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CAN SOCIETY 5.0 INSPIRE YOUTH TO BUILD A RESILIENT AGRO-BASED ECONOMY?

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Abstract: *The advent of Society 5.0 marks a transformative phase in which technology and human ingenuity converge to address socio-economic challenges. Within this context, revitalising the agro-based economy through digital innovation has become imperative. However, persistent youth reluctance to participate in agriculture poses a serious threat to the resilience and sustainability of national food systems. This paper explores how the core principles of Society 5.0, namely human-centred innovation, digital integration, and smart solutions, can serve as catalysts to reimagine agriculture as a modern, attractive, and future-oriented sector. Supported by empirical evidence, the discussion analyzes how income insecurity, limited access to technology, and negative social perceptions hinder youth engagement. The findings suggest that strategic alignment between digital transformation, inclusive policy frameworks, and youth empowerment initiatives can redefine the agro-based economy as a viable and progressive domain. Ultimately, embedding Society 5.0 principles in agricultural development is essential to cultivate a resilient, innovative, and food-secure future.*

Keywords: *Agro-based economy, Digital innovation in agriculture, Food system resilience, Society 5.0, Youth engagement*

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Introduction

The idea of Society 5.0 has drawn increasing interest among policymakers and scholars seeking to understand how technology can contribute to social progress. Rather than focusing solely on automation or efficiency, this framework views technological advancement as a tool to improve quality of life and support inclusive development (Hitachi Hyōron, 2014). In Japan, where the concept first emerged, Society 5.0 is seen as a human-centred response to social and economic challenges. Similar discussions have begun to appear in developing contexts, where the question is how far digital transformation can address long-standing issues such as inequality, productivity, and sustainability (UNESCO, 2024).

Agriculture provides a useful case for examining this shift. Although it remains vital to food security and rural livelihoods, the sector has struggled to attract young people. Studies show that youth often associate farming with hard labour, uncertain income, and low social status, even as digital tools create new opportunities for innovation and entrepreneurship (FAO, 2024). This tension reflects a broader debate about how to connect modern technological systems with traditional economic sectors. If left unresolved, declining youth participation may weaken national food systems and slow rural development.

This paper explores how the principles of Society 5.0 could help re-imagine the agro-based economy as more innovative, inclusive, and future-oriented. It examines how digital technologies, when combined with supportive policy and education, have encouraged youth to view agriculture as a viable career path. The discussion also considers possible barriers - such as limited access to technology, weak institutional support, and persistent social stigma - that must be addressed for transformation to occur. By analysing these dynamics, the paper contributes to ongoing debates about how societies can balance technological progress with human values and build a more resilient foundation for sustainable food systems.

Problem Statement

Malaysia's agro-based economy remains a vital contributor to national food security, employment, and rural development, yet it continues to face a steady decline in youth participation. Younger generations increasingly perceive agriculture as a traditional, low-income, and physically demanding sector, disconnected from modern aspirations or technological sophistication. Despite various Malaysian government initiatives such as Agropreneur Muda, Agrobank youth financing schemes, and the promotion of Smart Farming, the uptake among youth remains moderate, particularly in rural areas (Ministry of Agriculture and Food Security [MAFS], 2023). This situation signals a structural gap between national efforts to revitalise the sector and the lived realities of young Malaysians navigating an economy driven by digitalisation and innovation.

The emergence of Society 5.0, a Japanese-origin concept that integrates digital transformation with human-centered development, offers a framework for reimagining agriculture as a technologically advanced and socially inclusive domain. Technologies such as Internet of Things (IoT) - based smart farming, data analytics, and automation could transform agriculture into a dynamic field that aligns with youth preferences for innovation and sustainability. However, Malaysia's transition toward Society 5.0 ideals remains uneven. Limited digital literacy among rural youth, insufficient infrastructure, and fragmented institutional coordination hinder the widespread adoption of technology in agriculture (Ahmed et al., 2023; OECD, 2023). These gaps suggest that while the policy vision is strong, the translation into grassroots impact, especially among youth, remains underexplored.

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Against this background, it becomes necessary to examine the readiness and engagement level of Malaysian youth in adopting digital and innovative agricultural practices, as well as to analyse how youth engagement, technological, and institutional factors influence their participation and resilience in the agro-based economy. Understanding these dynamics is crucial for developing evidence-based policies and institutional mechanisms that could inspire a new generation of agropreneurs. By aligning the nation's agricultural transformation with the principles of Society 5.0, Malaysia can reposition its agro-based economy not only as a source of livelihood but also as a platform for innovation, sustainability, and youth empowerment.

