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DETERMINANTS OF WILLINGNESS TO VENTURE INTO URBAN FARMING AMONG MALAYSIAN URBAN CITIZENS: A QUANTITATIVE ANALYSIS BASED ON THE THEORY OF PLANNED BEHAVIOUR

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Abstract: *Urban farming has gained prominence as a strategic response to Malaysia's rising food security concerns, urban sustainability challenges, and increasing dependency on external food sources. Despite these pressing national needs, public willingness to engage in urban farming remains low, prompting the need for a focused behavioural investigation. This quantitative study examines the determinants influencing Malaysian urban citizens' willingness to venture into urban farming (WLN) using the Theory of Planned Behaviour (TPB) as the guiding framework. A structured questionnaire, developed from qualitative insights and validated through pilot testing, was administered to 200 urban residents across ten major cities in Peninsular Malaysia. Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4 was employed to test the relationships between five key constructs: Awareness (AWR), Non-Monetary Benefits (NMB), Monetary Benefits (MBS), Interest (INT), and Barriers and Challenges (BAR). The findings indicate that AWR and NMB are the strongest predictors of WLN, highlighting the roles of knowledge, environmental consciousness, social engagement, and perceived lifestyle improvement in shaping behavioural intention. MBS and INT also demonstrated significant positive effects, suggesting that individuals are additionally motivated by economic gains and personal enthusiasm for farming activities. Conversely, BAR was found to have an insignificant influence, implying that perceived obstacles such as space limitations, time constraints, or technical concerns do not substantially inhibit intention when motivational factors are strong. These results reinforce the relevance of the TPB framework in explaining pro-environmental behaviour and contribute to theoretical understanding by extending TPB into the domain of urban agriculture in a tropical, developing-country context. The findings provide actionable insights for policymakers, urban planners, and industry stakeholders to prioritize awareness-raising initiatives, community-based programs, training opportunities, and economic incentives to strengthen Malaysia's urban farming ecosystem.*

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Keywords: *Urban farming; Theory of Planned Behaviour; PLS-SEM; Sustainability; Urban food security*

Introduction

Malaysia's food system is facing increasing vulnerability due to rapid urbanization, low self-sufficiency levels, and rising dependence on food imports. In 2023 alone, Malaysia imported RM 78.79 billion worth of food and beverages despite being a tropical country with strong agricultural potential (DOSM, 2025a; Dardak, Haimid, & Masdek, 2020). The national Self-Sufficiency Ratio (SSR) for vegetables remains only 45.4%, reinforcing structural dependency and highlighting the need to expand domestic production capacity (CodeBlue, 2025). Rapid urbanization (projected to reach 80% of the population by 2030) further strains food access for urban households, especially the B40 income group, who spend a considerable proportion of income on food (World Bank, 2021; DOSM, 2025b). As a result, urban farming has increasingly been discussed as a sustainable mechanism to improve local food availability, affordability, and stability (Rezai, Shamsudin, & Mohamed, 2016; Tang, Slimani, Al-Ghazal, Talukdar, & Maharjan, 2023).

Despite strong potential, participation in urban farming remains low. Research indicates barriers including inadequate farming space, knowledge gaps, high initial setup costs, and weak institutional support (Ali & Vaipppuri, 2022; Khan, 2023). Existing literature is largely technical—hydroponics, aeroponics, vertical farming—while behavioural adoption remains insufficiently studied (Kozai, Niu, & Takagaki, 2016; Lakhiar, et al., 2020). This is a critical oversight because urban citizens, not traditional farmers, represent the primary drivers of adoption (Rabu & Muhammad, 2015; Albab, 2025).

The Theory of Planned Behaviour (TPB) provides an appropriate behavioural framework to understand willingness to adopt urban farming. TPB posits that intention is shaped by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Previous Malaysian agricultural studies confirm its relevance in predicting youth and community participation (Tiraieyari & Krauss, 2018; Muhammad, Chandran, & Keshminder, 2021). However, its application to general urban citizens' willingness to venture into urban farming at scale remains limited.

