

Prioritizing Solutions to Mitigate Abandoned Housing Projects: Insights from AHP Analysis in Malaysia



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Abstract:

Introduction: The issue of abandoned housing projects is a persistent global concern that brings about detrimental impacts on various fronts, including stakeholders, the economy, and sustainability. In Malaysia, this problem has been prevalent since the 1970s, and despite the government's concerted efforts through incentives, policies and laws, the numbers of abandoned projects continue to rise. The incomplete nature of these housing projects poses risks to the surrounding environment, has social ramifications, and negatively affects the national economy. The consequences of abandoned housing projects extend directly to homebuyers, who emerge as the primary victims. These individuals face the disappointment of unfulfilled aspirations to own a property, coupled with the prolonged commitment to rental arrangements. The persistence of this issue underscores the urgency of finding effective and sustainable solutions to mitigate the impacts on individuals, communities and the broader economy.

Aims: This study's objectives are to identify and analyze the various factors that contribute to the prevalence of abandoned housing projects in Malaysia. Besides, a comprehensive set of solutions and strategies is proposed to address the identified contributing factors as well as prioritize solutions aimed at preventing abandoned housing projects in Malaysia.

Methods: The study employs a multi-faceted research approach, leveraging insights from three key sources: an expert panel consisting of 10 industry experts, comprehensive literature reviews, and a questionnaire survey. Through this triangulation of data, the study identifies six critical factors, associated sub-factors, and suitable solutions pertinent to the issue of abandoned housing projects in Malaysia. A qualitative research approach is adopted, engaging various stakeholders crucial to the housing development sector, including developers, contractors, consultants, and local authorities. Their perspectives contribute to a well-rounded understanding of the challenges and potential solutions. Solutions are specifically paired with corresponding factors, aligning with the unique roles and responsibilities of each stakeholder group. The analytical framework for the study involves the use of the Analytical Hierarchy Process (AHP). This method facilitates the establishment of a pairwise relationship between factors and solutions related to abandoned housing projects in Malaysia. The AHP analysis adds a quantitative dimension, allowing for a systematic and structured evaluation of the relative importance and priority of each factor and its corresponding solution. By integrating insights from expert panels, literature reviews, and stakeholder engagement, and employing a rigorous analytical method like AHP, the study endeavors to provide a robust and nuanced understanding of the challenges surrounding abandoned housing projects and proposes practical solutions for the Malaysian context.

Results: The study's findings reveal a hierarchy of factors contributing to abandoned housing projects in Malaysia. The primary factor identified is financial, indicating that challenges related to funding play a pivotal role in project abandonment. Following closely are project participant factors, project management factors, market signals, procurement factors, and external factors. Furthermore, for the suitable solution, developers facing financial difficulties should proactively seek alternative funding solutions to address their financial challenges. One suggested approach is the utilization of developer community cooperation funds. This recommendation reflects a collective effort within the development community to provide financial support and mitigate funding-related issues.

Conclusion: The resulting ranking offers valuable insights and prioritization, empowering stakeholders to proactively anticipate project challenges and implement solutions to mitigate the occurrence of abandoned housing projects. These findings provide valuable insights for stakeholders involved in the housing development sector, offering actionable stakeholders involved in the housing development sector, offering actionable recommendations to address the root causes of abandoned housing projects in Malaysia. The emphasis on financial preparedness, collaborative funding approaches, and strategic planning aligns with a proactive and multifaceted approach to mitigate the challenges associated with abandoned housing projects.

Keywords: Abandoned housing projects, Financial challenge, Analytical hierarchy process (AHP), Stake holders, Economy, Global concern.

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1. INTRODUCTION

The construction industry encompasses diverse activities such as building, maintaining, and demolishing structures, spanning infrastructure and industrial, commercial, and residential development.

One prominent aspect of this industry is housing development, which involves stages like planning, design, financing, and eventual completion [1]. In Malaysia, the construction sector is a substantial contributor to the economy, fostering socioeconomic growth and offering employment opportunities within various sectors. Despite achieving success in housing provision, the construction industry faces persistent challenges, notably project failures characterized by delays, cost overruns, reduced productivity, and unsafe conditions. Among these challenges, abandoned projects emerge as one of the most severe outcomes. Abandoned housing projects are defined as instances where licensed developers discontinue work for a continuous period of over six months beyond the agreed completion date, as outlined in the Housing Development (Control and Licensing) Enactment of 1978.

Given Malaysia's estimated population of 32.7 million in 2020, representing around 0.42% of the global population, the demand for improved housing, efficient structures, and functional urban infrastructure continues to grow. However, despite the potential positive impact on Malaysian economy, construction activities often encounter issues such as time and cost overruns, as well as compromised quality, jeopardizing the effective utilization of national resources for recovery. Abandoned projects are a critical concern stemming from ailing construction endeavours, affecting various stakeholders within the construction landscape, including developers, contractors, buyers, government entities, and project funders [2]. In some cases, public funds are mobilized to revive select abandoned projects, as evidenced by the government's revival of 32 residential projects in 2017, amounting to approximately RM219.79 million (\approx \$52,747,600 USD) from the Malaysian government's coffers [3].

