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SOCIAL ENTREPRENEURSHIP AS A CATALYST FOR LOCAL ECONOMIC RESILIENCE: A PESTELE ANALYSIS OF A SCHOOL-BASED FARMING PROJECT

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Abstract

This study aims to evaluate the socioeconomic viability and planning implications of a social entrepreneurship model through a rabbit farming project at SMITI Sains Bahrul Ulum, Penang, utilizing an analytical PESTELE diagnostic framework. Employing a mixed-methods design, data were extracted from operational financial records, surveys involving 23 students and 14 school staff, and qualitative thematic analysis. The findings prove that the model is financially viable, generating a net profit of RM1,736.30 in its first cycle, which successfully triggered secondary economic spillover effects for the local community. From a social aspect, the acceptance level among educators was highly positive (mean 4.07); however, the students' moderate practical skills (mean 3.64) necessitate the establishment of structured mentor-mentee workshops. Furthermore, spatial and operational analyses revealed that space constraints (40' x 60') and a low breeding rate (50%) restricted maximum profit, thus requiring smart technology interventions. Nevertheless, environmental sustainability was achieved through a circular economy system utilizing livestock waste. By implication, to ensure the replicability of this model, the study urges local authorities to formulate more flexible zoning policies to allow the integration of community economic activities within institutional zones.

Keywords: Community economic development, social entrepreneurship, analytical PESTELE analysis, spatial policy planning, socioeconomic sustainability

INTRODUCTION

Community-based economic development through social entrepreneurship approaches is increasingly recognized as a catalytic strategy for building socioeconomic resilience and sustainability at the local level (Elsen, 2018). In the Malaysian context, the concept of social entrepreneurship, particularly those mobilized at the educational institution level, is gaining increasing attention from policymakers and academics. Private educational institutions, such as the People's Religious Schools (*Sekolah Agama Rakyat* or SAR), frequently face financial constraints that hinder smooth operations and the development of student facilities. To reduce complete dependence on tuition fees and public contributions, a social entrepreneurship model based on broiler rabbit farming was pioneered at the Sekolah Menengah Integrasi Teras Islam (SMITI) Sains Bahrul Ulum, Penang. This model aims not only to generate self-sustaining school finances but is also integrated with the surrounding residents to create a secondary economic chain (micro-economy) within the local community. This aligns directly with the role of small-scale industries at the community level in building wealth and diversifying the residents' sources of income (Masyhuri, 2024; Subhe, 2023).

However, social entrepreneurship initiatives in areas with educational institution status are rarely analysed from the perspective of planning theory and spatial analysis. Schools planning to implement commercial farming activities within educational institution zones typically face constraints from land use zoning guidelines by local authorities, as well as limited infrastructural space. Meanwhile, environmental instruments such as PESTELE (Political, Economic, Social, Technological, Environmental, Legal, and Ethical) are frequently utilized in decision-making studies and complex project management (Srdjevic, Bajcetic, & Srdjevic, 2012). However, in the context of existing studies, it often serves merely as a listing tool without translating the analysis into strategic findings or policy formulation.

Therefore, this study shifts the focus from descriptive discussions on fund management to a more rigorous empirical and analytical socioeconomic and spatial assessment framework. The main objective of this study is to evaluate the socioeconomic viability of the community economic development project based on social entrepreneurship at SMITI Sains Bahrul Ulum using an analytical PESTELE diagnostic framework.

This study employs methodological rigor by assessing the project's viability using transparent empirical data, specifically through the extraction of actual on-site financial metric records and the findings from the school community's perception survey. Through this data integration approach, this paper aims not only to prove the effectiveness and sustainability of the social entrepreneurship model but also to analyse the spatial challenges and the

management of agricultural facilities within educational zones. This in-depth analysis is highly critical for proposing a policy replication framework to planners and policymakers to support the relaxation of spatial zoning for suitable community economic generation activities within educational institution areas.

LITERATURE REVIEW

Community economic development through the lens of social entrepreneurship is now recognized as a critical paradigm shift in the discourse of local socioeconomic sustainability, where it emphasizes collective participation to build an economic system that not only pursues profit but also benefits society as a whole (Acquier et al., 2017; Newman, 1986). Although the practice of delivering social value has long existed, academic and policy discourse regarding this concept particularly involving educational institution-based initiatives in Malaysia is gaining widespread attention for solving community problems innovatively (Daud Fhiri, Abdullah, & Ahmad, 2018; Kadir & Sarif, 2016). Therefore, to position this study within the appropriate academic foundation and to justify the research gap, this literature review section is structured to focus the discussion on four main themes: (i) community economic development and social entrepreneurship, (ii) educational institution-based social entrepreneurship models, (iii) spatial planning and policy ecosystem implications, and (iv) the analytical application of PESTELE analysis.

