Identifying Critical Success Factors Related to Project Management to Achieve Critical Success Criteria in Social Housing

Review of Integrative Business & Economics Research

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ABSTRACT

The rise of urbanization and the advent of industrialization are often considered to go hand in hand. The concentration of residents in large cities is one factor that contributes to economic growth; however, this trend has raised the question of how to ensure that working people with jobs and people with low incomes have access to housing, which attracts human resources to these cities. To address this issue, we apply the theory of success in construction projects to investigate which critical success factors related to project management (procurement factor, project management, maintenance management, and land use) affect critical success criteria in the context of social housing. Using the hierarchical component model with critical success criteria measured in six dimensions (household satisfaction, stakeholders' satisfaction, housing operation, time measurement, location affordability, and quality) is a key focus of this research. We used Partial Least Squares Structural Equation Modelling (PLS-SEM) for theoretical estimation with hierarchical component model and a second-order variable (critical success criteria). Our findings revealed that all four critical success factors (procurement factor, project management, maintenance management, and land use) had significantly positive impacts on critical success criteria. This study makes a theoretical contribution to the theory of success in construction projects and offers practical implications for social housing.

Keywords: critical success factor, critical success criteria, social housing, hierarchical component model.

Received 18 March 2023 | Revised 22 July 2023 | Accepted 23 August 2023.

1. INTRODUCTION

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Housing is one of the most fundamental socioeconomic circumstances determining the quality of life and overall well-being of residents in any given country (Chan et al., 2019). In terms of its social impact, Adabre et al. (2020) showed that housing significantly reduces poverty, increases social mobility, and improves living circumstances. For developing nations, reducing poverty is a top priority, and this is done through implementing policies that have a significant impact on the poor. This attitude is reflected in almost all planning documents in many countries (Djulius et al., 2022).

Social housing is believed to be an effective—indeed, crucial—solution to the problems of urbanization and meeting sustainable development goals (SDGs) in order to respond to various aspects of social and environmental sustainability (Hidayah & Kartikadevi, 2021). Social housing is housing that is made available by governments and/or non-profit organizations through various assisted housing programs. It is built with environmentally friendly and sustainable materials, and offers long-term economic, environmental, and social benefits without an increased life-cycle cost. Social housing allows not only current but future generations to meet their housing needs based on overall social value (Oyebanji et al., 2013). As shown by Mukhtar et al. (2017), it is important for governments in developing nations to build strategies that enhance public housing provision to make it more affordable for low-income individuals.

Many social housing projects have not been well received, partly because they do not satisfy stakeholders and partly because customers—mainly low-income workers—cannot satisfy them. This might be related to the inefficiency of such projects in Vietnam. Most studies have focused on the reasons for housing policy failure and have disregarded the difficulties of identifying characteristics that impact the effectiveness of public housing despite the size of the issue. Extant studies (such as those by Ademiluyi, 2010; Ibem et al., 2011; Olayiwola et al., 2005) did not identify all the significant elements affecting public housing developments.

Most low-income earners evaluate additional influencing elements and criteria, especially affordability, when making home decisions (Adabre et al., 2019). This has frequently resulted in an information imbalance between developers (suppliers) and families (demanders) in the affordable housing market (Tobiet et al. 2020). This raises the question of how we can determine and measure the success of social housing (Ihuah et al., 2014). According to the theory of success (Mukhtar et al., 2017; Chan et al., 2019), there ought to be a causal relationship between critical success factors (CSFs) and critical success criteria (CSC) in the implementation of sustainable, affordable housing policies. This study selects four critical success factors related to project management (the procurement factor, project management, maintenance management, and land use). Building on Chan et al. (2019), critical success criteria would be constructed as a second-order variable with six first-order variables reflecting the six dimensions of household satisfaction, stakeholder satisfaction, housing operation, time measurement, location affordability, and quality.

Nevertheless, in the authors' assessment, only a few empirical studies look at the link between CSFs and CSC in public housing projects in Ho Chi Minh City (HCM City), both in English and Vietnamese. This study contributes to the discussion on the issue of social housing for people, especially low-income workers. As public housing, social housing provides the perfect conditions for people to contribute to the sustainable development of the city. This study is the first to assess the importance of planning and completing social housing projects, as the authors are motivated to conduct a formal study to identify CSFs, CSC, and the relationship between them, in order to improve and achieve success for long-term affordable housing in Ho Chi Minh City, Vietnam.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

2. LITERATURE REVIEW

2.1. Theory of success in construction projects

Ashley et al. (1987) describe project success as "results that are much better than predicted or typically seen in terms of cost, time, quality, safety, and participant satisfaction", but Sanvido et al. (1992) argue that the definition of project success is context dependent. As a result, the degree to which project goals and expectations are met according to a given participant is defined as project success in that person's eyes. Traditionally, project success is defined in terms of time, cost, and quality; however, several additional criteria that are essential indicators of project success have emerged in recent years (Mukhtar et al., 2017). According to Ahadzie et al. (2008) and Toor et al. (2009), these criteria are "end-users' satisfaction, other stakeholders' satisfaction, safety, minimum disputes/conflicts/legal proceedings, and environmental impacts of the project".

Much prior research has used success theory in its considerations of how CSFs affect CSC. In the implementation of sustainable affordable housing policies, Mukhtar et al. (2017) and Adabre et al. (2021) hypothesized a causal link between CSFs and CSC. It is believed that designing a CSF for social housing may help projects to succeed. Most notably, this relationship is based on the theory of success in construction projects identified by academics and practitioners alike (Pinto et al., 1987; Baccarini, 1999; Toor et al., 2009). According to Takim et al. (2004), it is difficult to manage public projects without first determining the critical success factors.