Although TPB has been applied previously in Malaysian agricultural behaviour studies, most research remains limited to student groups, community farmers, or youth samples, leaving mainstream urban populations largely unexplored. This gap is significant because food security reform requires widespread citizen participation, not only among individuals already exposed to agriculture. Additionally, existing TPB applications rarely incorporate context-specific determinants such as awareness, monetary and non-monetary benefits, lifestyle compatibility, or perceived constraints. Current literature often treats technical feasibility, behavioural intention, and management strategies separately, but no study integrates these elements into a unified decision-to-adoption model. Therefore, extending TPB using empirically derived variables offers a needed advancement in understanding willingness and modelling adoption pathways relevant to urban food resilience.

This study therefore aims to identify the determinants of willingness to venture into urban farming among urban citizens across ten Malaysian cities. Using Partial Least Squares Structural Equation Modelling (PLS-SEM), this research evaluates how awareness, perceived

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benefits, interest, and perceived barriers influence adoption intention. The findings contribute to theoretical extension of TPB and provide actionable insights for policy, community development, and urban agriculture planning.

Literature Review

Urban Farming and Food Security Challenges in Malaysia

Malaysia's food system is increasingly vulnerable due to rapid urbanization, population growth, and a high dependency on imported food. In 2023, Malaysia's food and beverage imports reached RM 78.79 billion, indicating structural dependence despite suitable climatic conditions for domestic food production. The vegetable Self-Sufficiency Ratio (SSR) remains at only 45.4%, contributing to food insecurity pressures, particularly in cities such as Kuala Lumpur, Johor Bahru, and Penang, where dense populations face high living costs and rising food prices. Research consistently shows that urban farming can enhance food availability, affordability, and nutritional diversity while reducing environmental stress and strengthening community ties (Grebitus, Chenarides, Muenich, & Mahalov, 2020). However, local studies also highlight persistent barriers including land constraints, rising setup costs, and policy-related restrictions (Hussain, Yusoff, Tukiman, & Samah, 2019). These issues underscore the need for deeper behavioural analysis to understand the drivers of public engagement in urban farming.

Behavioural Dimensions of Urban Farming Adoption

Urban farming adoption is strongly influenced by psychosocial, economic, and attitudinal factors. Malaysians often associate urban farming with health benefits, access to fresh produce, environmental contribution, and improved wellbeing, echoing findings from Grebitus et al. (2020), who reported that 73% of perceptions toward urban farming were positive, emphasizing sustainability, freshness, and community value. Social influence also plays an important role: community engagement, peer encouragement, and institutional support have been identified as catalysts for participation (Poulsen, Spiker, & Winch, 2014). Conversely, perceived barriers, including high initial costs, limited space, time constraints, and lack of technical skills, reduce engagement, as documented in several Malaysian studies (Othman, Mohamad, Latip, & Ariffin, 2018; Othman, Latip, & Ariffin, Motivations for sustaining urban farming participation, 2019). These behavioral aspects highlight the need for predictive modelling to identify the most influential determinants of willingness to engage in urban farming.

Theory of Planned Behaviour (TPB) in Agricultural and Sustainability Studies

The Theory of Planned Behaviour (TPB) is widely applied in sustainability behaviour research and provides a strong theoretical foundation for examining behavioural intention. In Malaysia, TPB has been validated in predicting participation in urban agriculture. Tiraieyari and Krauss (2018), for example, demonstrated that attitudes, subjective norms, career motives, and perceived barriers significantly shape youth involvement in urban agriculture. Similarly, Muhammad et al. (2021) found that subjective norms and publicity most strongly predicted intention to engage in community urban farming.

However, TPB applications have focused mainly on students, community farmers, and structured gardening groups but not general urban citizens, who represent Malaysia's largest potential adopter group. This gap indicates a need to expand TPB by integrating context-specific factors such as non-monetary benefits (e.g., mental wellbeing, environmental contribution), technological readiness, and lifestyle compatibility, many of which emerged prominently in qualitative insights.

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Gaps in Existing Research and the Need for Quantitative Modelling

Several gaps remain in Malaysia's urban farming literature:

- Limited focus on general urban populations: Most TPB studies focus on niche groups; mainstream urban citizens remain underexplored despite being vital to national food security.
- Lack of integration between TPB constructs and contextual determinants: Non-monetary benefits, climate awareness, digital farming tools, and lifestyle factors are not yet modelled quantitatively.
- Insufficient empirical testing of behavioural predictors: While qualitative studies identify motivations and barriers, they cannot determine which factors most strongly predict willingness.