Community Economic Development and Social Entrepreneurship

The concept of a community-based economy emphasizes local community participation, sustainability, as well as collective ownership and decision-making in driving economic activities (Newman, 1986). This approach aims to build an economic system that pursues not only physical growth but also social equity and mutual benefit for the broader society (Acquier, Daudigeos, & Pinkse, 2017). In this context, social entrepreneurship has evolved as a primary catalytic mechanism. Unlike traditional businesses that are centered on individual financial profit, social entrepreneurship is propelled by an innovative intent to create social value and address the fundamental problems of society (Dees, 1998; Kadir & Sarif, 2016).

The integration of these two concepts, particularly through small-scale enterprises and community entrepreneurship, has proven capable of enhancing socioeconomic resilience, diversifying income profiles, and generating a multiplier effect within the local community (Subhe, 2023; Yustika, 2019). A sustainable community economy directly stimulates the creation of local value chains, thereby reducing the community's dependence on external markets (Elsen, 2018).

Educational Institution-Based Social Entrepreneurship Models

Strong fundamental financial management is a critical element in ensuring the smooth operation of any institution, especially private educational institutions such as the Sekolah Agama Rakyat (SAR or literally translate People's Islamic Religious Schools). Issues of funding shortages and weak financial governance often hinder the delivery of education, infrastructure maintenance, and student welfare in these institutions. Recognizing this fact, the integration of commercial agricultural projects, such as broiler rabbit farming, into the school ecosystem acts as an innovative social entrepreneurship instrument to generate the institution's financial independence (Mohd Nor, 2022).

More significantly, the placement of social entrepreneurship projects in educational centers serves as a two-pronged approach in empowering the human capital of the younger generation. Community involvement in economic activities at the institutional level can instill practical skills, build leadership, foster an entrepreneurial mindset, and ensure they play a role in community wealth creation (Daud Fhiri, Abdullah, & Ahmad, 2018; Economic Planning Unit, 2015).

Spatial Planning and Policy Ecosystem Implications

The viability of institution-based community economic models is not only influenced by internal operational capacity but is highly dependent on the external planning ecosystem, particularly the spatial planning support and policies of local authorities. Urban planning literature asserts that land use transitions and zoning guidelines have an absolute influence on the feasibility and cost structure of a local economic project (Long et al., 2021).

Local authorities and local government institutions play a very important role, either as facilitators or barriers to the survival of these grassroots initiatives (Amanah et al., 2021; Liu et al., 2022). Without policy flexibility that allows the adaptation of institutional spaces for economic generation purposes, such as modular agricultural structures, efforts to replicate or expand this social innovation will face legal restrictions (van Doren et al., 2020).

Analytical Application of PESTELE Analysis

To evaluate and structure the strategic plan of a community project involving various stakeholders, the PESTELE (Political, Economic, Social, Technological, Environmental, Legal, and Ethical) framework is one of the most comprehensive diagnostic instruments. This analysis is typically used to assess external environmental factors capable of supporting or threatening the growth of an organization (Srdjevic, Bajcetic, & Srdjevic, 2012).

However, a weakness of most previous studies is merely using PESTELE as a listing tool. In this study, a paradigm shift is made by translating

the PESTELE framework into an analytical instrument. Empirical data are mapped into the PESTELE elements to identify not only the on-the-ground challenges but also to analytically break down this information into strategic planning policy implications to support future stability (Srdjevic, Bajcetic, & Srdjevic, 2012)

RESEARCH METHODOLOGY

Research Design

This study applies a mixed-methods case study design. This qualitative and quantitative case study approach is highly suitable for capturing complex social processes, in addition to understanding how socioeconomic empowerment is built within actual field contexts (Creswell, 2014). To structure the evaluation, the PESTELE (Political, Economic, Social, Technological, Environmental, Legal, and Ethical) diagnostic framework was used as the primary analytical basis. The PESTELE model is widely recognized as a comprehensive strategic planning instrument to identify external and internal environmental factors that can support or threaten the resilience and sustainability of a community project (Srdjevic, Bajcetic, & Srdjevic, 2012).

Sample Selection and Study Location

The study was conducted at Sekolah Menengah Integrasi Teras Islam (SMITI) Sains Bahrul Ulum, located in Mengkuang Titi, Kubang Semang, Penang. A non-probability purposive criterion sampling technique was employed to select a total sample of 37 participants, comprising 14 school staff (teachers and administrators) and 23 students.

- **School Staff Sampling ($n = 14$)**

Total population/census sampling was applied to all academic teachers and administrative personnel who were directly involved in the project steering committee, daily operational supervision, financial record-keeping, and PdPc co-curricular integration. Staff with no administrative or supervisory roles in the rabbit farming project were excluded.

