development

2.4.1. Government Policies and Support

The agricultural sector in Tay Ninh Province heavily relies on government policies and support to foster technical developments and acceptance. The government can foster the development and integration of new technologies by establishing a regulatory framework that is conducive to innovation and providing incentives. For instance, the implementation of policies that offer financial assistance for the acquisition of advanced agricultural machinery, grants for research and development, and tax benefits for technology-focused agribusinesses foster a favorable environment for technological innovation [4,40]. In addition, government-supported training programs and extension services provide farmers with the essential knowledge and skills to embrace new technologies, promoting a culture of innovation and ongoing enhancement in the agricultural industry [2,3]. These activities highlight the beneficial impact of government policies in promoting the application of technology in Tay Ninh's agriculture.

The mobilization of investments into Tay Ninh's agricultural sector is significantly influenced by government policies and support mechanisms. By establishing a stable and attractive investment environment, the government can effectively attract capital from both domestic and foreign investors. Policies that offer investment incentives, such as tax breaks, reduced tariffs, and streamlined regulatory procedures, lower the barriers to entry for investors. Additionally, government initiatives that improve infrastructure—such as roads, irrigation systems, and market access—enhance the profitability and feasibility of agricultural projects, making them more attractive to potential investors [5,6]. The presence of government-backed investment guarantee schemes and financial support programs further mitigates investment risks, encouraging more substantial and long-term investment in the agricultural sector [1,3]. These strategic government policies and support mechanisms not only increase the volume of capital flowing into Tay Ninh's agriculture but also ensure that these investments are sustainable and impactful. As a result, the following hypotheses are constructed as:

H1a. *Government Policies and Support have a positive impact on the technological advancements and adoption towards the agricultural sector in Tay Ninh Province.*

H1b. *Government Policies and Support have a positive impact on the mobilization of investments towards the agricultural sector in Tay Ninh Province.*

2.4.2. Human Resources and Expertise

The progress and implementation of technology in Tay Ninh's agriculture industry are greatly impacted by the presence and caliber of skilled human resources and expertise. Proficient and well-informed staff are

essential for comprehending, executing, and optimizing the advantages of contemporary agriculture technologies. Implementing training programs and educational initiatives to improve the IT proficiency of farmers and agricultural workers can result in the more efficient utilization of advanced technologies like precision farming tools, automated equipment, and data analytics [2,40]. Human resources that possess the appropriate skills are able to more effectively adjust to and incorporate new technology, resulting in enhanced productivity and efficiency within the agriculture industry. Consequently, this fosters a more inventive and competitive agricultural setting in Tay Ninh Province, highlighting the crucial role of human resources and experience in propelling technological progress and implementation.

Human resources and expertise play a pivotal role in attracting and mobilizing investments into Tay Ninh's agricultural sector. Investors are more likely to commit capital when they are confident in the capability of the local workforce to effectively manage and execute agricultural projects. A well-trained, skilled workforce ensures that investments are utilized efficiently and that projects are managed competently, reducing operational risks and increasing the likelihood of successful outcomes [3,5]. Moreover, expertise in modern agricultural practices and technologies can lead to innovation, making Tay Ninh's agricultural sector more attractive to investors looking for growth opportunities. By investing in human capital development, Tay Ninh can create a favorable environment for investment, thereby enhancing the flow of capital into its agricultural sector. This highlights the significant impact of human resources and expertise on the mobilization of investments, contributing to the province's overall economic growth and sustainability [1,6]. Consequently, the following hypotheses are constructed:

H2a. *Human Resources and Expertise have a positive impact on the technological advancements and adoption towards the agricultural sector in Tay Ninh Province.*

H2b. *Human Resources and Expertise have a positive impact on the mobilization of investments towards the agricultural sector in Tay Ninh Province.*

2.4.3. Infrastructure Development

Infrastructure development plays a crucial role in enabling technological developments and the adoption of new technologies in the agricultural sector in Tay Ninh Province. For the successful adoption of current agricultural technology, it is crucial to have strong infrastructure, including dependable power supply, fast internet, and efficient transportation networks. Enhanced road networks and communication systems facilitate easier availability of technological tools, agricultural inputs, and information, which are essential for the implementation of precision farming, automated machinery, and other advanced agricultural technologies [3,40]. Furthermore, the establishment of infrastructure dedicated to research and development can facilitate the creation of innovative solutions that are customized to address the specific requirements of the local agriculture sector. This, in turn, encourages the widespread adoption of new technologies. Therefore, the establishment of a comprehensive infrastructure immediately enhances the technological capacities of the agriculture sector in Tay Ninh Province.