While existing research has successfully demonstrated the benefits and constraints of urban farming, much of the literature remains fragmented, presenting findings descriptively rather than theoretically unified. For example, studies acknowledge the importance of health benefits, community belonging, and fresh food access (Grebitus, Chenarides, Muenich, & Mahalov, 2020; Poulsen, Spiker, & Winch, 2014), yet few critically compare which behavioural drivers exert stronger influence and under what conditions adoption becomes viable. Similarly, Malaysian research identifies barriers such as space and cost (Othman, Latip, & Ariffin, 2019), but does not empirically evaluate whether these constraints significantly reduce willingness, highlighting the need for comparative statistical testing rather than purely narrative reporting. Therefore, a stronger synthesis of past findings is essential, not only to describe what influences urban farming intention, but to evaluate how these elements interact and which are most behaviourally consequential.

To respond to this gap, the present study proposes a conceptually integrated behavioural model, where TPB constructs (Attitude, Subjective Norm, Perceived Behavioural Control) are combined with four context-specific antecedents: Awareness, Monetary Benefits, Non-Monetary Benefits, Interest, and Barriers. Unlike past studies that examine motivation or constraints in isolation, this model positions these variables simultaneously to identify dominant predictors of intention. A conceptual diagram of the proposed model should therefore be included to illustrate the hypothesised relationships and demonstrate theoretical extension.
This framework supports a data-driven, predictive PLS-SEM model tailored to Malaysia's urban context and helps guide policy, community planning, and the development of sustainable urban farming management strategies.

Methods

Research Design

This study employed a quantitative, cross-sectional survey design to examine the determinants influencing Malaysian urban citizens' willingness to venture into urban farming. The quantitative phase was part of a sequential exploratory mixed-method process, but this paper reports only the quantitative component. The research instrument used in this phase was developed based on the qualitative findings from semi-structured interviews and supported by constructs from the Theory of Planned Behaviour (TPB) to ensure conceptual alignment. Data were collected from urban residents across Peninsular Malaysia between April and June 2024 using a structured questionnaire. Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS 4 was used to test the hypothesized relationships among constructs.

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Population and Sampling

The target population consisted of Malaysian urban citizens aged 20 years and above, as individuals in this age group are generally capable of independent decision-making, financial responsibility, and participation in work- or business-related activities. Previous studies indicate that individuals above age 20 possess adequate cognitive maturity to make informed choices about economic and lifestyle behaviours (Arnett, 2000). Urban areas were defined according to each local council's administrative categorization to ensure consistency with national definitions of urban regions.

A purposive sampling approach with intercept data collection was used to ensure that only urban residents meeting eligibility criteria participated. Respondents were approached in major urban centres where foot traffic is high, such as shopping malls, public transport hubs, universities, and community spaces. When face-to-face participation was not feasible, the questionnaire link was provided via mobile device using a Google Form. The study initially gathered 204 responses; however, four were excluded due to zero standard deviation across all items, indicating non-engagement and invalid responses, resulting in a final sample of 200 valid respondents.

Purposive sampling was selected because the objective of this study required direct access to urban residents who are potential adopters of urban farming, rather than the general population. Random sampling would increase representational breadth, but it risks inclusion of non-urban or uninterested respondents, weakening behavioural inference. Purposive sampling therefore ensured relevance, accessibility, and topic familiarity which critical for behavioural intention modelling under TPB where cognitive awareness and exposure are prerequisites for meaningful response. Moreover, urban residents were targeted strategically at high-density public locations to maximize diversity within the sampling frame while maintaining construct validity.

Sampling locations included ten major cities in Peninsular Malaysia: Kuala Lumpur, Petaling Jaya, Shah Alam, Klang, Subang Jaya, Kajang, Ampang Jaya, Seremban, Ipoh, and Johor Bahru. Compared to the qualitative phase, additional cities such as Kajang and Ampang Jaya were included due to the larger sample size requirement and practical feasibility of accessing respondents.

Instrument Development

The survey instrument was developed directly from the qualitative findings and aligned with TPB constructs (attitude, subjective norms, and perceived behavioural control). The following key constructs were operationalized:

- Awareness (AWR): Knowledge and familiarity with urban farming, public exposure, and understanding of its benefits.
- Non-Monetary Benefits (NMB): Perceived advantages not related to direct income, such as health improvements, environmental contribution, and stress reduction.
- Monetary Benefits (MBS): Expected financial gains, cost savings, or income-generating potential.
- Interest (INT): Personal enthusiasm, curiosity, and motivation to engage in urban farming.
- Barriers (BAR): Perceived constraints such as lack of space, time, or technical skills.
- Willingness to Venture (WLN): The dependent variable representing intention to participate in urban farming activities.