- **Student Sampling ($n = 23$)**

Criterion-based purposive sampling was used to select students actively enrolled in the school's social entrepreneurship and agricultural co-curricular module. These students participated directly in the hands-on daily operations, including feeding, cage sanitation, breeding monitoring, and harvesting/slaughtering. Students outside this specialized module were excluded to eliminate response bias from non-participants.

This sampling strategy ensured that all respondents possessed firsthand operational experience and direct engagement required to rigorously assess the socioeconomic and pedagogical dimensions of the initiative (Ahmad & Wilkins, 2025).

Table 1: Survey Instrument Constructs, Measurement Scale, and Reliability Analysis

Target Group	Measured Sub-Constructs	No. of Items	Measurement Scale	Cronbach's Alpha (α)
Students (<i>n</i> = 23)	• Basic Knowledge & Awareness • Attitude & Career Interest • Practical & Handling Skills • Entrepreneurial Mindset	25	5-Point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)	0.789 (<i>Good</i>)
Staff & Teachers (<i>n</i> = 14)	• Project Perception & Suitability • Management & Operational Stability • Educational & Pedagogical Impact • Economic & Community Potential	25	5-Point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)	0.928 (<i>Excellent</i>)

Source: Authors' Questionnaire Survey Data

Data Collection

To ensure a robust data triangulation process, data collection in this study was carried out simultaneously through three (3) main instruments:

Document Analysis (Financial Records)

The assessment of economic viability (the Economic element in PESTELE) was extracted directly from the operational report database and the actual financial cash flow records for the project's first cycle. This involves the documentation of raw material costs, slaughtering operations, and sales revenue metrics.

Questionnaire (Quantitative Instrument and Constructs)

The quantitative survey instrument was structured using a 5-point Likert scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). To ensure measurement validity and internal consistency, two distinct self-administered questionnaires were tailored for students and school staff, measuring specific sub-constructs:

- **Student Survey Instrument (n = 23, 25 items)**

Measured four core constructs: (i) Basic Knowledge & Awareness of rabbit farming operations (e.g., nutrition, breeding cycles); (ii) Attitude, Interest & Time Commitment towards agricultural careers; (iii) Practical Handling Skills (e.g., livestock management, sanitation, slaughtering); and (iv) Entrepreneurial Mindset & Economic Value Perception. Internal consistency reliability yielded a high Cronbach's alpha ($\alpha = 0.789$).

- **Staff & Teacher Survey Instrument (n = 14, 25 items)**

Measured four core constructs: (i) Project Perception & Institutional Suitability (e.g., non-disruption of teaching and learning/PdPc, school image enhancement); (ii) Management & Operational Stability; (iii) Educational & Pedagogical Impact (experiential hands-on learning value); and (iv) Economic & Community Spillover Potential. Internal consistency reliability yielded an excellent Cronbach's alpha ($\alpha = 0.928$).

Open-Ended Survey (Qualitative)

To identify operational challenges and sustainability strategies (Technological and Environmental elements), open-ended survey responses were distributed to teachers and administrators to gather critical views regarding space constraints, biosecurity risks, and facility management.

Data Analysis

In line with the use of mixed-methods, data analysis was conducted through two dimensions, namely qualitative and quantitative analysis.

Quantitative Analysis

Data from the questionnaires were analysed using statistical software to produce a descriptive analysis, specifically determining the average metrics or Mean Scores. These mean scores are used to represent the percentage of agreement and the level of mastery of each target group towards the evaluated sub-constructs.

Qualitative Analysis (Thematic Analysis)

Data in the form of text responses from open-ended questions were analysed using a thematic analysis approach to break down the raw data into meaningful patterns, issues, and recommendations. This thematic coding process was adapted in line with the interactive qualitative data analysis model framework (Miles, Huberman, & Saldaña, 2014). Through this method, five (5) core themes were extracted, which include the effectiveness of experiential learning, the strength of project management and support, operational challenges and resource constraints, recommendations for improvement and innovation, and entrepreneurial and economic potential. These five themes serve as data

triangulation as they support the numerical data (quantitative) with text responses (qualitative themes) to strengthen the arguments.