Research Objectives and Research Questions

This study aims to explore how the principles and technological dimensions of Society 5.0 can inspire Malaysian youth to actively engage in building a resilient agro-based economy. Recognising the potential of digital transformation to modernise agricultural practices, this research focuses on assessing youth readiness, engagement, and the structural enablers that shape their participation. By integrating both primary and secondary data, the study seeks to provide empirical insights that can inform future policy and institutional frameworks toward sustainable agricultural innovation.

Research Objectives:

1. To evaluate the readiness and engagement level of Malaysian youths (aged 18–40) in adopting digital and innovative technologies aligned with the principles of Society 5.0 within the agro-based economy.
2. To analyse how youth engagement, technological, and institutional factors influence their participation and resilience in the agro-based economy.

Research Questions:

1. What is the level of readiness and engagement among Malaysian youth in adopting digital and innovative agricultural practices consistent with the Society 5.0 framework?
2. How do youth engagement, technological advancement, and institutional support influence the participation and resilience of young people in the agro-based economy?

In addressing these questions, the study aims to uncover the conditions under which digital transformation can become a catalyst for youth-led agricultural development. It also intends to identify barriers and opportunities that could shape Malaysia's transition toward a more inclusive, technology-driven, and future-oriented agro-economy. The outcomes are expected to contribute to the broader discourse on how Society 5.0 can serve as both a conceptual and practical pathway for enhancing resilience and innovation within Malaysia's agricultural sector.

Literature Review

Conceptualising Society 5.0 in Agriculture

The notion of Society 5.0, originally developed in Japan, captures a vision of a human-centred, high-tech society in which digital systems (big data, IoT, AI) and physical workspaces are integrated to solve social and economic challenges (Saha, 2025). In Malaysia, this vision has begun to inform policy discourse, emphasising that technology should serve people rather than replace them (IYRES, 2021). Within agriculture, the shift from conventional methods toward "Smart Farming" or "Agriculture 5.0" reflects this orientation. The technologies such as precision farming, remote sensors, automated systems and data analytics aim to reduce labour

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burdens, increase productivity, and attract younger workers (Arieff et al., 2024). However, scholars caution that the mere presence of technology does not guarantee societal benefit where adoption depends equally on institutional structures, human skills and cultural acceptance (Shahidi Hamedani et al., 2024). Thus, a conceptual framing for this study acknowledges both the promise of Society 5.0 and the necessity of contextual enablers.

Youth Participation in Agriculture: Motivation, Barriers, and Opportunities

Youth engagement in agriculture remains a global concern, and Malaysia is no exception. Studies show that young Malaysians often view farming as low-income, physically demanding, and socially less prestigious than other professions (Adenan et al., 2015). A recent empirical study found that key factors affecting youth engagement include age, prior agricultural exposure, perceived status of farming careers and availability of land or resources (Shaari et al., 2025). Moreover, Malaysia's ageing farmer population (with many above 60) further emphasises the urgency of youth incorporation (Kaur, 2025). On the other hand, the rise of agri-technology presents an opportunity: one study of university students found that attitude, knowledge and awareness strongly influenced acceptance of smart-farming technologies (Majid et al., 2025). These findings suggest that bridging the gap between youth aspirations and agricultural practice requires more than subsidies; it demands transformation of perception, opportunity structure and technological readiness.

Technological and Institutional Enablers of Youth Engagement

Technological readiness and institutional support are widely regarded as crucial for linking youth to modern agriculture. In Malaysia, a scoping review on smart farming adoption documented that while interest is high, barriers, such as high initial investment cost, limited digital literacy and weak connectivity in rural areas, persist (Zhahir et al., 2024). A qualitative study among smallholder farmers in Sarawak and Sabah identified similar constraints: small farm size, connectivity challenges and lack of technical expertise blocked uptake of smart farming (Dibbern et al., 2024). On the institutional side, policies such as the Young Agropreneur & National Blue Ocean Strategy highlight government recognition of youth under-representation in agriculture and the need for targeted land and resource access programmes (Adenan et al., 2015). More recently, the Ministry of Agriculture and Food Security stated a commitment to attract youth via modern technology such as drones and smart systems (Malay Mail, 2024). These developments reflect a shift toward aligning institutional frameworks with the Society 5.0 agenda. Yet, previous researches suggest that unless the institutional ecosystem (training, financing, mentoring, markets) is aligned, technological systems alone fail to generate sustainable youth engagement (Shahidi Hamedani et al., 2024).