The mobilization of capital investments in Tay Ninh's agricultural sector is significantly influenced by the state of infrastructure development. Investors are more likely to invest in regions where there is strong infrastructure support, as it reduces operational risks and costs. Well-developed infrastructure, including roads, irrigation systems, storage facilities, and transportation networks, ensures that agricultural products can be efficiently processed, stored, and transported to markets. This not only improves the profitability of agricultural ventures but also attracts more substantial and diverse investment opportunities [5,6]. Furthermore, the presence of modern infrastructure can enhance the scalability of agricultural projects, making them more appealing to large-scale investors. Infrastructure development thus serves as a catalyst for attracting both domestic and foreign capital, driving economic growth and improving the overall productivity of Tay Ninh's agricultural sector [1,3]. Therefore, the following hypotheses are constructed:

H3a. *Infrastructure Development has a positive impact on the technological advancements and adoption to-*

wards the agricultural sector in Tay Ninh Province.

H3b. *Infrastructure Development has a positive impact on the mobilization of investments towards the agricultural sector in Tay Ninh Province.*

2.4.4. Investment Promotion Programs

Investment promotion programs play a vital role in promoting the use of technology in Tay Ninh's agricultural industry. These initiatives frequently offer the essential financial incentives, scholarships, and subsidies that reduce the obstacles to implementing contemporary agricultural technologies. Investment promotion initiatives can directly impact the adoption of technical improvements in agriculture, such as precision farming instruments, automated irrigation systems, and digital data management solutions. Furthermore, these programs can foster collaborations with technology providers and research institutes, guaranteeing that farmers have opportunities to utilize state-of-the-art technologies and receive training. These programs serve to both incentivize the utilization of current technology and stimulate the creation of novel, regionally tailored solutions that have the potential to improve agricultural productivity and sustainability [2,4]. Hence, investment promotion programs have a crucial impact on stimulating technological progress and the integration of these innovations into Tay Ninh's agricultural industry.

Investment promotion programs play a crucial role in attracting capital investment to Tay Ninh's agriculture industry. These initiatives enhance the investment environment by providing several incentives, such as tax exemptions, streamlined regulations, and financial assurances, that decrease the risks and enhance the appeal of agricultural investments. By emphasizing the potential for profitability and long-term viability of agricultural initiatives, these programs can attract investors from both domestic and international markets. Furthermore, investment promotion plans frequently incorporate marketing and networking prospects, such as trade fairs and investment conferences, that facilitate the connection between investors and local agricultural firms, thereby promoting collaborations and partnerships. This focused strategy not only facilitates the attraction of immediate investment but also lays the groundwork for continuous expansion in investment in the agriculture sector [5,6]. Consequently, these programs play a crucial role in facilitating the influx of funds into Tay Ninh's agriculture sector, thereby bolstering its economic growth and promoting the use of advanced agricultural techniques [1,3,41]. Therefore, I put up the subsequent hypotheses:

H4a. *Investment Promotion Programs have a positive impact on the technological advancements and adoption towards the agricultural sector in Tay Ninh Province.*

H4b. *Investment Promotion Programs have a positive impact on the mobilization of investments towards the agricultural sector in Tay Ninh Provin*ce.