In the final phase, all numerical data (cash flow profits and mean scores) as well as these qualitative themes were integratively mapped into the PESTELE diagnostic framework. This analytical mapping enables the study to shift its focus from merely reporting financial figures to generating a critical discourse on the Spatial Planning Policy required by local authorities to support such social entrepreneurship

ANALYSIS

Economic (E) and Social (S) Dimensions: Value Creation and Human Capital Empowerment

From the perspective of economic viability (E), financial records prove that this social entrepreneurship model generated a net profit of RM1,736.30 in its first cycle. This economic feasibility is also strongly supported by the qualitative analysis results through Theme 5 (Entrepreneurial and Economic Potential), where teachers view the project as having significant potential to generate school income through a variety of downstream products. This perspective is evidenced by a respondent's quote stating, *"Rabbits can be sold and by-products such as fertilizer can be used or sold, serving as an entrepreneurial (opportunity) for the students"*.

However, this economic success must be evaluated alongside social acceptance (S). Qualitative analysis through Theme 1 (Effectiveness of Experiential Learning) indicates that educators are highly positive regarding the pedagogical impact of this project. The majority of respondents emphasized that it fulfills the requirements of authentic learning, as voiced by a respondent: *"It provides an opportunity for students to experience the reality of managing the livestock farming world"*. Nevertheless, an analytical paradox exists when these data are triangulated with student responses. Although teachers perceive it as effective (Theme 1), quantitative data reveals that students' practical skills are only at a moderate level (mean 3.64). This situation is supported by the findings of Theme 3 (Operational Challenges and Resource Constraints), where teachers themselves acknowledge the existence of challenges regarding student commitment, stating, *"There are indeed students who have no interest in venturing into this field"*. This proves that the mere provision of physical infrastructure is insufficient without being supported by continuous skills guidance modules.

Table 2: Financial Breakdown and Profitability Metrics for the First Production Cycle

Category	Item Description	Quantity / Volume	Unit Price (RM)	Total Amount (RM)
Gross Revenue (A)	Live Breeding Rabbits (<i>Arnab Hidup</i>)	5 heads	RM 150.00 / head	RM 750.00
	Fresh Rabbit Meat (<i>Daging Arnab</i>)	63.96 kg	RM 30.00 / kg	RM 1,918.80
Total Gross Revenue				RM 2,668.80
Operational Costs / OPEX (B)	Pellet Feed (Type 702P)	10 bags	RM 49.50 / bag	RM 495.00
	Pellet Feed (Type PHL128)	10 bags	RM 43.75 / bag	RM 437.50
Total Operational Cost				RM 932.50
Net Operational Profit (A - B)	First Harvest Cycle (3–4 Months)			RM 1,736.30
Financial Viability Indicators	Operating Profit Margin	$\frac{\text{Net Profit}}{\text{Total Revenue}} \times 100\%$		65.06%

Source: Authors' Field Operational Financial Records

To rigorously validate the economic sustainability of the model, Table 2 itemizes the exact operational cash flow recorded during the project's initial harvest cycle (spanning 3 to 4 months). Capital expenditure (CAPEX) for primary infrastructure—including the 40' × 85' shelter facility, 240 modular cages, and initial breeding stock (60 females, 10 males)—was capitalized via the social innovation research grant.

On an operational level, the project generated a gross revenue of RM 2,668.80, derived from the direct sale of 5 live breeding rabbits (RM 750.00) and 63.96 kg of processed carcass meat (RM 1,918.80). Total variable operating expenses (OPEX) were strictly confined to feed supplies (20 bags of specialized pellets costing RM 932.50). This yielded a net operational profit of RM 1,736.30 per production cycle, translating to an operational profit margin of 65.06%. Because labor was integrated into student experiential learning and staff co-curricular oversight, fixed overhead expenses remained negligible, confirming that the operational model is financially self-sustaining for subsequent cycles.

Technological (T) and Environmental (E) Elements: Operational Challenges and Sustainability Practices

The achievement of this project's economic goals is also constrained by on-the-ground operational challenges (Technological Element). Based on the findings in Theme 3 (Operational Challenges and Resource Constraints), in addition to the issue of student interest, the primary constraint limiting maximum profit generation is the low breeding productivity rate (around 50%) as well as the risk

of animal diseases. This was emphasized by a respondent: “*The low productivity level of the breeding rabbits prevents the project’s profit from being maximized*”.

To resolve these operational gaps within the limited pen facility space (40’x85’) for 240 cages accommodating 60 female breeders and 10 male breeders including future offspring, smart technology intervention is the answer. The findings from Theme 4 (Recommendations for Improvement and Innovation) suggest a transition from manual farm management to digitalization. According to the respondents, among the resolutions that require immediate adaptation include, “*The use of modern technology such as digital record systems (and) automated feeding/watering*”.