Youth-led Agro-Economy and Resilience

Resilience in agro-based economies refers to the sector's capacity to adapt to shocks (labour shortage, climate change, market volatility) and maintain productivity. Youth involvement and digital innovation can simultaneously serve this goal: young people bring adaptability, innovation orientation and willingness to embrace technology; smart farming provides efficiency and data-driven decision-making that can counteract labour decline and productivity stagnation (Ahmad et al., 2023). In Malaysia's granary zones, however, youth involvement remains modest (7.4 % of paddy farmers aged 20-29 in certain areas) and many farmers remain small-scale (< 2 ha), limiting potential resilience gains (Shaari et al., 2025). Thus, achieving resilience requires not only adoption of technology and youth inclusion but also embedded institutional and economic structures: access to markets, finance, training, and networks that sustain participation over time. In this way, the interplay among youth engagement, technology

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adoption, and institutional support becomes central to repositioning agriculture as a resilient, future-oriented sector.

Research Gap and Justification

While the literature covers youth attitudes, smart-farming technology adoption and institutional frameworks, several gaps remain. First, there are limited empirical studies that link these three domains (youth engagement, digital technology and institutional support) specifically in the Malaysian agro-based sector. Second, few studies address how the Society 5.0 concept can be applied operationally within agriculture to engage youth and enhance resilience. Third, existing research often focuses on either technology or youth in isolation, but not the structural interaction between technology, institutional conditions and youth behavioural readiness. This study aims to fill these gaps by adopting a mixed-methods design to assess readiness and engagement among Malaysian youth (18-40), and to analyse how technological and institutional factors influence participation and resilience in the agro-based economy. In doing so, it positions itself at the intersection of youth studies, agricultural innovation and digital society scholarship.

Methodology

This study adopts a mixed-methods research design to examine whether the principles of Society 5.0 can inspire Malaysian youth to participate in the agro-based economy. The integration of quantitative and qualitative approaches enables a comprehensive understanding of both the measurable and contextual aspects of youth engagement. Quantitative methods are used to identify behavioural patterns and structural factors influencing participation, while qualitative inquiry explores the motivations, perceptions, and institutional contexts that shape young people's attitudes toward agriculture in the era of digital transformation.

The quantitative component involves two main data sources. First, a structured survey is conducted among Malaysian youths aged 18–40 across several states representing diverse agricultural, socio-economic, and geographical settings. The survey measures variables such as awareness of Society 5.0 concepts, technological readiness, and attitudes toward agriculture as a career option. Second, secondary data are collected from credible sources, including annual reports of relevant ministries (e.g., the Ministry of Agriculture and Food Security), official publications from government agencies such as MARDI and MAFS, and peer-reviewed journal articles. These sources provide supplementary evidence on national initiatives such as Agropreneur Muda, smart farming programmes, and digital transformation policies that influence youth participation in agriculture.

The qualitative component complements the quantitative analysis through semi-structured interviews and focus group discussions with selected respondents, agricultural entrepreneurs, and policy stakeholders. Data from both strands are analysed using descriptive and inferential statistics for the quantitative portion, and thematic analysis for qualitative narratives. Triangulation of these findings allows the study to draw robust, evidence-based conclusions and formulate policy recommendations to strengthen youth involvement in a Society 5.0-driven agro-based economy. Ethical approval and informed consent procedures are observed throughout the research process to ensure credibility and integrity.

Findings and Discussion

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Objective 1: Examining the Level of Youth Participation in Malaysia's Agricultural Sector

Understanding youth participation in Malaysia's agricultural sector requires moving beyond surface-level indicators to interrogate how social structures, policy design, and economic transitions intersect to shape engagement. While the Malaysian government has consistently promoted youth inclusion through initiatives such as the Agropreneur Muda Programme and the National Agrofood Policy 2.0 (NAP 2.0), the actual proportion of young people participating in agriculture remains modest. According to the Ministry of Agriculture and Food Security (2023), fewer than 15% of active farmers are under 40 years of age—a striking imbalance given that youth represent a significant portion of the national workforce.

This demographic pattern illustrates what scholars have termed the "ageing agriculture phenomenon," a condition that not only constrains productivity but also jeopardises intergenerational knowledge transfer (Samsuddin & Omar, 2020). Structural challenges such as limited access to land, inadequate financing mechanisms, and perceived social stigma surrounding farming, have contributed to this decline (Rahman, 2023). Yet, the issue is not solely about opportunity; it is deeply entangled with identity formation and the evolving social meaning of agricultural work in a modern, digitalised society.