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Each construct was measured using multiple Likert-scale items (1 = strongly disagree, 5 = strongly agree). Demographic items, including age, gender, city of residence, income group, education level, and weekly available time for urban farming, were also included. The questionnaire was first prepared in English and then translated into Malay to ensure comprehension across diverse linguistic backgrounds.

To enhance instrument transparency, sample Likert-scale items are presented below. Examples include:

- AWR: "I am aware of urban farming initiatives available in my city."
- NMB: "Urban farming can reduce stress and improve wellbeing."
- MBS: "Urban farming can lower my monthly food expenses."
- INT: "I would like to try growing food using modern urban farming methods."
- BAR: "I do not have enough space or resources to start urban farming."
- WLN: "I am willing to participate in urban farming if given the opportunity."

These item examples illustrate the operationalisation of constructs and allow replication by future researchers.

Pretest and Pilot Study

The questionnaire was constructed based on qualitative themes and TPB constructs, translating interview-derived concepts into measurable items across six variables: awareness, non-monetary benefits, monetary benefits, interest, barriers, and willingness to venture. All items used a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Content clarity was evaluated through a pretest (n=10) and refined, followed by a pilot test (n=30) to assess reliability and internal consistency. Cronbach's alpha and corrected item-total correlations exceeded the required thresholds ($\alpha \geq .70$; $r \geq .30$), indicating strong reliability(Tavakol & Dennick, 2011; Taber, 2018). No items were removed, and only minor wording adjustments were made before full deployment.

Data Collection Procedures

Data were collected over a three-month period from April to June 2024 using both face-to-face and virtual approaches. For face-to-face collection, the researcher intercepted eligible individuals in public spaces, provided a brief explanation of the study, obtained verbal consent, and guided respondents through completing the survey. For participants who preferred digital access, the Google Form version of the questionnaire was shared on the spot. All completed surveys were manually transcribed into an Excel spreadsheet and cross-checked three times to minimize transcription errors. Standard deviation screening identified four invalid responses, which were removed. The dataset was also checked for duplicates and missing values; none were found.

Data Analysis Techniques

Data were analysed using SmartPLS 4 following a two-stage approach:

- **Measurement Model Assessment**
  - Reliability (Cronbach's Alpha, Composite Reliability)
  - Convergent validity (Average Variance Extracted – AVE)
  - Discriminant validity (Fornell–Larcker and HTMT criteria)
- **Structural Model Assessment**
  - Path coefficients (β)
  - Coefficient of determination (R^2)

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- Effect size (f^2)
- Predictive relevance (Q^2)
- Bootstrapping (5,000 subsamples) for significance testing

This approach follows guidelines by Hair, Hult, Ringle, and Sarstedt (2019) and is appropriate for exploratory modelling and theory development.

Results and Findings

This section presents the sample characteristics and descriptive profile of Respondent follow by the results of the measurement model and structural model assessments using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 4. A total of 200 valid responses were analysed following data screening procedures. The analysis followed the two-step approach recommended by Hair et al. (2019).

Sample Characteristics and Descriptive Profile of Respondents

A total of 204 responses were collected, and after data screening, where four responses were removed due to zero variation across answers, 200 valid samples remained for analysis. Respondents were drawn from 10 major urban cities in Peninsular Malaysia, representing some of the most populated and economically active areas. These locations were selected based on accessibility and feasibility of data collection, given the need to gather a sufficiently large sample within a limited time frame.

The sample includes only individuals aged 20 years and above, as this age group typically enters the workforce and household decision-making stage, making them more relevant for studying behavioural intentions toward urban farming. The demographic distribution reflects a realistic cross-section of Malaysia's urban environment, with diversity in ethnicity, gender, education level, and income range (Table 1).

Overall, the dataset demonstrates adequate heterogeneity and statistical suitability for PLS-SEM analysis. The diversity in respondent backgrounds provides a solid foundation for examining the behavioural predictors of willingness to venture into urban farming within the TPB framework.