The theory of success created by Belassi et al. (1996) consisted of components that regulate the performance of a project under four primary managers. This was an extension of the identification of the elements that contributed to the success or failure of the project. Adopting this particular theory to evaluate project performance is justifiable because it is contemporary and offers a comprehensive approach that encompasses a holistic view of project factors (Belassi et al., 1996; Kureshi, 2013). This theory elucidates several previously obscured aspects, as well as the interaction between those factors and others. Management, by conducting an in-depth examination of these elements, would be able to make appropriate choices, allowing them to prevent project failure. According to Belassi et al. (1996), each of these aspects plays a critical role in determining the outcome of a project. As a result, incorporating the components of this theory increases the likelihood that a construction project will be successful. It would also assist in reducing the danger of unethical actions and increasing the general sustainability of a nation, as well as formulating a more effective monitoring framework.

2.2. Critical Success Criteria

Critical success criteria (CSC) have been recognized and categorized by specialists in affordable housing worldwide (Chan et al., 2019). Research on key CSC for long-term affordable housing initiatives is vital for various reasons. Understanding CSC is necessary for the formulation of sustainable and affordable housing policy to address current and future affordability challenges. Important project CSC must be identified so that construction managers, project managers, and policymakers may most effectively plan project resource allocation (Chua et al., 1999). Additionally, Lim et al. (1999) distinguish between success criteria, which they define as "a collection of principles or measures that can be used to assess project success", and success factors, which they define as "any condition, element or effect that leads to the successful or unsuccessful completion of a project". Meanwhile,

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Baccarini (1999) put the success criteria of a project into two categories: product success and project management success, depending on the aim and intended use of the product, and the output and input of the project. The success of a product is determined by its aims and purpose, but the outputs and inputs determine the success of a project. Because of this, CSC are essential for implementing every public housing plan in developed and developing countries.

The critical success criteria described in earlier research (Baccarini, 1999; Al-Tmeemy et al., 2011) are broad and applicable to many building projects, so not all of them may be relevant for housing projects owing to variances in the features of individual projects. Chan et al. (2019) argued that it is impossible to accept the research findings by Ahadzie et al. (2008) as a comprehensive CSC for affordable housing projects. Chan et al. (2019) believed that it was vital to identify the unique CSC for long-term social housing projects, so they used qualitative research methodologies to study these criteria for affordable housing projects. Consequently, relevant CSC can be grouped into six components: household satisfaction, stakeholders' satisfaction, house operation cost CSC, time measurement CSC, location affordability cost CSC and quality-related CSC (Chan et al., 2019). According to Nguyen et al. (2004), a project must be completed within the allotted timescales and to the satisfaction of all stakeholders in order to be deemed successful.

2.3. Critical Success Factors

The notion of CSFs was initially proposed in 1976 and has since been recognized as one of the fundamental components required to achieve objectives (Rockart, 1982). In order to achieve social housing sustainability, all concerns relating to the economy, environment, and society must be addressed holistically in the development of social housing. Therefore, the Critical Success Factors (CSFs) of sustainable social housing are used to overcome these difficulties (Oyebanji et al., 2017). It is necessary to use the critical success factors of social housing to measure its sustainability and success. D. Ronald Daniel, on behalf of the management consultancy firm McKinsey & Co., was the first to engage with and popularize the notion of CSFs in 1961, identifying them as factors that affect a business unit or organization (Sukri et al., 2020). The term was used in the context of information systems and project management, then Sanvido et al. (1992) brought it into the construction field, claiming that CSFs are the collection of predictive factors that can assure the success of project. CSFs are the areas that management must carefully address to maintain high performance. Rungasamy et al. (2002) suggested that CSFs are critical to the success of any program or approach, in that if the factors' objectives do not meet expectations, the program will be regarded a failure. From these definitions, there is no doubt that CSFs are a set of components or circumstances that affect project success. Nevertheless, the causes of social housing failure have been given more weight than the factors for social housing success in most studies. Due to this shortcoming, the failure to establish CSFs becomes the primary cause of issues in managing public projects (Takim et al., 2004). Also, the presence or absence of numerous CSFs may result in the successful or failed project outcome (Pinto et al., 1989). Hence, identifying CSFs for social housing can affect the success of the projects.

3. THEORETICAL BACKGROUND AND HYPOTHESES

3.1. Procurement factor and critical success criteria

Procurement is "a phrase that defines the activities conducted by a client or employer who is aiming to bring about the construction or restoration of a facility" (Mukhtar et al., 2017).

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Every author, including Chan et al. (2004) and Hwang et al. (2013), agrees that procurement is a significant success component, as Mukhtar et al. (2017) described. Dissanayakai et al. (1999) described the scope of procurement as the context within which construction is brought about, purchased, or gained. As a result, two attributes are used to quantify this variable: the procurement method (the process by which the organization responsible for the design and construction of the project is selected) and the tendering method (the procedures adopted for the selection of the project team and in particular the main contractor). When it comes to resource allocation and authority delegation, the developer organizations' top management support for their project managers will make a substantial contribution to the project's successful conclusion.

These findings are congruent with those of Pinto et al. (1987), Belassi et al. (1996), and Gudienė et al. (2013), as well as Ihuah et al. (2014b). Mukhtar et al. (2017) show that the procurement element generally influences the success of social housing projects. In our case, we believe that a strong procurement ethos is a significant component in determining the success of social housing projects, resulting in our first hypothesis:

H1: The procurement factor has a significantly positive effect on critical success criteria in social housing.

3.2. Project management and critical success criteria

Project management is described as the process of planning, organizing, monitoring, and controlling all aspects of a project as well as the motivation of all stakeholders to accomplish the project's goals safely and within agreed-upon time, cost, and performance constraints (Mukhtar et al., 2017). According to the Project Management Institute (PMI), "Project management is the use of knowledge, skills, tools, and procedures across a wide variety of activities to satisfy the needs of a specific project." Thanks to the management tools, project managers can plan and execute their construction projects in a way that increases the likelihood of the projects' success. Project management ensures that all team members are aware of any changes in the project at the appropriate moment, thus reducing waste and conflict—a claim supported by Chan et al. (2004) and Fortune et al. (2006). Furthermore, a clearly stated project objective helps keep everyone on the team aiming in the same direction, saving time and supporting the effective use of resources. These results are corroborated by previous research (Gudienė et al., 2013; Ihuah et al., 2014). Chan et al. (2004), Chua et al. (1999), Tabish et al. (2012), and Toor et al. (2009) all concluded that project management is a significant component of project success. The success of social housing projects is strongly correlated with project management factors (Mukhtar et al., 2017). Based on these findings, we offer the following hypothesis:

H2: Project management has a significantly positive effect on critical success criteria in social housing.