While the challenges of abandoned housing projects are particularly prevalent in Malaysia, it is not unique to the country. Developed nations like China and the United Kingdom also grapple with similar issues [4]. For instance, China has allocated substantial loans to rehabilitate and complete abandoned housing projects, underlining the

global scope of the problem. Numerous factors contribute to the issue of project abandonment, including mismanagement by inexperienced developers, inadequate project planning, inaccurate cost estimations, poor cost control, unsuitable designs, and financial difficulties [5].

Other factors include legal disputes, deficient risk assessments, unfavourable government policies, incompetent workforce, lack of proper enforcement and monitoring, and corruption [6]. In essence, project incompleteness can result from a combination of internal and external factors, exacerbating the challenge.

In addressing the challenge of abandoned housing projects in Malaysia, the government took several initiatives. In 1990, the government established the Abandoned Housing Project Fund, overseen by Bank Negara. By the year 2000, the Ministry of Urban Wellbeing, Housing and Local Government (MHLG) had allocated RM300 million (\approx \$72,000,000 USD) for the rehabilitation of such projects, which was later increased to RM600 million (\approx \$144,000,000 USD). As in 2016 reported by Bernama, the government had disbursed RM219.54 million (\approx \$52,692,960 USD) from MHLG for the rehabilitation of 32 construction projects. According to MHLG, out of these projects, 190 had been successfully completed, 15 were still in progress, and 48 more were in the planning stage for rehabilitation [7].

In 2004, the former Malaysian Prime Minister officially introduced the Built Then Sell (BTS) construction concept as one of the solutions to address the issue of abandoned housing projects in Malaysia. However, a prior study conducted [6] enhanced the BTS concept by proposing the integration of sustainable elements into the financial model, aiming to benefit all stakeholders involved in housing development. Nonetheless, it was observed that the BTS concept faced challenges and disadvantages for developers, as highlighted [8].

Concurrently, another solution proposed by the government involved amending the Housing Development Act [9]. This amendment sought not only to prevent the occurrence of abandoned housing projects but also to safeguard the interests of homebuyers. The Malaysian government has taken various initiatives to tackle the issue of abandoned housing projects, such as introducing the Built Then Sell (BTS) concept, amending regulatory acts, and implementing public-private partnership (PPP) programs [10].

Despite these efforts, the problem persists and is unsolved. Therefore, this study aims to create a relationship between the factors contributing to the housing abandonment project and a suitable solution of abandoned housing projects in Malaysia, enhancing the construction industry's risk management processes. Moreover, the study contributes to make a significant impact on the construction industry by enhancing its risk management processes. This contribution is vital in addressing and mitigating challenges related to abandoned housing projects, fostering a more sustainable and robust construction environment in Malaysia. The findings and recommendations from this study can potentially inform policymakers, industry practitioners, and stakeholders in devising effective strategies to prevent and manage housing abandonment, thereby promoting the overall stability and success of construction projects in the country.

2. LITERATURE REVIEW

This section provides a comprehensive review of existing research pertinent to the present study. The examination commences with an overview of housing development in Malaysia, emphasizing the housing types in Malaysia and addresses the current challenges faced by the housing industry. The research then focuses on the most critical issue within the housing sector, namely abandoned housing projects.

2.1. Housing Development in Malaysia

In Malaysia, developers are categorized into three main groups: the public sector, the private sector, and the latest addition, the partnership between the public and private sectors. Private companies engaged in project development are required to obtain a license from the Ministry of Urban Well-being, Housing and Local Government (MHLG). MHLG plays a pivotal role in facilitating the provision of affordable housing for eligible individuals, overseeing private housing development and residential property management, and intervening to resolve housing disputes. Furthermore, developers are obligated to register as members of the Real Estate and Housing Developer Association Malaysia (REDHA). Serving as a guiding force, REDHA empowers property developers to construct high-quality housing and real estate, striving to uphold the highest standards of performance and professionalism for the betterment of the nation.

Before embarking on any housing development, developers in Malaysia are required to apply for a license and permit under the Housing Development Act (Control and Licensing) of 1966. This legislation serves to regulate and monitor the activities of housing developers, ensuring the protection of the interests of homebuyers. Section 5(1) of the Housing Development (Control and Licensing) Act 1966 (Act 118) and its regulations stipulate that developers without the necessary license are prohibited from initiating any developments. Additionally, Section 6 of the act mandates developers to pay RM 200,000 to the controller as a guarantee and collateral, with a required

paid-up capital of no less than RM 250,000. If a project is abandoned or the developer fails to complete construction, the deposit money is non-refundable within a 24-month validation period.

Construction projects involve substantial investments in equipment, overhead, workforce, and payroll. Delays can lead to increased costs and potential litigation. To mitigate these risks, contractors and developers require well-planned schedules. Mismanagement of risks during construction can result in project failure and abandonment. The issue of abandoned housing projects is not new in Malaysia and has been steadily increasing, posing challenges for developers, contractors, and buyers [11].

Abandoned housing projects not only waste financial resources but also valuable land and construction materials.