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Table 1: Summary of Respondent Profile (n = 200)

Category	Sub-Category	Frequency (n)	Percentage (%)
City of Residence	Kuala Lumpur	38	19.0
	Petaling Jaya	24	12.0
	Shah Alam	21	10.5
	Subang Jaya	20	10.0
	Klang	19	9.5
	Kajang	18	9.0
	Ampang Jaya	17	8.5
	Johor Bahru	17	8.5
	Seremban	13	6.5
	Ipoh	13	6.5
Age Group	20–29 years	100	50.0
	30–39 years	56	28.0
	40–49 years	30	15.0
	≥50 years	14	7.0
Gender	Male	140	70.0
	Female	60	30.0
Ethnicity	Malay	114	57.0
	Chinese	46	23.0
	Indian	34	17.0
	Others	6	3.0
Education Level	Diploma / STPM	56	28.0
	Bachelor's Degree	90	45.0
	Master's Degree	44	22.0
	Doctorate	10	5.0
Employment Status	Employed	194	97.0
	Unemployed / Student	6	3.0
Monthly Income	< RM 3,000	42	21.0
	RM 3,001–6,000	72	36.0
	RM 6,001–10,000	54	27.0
	> RM 10,000	32	16.0
Time Available for Urban Farming	<1 hour/week	46	23.0
	1–3 hours/week	82	41.0
	4–6 hours/week	42	21.0
	>10 hours/week	30	15.0

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Measurement Model Assessment

The measurement model was evaluated to ensure the reliability and validity of all constructs before examining the structural relationships. Indicator reliability was first assessed through outer loadings. Indicators with loadings above 0.70 were considered satisfactory, reflecting that each item contributed substantially to its underlying construct (Hair, Risher, Sarstedt, & Ringle, 2019). Items with loadings between 0.60 and 0.70 were retained when theoretically justified and when their removal did not significantly improve reliability, which aligns with common guidelines in exploratory behavioural research (Hair, et al., 2021). Overall, the retained items demonstrated acceptable reliability levels, supporting their adequacy for measuring Awareness, Non-Monetary Benefits, Monetary Benefits, Interest, Barriers and Challenges, and Willingness to Venture.

Internal consistency reliability was examined using Cronbach's Alpha and Composite Reliability (CR). Both indices exceeded the recommended threshold of 0.70 for all constructs, indicating strong internal coherence among items (Hair, Risher, Sarstedt, & Ringle, 2019). CR values were consistently above 0.80, demonstrating high reliability and stability of the measurements across constructs. This confirms that the constructs were measured with precision and consistency, fulfilling the internal reliability requirement for PLS-SEM measurement models.

Convergent validity was evaluated using the Average Variance Extracted (AVE). All AVE values surpassed the minimum threshold of 0.50, meaning that each construct explained more than half of the variance in its indicators (Hair, Risher, Sarstedt, & Ringle, 2019). This signifies adequate convergence and confirms that the items within each construct share substantial common variance. The AVE results further validate the conceptual coherence of the constructs used in this study.

Discriminant validity was assessed using the Heterotrait–Monotrait ratio of correlations (HTMT). All HTMT values fell below the recommended upper limit of 0.85, indicating that the constructs were empirically distinct from one another (Henseler, Ringle, & Sarstedt, 2015). This ensures that the constructs do not overlap conceptually and that each measures a unique aspect of the factors influencing willingness to venture into urban farming. Meeting HTMT criteria confirms the robustness of the measurement model in maintaining construct distinctiveness.

Collectively, the results confirm that the measurement model demonstrates strong indicator reliability, solid internal consistency, adequate convergent validity, and clear discriminant validity. These findings affirm that the measurement structure is methodologically sound and appropriate for advancing to the structural model assessment using PLS-SEM.

Structural Model Assessment

The structural model was evaluated to determine the significance and strength of relationships between the constructs predicting Willingness to Venture into Urban Farming (WLN). Prior to hypothesis testing, collinearity was assessed using the Variance Inflation Factor (VIF). All VIF values were below the acceptable threshold of 5.0, indicating no multicollinearity issues among the predictor constructs (Hair, Risher, Sarstedt, & Ringle, 2019). This confirms that each construct contributed uniquely to predicting WLN and that the structural paths could be interpreted reliably (Table 2).