3.3. Maintenance management and critical success criteria

Allen (1993) defined maintenance management as "the effective and efficient exploitation of resources to guarantee that the process and its facilities are maintained operational to the standards expected by the users". The tenants' overall well-being depends on the effectiveness of the maintenance management of the finished public housing units. Repairs and scheduled maintenance are critical components of the effective management of public housing facilities (Horvath et al., 2012). They are also the most important and most difficult

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

components of public housing service provision, and they need significant funding to ensure their success. If the tenants' requirements for efficient maintenance management and repairs are met, the quality of their lives will be improved as a result (Wordsworth, 2001). Allen (1993) defined maintenance management as a significant success component, which was also noted by Mukhtar et al. (2017). Maintenance management is believed to have a favorable impact on the overall performance of social housing projects in general. Because of this, we posit the following hypothesis:

H3: Maintenance management has a significantly positive effect on critical success criteria in social housing.

3.4. Land use and critical success criteria

In contrast to the segregation of residential land uses from non-residential land uses, (Aurand, 2010) described mixed land use as a combination of commercial, residential, and industrial lands uses within a particular geographical region. According to proponents of smart development, one of the most effective methods to better address the housing requirements of low-income earners is via mixed land use rather than through the domination of single-family neighborhoods (Kalinosky, 2001). In modern planning strategies, mixed land use is one of the most important things to keep in mind when planning, and to achieve sustainability objectives, it is a planning concept that assures a mix of stores, flats, workplaces, and houses. Generally speaking, (Adabre et al., 2019) concluded that mix land use CSFs is associated directly with the effectiveness of social housing projects. As a result, we suppose that a strong sense of mix land use contributes considerably to the growth of social housing development.

A regulatory system that tries to optimize the efficiency of land use while also guaranteeing more fairness in that usage is referred to as "land-use planning" (Evans, 2008). Whitehead (2007) found that housing prices have risen in part because of factors such as population growth and public infrastructure. In fact, the design and supply of infrastructure give advantages to the community that might increase the value of a piece of property. If the government provides these infrastructural facilities, then policies might be developed that relate the appreciation of land value to creating long-term affordable housing opportunities. Land use planning is the word used to describe this system, and in the research of (Adabre et al., 2019), land use planning is verified to the be critical success factors of social housing. Hence, it can be posited that social housing success is affected by land use planning factor on an upward trend.

H4: Land use has a significantly positive effect on critical success criteria in social housing.

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Figure 1: The new conceptual model, built up according to Mukhtar et al. (2017), Chan et al. (2019) and Adabre et al. (2021).

4. METHODOLOGY

4.1. Data collection and measurement scale

We conducted data collection with significant assistance from the Ho Chi Minh City Department of Planning and Architecture, the Ho Chi Minh City Department of Construction, and the Vietnam National Real Estate Association (Ho Chi Minh City branch), who enabled us to approach construction companies based in Ho Chi Minh City. We adopted the measurement scale from previous studies and incorporated a total of 33 items (see Appendix 1). There were two question types in the questionnaire: demographic questions, and psychological questions answered on a 5-point Likert scale (showing degree of importance) that measured various concepts in the conceptual framework. The questionnaire was translated from English into Vietnamese and distributed to construction companies. The preliminary survey was modified by 30 construction experts working in the Ho Chi Minh City Department of Planning and Architecture, the Ho Chi Minh City Department of Construction, the Vietnam National Real Estate Association (Ho Chi Minh City branch), and some construction companies involving in social housing projects in Ho Chi Minh City.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

The large-scale survey was conducted among top managers, managers, and employees working at construction companies involved in social housing in Ho Chi Minh City from August 2021 to December 2021.

4.2. Assessment method

Partial least squares structural equation modelling (PLS-SEM) is "an appropriate statistical method with which to estimate various causal relationships among latent variables in the complex conceptual framework, and to analyze small sample sizes" (Hair & Sarstedt, 2019; Ngoc Ton et al., 2023). Instead of making assumptions about the data distribution, we conducted resampling using bootstrapping methods (Kwong et al., 2013).

The conceptual framework was created in the form of a hierarchical component model with one second-order variable (i.e., critical success criteria) measured by six first-order constructs (i.e., household satisfaction, satisfaction of stakeholders, housing operation, time measurement, location affordability, and quality-related characteristics). The reflective-reflective specification of higher-order constructs was applied to build up the hierarchical component model. Indeed, "higher-order constructions support the reduction of path model linkages, resulting in model parsimoniousness" (Ngoc Ton et al., 2023). We used SMART-PLS (software version 3.0) to test measurement and structural models in the PLS-SEM approach.

5. RESULTS AND DISCUSSION

5.1. Results

The mass survey approached 181 target respondents, from which we obtained 151 valid cases for further data analysis and discarded 30 invalid cases due to missing data and low variation. The demographic information supplied by the respondents is summarized in Table 1.

89 males and 62 females provided valid surveys, making up 58.94% and 41.06% of the valid responses, respectively. The survey focused on individuals between the ages of 26 and 65 and sought to learn about their perspectives on the success criteria of housing project and the factors that, as a result of their participation in the construction sector, they believed affected that success. Older respondents between the ages of 41 and 65 contributed over 39% of the total, the highest percentage in the poll, whereas those between the ages of 26 to 35 accounted for 31.13%. Those aged between 36 and 40 comprised over 20%, over twice as many as persons equal to or below 25 years old, while those aged above 66 made up only a modest proportion of the population, 0.66%. Respondents above 21 years were ranked at the bottom of the working duration ladder, followed by those of 5 years or fewer and people of 16 to 20 years working duration. 31.79% respondents had the significant working duration, compared to just 22.52% who had experienced 11 to 15 years. Half of the surveyed people were employees; managers accounted for roughly 40%; and the remaining ~10% were top managers. 61.59% worked for private organizations, while public and partially public organizational types were represented by 25.83% and 12.58%, respectively.