2.4.5. Technological Advancements and Adoption

The utilization of advanced technology and its widespread implementation are crucial in attracting investors into Tay Ninh's agricultural industry. Modern technologies, such as precision farming, automated equipment, and data-driven decision-making tools, greatly improve the efficiency, productivity, and profitability of agricultural operations. The advancement in technology enhances the appeal of the industry to investors, who aim to take advantage of breakthroughs that offer greater profitability and reduced uncertainties. Adopting innovative technology in the agriculture sector showcases to potential investors the sector's ability to implement modern, scalable, and sustainable methods, which is essential for long-term profitability [2,4].

Furthermore, technological developments mitigate the risks and operational inefficiencies that commonly discourage investment in agriculture. Technologies that offer real-time data on crop health, soil conditions, and market trends allow for more accurate and well-informed decision-making, leading to optimized resource utilization and cost reduction. Enhancements in operational efficiency and risk management contribute to the establishment of a more foreseeable and safeguarded investment climate. Consequently, investors are more inclined to spend money in agricultural initiatives that exhibit technological innovation and the potential for

long-term growth. Technological improvements and their implementation operate as a catalyst for bringing substantial capital investment into Tay Ninh's agricultural sector, promoting its development and contribution to the regional economy [3,6]. Thus, the subsequent hypothesis is formulated:

H5. *Technological Advancements and Adoption have a positive impact on the mobilization of investments towards the agricultural sector in Tay Ninh Province.*

From the above discussions, the research model is developed as **Figure 1**:

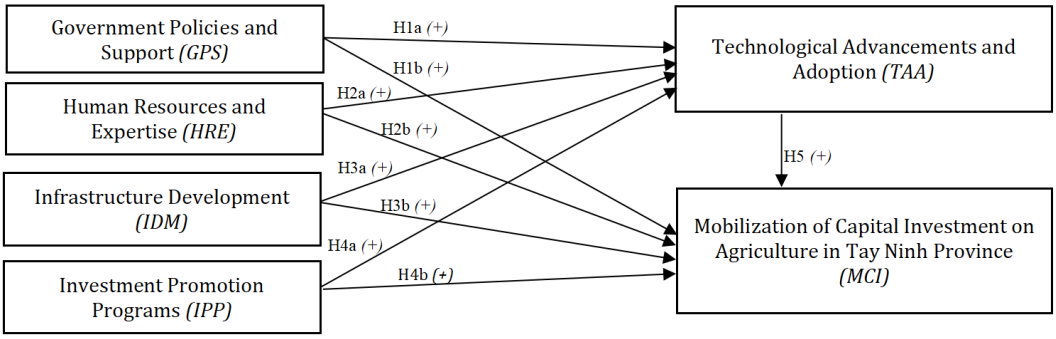

Figure 1. Research Model.

(Source: Constructed by the author)

3. Data Collection and Analysis

3.1. Data Collection and Sampling

This study collected data through a structured questionnaire designed to capture agricultural investors' intentions regarding future investments in Tay Ninh Province's agricultural sector [42]. The target population consisted of agricultural investors, including individuals and businesses actively engaged in or planning to invest in agricultural activities within or related to Tay Ninh Province. Respondents were selected based on their involvement in agricultural investment activities, such as funding farming operations, agribusiness ventures, or technology-driven agricultural projects, ensuring their relevance to the study's objectives.

To ensure comprehensive coverage and accessibility, data collection was conducted using a mixed approach, combining in-person interviews and electronic correspondence (e.g., email surveys). This dual method facilitated participation from a geographically diverse group of investors, including those located within Tay Ninh Province and those operating outside the province but with interests in its agricultural sector. Convenience sampling was employed to efficiently gather data from a broad and diverse range of participants, as it allowed researchers to target respondents who were readily available and willing to participate [4,43,44]. To enhance the representativeness of the sample, efforts were made to include investors from various business scales (small, medium, and large-sized businesses) and with differing levels of investment experience (under 3 years, 3 to under 10 years, and 10 to under 20 years). This approach ensured that the sample reflected the diversity of the agricultural investment landscape in and around Tay Ninh Province.