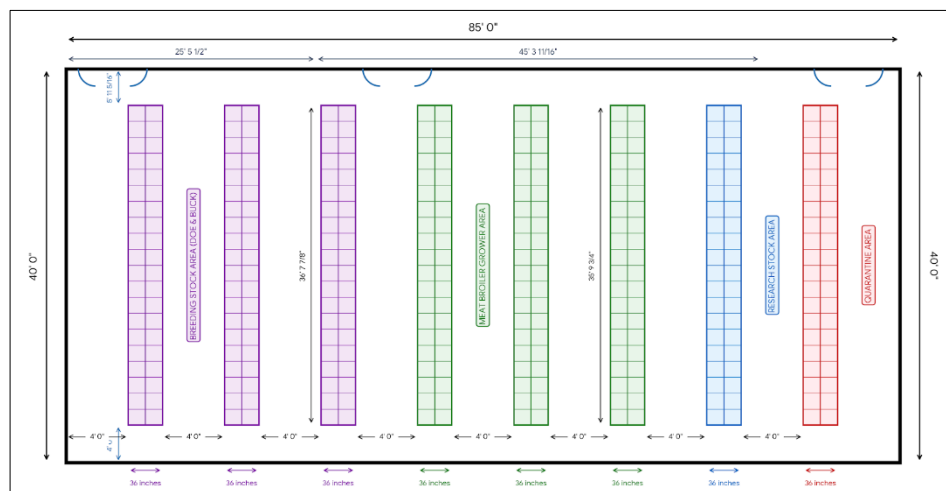


Figure 1: Spatial Layout and Functional Zoning Plan of the Rabbit Farming Facility (40' × 85')

Source: Authors' Spatial Layout Mapping

Furthermore, in line with the Environmental (E) dimension, the recommendation in Theme 5 to process rabbit waste as fertilizer also proves that sustainability practices through a circular economy are not only environmentally friendly but are capable of reducing the school’s agricultural input purchasing costs. Clear qualitative evidence supporting the circular economy model is directly grounded in open-ended survey feedback from school staff and official grant operational records. Rather than treating livestock waste as an environmental disposal burden, the project implements an on-site waste-to-resource management framework where rabbit manure and urine are systematically repurposed as organic fertilizer for the school’s vegetable garden. This closed-loop practice is validated by qualitative feedback under Theme 5 (Entrepreneurial and Economic Potential), where a teacher respondent (R5)

emphasized that *“Rabbits can be sold, and by-products such as fertilizer can be used [for the school garden] or sold, serving as an entrepreneurial opportunity for students.”*

Operationally, solid waste (feces) and liquid waste (urine) collected daily from pen trays are channelled directly into the school’s composting area rather than being discharged into municipal public drainage systems. This zero-waste discharge protocol mitigates local environmental health risks, including potential odour nuisances and vector breeding, thereby aligning with the Environmental Quality Act 1974. Furthermore, applying organic compost directly to the school’s vegetable plots substitutes commercial synthetic fertilizer inputs, effectively lowering operational expenditures while cultivating student awareness of sustainable agricultural value chains.

Political (P), Legal (L), and Ethical (E) Elements: Strategic Networks and Spatial Policy Implications

The resilience of the social entrepreneurship model in this institution is highly dependent on external institutional support elements (Political and Governance Elements). The qualitative analysis forming Theme 2 (Project Management Strength and Support) reveals that this project remains sustainable due to the existence of a strategic network involving Universiti Sains Malaysia (USM) and the Department of Veterinary Services. The importance of this cross-sector collaboration is directly acknowledged by the school community: *“The main strength of this project is the cooperation with USM and Veterinary (Services), and it is suitable to be carried out within the school area...”*. This external expertise network acts as the backbone to resolve the gap in student skills, as suggested in Theme 4, namely the need to establish *“... mentors among experienced breeders to guide the school”*.

To enable this social entrepreneurship initiative to be replicated on a large scale to other educational institutions, it requires flexibility in local planning policies. The resilience of the social entrepreneurship model in this institution cannot be realized without governance and legal support (P and L). The analysis reveals that the primary strength factor of this project depends on the strategic network (Theme 2), specifically the collaboration between the school and external parties such as USM, the Department of Veterinary Services, and the Kedah Broiler Rabbit Cooperative. This multi-entity support network is crucial for transferring technical expertise (Amanah et al., 2021) and ensuring compliance with financial management ethics (Ahmad Baharum, Hwa, & Mohd Salleh, 2025), considering that this project was developed through social fund contributions.

To enable this initiative to be scaled and replicated to other schools as a model of financial independence (Theme 5), it requires local planning policy

interventions. Policy analysis finds that the integration of micro-scale commercial agricultural structures into areas with educational institution status will typically face approval constraints and land use zoning guidelines from local authorities. In practice, the project at SMITI Sains Bahrul Ulum currently operates within a regulatory grey area without formal planning permission. However, driven by the urgent need for Community Economic Development (CED) and financial self-sufficiency, the school initiated this project informally through strong grassroots community collaboration.