The design consultancy department was represented by 31.13% of respondents, followed by project management / law and project development with 23.18% and 15.89%, respectively. Other departments such as construction, finance, and market research / marketing / sales comprised less than 10%.

Table 2 reveals that the reliability and convergent validity of all latent variables in the reflective measurement model achieved thresholds proposed by Hair et al. (2019) (i.e.,

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

factor loading of at least 0.708, composite reliability ranging between 0.7 to 0.95, and average variance extracted of at least 0.5).

According to Wetzels et al. (2009) and Ngoc Ton et al. (2023), R-squared values are divided into three categories representing the quality of structural model. These ranges are small, medium, and large effects (i.e., below 0.02, in the range of 0.13 to 0.26, and above 0.26, respectively). We found that the structural model had a large effect with an R-squared value of 0.55 for critical success criteria, meaning that all of the explanatory variables in the structural model can explain 55% of critical success criteria variability. Full-collinearity test was conducted to check common method bias. All inner VIF values in both vertical collinearity and lateral collinearity were controlled below 3.3 (Kock & Lynn, 2012; Rasoolimanesh et al., 2015).

According to Hair et al. (2017) and Ton et al. (2021), discriminant validity can be assessed with the Fornell-Larcker Criterion (i.e., "the square root of AVE [average variance extracted] for each latent construct should be higher than the off-diagonal correlation") and the Heterotrait-Monotrait Ratio (i.e., HTMT [heterotrait-monotrait] values below 0.85—a conservative threshold) (see Tables 3 and Table 4, respectively).

Table 5 and Figure 2 shows the results of hypothesis testing with all significantly positive causal relationships between critical success factors and critical success criteria. The procurement factor had a significantly positive effect on critical success criteria (β = 0.202 and p-value $\leq$ 0.01, supporting H1). Project management had a significantly positive effect on critical success criteria (β = 0.302 and p-value $\leq$ 0.001, supporting H2). Maintenance management had a significantly positive effect on critical success criteria (β = 0.28 and p-value $\leq$ 0.001, supporting H3). Land use had a significantly positive effect on critical success criteria (β = 0.144 and p-value $\leq$ 0.05, supporting H4). In the hierarchical component model, six dimensions were significantly (p-value $\leq$ 0.001) reflective-reflective lower-order constructs of critical success criteria (i.e., housing operation with β = 0.831; household satisfaction with β = 0.863; location affordability with β = 0.693; quality with β = 0.827; stakeholder satisfaction with β = 0.828; and time measurement with β = 0.775).

Table 6 provides new insights on significant drivers related to project management of critical success criteria for social housing with multi-group analysis. In general, all sub-samples (i.e., employee or middle/top manager in terms of working position, working duration with less or more than 10 years) reveals critical success criteria were significantly (p-value $\leq$ 0.001) measured by six dimensions (e.g., housing operation, household satisfaction, location affordability, quality, stakeholder satisfaction, time measurement) in the forms of second-order variable and hierarchical component model. However, there are some critical differences in causal relationships across these sub-samples. In terms of working position, procurement factor was a significant driver of critical success criteria for social housing among middle/top managers, while maintenance management and land use were significant drivers of critical success criteria for social housing among employees. In terms of working duration, project management, maintenance management, land use were significant drivers of critical success criteria for social housing among respondents with equal and less than 10 years of working experience; whistle procurement factor was a significant driver of critical success criteria for social housing among respondents with more than 10 years of working experience.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 1: Respondents' demographics.

Categories	Outcomes	Respondents	Percentage (%)
Age	Equal or below 25	8	5.30
	From 26 to 35	47	31.13
	From 36 to 40	36	23.84
	From 41 to 65	59	39.07
	Above 66	1	0.66
Gender	Female	62	41.06
	Male	89	58.94
Construction organization	Yes	125	82.78
	No	26	17.22
Organizational type	Private	93	61.59
	Public	39	25.83
	Partially Public	19	12.58
Working position	Employee	80	52.98
	Manager	58	38.41
	Top Manager	13	8.61
Working duration	Equal or below 5 years	26	17.22
	From 6 to 10 years	48	31.79
	From 11 to 15 years	34	22.52
	From 16 to 20 years	28	18.54
	Above 21 years	15	9.93
Department	Construction	8	5.30
	Design Consultancy	47	31.13
	Finance	12	7.95
	Market Research / Marketing / Sales	7	4.63
	Project Development	24	15.89
	Project Management / Law	35	23.18
	Passing various departments	18	11.92
Total		151	100.00

Source: The authors.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 2: Reliability and convergent validity of the latent constructs.

Construct	Items	Factor Loading	Cronbach's Alpha	CR	AVE	R-squared	Full Collinearity VIF
Thresholds		**≥ 0.708**		**[0.7;0.95]**	**≥ 0.5**		**≤ 3.3**
Critical success criteria*			0.918	0.930	0.507	0.550	2.090
Housing operation	HO2, HO3	0.906 - 0.907	0.783	0.902	0.822	0.690	
Household satisfaction	HS1, HS3, HS4	0.814 - 0.907	0.835	0.901	0.753	0.745	
Location affordability	LOCA1, LOCA2	0.861 - 0.862	0.653	0.852	0.742	0.480	
Quality	QUAL1, QUAL3	0.873 - 0.904	0.735	0.883	0.790	0.683	
Stakeholder satisfaction	SS2, SS3	0.889	0.735	0.883	0.791	0.686	
Time measurement	TIME2, TIME3	0.857 - 0.869	0.658	0.854	0.745	0.601	
Land use	LAND1, LAND2, LAND3	0.710 - 0.813	0.669	0.820	0.603		1.249
Maintenance management	MAINTEN1, MAINTEN2, MAINTEN3, MAINTEN4	0.822 - 0.865	0.862	0.906	0.707		1.552
Procurement factor	PROCUR1, PROCUR2, PROCUR3	0.727 - 0.864	0.696	0.832	0.625		1.261
Project management	PROJECT1, PROJECT2	0.858 - 0.905	0.716	0.875	0.777		1.861

Notes: * means second-order latent constructs (reflective-reflective specification), CR = Composite Reliability, AVE = Average Variance Extracted.