The selection process began with identifying potential respondents through local agricultural associations, investment forums, and business networks in Tay Ninh Province. Additionally, online platforms and databases of agricultural investors in Vietnam were utilized to reach investors outside the province. Invitations to participate were extended to those who met the inclusion criteria: (1) current or prospective investment in Tay Ninh's agricultural sector, (2) involvement in decision-making related to agricultural capital allocation, and (3) willingness to provide informed consent for participation. To verify the clarity and relevance of the questionnaire, a pre-test was conducted with a group of ten agricultural investors, whose feedback led to minor modifications to improve comprehension and applicability.

A total of 269 valid surveys were collected over a two-month period in May and June, meeting the sample size requirements for structural equation modeling (SEM), which recommends at least 10 units per latent variable [4,45]. The final sample included investors from diverse backgrounds, as evidenced by the demographic distribution: 42% were based in Tay Ninh Province, while 58% operated outside the province; 15.6% represented small-sized businesses, 53.2% medium-sized, and 31.2% large-sized; and 14.9% had under 3 years of investment experience, 49.1% had 3 to under 10 years, and 36.1% had 10 to under 20 years. This diverse sample provided a robust foundation for analyzing the factors influencing technological adoption and capital mobilization in Tay Ninh's agricultural sector, ensuring the findings are reflective of varied perspectives within the investment community.

3.2. Data Analysis

Table 1 displays the demographic data of the 269 participants that were polled for the study, offering valuable information on their business location, size, and investing experience. 58% of the respondents operate enterprises outside Tay Ninh Province, while the remaining 42% are headquartered within the province. In terms of the magnitude of their operations, the majority of firms, accounting for 53.2%, fall into the category of medium-sized enterprises. This is followed by 31.2% of businesses that are classified as large-sized, and 15.6% that are categorized as small-sized. Regarding investing experience, around 49.1% of the participants have between 3 to under 10 years of experience, 36.1% have been in the field for 10 to under 20 years, and a smaller portion, 14.9%, has less than 3 years of investment experience. The demographic distribution of the respondents in this study reflects the wide range of business sizes and investment backgrounds, offering a thorough overview of the agricultural investment situation in and around Tay Ninh Province.

Table 1. Demographic Information of the Respondents.

Variable	Category	Frequency	Percentage *(%)*
Business Location	in Tay Ninh province	113	42.0
	outside Tay Ninh province	156	58.0
Business Scale	Small-sized business	42	15.6
	Medium-sized business	143	53.2
	Large-sized business	84	31.2
Investment Experience	Under 3 years	40	14.9
	From 3 to under 10 years	132	49.1
	From 10 to under 20 years	97	36.1
TOTAL		**269**	**100.0**

(Source: From the author's data analysis results)

Table 2 presents the outcomes of the reliability and discriminant validity assessments, which evaluate the dependability and uniqueness of the concepts utilized in the research. The findings demonstrate strong reliability across all constructs, as indicated by Cronbach's alpha (α) values surpassing the acceptable threshold of 0.7, with scores ranging from 0.893 to 0.927. The composite reliability (*CR*) values provide additional confirmation of the constructions' dependability, all of which above 0.9, showing a high level of internal consistency. In addition, the Average Variance Extracted (*AVE*) values for all constructs are above the 0.5 benchmark, ranging from 0.699 to 0.815. This indicates that a substantial amount of variance is captured by the constructs in relation to measurement error. The results not only show the strength and reliability of the measurement scales, but also confirm that the several concepts being measured are clearly separate from each other. This provides a strong basis for the future structural equation modeling.

Table 2. Reliability and Discriminant Validity Tests (*HTMT Matrix*).