2.2. Issues and Challenges in Housing Development in Malaysia

The National Housing Department (NHD) identified key issues in the housing industry as outlined in the National Housing Policy 2018. First, affordability is a major concern, with housing prices rendering homeownership inaccessible for many citizens, particularly those with lower incomes [12]. This affordability challenge contributes to a second issue, the mismatch between supply and demand.

NHD also observed that the Malaysian housing industry relies on traditional construction methods, procurement processes, and housing delivery systems, leading to inefficiencies. Unforeseen circumstances during construction further exacerbate challenges. Project delays, a major concern highlighted by a study [13], are attributed to factors such as poor contract management, material shortages, design changes, weather conditions, and delayed payments. Late delivery of housing stock is a significant contributor to project abandonment. For instance, in 2017, out of 637,582 units built by private developers, 53,002 units were labeled as "sick projects," 15,284 units experienced delays, and a staggering 64,640 units were abandoned, as depicted in Fig. (1). This underscores the urgency of addressing these issues to ensure a more sustainable and effective housing industry in Malaysia.

2.3. Abandoned Housing Project in Malaysia

The concept of abandoned housing and abandoned housing projects differs significantly. Abandoned housing refers to individual houses left unused, often due to the owner's intention for future investment without immediate occupancy or the developer's failure to sell completed properties due to inadequate marketing strategies. On the other hand, abandoned housing projects pertain to incomplete construction projects or those halted midway.

MHLG defines an abandoned project as one that remains unfinished beyond the delivery date specified in the Sale and Purchase (S&P) agreement, with no significant construction activity taking place at the project

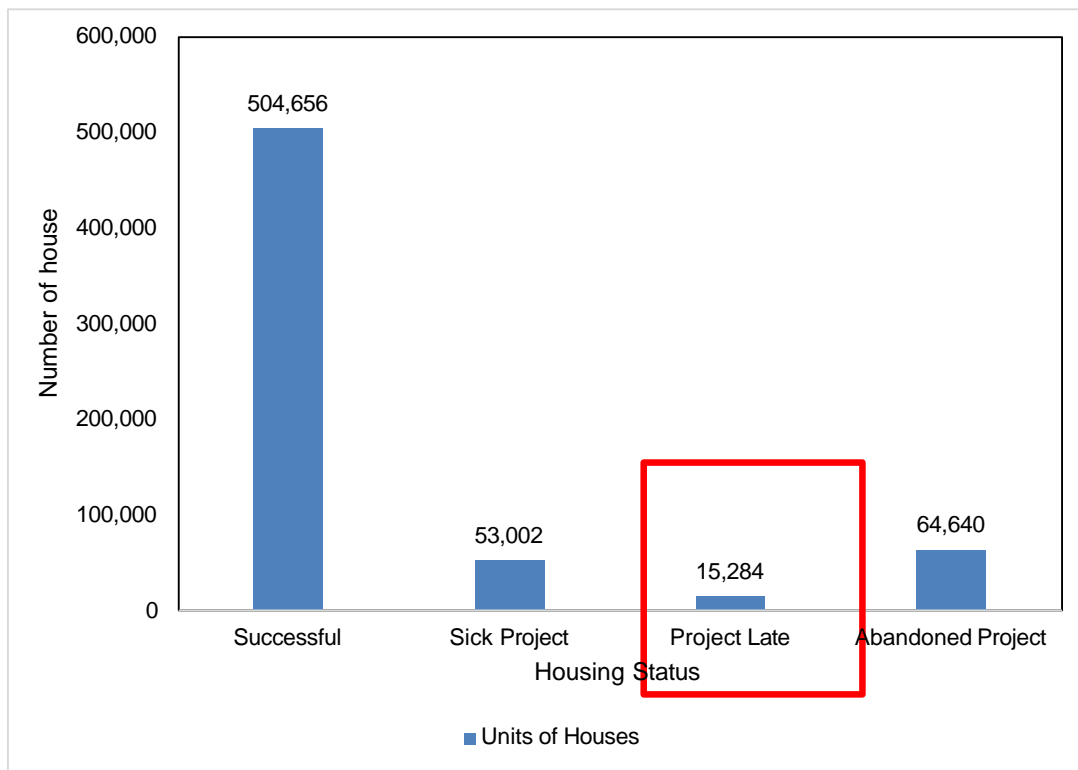


Fig. (1). Housing status in year 2017
 Source: (National Housing Department, 2017).