Source: The authors.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 3: Discriminant analysis (Fornell-Larcker Criterion).

Constructs		Fornell-Larcker Criterion				
		1	2	3	4	5
1	Critical success criteria	0.712				
2	Land use	0.459	0.777			
3	Maintenance management	0.616	0.400	0.841		
4	Procurement factor	0.574	0.371	0.500	0.790	
5	Project management	0.647	0.424	0.587	0.590	0.882

Source: The authors.

Table 4: Discriminant analysis (Heterotrait-Monotrait Ratio).

Constructs		Heterotrait-Monotrait Ratio (HTMT)				
		1	2	3	4	5
1	Critical success criteria	Criteria ≤ 0.85				
2	Land use	0.590				
3	Maintenance management	0.685	0.530			
4	Procurement factor	0.714	0.550	0.647		
5	Project management	0.790	0.620	0.747	0.829	

Source: The authors.

Table 5: Results of hypothesis testing.

Hypothesis	Relationship	Estimate	Effect size (f^2)
H1	Procurement factor -> Critical success criteria	0.202**	0.055 (small)
H2	Project management -> Critical success criteria	0.302***	0.105 (small)
H3	Maintenance management -> Critical success criteria	0.28***	0.105 (small)
H4	Land use -> Critical success criteria	0.144*	0.035 (small)
	Critical success criteria -> Housing operation	0.831***	2.226 (large)
	Critical success criteria -> Household satisfaction	0.863***	2.923 (large)
	Critical success criteria -> Location affordability	0.693***	0.922 (large)
	Critical success criteria -> Quality	0.827***	2.157 (large)
	Critical success criteria -> Stakeholder satisfaction	0.828***	2.188 (large)
	Critical success criteria -> Time measurement	0.775***	1.508 (large)

Notes: *** p-value ≤ 0.001; ** p-value ≤ 0.01; * p-value ≤ 0.05.
Source: The authors.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

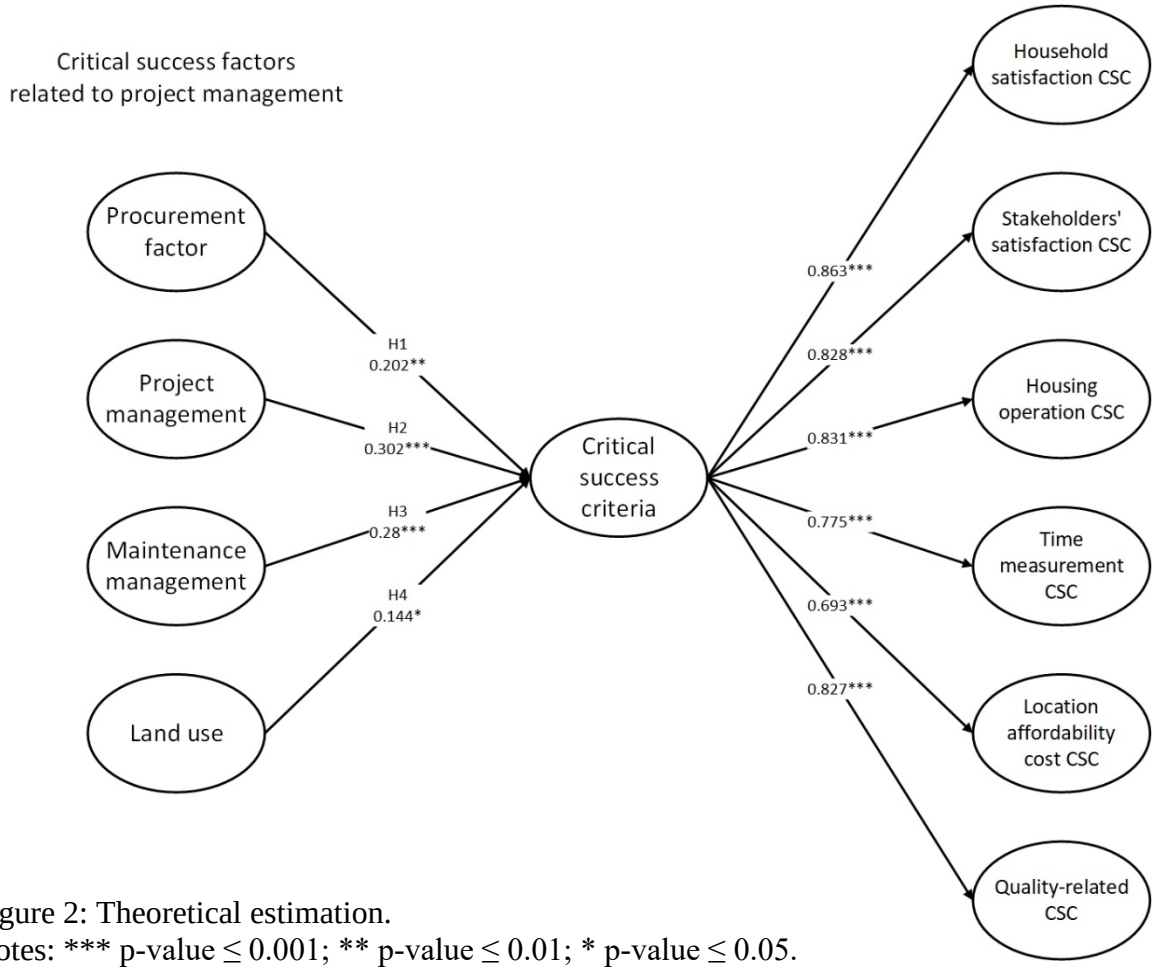

Figure 2: Theoretical estimation.
Notes: *** p-value ≤ 0.001; ** p-value ≤ 0.01; * p-value ≤ 0.05.
Source: The authors.