Therefore, as a contribution to the field of spatial planning, this study proposes that urban planners develop more flexible zoning guidelines. As a contribution to the field of spatial planning, this study proposes that urban planners develop more flexible zoning guidelines. This policy relaxation should allow community-based agricultural structures to operate legally within institutional zones, provided that they comply with strict public biosecurity controls and regulations.

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Operational Reality vs. Proposed Regulatory Blueprint

In practice, as an exploratory pilot initiative, the rabbit farming project at SMITI Sains Bahrul Ulum operated through informal grassroots mechanisms rather than obtaining statutory municipal planning approvals. Operational compliance was maintained via direct advisory support from the strategic network (USM ARASC and the Department of Veterinary Services) for animal welfare and health, alongside internal consent from the School Management Board. Environmental management was handled organically by redirecting waste into the school's garden plot as compost.

However, to transition this pilot from an informal grassroots project into a scalable, legally recognized social entrepreneurship model that can be replicated across other educational institutions, a comprehensive regulatory blueprint spanning five structural pillars is necessary:

- **Statutory & Animal Welfare Alignment (Legal)**
Formalizing operations under the Animal Welfare Act 2015 (Act 772) regarding cage dimensions and density and ensuring meat processing follows MS 1500 Halal slaughtering standards.
- **Institutionalized Health & Biosecurity (Health)**
Establishing formal protocols with the Department of Veterinary Services for routine biosecurity monitoring and implementing strict cold-chain hygiene compliance for processed meat packaging.
- **Environmental Standard Operating Procedures (Environmental)**
Standardizing the closed-loop circular economy practices to ensure manure processing mitigates odor and fly vectors, complying with the Environmental Quality Act 1974 (Act 127) requirements without causing local public nuisances.
- **School Administration Protocols (School)**
Institutionalizing student involvement strictly within formal co-curricular hours with mandatory safety equipment (PPE), ensuring core academic teaching and learning (PdPc) priorities remain uncompromised.
- **Local Authority Licensing (Local Authority)**
As a core contribution to spatial planning, this study advocates for a ‘Conditional Planning Permission’ mechanism by local authorities. This policy flexibility must allow micro-scale, community-based commercial agricultural structures to operate legally within institutional land use zones, provided they comply with the aforementioned health and biosecurity regulations.

Table 3: Synthesis of PESTELE Diagnostics, Empirical Findings, and Spatial Planning Implications

PESTELE Elements	Empirical Findings (Quantitative & Qualitative Thematic Analysis)	Spatial Planning and Policy Implications
Economic	• Generated a net profit of RM1,736.30 in the first cycle of operation with a sales value of RM2,668.80. • Triggered a multiplier effect for the community through secondary economic chains (Theme 5), such as the sale of rabbit satay and burger patties by the residents.	• Mixed Land Use Policy - Justifies the need for local planning policies to view educational institution zones not only as academic hubs but also as legitimate incubator hubs for micro/community economic generation.
Social	• Educators’ acceptance was highly positive (Mean 4.07) and effective for hands-on learning (Theme 1). • Existence of a skills paradox: Students’ mastery of practical skills was only at a moderate level (Mean 3.64), and interest in farming careers was low (Mean 3.39) due to time constraints (Theme 3).	• Inclusive Training Space Provision - Planning policies must support the provision of appropriate physical support infrastructure for structured mentor-mentee programs with industry experts within the school area.

PESTELE Elements	Empirical Findings (Quantitative & Qualitative Thematic Analysis)	Spatial Planning and Policy Implications
Technological	- Manual operations were inefficient in limited space (a 40'x60' pen accommodating 240 cages for 60 female breeders and 10 male breeders). - The breeding productivity rate of pregnant rabbits was very low (around 50%) (Theme 3). - Resolutions require smart technology interventions such as digital record systems and automated feeding (Theme 4).	Smart Infrastructure Integration - The necessity for the installation and integration of smart/modular technology structures to maximize yield in compact spaces.
Environmental	- Sustainable livestock waste management through the implementation of a circular economy (Theme 5). - Organic waste (rabbit feces and urine) is not discarded; instead, it is processed and reused as organic fertilizer for the school's vegetable garden project.	Biosecurity and Landscape SOPs - Requires spatial planners to establish facility design standards equipped with a centralized solid waste management system at the project site to ensure zero environmental pollution (public biosecurity).
Political, Legal & Ethical	- Project sustainability highly depends on a strategic network of various stakeholders (Theme 2), involving USM, the Department of Veterinary Services, and community cooperatives. - Ethical-based financial management transparency that complies with funding guidelines.	Zoning Flexibility & Conditional Approval - Urging local authorities to amend zoning policies by granting flexibility (e.g., Conditional Planning Permission) so that these community-driven micro-scale commercial activities, which often operate in regulatory grey areas, can be legally replicated in any area with educational institution status.