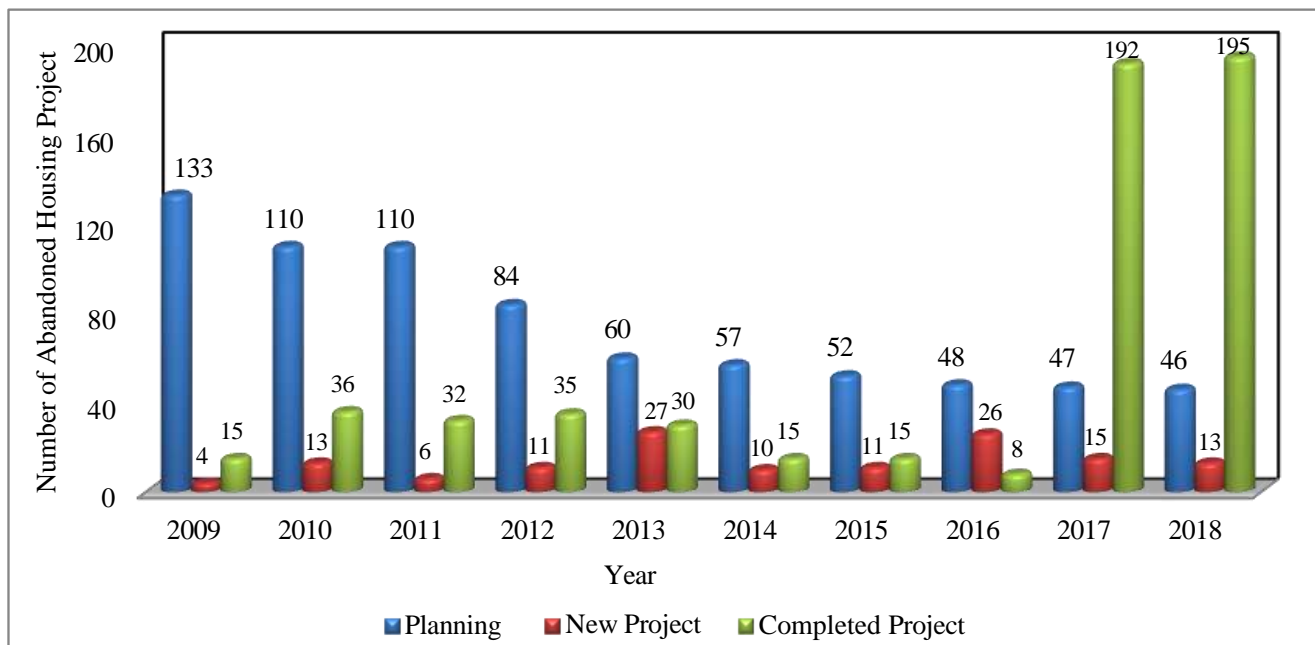


Fig. (2). Abandoned housing project status
 Source: Abandoned project rehabilitation division, national housing department.

site for a continuous period of six (6) months. Additionally, if a winding-up petition is filed in the High Court under Section 218 of the Companies Act 1966, it is also considered an abandoned project. Furthermore, MHLG stipulates that a project will be classified as abandoned if the company responsible is placed under the control of a Receiver and Manager. Project abandonment can also occur when the developer formally communicates their inability to complete the project in writing to the Controller of Housing or when the ministry certifies it as abandoned under Section 11(1)(a) of Act 118 [11-15].

For an overview, the data presented in Fig. (2) shows the status of abandoned housing projects in Peninsular Malaysia spanning from December 2009 to December 2020. This figure includes information on the number of abandoned housing projects that are currently in the planning stage for rehabilitation, new projects that have been classified as abandoned, and completed projects that have been removed from the list of abandoned projects. Despite a decrease in the number of abandoned housing projects observed from 2009 to 2016, this trend experienced a resurgence from 2017 to 2018.

2.4. Causes and Factors of Abandoned Housing Projects

Numerous studies have identified various factors contributing to the issue of project abandonment. Previous research has pinpointed factors such as mismanagement within companies, often due to inexperienced developers, inadequate project planning, inaccurate cost estimations, insufficient cost control, inappropriate design, insufficient feasibility studies, and ineffective marketing strategies [5, 16, 17]. Additionally, financial difficulties faced by developers, particularly as a severe underlying cause, have been recognized as a primary factor in project abandonment. Other factors contributing to abandoned housing projects include land and legal disputes, inadequate project risk assessment, unfavorable government policies, a lack of skilled workers, insufficient enforcement and monitoring by authorities, and issues related to corruption [18-20]. In conclusion, The interplay of these internal and external factors creates a challenging landscape for the housing industry. Addressing the issue of abandoned housing projects necessitates a comprehensive and multifaceted approach, including improvements in project management practices, financial support mechanisms, regulatory frameworks, and stakeholder collaboration. As the housing industry continues to evolve, a holistic strategy is essential to mitigate the risks associated with project abandonment and foster a more sustainable and resilient construction environments in the future.

3. MATERIALS AND METHODOLOGY

In this study, a quantitative methodology was employed to address the research objectives. Data collection involved an extensive literature review and semi-structured interviews. This approach aligns with the structured nature of the study [16-21]. Descriptive

analysis, specifically the Analytical Hierarchy Process (AHP), was utilized to establish relationships between factors and solutions for abandoned housing projects. This statistical approach assists in understanding the impact of various variables on project abandonment.

3.1. Extensive Literature Review

This research endeavour commenced by gathering comprehensive information concerning abandoned housing projects in Malaysia, a process that involved both government statistics and an extensive literature review conducted systematically. The literature review was designed to delve into various aspects, including the factors contributing to abandonment, its impacts, and government-driven incentives aimed at reducing the prevalence of abandoned housing projects in Malaysia.