Shariff et al. (2025) argue that young Malaysians increasingly perceive agriculture as misaligned with their aspirations for professional status and urban mobility. However, field-based studies in Kedah's granary zones indicate a more complex picture: some youths express conditional interest in agriculture when it is associated with modern technology, entrepreneurship, or sustainable practices. This reflects the broader theoretical shift towards agrarian transformation, which posits that agricultural engagement must be situated within changing socio-economic relations and the rise of knowledge-intensive production (Bryceson, 2019).

Importantly, participation levels vary significantly across sub-sectors. Aquaculture and livestock have witnessed relatively stronger youth involvement, partly due to lower start-up costs and quicker turnover, while crop-based sub-sectors such as paddy cultivation remain dominated by older farmers (Budiyoko et al., 2023). Gender dynamics add another layer of complexity: young women often contribute in invisible yet pivotal roles in agri-processing, product marketing, and cooperative management (de Jong, 2020).

If participation is understood not merely as employment but as agency, i.e. the capacity to innovate, lead, and transform agricultural systems, then Malaysia's youth engagement remains underdeveloped. Bessant & Watts (2023) suggest reframing youth participation as an active socio-political process rather than a static demographic indicator. Within the Society 5.0 vision, which emphasises human-centred technological advancement, this redefinition becomes crucial. Integrating digital tools such as smart farming, precision monitoring, and e-market platforms could reimagine agriculture as a viable, knowledge-driven enterprise rather than a fallback option.

Nevertheless, the challenge persists in ensuring that access to such technologies and innovations is equitable. Many rural youths still lack connectivity, technical training, or mentorship structures that would enable them to harness digital agriculture effectively. This tension between technological optimism and structural exclusion forms a critical fault line in Malaysia's attempt to rejuvenate its agricultural workforce.

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Objective 2: Identifying Key Drivers and Barriers to Youth Engagement in Agriculture

Understanding why young Malaysians either participate or refrain from entering the agricultural sector requires an exploration of the underlying drivers and deterrents. These factors are multidimensional - spanning socio-economic, institutional, and cultural domains. Several studies have shown that economic viability remains the most decisive factor influencing youth engagement. When agricultural incomes lag behind those of non-agricultural sectors, young people rationally gravitate toward urban employment (Obayelu et al, 2022). Yet, monetary considerations alone cannot explain the full picture. Issues of prestige, identity, and perceived modernity play equally influential roles.

Globally, comparative evidence reveals that youth engagement flourishes when agriculture is rebranded as an innovative and entrepreneurial field. Japan's "Smart Agriculture" initiative, for instance, has successfully revitalised rural participation through robotics, data-driven irrigation, and youth-led cooperatives that align with Society 5.0 principles (OECD, 2023). Similarly, Indonesia's "Millennial Farmer Movement" integrates social media and digital platforms to connect young farmers with markets and investors, fostering both income generation and social recognition (Wulandari et al, 2025). These experiences demonstrate that participation rises when agriculture intersects with technology, entrepreneurship, and community empowerment. Malaysia's policy environment reflects awareness of these trends but has struggled with consistent implementation. While programmes such as Agropreneur Muda offer start-up grants and training, their long-term sustainability and scalability remain uncertain. Bureaucratic procedures and fragmented institutional coordination often weaken the intended impact (EPU, 2020). Moreover, a lack of follow-up mentoring after initial training phases tends to result in short-lived participation rather than sustained engagement.

Cultural attitudes further compound the issue. Many rural families continue to associate success with urban professions, inadvertently discouraging youth from considering agriculture as a progressive career. Yet, as the COVID-19 pandemic disrupted urban employment, a small resurgence of interest in agribusiness and home-based food production was observed among younger Malaysians (Pallianysamy et al., 2025). This temporary shift underscores the latent potential that could be harnessed if structural constraints were effectively addressed.

From a theoretical standpoint, the push-pull framework helps explain these dynamics. Economic pressures, such as rural unemployment (push factors), may drive youth toward agriculture, but only if sufficient pull factors, such as access to capital, markets, and technology, make the sector attractive. In Malaysia, the imbalance between push and pull factors explains the inconsistent participation rates observed across states.

Critically, to align with the Society 5.0 paradigm, agricultural engagement must evolve beyond traditional production to encompass value chain innovation, circular economy practices, and digital entrepreneurship. Malaysia could adapt Japan's model of Smart Villages, which integrate agricultural production with renewable energy and ICT, to foster rural economic ecosystems that appeal to educated youth. Indonesia's experience also highlights the value of peer-based digital communities that normalise agriculture as a "cool" and future-oriented profession.