Source: Authors' Primary Research Data & PESTELE Synthesis

DISCUSSION

Based on the PESTELE diagnostic analysis, the findings of this study reveal several critical implications for the viability of the educational institution-based community economic development model. This discussion encompasses four main axes: the empowerment of the local economy, the reality of the youth skills mismatch, the integration of technology in sustainability practices, and the need for flexibility in spatial planning policies.

Community Economic Empowerment Through Social Entrepreneurship

From the perspective of economic viability, this broiler rabbit farming model proves that educational institutions such as the SAR have great potential to

operate as economic generation centers. The success in generating a net profit of RM1,736.30 in the first cycle aligns with the view of Subhe (2023), who asserts that small-scale enterprises and industries act as engines for job creation, broaden income diversification, and stimulate local economic growth through the multiplier effect at the grassroots level.

In the context of the project at SMITI Sains Bahrul Ulum, the resulting secondary economic chains such as the sale of satay and burger patties by residents directly contribute to reducing reliance on a single source of income. This phenomenon is supported by the studies of Umam (2024) and Sayed Nordin et al. (2025), which found that local resource-based agro-industrial innovation not only increases commodity value-added but also serves as a robust medium of social transformation to empower community economic resilience. Through this approach, the main goal of social entrepreneurship is successfully realized, which is to innovatively create social value while providing continuous solutions to local socioeconomic problems (Daud Fhiri, Abdullah, & Ahmad, 2018).

Skills Mismatch and Youth Development

Although this initiative recorded a highly positive level of social acceptance from educators, the analysis reveals the existence of a pedagogical paradox among the youth (students). Their level of theoretical knowledge improvement was recorded at a high level, yet their mastery of practical skills and interest in making agriculture a career were merely at a moderate level.

This situation clearly illustrates the existence of the skills mismatch issue that often plagues the youth labor market in Malaysia, where possessed qualifications do not align with the practical competencies demanded in the field (Said & Jamaludin, 2018). In line with the vision to drive rural youth involvement through the Community Base Integrated Farming (CBIF) concept, continuous support and a mentoring ecosystem are highly critical (Ab Rahman et al., 2018). The direct transfer of expertise through mentor-mentee module interventions or industry-based training (coaching and monitoring) must be implemented. This practical guidance is capable of fostering confidence and agency in the youth, proving that they have the actual capacity to bring about social change and generate financial sustainability (Daud Fhiri et al., 2018; Salkowitz, 2010).

Smart Technology Integration and Circular Economy Sustainability

Through the analysis of the environmental (E) and technological (T) dimensions, the operations of this project faced breeding productivity restrictions that limited maximum profit. This tactical weakness indicates that reliance on manual farm management methods must be ceased; instead, a rapid transition to the use of smart technology innovations such as automation systems, digital management

records, and genetic monitoring is urgently needed (Neethirajan, 2023; Saiz-Rubio & Rovira-Más, 2020).

Despite facing technical challenges, the model in this school deserves to be highlighted as a reference for sustainability due to its practical success in implementing a circular economy. Organic waste, such as rabbit feces, has been reprocessed into organic fertilizer for the school garden. This approach of treating waste as a new agricultural resource directly minimizes the impact of ecological damage while simultaneously generating operational cost-reduction value (Purnamasari et al., 2026; Cobo, Dominguez-Ramos, & Irabien, 2018). This independent, community resource-based management also supports the eco-social transformation framework, where waste recycling and local food production build community resilience against global uncertainties (Elsen, 2018).

Spatial Planning Policy Implications and Integrated Networks

The most significant contribution of this study pertains to urban planning practices and local government policies. The study concludes that the sustainability of the social entrepreneurship model at SMITI Sains Bahrul Ulum is successfully maintained through the existence of a strategic network involving collaboration among the school, USM, the Department of Veterinary Services, and local cooperatives. This cross-sector network proves that multi-stakeholder collaboration is the strongest foundation for transferring technical expertise and ensuring the independence of community empowerment programs (Umam, 2024; Emerson et al., 2012).

To enable this social entrepreneurship framework to be replicated on a large scale in other locations, proactive intervention from local authorities and urban planners is imperative. Local government administrative structures act as absolute determinants that can either facilitate or hinder the survival of such grassroots projects through their land use policies (Liu et al., 2022; van Doren et al., 2020). Therefore, as an implication for spatial planning theory, local authorities are advised to review and formulate more flexible zoning guidelines. The success of this community-driven effort highlights a significant gap in current spatial planning policies. It demonstrates that local authorities must introduce zoning flexibility. Rather than penalizing such grassroots innovations that currently lack formal approvals, urban planners should formulate a 'Conditional Planning Permission' framework. This spatial policy flexibility must allow community-based integrated agricultural structures to operate legally within institutional zones, provided that compliance with strict public biosecurity regulations remains a priority. This infrastructural policy support aligns with efforts to integrate community agriculture as part of a master plan for poverty mitigation and food security (Amanah et al., 2021; Long et al., 2021).