To ensure a thorough examination and analysis of prior research findings specific to this domain, a meticulous approach was adopted for scrutinizing publications in academic journals. This approach involved a well-structured plan for the review process, along with computer-based searches. In the initial phase, two databases, Scopus and Science Direct, were harnessed. These databases offered comprehensive coverage across a spectrum of scientific disciplines, encompassing fields such as engineering, energy, materials, and transportation, all presented in the English language. The search criteria were strategically based on specific keywords found in the titles, abstracts, and keywords fields of publications. Notably, the search terms included ("Abandoned housing project" OR "Unfinished Housing Project") AND ("Construction Project" OR "Civil Engineering Project").

The subsequent phase involved a meticulous visual examination and content analysis. During this stage, diligent efforts were made to eliminate duplications in titles and authorship, while content that did not pertain to the matters concerning abandoned housing projects was judiciously excluded. This rigorous and extensive literature review yielded a comprehensive grasp of the most recent developments related to abandoned housing projects in Malaysia, including an understanding of the factors contributing to their abandonment.

3.2. Semi-structured Interview

A pilot study was undertaken to assess the viability of several critical components essential for the full-scale investigation, as discussed in a study [22,23]. The advantages of conducting a pilot study include the ability to identify and rectify issues, thus enhancing the adequacy of processes, instruments, or research methods before embarking on the primary survey [24]. For the semi-structured interviews, ten (10) experts possessing over a decade of experience in housing development, representing diverse professional backgrounds, were carefully selected as shown in Table 1. A study [25] recommended the use of semi-structured interviews in this phase to obtain in-depth insights and suggestions from the expert panel. These experts, who had dealt with

abandoned housing projects in their careers, played a pivota role in validating the factors compiled from the literature review.

With the respondents' consent, the interviews were recorded for accuracy. The interview format commenced with an introductory cover letter explaining the purpose, followed by inquiries about personal information and the main research questions. The sessions were transcribed into written scripts for subsequent analysis. A combination of deductive and inductive methods was employed to identify response patterns, uncover the factors contributing to abandoned projects, and propose preventive measures.

Table 1. Interviewee background.

Respondent Reference	Designation	Year of Experience
E1	Registered as a professional Civil and Structural Engineer	More than 21 Years
E2	Registered Architect	15 Years - 20 Years
E3	Registered Architect	More than 21 Years
E4	Registered Land Surveyor	More than 21 Years
E5	Housing Developer Director	More than 21 Years
E6	Housing Developer Director	More than 21 Years
E7	Housing Developer Director	More than 21 Years
E8	Main Contractor G7	15 Years - 20 Years
E9	Main Contractor G7	15 Years - 20 Years
E10	Main Contractor G7	15 Years - 20 Years

3.3. Questionnaire Survey

The primary method used for the main survey was a questionnaire. In this research, a total of one hundred (100) sets of questionnaires were distributed to various

housing development experts across Peninsular Malaysia. The survey was conducted using two (2) different approaches: face-to-face interviews with local experts and sending printed questionnaires to selected experts within the Peninsular Malaysia *via* postal services. Prior to responding to the questionnaire, a brief explanation was provided to the experts on how to complete the questionnaire for both the face-to-face and printed questionnaire approaches, including the option of using video conferencing or phone calls. Section C of the questionnaire utilized the Analytical Hierarchy Process (AHP) for multi-criteria decision-making (MCDM). A detailed explanation of the AHP technique was given to the respondents, including an explanation of the pairwise questionnaire. It was assumed that the respondents might not be familiar with this type of questionnaire. Therefore, special attention was given to ensuring their understanding. The respondents were encouraged to use the comparative one to nine (1 to 9) scale to rate their preferences in the pairwise questionnaire, and they were reminded not to leave any questions unanswered.

3.4. Analytical Hierarchy Process (AHP)

AHP recognized as an approach rooted in the evaluation of field experts for making decisions involving multiple criteria, can be effectively employed with a relatively smaller number of participants, as noted [26]. The prioritization process began by constructing a hierarchy that encompassed all factors and their solutions in relation to the overarching goal of mitigating abandoned housing projects. To manage a large number of components or variables effectively, they were organized into clusters to prevent extreme variations [27].