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The coefficient of determination (R^2) for WLN was 0.612, demonstrating that the five predictors (Awareness (AWR), Non-Monetary Benefits (NMB), Monetary Benefits (MBS), Interest (INT), and Barriers (BAR)) collectively explained 61.2% of the variance in willingness to venture into urban farming. Based on established guidelines, this represents a moderate to substantial level of explanatory power for behavioural intention studies (Chin, 2010; Hair, Risher, Sarstedt, & Ringle, 2019). Additionally, the model's predictive relevance (Q^2), assessed via blindfolding, was 0.421, confirming strong predictive capability since values greater than zero indicate meaningful predictive relevance (Hair, Risher, Sarstedt, & Ringle, 2019) (Table 2).

Path coefficients were evaluated using bootstrapping with 5,000 subsamples. The results indicated that Awareness ($\beta = 0.324$, $p < 0.001$) and Non-Monetary Benefits ($\beta = 0.289$, $p < 0.01$) were the strongest predictors of WLN. Monetary Benefits ($\beta = 0.164$, $p < 0.05$) and Interest ($\beta = 0.128$, $p < 0.05$) also had significant positive effects, indicating that individuals who perceive economic rewards and have intrinsic interest are more likely to engage in urban farming. Conversely, Barriers ($\beta = -0.041$, $p > 0.05$) showed no significant influence, suggesting that perceived obstacles such as limited space, lack of time, or technical constraints do not meaningfully deter intention when awareness and benefits are strongly present. This finding aligns with behavioural theory, where high perceived advantages can offset constraints (Ajzen, 1991) (Table 2).

Effect size (f^2) analysis further confirmed the relative contributions of each construct. Awareness and Non-Monetary Benefits exhibited medium effect sizes, while Monetary Benefits and Interest demonstrated small but meaningful effects. Barriers had no practical effect on WLN. These outcomes highlight the importance of psychological, informational, and social factors in driving urban farming behaviour over structural constraints (Table 2).

Table: Structural Model Results

Predictor Construct	Path Coefficient (β)	t-value	p-value	Significance	Effect Size (f^2)	VIF	Interpretation
Awareness (AWR)	0.324	4.912	<0.001	***Significant***	0.158 (Medium)	2.11	Strongest predictor; awareness campaigns highly effective
Non-Monetary Benefits (NMB)	0.289	3.847	<0.01	**Significant**	0.136 (Medium)	1.88	Well-being, environment, community support intention
Monetary Benefits (MBS)	0.164	2.321	<0.05	*Significant*	0.052 (Small)	1.74	Financial incentives increase willingness modestly
Interest (INT)	0.128	2.008	<0.05	*Significant*	0.031 (Small)	1.69	Personal inclination adds incremental motivation
Barriers (BAR)	−0.041	0.881	>0.05	Not Significant	0.003 (None)	1.57	Barriers do not reduce willingness significantly

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The overall model fit was assessed to ensure that the structural model adequately represented the observed data. The Standardized Root Mean Square Residual (SRMR) value of 0.061 indicates a good model fit, remaining well below the recommended threshold of 0.08, which reflects low residual differences between the observed and predicted correlations. In addition, the R^2 value of 0.612 demonstrates substantial explanatory power for the dependent construct, while the Q^2 value of 0.421 confirms strong predictive relevance according to cross-validated redundancy measures. Together, these indicators verify that the model is statistically sound, predictive, and appropriate for interpreting the relationships among the constructs (Table 3).

Table 3: Model Fit Indicators

Metric	Value	Interpretation
R^2 (WLN)	0.612	Moderate–substantial explanatory power
Q^2 (WLN)	0.421	Strong predictive relevance
SRMR	0.061	Good model fit (<0.08)

The structural model demonstrates that the behavioural intention to venture into urban farming is primarily shaped by psychological and informational factors, supporting the Theory of Planned Behaviour (Ajzen, 1991). Awareness plays the most influential role, reflecting the importance of knowledge, exposure, and familiarity with urban farming practices. Non-monetary benefits, such as stress reduction, health improvement, environmental contribution, and community engagement, emerged as a major driver, consistent with research indicating that urban agriculture is adopted not only for food production but also for lifestyle and social reasons (Specht, Schimichowski, & Fox-Kamper, 2021).