Table 6: Multigroup analysis.

Categories		**Working position**		**Working duration**	
Categorial outcomes		**Employee**	**Middle/ Top manager**	**≤ 10 years**	**> 10 years**
Sub-samples		**(n = 74)**	**(n = 77)**	**(n =80)**	**(n = 71)**
Hypothesis					
H1	Procurement factor -> Critical success criteria	0.161	0.367***	0.129	0.353***
H2	Project management -> Critical success criteria	0.31**	0.274*	0.304*	0.238
H3	Maintenance management -> Critical success criteria	0.313**	0.2	0.298*	0.215
H4	Land use -> Critical success criteria	0.19*	0.076	0.227*	0.048
	Critical success criteria -> Housing operation	0.834***	0.823***	0.778***	0.88***
	Critical success criteria -> Household satisfaction	0.844***	0.885***	0.856***	0.873***
	Critical success criteria -> Location affordability	0.659***	0.776***	0.768***	0.594***
	Critical success criteria -> Quality	0.824***	0.823***	0.817***	0.833***

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Critical success criteria -> Stakeholder satisfaction	0.844***	0.802***	0.872***	0.772***
Critical success criteria -> Time measurement	0.765***	0.79***	0.8***	0.747***

Notes: *** p-value ≤ 0.001; ** p-value ≤ 0.01; * p-value ≤ 0.05.
Source: The authors.

5.2. Discussion

Following the guidelines provided by Mukhtar et al. (2017) and Chan & Adabre (2019), we created a new structural model to illustrate the causal relationship between critical success factors related to project management and critical success criteria for social housing projects. Critical success criteria were built as second-order variables to illustrate multi-dimensional variables measured in six dimensions.

Although the measurement model and structural model were built in different forms compared to previous iterations, they were consistent with Mukhtar et al. (2017) when four critical success factors related to project management (i.e., the procurement factor, project management, maintenance management, and land use) had significantly positive effects on critical success criteria.

This research makes a theoretical contribution regarding theory of success in social housing projects. It fills the research gap identified by Chan et al. (2019) in proving the causal relationship between critical success factors and critical success criteria, in which critical success criteria are inherited from multidimensional variables in the context of social housing, depicting different characteristics of social housing that adopts a sustainable affordable approach.

This study has practical implications for policymakers and construction companies in the field of social housing. By choosing appropriate places for social housing in areas with easy access to social facilities (e.g., markets, schools, hospitals) and provided with adequate infrastructure (e.g., roads, electricity, water), the initiative will assist private families in purchasing social housing in locations and at prices that suit each of the target groups. In addition, families can save money on expenditures associated with transportation (e.g., going from home to work, hospital, school, local centers, etc.).

The procedure for choosing suppliers in the building of social housing projects must be open to competition and have clear communication, in addition to comprehensive and exhaustive contract documentation. This would contribute to improving the level of satisfaction felt by members of the project team and "reduce the trouble of disagreements and litigation" (i.e., legal paperwork, contracts, titles, and maintenance expenses) by 2%. In addition, this would decrease the applicant's period waiting until a suitable home is identified (i.e., the time from application to approval).

The project management process is always of critical significance during social housing construction. In addition to performing thorough inspections and monitoring the construction project, the contractor is responsible for developing a workable implementation strategy for the social housing project. They can potentially improve the utilitarian aspects of social housing projects (e.g., playgrounds, green parks, kindergartens, supermarkets, public toilets, etc.). In addition, project management can provide security and safety in social housing projects and efficiently employ investment funds to create social housing projects, assure implementation time to minimize capital pooling, and prevent the waste of resources. Most significantly, businesses should concentrate their efforts on enhancing project management, because doing so helps to increase both the quality of projects and the use of technology (in the connection of

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

utilities, telecommunications, building management software, surveillance cameras, fire protection, etc.).

Finally, investors and other stakeholders should emphasize the maintenance of social housing projects. This should be done by monitoring and checking the deterioration of the finished construction, determining its cause, promptly implementing the necessary repairs, and controlling the quality of the maintenance and repair work. This is because this factor helps to reduce costs during the operation (use) of the work (using good construction materials and equipment to avoid minor damage and conducting regular maintenance to promptly address damage to extend the life of the building) and ensures environmental protection and the environmental friendliness of social housing projects (garbage collection, wastewater treatment, economical use energy, and planting more trees to improve the microclimate of the building).

6. CONCLUSION

The research objective was to investigate which critical success factors relating to project management affect the critical success criteria of social housing projects, and to seek best practices in project management for the success of social housing in Ho Chi Minh City. We found that four critical success factors related to project management (the procurement factor, project management, maintenance management, and land use) had significantly positive effects on critical success criteria in social housing. Indeed, critical success factors must be fulfilled to achieve critical success criteria and generate successful social housing projects. We used the hierarchical component model with a second-order construct (with critical success criteria measured by six first-order constructs/dimensions) in this research to revisit the causal relationship between critical success factors and critical success criteria.

The target population in this study consisted of construction companies involved in social housing projects. Further research would expand the target population to include other social housing stakeholders (e.g., policy makers and house buyers) to fully understand success in social housing.

ACKNOWLEDGEMENTS

This research is funded by Vietnam National University HoChiMinh City (VNU-HCM) under grant number C2023-28-09. Thanks to the anonymous reviewer for his/her helpful comments and suggestions.

REFERENCES

[1] Adabre, M. A., Chan, A. P., Darko, A., Osei-Kyei, R., Abidoye, R., & Adjei-Kumi, T. (2020). Critical barriers to sustainability attainment in affordable housing: International construction professionals' perspective. *Journal of Cleaner Production*, *253*, 119995.

[2] Adabre, M. A., & Chan, A. P. (2019a). Critical success factors (CSFs) for sustainable affordable housing. *Building and Environment*, *156*, 203-214.