	α	CR *(rho_a)*	CR *(rho_c)*	AVE	GPS	HRE	IDM	IPP	MCI	TAA
GPS	0.927	0.928	0.945	0.774						
HRE	0.893	0.894	0.921	0.699	0.874					
IDM	0.902	0.904	0.928	0.719	0.846	0.746				
IPP	0.920	0.921	0.940	0.758	0.887	0.880	0.887			
MCI	0.924	0.928	0.946	0.815	0.731	0.743	0.710	0.826		
TAA	0.915	0.917	0.937	0.747	0.719	0.720	0.613	0.766	0.636	

(Source: From the author's data analysis results)

3.3. Structural Equation Modelling

Table 3 presents the path coefficients from the structural equation modeling analysis, highlighting the relationships between various factors affecting the mobilization of capital investment and technological advancements in Tay Ninh Province's agricultural sector. The results show that all hypothesized relationships are statistically significant, as indicated by T-statistics exceeding the critical value of 1.96 and P-values less than 0.05. Notably, the path coefficient for the impact of Government Policies and Support on the mobilization of capital investment (*H1a*) is 0.260, with a T-statistic of 3.768 and a P-value of 0.000, suggesting a strong positive influence. Similarly, Government Policies and Support also positively impact technological advancements and adoption (*H1b*), with a path coefficient of 0.173, a T-statistic of 2.468, and a P-value of 0.014, indicating that supportive policies significantly encourage the use of modern technologies in agriculture.

Table 3. Path Coefficients.

Hypothesis	Relationship	Original Sample	Mean	STDEV	T Statistics	P Values	Result
H1a	**GPS -> MCI**	0.260	0.259	0.069	3.768	0.000	Accepted
H1b	**GPS -> TAA**	0.173	0.174	0.070	2.468	0.014	Accepted
H2a	**HRE -> TAA**	0.168	0.167	0.056	2.988	0.003	Accepted
H2b	**HRE -> MCI**	0.267	0.268	0.054	4.938	0.000	Accepted
H3a	**IDM -> TAA**	0.132	0.134	0.056	2.378	0.017	Accepted
H3b	**IDM -> MCI**	0.149	0.151	0.057	2.603	0.009	Accepted
H4a	**IPP -> TAA**	0.502	0.501	0.053	9.500	0.000	Accepted
H4b	**IPP -> MCI**	0.213	0.212	0.067	3.190	0.001	Accepted
H5	**TAA -> MCI**	0.487	0.484	0.060	8.080	0.000	Accepted

(Source: From the author's data analysis results)

The analysis also reveals a significant positive relationship between Human Resources and Expertise and both technological advancements (*H2a*) and capital mobilization (*H2b*), with path coefficients of 0.168 and 0.267, respectively. These findings, supported by T-statistics of 2.988 and 4.938 and P-values of 0.003 and 0.000, underscore the crucial role of skilled human resources in driving both technology adoption and investment attraction. Infrastructure Development (*H3a* and *H3b*) also shows a positive impact on both technological adoption and investment mobilization, with path coefficients of 0.132 and 0.149, respectively, further emphasizing the importance of adequate infrastructure in enhancing agricultural productivity and investment attractiveness.

Investment Promotion Programs have the highest impact on technological advancements (*H4a*) among the variables, with a path coefficient of 0.502 and a

T-statistic of 9.500, demonstrating a very strong positive effect. They also significantly influence investment mobilization (*H4b*), with a path coefficient of 0.213, reinforcing the idea that targeted promotion strategies are effective in attracting capital. Finally, Technological Advancements and Adoption (*H5*) are shown to have a substantial impact on the mobilization of investments, with a path coefficient of 0.487, a T-statistic of 8.080, and a P-value of 0.000. This highlights that advancements in technology not only improve agricultural practices but also play a critical role in attracting investment into the sector. Overall, the results of **Table 3** provide robust evidence supporting the study's hypotheses, illustrating the interconnectedness of government support, human resources, infrastructure, and technology in driving agricultural development and investment in Tay Ninh Province.

Table 4 illustrates the specific indirect effects within the structural model, shedding light on how intermediary variables influence the relationship between independent and dependent variables. The analysis reveals that government policies and support (*GPS*) indirectly impact the mobilization of capital investment (*MCI*) through technological advancements and adoption (*TAA*). This is evidenced by a path coefficient of 0.084, a T-statistic of 2.400, and a P-value of 0.016, indicating a statistically significant mediating effect. This finding suggests that while government policies directly encourage investment, their effectiveness is enhanced when they simultaneously promote technological advancements. Similar indirect effects are observed for human resources and expertise (*HRE*), with a path coefficient of 0.082, demonstrating that the presence of skilled human resources amplifies the impact of technological adoption on investment mobilization. Infrastructure development (*IDM*) also shows a positive and significant indirect effect (*path coefficient of 0.064*), highlighting the role of robust infrastructure in facilitating technology-driven investments. The strongest indirect effect is observed with investment promotion programs (*IPP*), which have a path coefficient of 0.245, suggesting that these programs significantly enhance the adoption of technology, thereby boosting capital investment in the agricultural sector.