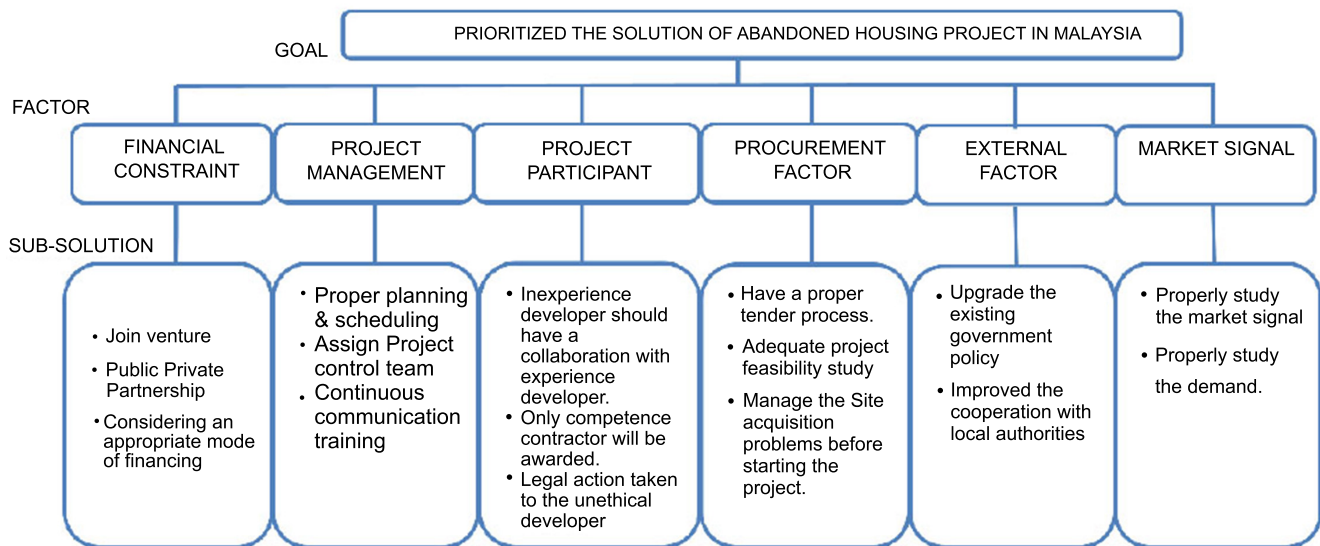


Fig. (3). Hierarchy diagram of goal, factors, and sub-factors of abandoned housing project.

In this study, the pairwise comparison technique has been employed to assess and compare criteria and alternatives, determining the weighted values of each criterion within the Analytical Hierarchy Process (AHP). This method involves judging the ratios for each pair of alternatives in the hierarchy, leading to the derivation of ratio scale measures. The AHP analysis procedure encompasses several steps. Firstly, graphical representations of the problem, presented as a hierarchy diagram, are drawn providing a visual representation of the analytical structure for a comprehensive understanding of the decision-making process. (Fig. 3).

Secondly, the AHP analysis involves the pairwise comparison of each element within the identified sub-factor and alternatives. To achieve this, data collected from a questionnaire survey, supplemented by insights from expert panel interviews, are interpreted using a 9-point scale. The scale for AHP is represented by crisp values, as detailed in Table 2. This scaling process facilitates a systematic comparison of the elements,

providing a numerical basis for their relative importance in the decision-making process. Thirdly, the AHP process involves generating pairwise comparison matrices. In these matrices, the diagonal elements always have a value of one (1). The upper triangular matrix is then filled according to the following rules; If the judgment value is on the left side of one (1), the actual judgment value is placed. Otherwise, if the judgment value is on the right side of one (1), the reciprocal value is inserted. This step ensures consistency in the comparison matrices and captures the relative importance of each element in relation to the others within the sub-factors and alternatives (Table 2).

Subsequently, matrix algebra techniques, as in Eqs. (1 to 4), were employed to analyse the variables and identify the optimal solution. This process allowed for systematically identifying the most effective approach among the solutions, considering their relative importance and the goal of addressing abandoned housing projects.

$$\text{Eigenvector, } A_{ij} = \begin{bmatrix} w1 & \dots & wn \\ \vdots & \ddots & \vdots \\ wn1 & \dots & nnn \end{bmatrix} = \frac{(w1 \times \dots \times wn)^{1/n}}{\sum [\sum_{i=1}^n (w1 \times \dots \times wn)]^{1/n}} \quad (1)$$

$$\text{Eigenvalue, } \lambda_{\max} = \frac{\sum_j^n (\sum_{i=1}^n A_{ij}) w_j}{A_{ij}} \quad (2)$$

$$\text{Consistency test, } CI = \frac{\lambda_{\max} - n}{n - 1} \quad (3)$$

$$\text{Consistency Ratio, } CR = \frac{CI}{RI} \quad (4)$$

4. RESULT ANALYSIS

4.1. Priorities Weightage of Factors and Sub-solution

This section presents the outcomes of the Analytical Hierarchy Process (AHP) analysis, which prioritized the weightage of factors and solutions for preventing and minimizing abandoned housing projects in Malaysia. The analysis covered two categories: factors and solutions. Table 3 presents the rankings of the six main factors and fifteen solutions aimed at preventing and minimizing abandoned housing projects in Malaysia. In the realm of factors, the analysis revealed the following ranks and weighted values: the financial factor held the top rank with a weighted value of 0.3961, followed by the project management factor at 0.2317, market signal at 0.1601, procurement factor at 0.0761, project participant factor at 0.0689, and external factor at 0.067. These findings

indicated a consensus among respondents that addressing financial issues should be the foremost priority, followed by project management and subsequent factors.

Turning to the solutions section, the top five rankings were as follows: “Developers need to consider appropriate modes of financing” held the first position with a weighted value of 0.1918, followed by “Proper planning and scheduling” at 0.1421, “Public-Private Partnership (PPP)” at 0.1117, “Joint venture” at 0.0926, and “Properly studying current demand and housing market signals” with a weighted value of 0.0747. Additionally, the middle-ranking sub-solutions included “Improvement of marketing strategy” at 0.0694, “Assignment of project control teams” at 0.0585, “Shifting the housing delivery concept from STB to BTS” at 0.0342, “Continuous project management and communication training” at 0.0311, and “Implementation of strict tendering processes” at 0.0267.