[3] Adabre, M. A., & Chan, A. P. (2019b). The ends required to justify the means for sustainable affordable housing: A review on critical success criteria. *Sustainable Development*, *27*(4),781-794.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[4] Adabre, M. A., & Chan, A. P. (2021). Modeling the impact of barriers on sustainable housing in developing countries. *Journal of Urban Planning and Development*, *147*(1), 05020032.
[5] Ahadzie, D. K., Proverbs, D. G., & Olomolaiye, P. O. (2008). Critical success criteria for mass house building projects in developing countries. *International Journal of Project Management*, *26*(6), 675-687.
[6] Allen, D. (1993). What Is Building Maintenance? *Facilities*, *11*(3), 7–12. https://doi.org/10.1108/EUM0000000002230.
[7] Al-Tmeemy, S. M. H. M., Abdul-Rahman, H., & Harun, Z. (2011). Future criteria for success of building projects in Malaysia. *International Journal of Project Management*, *29*(3), 337-348.
[8] Ashley, D., Lurie, C., & Jaselskis, E. (1987). Determinants of construction project determinants. *Project Management Journal*, *18*(2).
[9] Aurand, A. (2010). Density, Housing Types and Mixed Land Use: Smart Tools for Affordable Housing? *Urban Studies*, *47*(5), 1015–1036.
[10] Baccarini, D. (1999). The logical framework method for defining project success. *Project Management Journal*, *30*(4), 25-32.
[11] Belassi, W., & Tukel, O. I. (1996). A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*, *14*(3), 141-151.
[12] Chan, A. P., & Adabre, M. A. (2019). Bridging the gap between sustainable housing and affordable housing: The required critical success criteria (CSC). *Building and Environment*, *151*, 112-125.
[13] Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, *130*(1), 153-155.
[14] Chua, D. K. H., Kog, Y. C., & Loh, P. K. (1999). Critical success factors for different project objectives. *Journal of Construction Engineering and Mmanagement*, *125*(3), 142-150.
[15] Cohen, J. (1988) *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum.
[16] Dissanayaka, S. M., & Kumaraswamy, M. M. (1999). Evaluation of factors affecting time and cost performance in Hong Kong building projects. *Engineering, Construction and Architectural Management*, *6*(3), 287-298.
[17] Djulius, H., Lixian, X., Lestari, A. N., & Eryanto, S. F. (2022). The Impact of a Poor Family Assistance Program on Human Development in Indonesia. *Review of Integrative Business and Economics Research*, *11*(4), 59-70.
[18] Evans, A. W. (2008). *Economics, Real Estate and the Supply of Land*. John Wiley & Sons.
[19] Fortune, J., & White, D. (2006). Framing of project critical success factors by a systems model. *International Journal of Project Management*, *24*(1), 53-65.
[20] Gudienė, N., Banaitis, A., Banaitienė, N., & Lopes, J. (2013). Development of a conceptual critical success factors model for construction projects: a case of Lithuania. *Procedia Engineering*, *57*, 392-397.
[21] Hair Jr, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2017). *Advanced Issues in Partial Least Squares Structural Equation Modeling*. SAGE Publications.
[22] Hair Jr, J. F., & Sarstedt, M. (2019). Factors versus composites: Guidelines for choosing the right structural equation modeling method. *Project Management Journal*, *50*(6), 619-624.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[23] Henseler, J., Ringle, C. M., & Sarstedt, M. (2012). Using partial least squares path modeling in advertising research: basic concepts and recent issues. *Handbook of Research on International Advertising*, *252*.
[24] Hidayah, E., & Kartikadevi, A. (2021). The Analysis of Sustainability Report and Its Effects on Company Performance and Company Value. *Review of Integrative Business and Economics Research*, *10*, 40-54.
[25] Horvath, A., & Mydin, A. O. (2012). Towards best practice in public housing maintenance management. *European Researcher*, (30), 1538-1544.
[26] Hwang, B. G., & Lim, E. S. J. (2013). Critical success factors for key project players and objectives: Case study of Singapore. *Journal of Construction Engineering and Management*, *139*(2), 204-215.
[27] Ihuah, P. W., Kakulu, I. I., & Eaton, D. (2014). A review of Critical Project Management Success Factors (CPMSF) for sustainable social housing in Nigeria. *International Journal of Sustainable Built Environment*, *3*(1), 62-71.
[28] Kalinosky, L. (2001). Smart Growth for Neighborhoods: Affordable Housing and Regional Vision. National Neighborhood Coalition, Washington, DC
[29] Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. Journal of the Association for information Systems, 13(7).
[30] Kureshi, N. (2013). Project performance and contingency theory. *Journal of Strategy and Performance Management*, *1*(2), 46.
[31] Lim, C. S., & Mohamed, M. Z. (1999). Criteria of project success: an exploratory re-examination. *International Journal of Project Management*, *17*(4), 243-248.
[32] Mukhtar, M. M., Amirudin, R. B., Sofield, T., & Mohamad, I. B. (2017). Critical success factors for public housing projects in developing countries: a case study of Nigeria. *Environment, Development and Sustainability*, *19*, 2039-2067.
[33] Ngoc Ton, H. N., Shumshunnahar, M., Nhat Tu, T. N., & Nguyen, P. T. (2023). Revisiting social capital and knowledge sharing processes in tertiary education: Vietnamese and Bangladeshi students as target populations. *Cogent Social Sciences*, *9*(1), 2186579.
[34] Oyebanji, A. O., Liyanage, C., & Akintoye, A. (2017). Critical Success Factors (CSFs) for achieving sustainable social housing (SSH). *International Journal of Sustainable Built Environment*, *6*(1), 216-227.
[35] Pinto, J. K., & Covin, J. G. (1989). Critical factors in project implementation: a comparison of construction and R&D projects. *Technovation*, *9*(1), 49-62.
[36] Pinto, J. K., & Slevin, D. P. (1987). Critical factors in successful project implementation. *IEEE transactions on engineering management*, (1), 22-27.
[37] Rockart, J. F. (1982). The Changing Role of the Information Systems Executive: A Critical Success Factors Perspective. *Sloan Management Review (pre-1986)*, *24*(1), 3.
[38] Rungasamy, S., Antony, J., & Ghosh, S. (2002). Critical success factors for SPC implementation in UK small and medium enterprises: some key findings from a survey. *The TQM Magazine*, *14*(4), 217-224.
[39] Rasoolimanesh, S. M., Jaafar, M., Kock, N., & Ramayah, T. (2015). A revised framework of social exchange theory to investigate the factors influencing residents' perceptions. *Tourism Management Perspectives*, *16*, 335-345.
[40] Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M., & Coyle, M. (1992). Critical success factors for construction projects. *Journal of Construction Engineering and Management*, *118*(1), 94-111.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[41] Sarstedt, M., Hair, J. F., Cheah, J. H., Becker, J. M., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australas. Mark. J.*, *27*(3), 197–211.
[42] Sukri, N. A. N. M., Ismail, Z., & Ariffin, W. T. W. (2020). Conceptual framework for developing a model of effective tree preservation order (Act 172) implementation in construction projects. *International Journal of Sustainable Construction Engineering and Technology*, *11*(1), 18-30.
[43] Tabish, S. Z. S., & Jha, K. N. (2012). Success traits for a construction project. *Journal of Construction Engineering and Management*, *138*(10), 1131-1138.
[44] Takim, R., Akintoye, A., & Kelly, J. (2004). Analysis of performance measurement of construction projects in Malaysia. *Globalisation and Construction*, 534-546.
[45] Tobi, S. U. M., Jasimin, T. H., & Rani, W. N. M. W. M. (2020). Overview of Affordable Housing from Supply and Demand Context in Malaysia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 409, No. 1, p. 012010). IOP Publishing.
[46] Ton, H. N. N., Nguyen, P. V., & Tran, H. Q. (2021). Employee engagement and best practices of internal public relations to harvest job performance in organizations. *Problems and Perspectives in Management*, *19*(3), 408.
[47] Toor, S. U. R., & Ogunlana, S. O. (2009). Construction professionals' perception of critical success factors for large-scale construction projects. *Construction Innovation*, *9*(2), 149-167.
[48] Wetzels, M., Odekerken-Schroder, G., & van Oppen, C. (2009). Using PLS Path Modeling for Assessing Hierarchical Construct Models: Guidelines and Empirical Illustration. *Management Information Systems Quarterly*, *33*(1), 177-195.
[49] Whitehead, C. M. (2007). Planning policies and affordable housing: England as a successful case study? *Housing Studies*, *22*(1), 25-44.
[50] Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, *24*(1), 1-32.
[51] Wordsworth, P., & Lee, R. (2001). *Lee's Building Maintenance Management*. Blackwell Science.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Appendix 1: MEASUREMENT SCALE (Note: SD = Standard deviation)