Table 4. Specific Indirect Effects.

Relationship	Original Sample	Sample Mean	STDEV	T Statistics	P Values	Result
GPS -> TAA -> MCI	0.084	0.084	0.035	2.400	0.016	Supported
HRE -> TAA -> MCI	0.082	0.081	0.029	2.785	0.005	Supported
IDM -> TAA -> MCI	0.064	0.065	0.028	2.303	0.021	Supported
IPP -> TAA -> MCI	0.245	0.243	0.042	5.815	0.000	Supported

(Source: From the author's data analysis results)

Figure 2 visually represents the path coefficients from the Partial Least Squares Structural Equation Modeling (*PLS-SEM*) analysis, providing a comprehensive view of the relationships between the study variables. The model demonstrates that government policies, human resources, infrastructure development, and investment promotion programs all have direct and positive impacts on both technological advancements and capital investment mobilization. The path coefficients depicted in **Figure 2** align with the findings in **Table 3**, confirming the robustness of the hypothesized relationships. Notably, the figure illustrates the critical role of technological advancements and adoption as a mediator. The strong path coefficient from technological advancements to capital investment mobilization (*0.487*) underlines its central role in the model, suggesting that improving technology adoption is a key strategy for attracting investment into Tay Ninh's agricultural sector. The model also highlights that investment promotion programs are particularly effective in driving technological adoption, as indicated by their high path coefficient, underscoring the importance of targeted initiatives to enhance technology use and investment.