Replicability and Spatial Adaptation Across Rural, Semi-Urban and Urban Contexts

To evaluate the scalability of this school-based social entrepreneurship model across diverse geographic and socio-spatial landscapes, the operational framework must be contextualized according to rural, semi-urban and urban educational environments. While the pilot case at SMITI Sains Bahrul Ulum demonstrates viability within a semi-urban/rural setting, replication in other institutional contexts requires distinct spatial and technological adaptations.

- **Rural School Contexts**

Rural educational institutions possess abundant physical land footprints and experience low spatial friction with residential neighbors, making them ideal for horizontal facility expansion (40' × 60'). In this context, replicability is highly feasible by integrating livestock farming directly with large-scale agricultural crop plots through closed-loop composting systems. However, the primary operational constraints in rural areas stem from technical breeding knowledge gaps, lower breeding efficiency (~50%), and logistics distances to bulk commercial buyers. To overcome these challenges, rural replication must be anchored by strong technical partnerships with community cooperatives such as the Kedah Broiler Rabbit Cooperative and the Department of Veterinary Services to maintain flock productivity.

- **Semi-Urban School Contexts**

In semi-urban environments such as the SMITI Sains Bahrul Ulum case site, schools operate under moderate land availability while benefiting from immediate proximity to localized micro-markets and food vendors (e.g., satay and patty stalls). Replicability in semi-urban contexts hinges on managing spatial buffer zones and preventing nuisance factors (odor and vector risks) near adjacent residential neighborhoods. Facility design should utilize semi-closed modular structures with mesh screening and bio-slurry waste fermentation to neutralize odor before application to school gardens. This achieves an optimal balance between micro-scale meat production and direct community supply chains.

- **Urban School Contexts**

Urban schools face severe land scarcity, strict municipal zoning guidelines, and zero tolerance for public nuisances. Replicability in urban environments necessitates a paradigm shift from volume-driven horizontal farming toward compact vertical farming systems. Urban schools can adopt multi-tiered, climate-controlled indoor vertical cages equipped with automated waste-flushing mechanisms to eliminate odor. Although initial capital expenditure (CAPEX) for urban setups is higher, the project focus shifts strategically from mass meat production toward high-value educational STEM incubators,

experiential bio-learning and localized organic fertilizer production for urban rooftop gardens.

By adapting the facility footprint and operational focus to these geographic realities, local authorities and school administrators can utilize this model as a flexible, context-sensitive tool for local economic resilience and sustainable agricultural education.

CONCLUSION

This study concludes that the community economic development model based on social entrepreneurship through the rabbit farming project at SMITI Sains Bahrul Ulum is proven to be empirically viable. From an economic perspective, this initiative successfully generated self-sustaining financial viability through a net profit of RM1,736.30 in its first cycle and triggered secondary economic chains that directly benefit the local community through the sale of downstream products (Subhe, 2023; Yustika, 2019). However, social analysis reveals the existence of a pedagogical paradox and a skills mismatch among students, which demands more structured practical skills guidance interventions (Said & Jamaludin, 2019). Despite operational constraints such as a low breeding rate and space limitations that require smart technology adaptations (Saiz-Rubio & Rovira-Más, 2020), this model still successfully practiced sustainable circular economy practices by optimizing livestock waste as organic fertilizer (Cobo, Dominguez-Ramos, & Irabien, 2018; Koul, Yakoob, & Shah, 2022).

As a primary contribution to spatial planning and local government policy literature, this study asserts that the survival of grassroots social innovation initiatives is highly dependent on the support of a multi-entity strategic network ecosystem (Amanah et al., 2021). To realize the potential of replicating this model on a larger scale to other schools, this study urges policymakers, particularly local authorities, to review and restructure spatial zoning guidelines more flexibly. Recognizing that current institutional zoning rigidly restricts such activities, a policy shift towards Conditional Planning Permission is crucial. A spatial policy shift that allows the integration of micro-scale commercial agricultural activities within areas designated as educational institutions will not only resolve land use conflicts. A spatial policy shift that allows the integration of micro-scale commercial agricultural activities within areas designated as educational institutions will not only resolve land use conflicts but also elevate social entrepreneurship as a core strategy in holistically driving food security and local socioeconomic resilience.

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