Table 2. Pairwise comparisons of the AHP standard scale.

Preferences on Pairwise Comparison	Preference Number
Equally important	1
Moderately more important	3
Strongly more important	5
Very strong more important	7
Extremely more important	9
The intermediate value between the two adjacent judgments	2,4,6,8

Table 3. Rank of factor and solution.

Factor	Solution	Local Weight	Global Weight	Rank
Financial 0.3961 (Rank 1)	Joint venture	0.2339	0.0926	4
	Public-Private Partnership (PPP)	0.2820	0.1117	3
	Considering an appropriate mode of financing	0.4841	0.1918	1
Project Management 0.2317 (Rank 2)	Proper planning and management	0.6131	0.1421	2
	Assign project control team	0.2526	0.0585	7
	Continuous PM & CM training	0.1343	0.0311	9
Market Signal 0.1601 (Rank 3)	Improved the marketing strategy	0.4337	0.0694	6
	Properly study the housing demand & market signal	0.4665	0.0747	5
Procurement 0.0761 (Rank 4)	Strict tendering process	0.3876	0.0267	10
	Change the housing delivery concept from STB to BTS concept	0.4495	0.0342	8
Project Participant 0.0689 (Rank 5)	Effective collaboration between project team	0.377	0.026	12
	Only competence contractor will be awarded	0.3932	0.0263	11
External 0.067 (Rank 6)	Improved cooperation with local authorities	0.2354	0.0162	15
	Enhancing the current policy, requirement and regulation for statutory approval	0.3221	0.0245	13
	Legal action taken to unethical developer (enforcement of the law)	0.2805	0.0188	14

Conversely, the lower-ranking sub-solutions chosen by respondents were “Awarding only competent main contractors” with a weighted value of 0.0263, “Enhancing collaboration between project teams” at 0.0260, “Enhancing current policies, requirements, and regulations for statutory approval” at 0.0245, “Enforcing existing laws on unethical developers causing abandoned projects” at 0.0188, and finally, “Improving cooperation between developers and regulatory bodies” at 0.0162.

5. DISCUSSION ON THE PRIORITIES SOLUTION

Based on the results gathered from respondents, several essential strategies emerged to prevent the abandonment of housing projects. Prioritizing financial solutions is the most critical problem faced by the developer that contributes to the abandoned project. The interviewee highlighted the critical importance of addressing financial challenges as the foremost step in preventing housing project abandonment. This finding aligns with previous research and underscores the significance of developers considering appropriate modes of financing to bolster their financial stability [28, 29].

Enhancing financial capability and management practices emerged as crucial strategies supported by other researchers. Given the substantial financial demands of housing development, exploring alternative financing options is vital to prevent project abandonment.

Other than that, effective and proper planning and management emerged as the second top-ranked solution. It was evident that financial planning, beginning from the project's planning stage, is vital to ensure project success. Accurate scheduling, timely commencement of construction work after obtaining planning permission, and comprehensive project budgeting contribute to preventing financial strain and abandonment [30]. Implementing tools such as Building Information Modelling (BIM) and adapting to modern project management software also enhance project efficiency and quality [31].

Besides, implementing Public-Private Partnerships (PPP) for housing projects emerged as a solution to enhance financial factors. Previous studies demonstrated that PPP implementation accelerates construction processes and improves housing quality, with the private sector contributing expertise and risk-sharing. It also mitigates political conflicts [32]. A research [33] found that European countries like the UK, Netherlands, Ireland, and Germany embrace PPP with income reuse. Thus, PPP enhances housing development success, overcoming financial constraints.

Another effective solution identified by the respondents is the adoption of Joint Ventures between landowners and private developers. Joint ventures can

lower project costs, expedite project completion through faster approval processes, and enable organizations with limited funding but substantial project management expertise to take on larger projects. To ensure the successful development of housing projects and prevent abandonment, it is crucial to accurately study housing demand and market signals.

Understanding customer preferences for pricing, features, facilities, and residential types is essential for balancing supply and demand. Effective marketing strategies can boost buyer confidence, resulting in improved property sales. Furthermore, a competent project control team is vital for managing construction projects effectively and preventing abandonment. Competent project managers can enhance organization, control, and decision-making throughout the project lifecycle. Other researchers have also observed that the joint venture concept, particularly with landowners, can assist private developers in mitigating risks and reducing investment costs related to land [34]. In Nigeria, private developers have adopted joint ventures with financial institutions as a financing model to successfully complete property development projects [35]. Additionally, a study [36] highlighted that contractors in Texas expanded their areas of expertise and maximized profits without the need to borrow funds for project investments. In conclusion, the findings of this study, supported by previous research, affirm that the joint venture concept holds promise in preventing abandoned housing projects in Malaysia.