CONCEPTS	DIMENSIONS	CODE	ITEMS	MEAN	SD	DELETED
Critical success factors (CSFs) (Adabre & Chan, 2019a; Mukhtar et al., 2017)	Mixed Land Use CSFs Land Use Planning CSFs	LAND1	Adequate accessibility to social amenities	3.768	0.849	
		LAND2	Good location for housing projects	3.98	0.741	
		LAND3	Adequate infrastructure supply by government	4.384	0.67	
		LAND4	Formulation of sound housing policies	4.1 99	0.719	deleted
	Procurement factor	PROCUR1	Comprehensive contract documentation	4.225	0.729	
		PROCUR2	Competitive procurement process	4.066	0.725	
		PROCUR3	Transparency in procurement process	4.364	0.656	
	Project management	PROJECT1	Development of a good project plan	4.258	0.695	
		PROJECT2	Effective control system	4.291	0.626	
	Maintenance management	MAINTEN1	Monitoring condition/defects/deterioration of the completed housing	4.424	0.635	
		MAINTEN2	Identifying the causes of the defects	4.344	0.641	
		MAINTEN3	Timely execution of repairs needed	4.377	0.716	
		MAINTEN4	Controlling the quality of the maintenance work	4.331	0.627	
Critical success criteria (CSC) Chan & Adabre (2019)	Household satisfaction	HS1	Functionality of housing facility	4.066	0.811	
		HS2	End user's satisfaction with the housing facility	4.079	0.724	deleted

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

CONCEPTS	DIMENSIONS	CODE	ITEMS	MEAN	SD	DELETED
		HS3	Maintainability of housing facility	4.179	0.72	
		HS4	Safety performance (crime)	4.238	0.725	
	Stakeholders' satisfaction	SS1	Timely completion of project	4.219	0.708	deleted
		SS2	Project team satisfaction	3.874	0.775	
		SS3	Reduced occurrence of disputes and litigation	4.252	0.791	
	Housing operation CSC	HO1	Energy efficiency of housing facility	3.861	0.838	deleted
		HO2	Reduced lifecycle cost of housing	4.053	0.735	
		HO3	Environmental performance of housing facility (Eco-friendly)	4.086	0.718	
Critical success criteria (CSC) Chan & Adabre (2019)	Time measurement CSC	TIME1	Take up rate of housing facility (marketability of housing facility)	3.781	0.905	deleted
		TIME2	Waiting time of applicants before being located housing unit	4.04	0.771	
		TIME3	Construction cost performance of housing facility	4.265	0.778	
	Location affordability cost	LOCA1	House price in relation to income	4.146	0.749	
		LOCA2	Commuting cost from the location of housing to public facilities	3.815	0.749	
		LOCA3	Rental cost in relation to income	4.397	0.691	deleted
	Quality-related CSC	QUAL1	Quality performance of project	4.205	0.703	
		QUAL2	Aesthetically pleasing view of completed house	3.768	0.809	deleted
		QUAL3	Technology transfer	3.887	0.834	
		QUAL4	Technical specification of housing	4.02	0.818	deleted

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)