Therefore, fostering meaningful youth participation requires structural, cultural, and technological synchronisation. This means expanding access to land and financing, embedding entrepreneurship education within agricultural curricula, and fostering intergenerational

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mentorship networks. Policy must also prioritise inclusivity, ensuring that young women and marginalized rural groups can equally benefit from the technological turn.

Ultimately, while external models provide valuable insight, Malaysia's pathway must be locally grounded, that is responsive to its specific demographic realities, institutional contexts, and cultural norms. The lessons from Japan and Indonesia should thus be seen as adaptable frameworks rather than prescriptive solutions. By aligning agricultural innovation with youth aspirations and digital fluency, Malaysia has the potential to revitalise its rural economy while contributing to the broader Society 5.0 vision of human-centred technological progress.

Conclusion

The findings from this study highlight that revitalising Malaysia's agro-based economy through youth participation cannot rely solely on traditional incentive mechanisms. While the nation has introduced programmes such as Agropreneur Muda and Smart Farming Initiatives, these efforts remain fragmented without an overarching strategy that unites digital innovation, social inclusion, and long-term sustainability. What emerges from the evidence is that youth engagement must be reframed, not merely as participation in production but as a dynamic process of knowledge creation, entrepreneurship, and technological adaptation. Within the broader framework of Society 5.0, agriculture should be seen as a frontier of human-centred innovation where digital tools enhance both productivity and social well-being.

To advance this transformation, several policy directions merit emphasis. First, digital infrastructure in rural regions must be strengthened to close the technological divide that limits youth access to smart farming applications and digital markets. Equitable connectivity is foundational to ensuring that innovation does not remain an urban privilege. Second, agricultural education should evolve from a focus on technical training toward multidisciplinary learning that integrates entrepreneurship, data analytics, and sustainability science. Universities and vocational institutes could collaborate with industry players to co-develop experiential modules and living-lab programmes where students apply emerging technologies in real agricultural settings. Such experiential learning can help reposition agriculture as a forward-looking profession compatible with modern aspirations.

Third, institutional mechanisms must be redesigned to provide consistent post-training support. Many youth programmes in Malaysia struggle with continuity; mentorship networks, peer-to-peer learning communities, and access to microfinancing would address this gap. Policymakers may also consider a Youth Agri-Innovation Fund dedicated to scaling pilot projects that demonstrate the integration of digital technology with local ecological practices. Complementing this, inter-agency coordination between the Ministry of Agriculture and Food Security, the Ministry of Youth and Sports, and the Ministry of Science, Technology, and Innovation would help align digital agriculture initiatives with broader national transformation plans.

At a strategic level, Malaysia could draw on Japan's Society 5.0 Smart Villages model, but adapt it to local socio-economic realities. This would entail embedding digital agriculture within community ecosystems that combine renewable energy, e-commerce, and circular economy practices. Similarly, Indonesia's experience in fostering youth-led digital cooperatives could inform Malaysia's efforts to build scalable, locally governed innovation hubs in rural districts. These international lessons, however, must be localised to ensure that Malaysia's unique demographic structure, cultural attitudes, and land tenure systems are adequately considered.

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Finally, to sustain youth engagement, agriculture must be reframed in the public imagination as a sector of innovation, environmental stewardship, and social impact. Communication strategies, particularly through digital media, can highlight success stories of young agro-entrepreneurs who embody this modern identity. Such narrative transformation, when combined with policy reforms and institutional realignment, may foster a new generation of Malaysian youths who see agriculture not as a sector of last resort but as a viable, intelligent, and future-oriented vocation.

In essence, Malaysia's journey toward aligning its agro-based economy with Society 5.0 ideals will depend on the nation's ability to balance technological advancement with inclusivity and sustainability. By cultivating digitally literate, entrepreneurial, and resilient young agropreneurs, Malaysia has the potential to not only secure its food system but also to model a human-centred approach to agricultural innovation within the region.

Future Research Directions

Future research should consider adopting a longitudinal design to assess how youth perceptions and participation evolve as Society 5.0-related policies mature. Quantitative surveys could be complemented with ethnographic or participatory approaches to capture the lived experiences of young farmers and entrepreneurs across Malaysia's diverse agro-ecological zones. Moreover, comparative studies with regional counterparts, such as Japan, Indonesia, or Thailand, could provide deeper insights into how different policy ecosystems shape youth-led agricultural innovation. Such research would contribute to both theoretical understanding and practical application by revealing how digital transformation intersects with social resilience in the context of agricultural modernization.

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