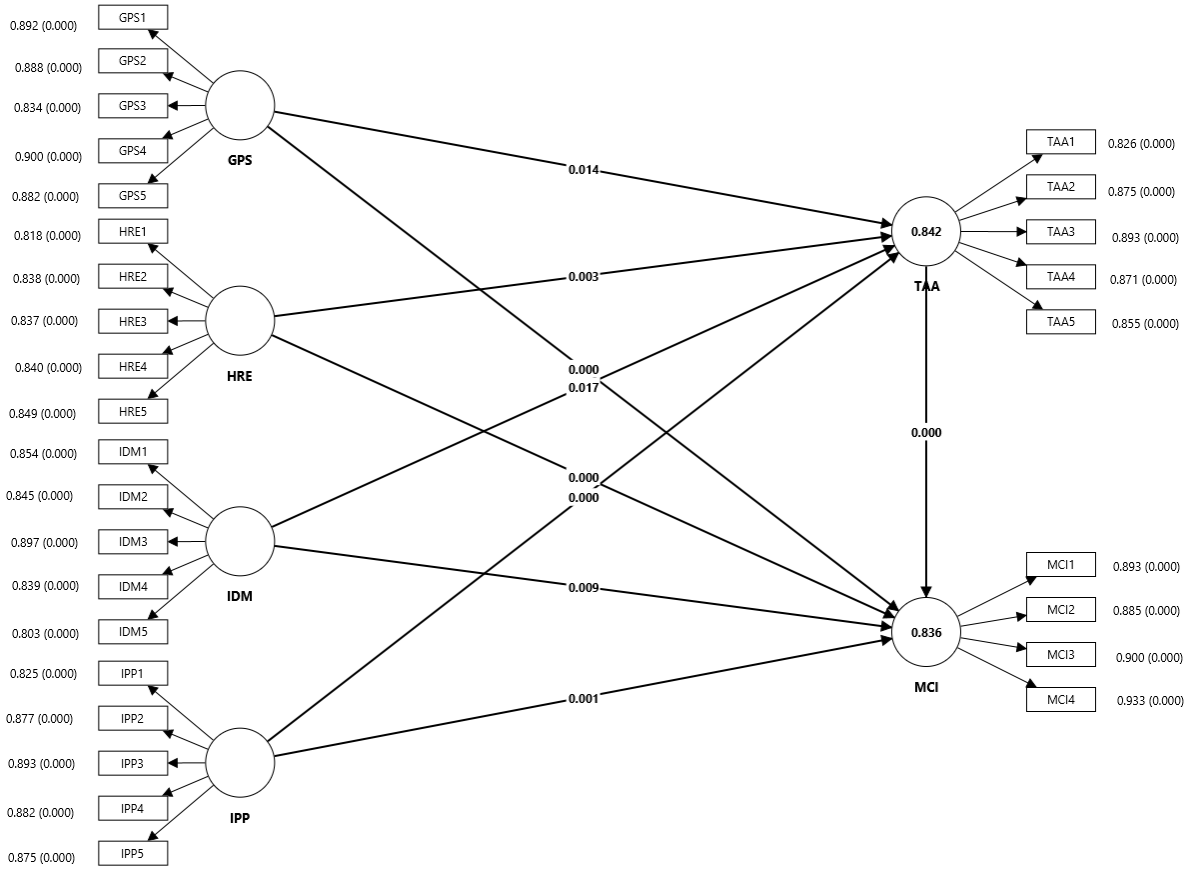

Figure 2. Result of PLS-SEM Structural Model Path Coefficient.

(Source: From the author's data analysis results)

4. Findings Discussion

The findings of the study highlight the significant role of various factors in enhancing the mobilization of capital investment and technological advancements in Tay Ninh Province's agricultural sector. One of the key findings is the positive impact of government policies and support on both technological adoption and investment mobilization. The study demonstrates that strategic government interventions, such as providing subsidies, tax incentives, and infrastructural support, create a conducive environment for technological innovations and attract investment into agriculture. This dual impact underscores the importance of a supportive regulatory framework that not only fosters technological progress but also boosts investor confidence [3,4].

Another critical finding is the influence of human resources and expertise on technology adoption and investment mobilization. Skilled labor and expert knowledge are essential for the successful implementation and utilization of modern agricultural technologies. The study shows that enhancing the skills and expertise of the agricultural workforce can lead to more effective use of technology, which in turn makes the sector more attractive to investors. This finding suggests that investment in education and training programs is crucial for driving both technological advancements and investment in agriculture [2,40].

The results also indicate that infrastructure development is a fundamental enabler of both technological advancements and capital mobilization in the agricultural sector. Adequate infrastructure, including reliable power supply, efficient transportation networks, and advanced communication systems, facilitates the integration of modern technologies and reduces operational costs, making agricultural projects more appealing to investors. This finding highlights the need for continuous investment in infrastructure to support the growth

and modernization of Tay Ninh's agriculture [5,6].

Furthermore, the study reveals that investment promotion programs are particularly effective in driving technological adoption and attracting capital. By providing financial incentives and facilitating partnerships between farmers and technology providers, these programs lower the barriers to technology adoption and create opportunities for increased investment. The strong influence of investment promotion programs on both technology use and investment flow emphasizes the importance of targeted initiatives to stimulate agricultural development [1,3].

Lastly, the study confirms that technological advancements and adoption significantly enhance the mobilization of investments in Tay Ninh's agricultural sector. The adoption of advanced technologies not only improves agricultural productivity and efficiency but also reduces uncertainties and operational risks, creating a more secure investment environment. This finding underscores the role of technological innovation as a catalyst for attracting substantial capital investment, thereby supporting the sustainable development of Tay Ninh's agriculture and contributing to the region's economic growth [2,6].

5. Implications

The findings of this study have significant implications for policymakers, agricultural stakeholders, and investors in Tay Ninh Province. First and foremost, the positive impact of government policies and support on technological advancements and investment mobilization suggests that effective policy frameworks are crucial for agricultural development. Policymakers should continue to design and implement supportive policies, such as subsidies for technological adoption, tax incentives for agribusinesses, and investment in infrastructure. These measures not only promote the use of advanced agricultural technologies but also enhance the attractiveness of the agricultural sector to both domestic and foreign investors. By doing so, Tay Ninh can achieve sustainable agricultural growth and boost its contribution to the provincial economy.