Changing the housing delivery system from the "Sell Then Build" (STB) approach to the "Build Then Sell" (BTS) system was also suggested as a solution. The BTS system offers advantages such as easier loan approval, reduced stamp duty, and lower interest rates for buyers, but it requires substantial upfront capital. Continuous project management and communication skills training were proposed to improve overall project performance, teamwork, and communication. Effective communication and collaboration among project team members can lead to better project outcomes. Enhancing the effectiveness of the tendering process, strict regulation, and proper systems for tender evaluation can help select the most qualified and competent contractors. This, in turn, reduces the risk of selecting unethical or incompetent contractors, contributing to project success. Additionally, a study conducted by [34-37] suggested that the government could play a role in preventing abandoned housing projects by implementing new policies related to the Built-Then-Sell (BTS) system. Specifically, they proposed that the BTS system should be integrated with any Sell-Then-Build (STB) project for a certain percentage of the total housing built. This approach ensures that developers can still generate profits and cover any budget shortfalls, thereby reducing the likelihood of developers abandoning unprofitable projects. Effective collaboration between stakeholders, including local authorities, developers, consultants, and contractors, is essential for project success. Collaboration enhances teamwork, creativity, productivity, and problem-solving abilities while main-

taining a clear division of responsibilities. Stricter law enforcement against unethical developers was suggested as a means to prevent abandoned housing projects. Enhancing the enforcement of existing housing development laws and regulations can help protect homebuyers. Improving government policies and regulations related to statutory approvals and land use planning can streamline the development process and reduce project costs. Standardizing requirements and regulations can further assist developers in completing projects on time and within budget. As affirmed by a study [38], the existing Housing Development Act is deemed rigid, but its effectiveness hinges on the enforcement of the law. Other researchers [39], emphasize that effective law enforcement and an efficient bureaucracy can enhance the ethical standing of individuals. Furthermore, a study [40] claims that the current high housing prices may not justify the losses faced by unlucky buyers, even with an increase in tribunal claims. Consequently, an author [11] recommends that the government strengthen existing laws to provide better protection for unfortunate home buyers.

Finally, respondents highlighted the importance of cooperation between local authorities and project stakeholders to prevent internal conflicts and ensure project success. Effective coordination between local authorities and developers can expedite the approval process and reduce the potential misunderstandings.

Based on the discussion, the multifaceted strategies encompass financial management, efficient planning and project management, technological adoption, public-private partnerships, Joint Ventures, market research, marketing strategies, competent project control, housing delivery system reforms, training initiatives, tendering improvements, collaboration efforts, law enforcement reinforcement, policy enhancements, and local authority cooperation. Implementation of these solutions holds promise in significantly reducing the occurrence of abandoned housing projects, ensuring a more successful and sustainable trajectory for housing development in Malaysia. By integrating these strategies, stakeholders can collectively contribute to a more resilient and thriving housing industry that meets the needs of both developers and homebuyers, thereby fostering a robust and reliable housing landscape in the country.

CONCLUSION

In conclusion, this study has addressed the multifaceted issue of abandoned housing projects in Malaysia, encompassing various objectives aimed at understanding, analyzing, and proposing effective solutions. The findings reveal critical insights into the factors contributing to abandoned housing projects, spanning financial challenges, project management issues, market signals, and external influences.

The utilization of the Analytical Hierarchy Process (AHP) has allowed for the prioritization of solutions tailored to each contributing factor. Collectively, the proposed solutions offer a strategic roadmap to mitigate

abandoned housing projects in Malaysia. By targeting specific contributing factors and involving relevant stakeholders at different levels, these recommendations aim to foster a more resilient, efficient, and sustainable housing development landscape in the country. Implementation of these solutions holds the potential to significantly reduce the occurrence of abandoned housing projects, ensuring the successful and responsible development of housing projects in Malaysia. Overall, the results offer a comprehensive guide for stakeholders, emphasizing targeted strategies that can effectively curb the issue of abandoned housing projects and ensure successful project outcomes.

LIMITATIONS AND RECOMMENDATIONS

Every research study has its limitations, and for future studies, researchers may consider exploring the following avenues to further enhance the understanding and solutions for abandoned housing projects:

1. Investigate the long-term impacts of implemented solutions on reducing abandoned housing projects. This longitudinal study can provide insights into the sustainability and effectiveness of the proposed measures over an extended period.

2. Explore the integration of emerging technologies, such as artificial intelligence, big data analytics, and smart infrastructure, in the housing development process. Assess how these technologies can contribute to more efficient project management and risk mitigation.

HIGHLIGHTS

Overview of the status of abandoned housing projects in Peninsular Malaysia from December 2009 to December 2020, including trends in the number of such projects over the years.

Factors contributing to the issue of project abandonment, both internal and external. These include mismanagement, inadequate planning, financial problems, legal disputes, and government policies.

The Analytic Hierarchy Process (AHP) as an approach for multi-criteria decision-making in the research.

LIST OF ABBREVIATIONS

AHP	= Analytical Hierarchy Process
MHLG	= Ministry of Urban Wellbeing, Housing and Local Government
BTS	= Build Then Sell
PPP	= Public-Private Partnership
S&P	= Sale and Purchase
BIM	= Building Information Modelling
STB	= Sell Then Build

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIAL

All the data sources had been mentioned in article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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