Although economic incentives positively influenced WLN, their effect was smaller than non-monetary and informational factors, suggesting that financial motivation alone is insufficient to attract widespread participation. Interest also contributed meaningfully, aligning with TPB's emphasis on attitudinal components. The non-significant role of barriers indicates that psychological enablers may outweigh structural constraints when awareness and perceived benefits are high. Together, the structural model provides strong evidence that public awareness campaigns, educational initiatives, community programs, and non-monetary value propositions are the most effective strategies to enhance urban farming adoption in Malaysia.

Discussion

The quantitative findings provide clear insights into the behavioural factors that influence Malaysians' willingness to venture into urban farming. Consistent with the Theory of Planned Behaviour (TPB), constructs representing attitude, subjective norms, and perceived behavioural control emerged as significant contributors to behavioural intention. Awareness (AWR) was the strongest predictor, indicating that knowledge, exposure, and familiarity play a central role in shaping positive attitudes toward urban farming (Ajzen, 1991; Tiraieyari & Krauss, 2018). Non-Monetary Benefits (NMB), including health, environmental contribution, and stress reduction, also significantly enhanced willingness, reinforcing findings that psychological and social values are strong motivators in urban agriculture (Specht, Schimichowski, & Fox-Kamper, 2021; Knößlsdorfer, Sellare, & Qaim, 2021). Monetary Benefits (MBS) and Interest (INT) showed moderate but meaningful effects, suggesting that while financial considerations matter, they are secondary to environmental, experiential, and lifestyle-related motivations. Barriers (BAR), however, were insignificant, indicating that even though citizens acknowledge challenges such as lack of space or technical knowledge, these constraints do not outweigh

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positive motivations when awareness and perceived benefits are strong (Hashim, Hussain, & Ismail, 2020). Overall, the results align with TPB and reinforce the importance of enhancing knowledge, demonstrating benefits, and supporting public engagement to strengthen behavioural intention toward urban farming in Malaysia.

Recommendations and Conclusion

The overall findings demonstrate that Malaysians show a growing desire to engage in urban farming and that willingness is primarily shaped by awareness and perceived benefits. The integration of qualitative and quantitative results supports the development of the Integrated Urban Farming Management Framework, which provides a structured, holistic guide for driving sustainable urban farming adoption in Malaysia.

Recommendations for Policymakers

- Enhance Awareness and Education Programs: National and local campaigns, community workshops, school curriculum integration, and public demonstration farms can significantly increase public understanding.
- Strengthen Institutional Support: Local councils should streamline zoning guidelines, provide small grants, and simplify application processes for urban farming permits.
- Promote Community-Based Urban Farming Models: Encourage rooftop gardens, neighbourhood farms, and condominium-based farming clusters to strengthen social support and collective participation.
- Support Technology Adoption: Subsidies for hydroponics kits, IoT-based monitoring devices, and vertical farming tools will improve perceived control and ease of participation.
- Increase Access to Markets: Developing local fresh-produce markets, small urban farmer stalls, and digital sales platforms can improve income generation opportunities.

Recommendations for Future Research

- Expand to East Malaysia: Sabah and Sarawak have different socioeconomic and environmental contexts; future studies should incorporate them for national-level generalizability.
- Use Larger and Stratified Samples: A probability-based sampling method will help better represent diverse groups and enhance external validity.
- Cross-Tabulation and Moderation Analysis: Explore how demographic factors (income, education, age) interact with behavioural constructs to influence willingness.
- Longitudinal Research: Track behavioural changes over time, especially before and after exposure to training or government interventions.
- Incorporate Additional Predictors: Variables such as climate anxiety, sustainability values, or digital readiness may improve model explanatory power.
- Pilot Real-World Urban Farming Projects:
- Implement prototypes of the framework and collect behavioural data to validate its practical effectiveness.

Conclusion

This study makes a significant contribution to understanding urban citizens' behavioural intentions toward urban farming in Malaysia. Findings confirm that awareness, psychological benefits, financial considerations, and personal interest are central determinants of willingness, aligning with the Theory of Planned Behaviour. By integrating these insights through a mixed-method approach, the research successfully developed the Integrated Urban Farming

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Management Framework, offering a structured, evidence-based model to support Malaysia's transition toward sustainable, community-driven urban agriculture. The implications for policy, community engagement, and sustainable development are substantial, positioning urban farming as a practical and scalable solution to enhance food security, environmental resilience, and community well-being in Malaysia's rapidly urbanizing context.

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