The role of human resources and expertise in driving technological adoption and investment underscores the need for continuous investment in education and training programs tailored to the agricultural sector. Developing a skilled workforce that is proficient in modern agricultural practices and technologies will not only improve productivity but also increase investor confidence. Agricultural extension services, vocational training, and partnerships with academic institutions can be leveraged to build capacity and enhance the skills of the local workforce. By focusing on human capital development, Tay Ninh can create a more innovative and competitive agricultural sector that is capable of adapting to and leveraging new technologies.

Infrastructure development also emerged as a critical factor influencing technological advancements and investment in agriculture. The findings suggest that improving infrastructure, such as roads, irrigation systems, and communication networks, is essential for supporting modern agricultural practices and attracting investment. This implies that government and private sector collaborations should prioritize infrastructure projects that directly benefit the agricultural sector. Enhancing infrastructure not only facilitates the adoption of technology but also reduces logistical costs and increases the overall efficiency and profitability of agricultural operations, making the sector more appealing to investors.

The significant influence of investment promotion programs on both technological adoption and capital mobilization highlights the importance of targeted promotional efforts. Authorities in Tay Ninh should design and implement specific programs that provide financial incentives, reduce regulatory barriers, and facilitate connections between farmers, technology providers, and investors. Hosting agricultural fairs, investment forums, and training workshops can create awareness, stimulate interest, and build networks that are crucial for investment flows. These programs can play a vital role in creating a dynamic investment climate that supports the continuous growth and modernization of Tay Ninh's agricultural sector.

Finally, the study underscores the role of technological advancements as a key driver of investment in agriculture. To leverage this, Tay Ninh should focus on creating an environment that fosters technological innovation and adoption. This could involve setting up

research and development centers, providing grants for innovation, and supporting start-ups in agricultural technology. By doing so, Tay Ninh can position itself as a hub for agricultural innovation, attracting investments that not only benefit the local economy but also contribute to broader economic development goals. These strategic initiatives will ensure that Tay Ninh's agricultural sector remains competitive, resilient, and capable of meeting the demands of the future.

6. Conclusion

This study provides a comprehensive analysis of the factors driving technological adoption and investment mobilization in Tay Ninh Province's agricultural sector, highlighting the critical roles of government policies, human resources, infrastructure, and investment promotion programs. The findings confirm that supportive government policies, such as subsidies and streamlined regulations, create an environment that enables technological innovation and attracts both domestic and foreign capital. A skilled workforce, bolstered by targeted education and training, enhances the effective use of modern technologies, thereby increasing investor confidence and agricultural productivity. Robust infrastructure, including transportation and communication networks, facilitates the integration of technology and reduces operational costs, making the sector more attractive to investors. Investment promotion programs, through financial incentives and strategic partnerships, significantly boost technology adoption and capital inflows, underscoring their importance in fostering a dynamic agricultural investment landscape.

The study's results offer a clear roadmap for policymakers and stakeholders aiming to advance sustainable agricultural development in Tay Ninh. By prioritizing policy reforms, workforce development, infrastructure improvements, and targeted promotional initiatives, Tay Ninh can enhance the competitiveness and resilience of its agricultural sector. Technological advancements emerge as a key mediator, amplifying the impact of these factors on investment mobilization and underscoring the need to foster innovation. While the findings are context-specific, they provide valuable insights for other agriculture-dependent regions. Future research should investigate the longitudinal impacts and broader applicability to refine strategies for sustainable agricultural growth.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Thu Dau Mot University.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data supporting the reported results are available upon request from the corresponding author, subject to the approval of relevant ethical and privacy restrictions. No publicly archived datasets were generated or analyzed during this study, as confidentiality agreements with participants precluded such disclosure.

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Conflicts of Interest

The author declares no conflict of interest.

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