



The Success Criteria of Public Housing Project in Nigeria

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ABSTRACT

There is no consensus among researchers of what constitutes projects success; every project type may have different success criteria. Identifying project success criteria at the initial stage of a project can contribute to effective utilization of resources. The aim of this study is to establish the criteria for measuring public housing project success in Nigeria. The data collection was carried out in Nigeria by means of structured interviews with ten experts in housing, a pilot survey and questionnaire survey. A questionnaire survey was carried out in which 550 questionnaires were administered to construction professionals who involve in public housing projects, in order to elicit their perceptions on success criteria for public housing projects. The sample was drawn using purposive sampling method since there is no sample frame of people with experience in public housing. Two hundred and seventy six questionnaires (276) were returned completed representing 50.2% response rate. The data collected were analysed using structural equation modelling technique. The results reveal six criteria for measuring public housing project management success, these are client's satisfaction, project completed on time, project completed to specified quality standard, absence of disputes, safety, and completion within budget. The results also reveal four criteria for measuring public housing product success which include meeting the project purpose, end users' satisfaction, environmental impact and aesthetic appearance of the . Understanding the findings of this study by policy makers and project managers can improve effectiveness and efficiency of public housing projects in Nigeria.

1. Introduction

The aim of every stakeholder of a given project is to achieve successful project outcome. Generally success may be described as an accomplishment of an aim or purpose as defined in Oxford English Dictionary. But one may ask how can project success be measured? To answer this question various studies have been conducted on the area of project success. However, until now there is no consensus among researchers on the standard definition of the term project success or common set of the success measures (Ika, 2009; McLeod and MacDonell, 2012). This is because the perceptions of different stakeholders on project success may not be the same (Toor and Ogunlana, 2010). For instance client may consider project as successful if it is completed within time and budget. Contractor may evaluate success on a project based on the amount of profit realised, while to end users a project is successful if it meets acceptable quality standard and function properly.

Baccarini (1999) noted that the criteria of measuring project success must be established at the initial stage of a project to enable the project team members work in the same direction. Lack of understanding of

success criteria at the beginning of a project may lead to disagreement among project stakeholders about whether a project is successful or not; since different stakeholders have different perceptions (Toor and Ogunlana, 2009; Baccarini, 1999).

Despite a number of project success measures have been suggested by many researchers, there is no common set of measures that can be applied to all types of projects. Different project type may have different success measures (Muller and Turner, 2007). Earlier, Cox et al. (2003) noted that there is a great need in identifying common measures of construction project success which executive and project managers can use in measuring success of a given project. Pinto and Slevin (1988) assert that until there is agreement among researchers and project managers on the determinant of project success it will be difficult to accurately monitor and predict the project outcome.

Many developing countries experience shortages of housings due to rapid growth in populations and urbanisation which led to poor living condition of their people (Bredenoord and van Lindert, 2010). In response to this problem government provides public housing to low income households who cannot afford to own or have access to decent

housing at market price (Ibem and Solanke, 2011). Public housings are housing provided for low incomes earners which are subsidised by public fund (UN Habitat, 2009. This type of project accounts for large volume of construction activities in many developing countries and involves many stakeholders. The, production and management technique applied in public housing projects differ from one off construction project, and hence requires different approach (Ahadzie et al. 2008). Therefore, even though the criteria for measuring success of these projects may be common to some generic projects, some of the success criteria may be unique to public housing.

Since public housing projects involve a number of stakeholders, there is a need to establish measures of success for those projects to enable the interest group evaluate the projects' success. However, researchers have not made effort to establish the measures of success of this type of project especially in developing countries. This motivated the conduct of this research work. The aim of this study is to establish principal measures of public housing project success to enable stakeholders evaluate successful projects' outcome. Ahadzie et al. (2008) noted that identification of principal measures of project success can assist in appropriate resource allocation and effective project management.

2 Literature Review

2.1 Public Housing Development in Nigeria: Historical Perspectives

The Federal Republic of Nigeria is located in West Africa and covers an area of 923, 768 square Kilometres. Nigeria has population of about 174 million people with more than 250 ethnic groups. High rate of population growth and rapid urbanisation have led to shortages of decent housing in the country. Presently, there are about 17 million units of housing deficit in Nigeria (Aribigbola, 2013; Iweala, 2014).

In order to address the housing problems in the country, government initiated public housing programmes since the attainments of the country's independence in 1960. During that period five year development plans were designed as a mechanism of economic growth. The housing sector has been neglected in the first and second plan due unrest in the country (Ademiluyi, 2010; FGN, 2012). For instance, in the first development plan 24,000 housing were planned to produced, but only 500 unit had been completed (Makinde, 2013). The national housing programme was established in the second development plan in 1972 (FGN, 2012; Makinde, 2013). During the period between 1970 and 1974, government planned to construct 59,000 housing units however, only 7,080 housing units were built (FGN, 2012; Ibem et al., 2011). From 1975 to 1979 marked the period of third development plan, government earmarked to construct 202,000 housing units, but by the end of the period 28, 500 housing were completed, representing 14.1% achievement ((FGN, 2012; (Ihuah et al. 2014; Makinde, 2013). In 1979 the new democratically elected government planned to construct forty thousand housing units each year in the various states of federation, for a period of four years (1979-1983), of which 80% was earmarked for low income earners. However, at the end of the programme only thirty two thousand housing representing 20% of the planned housing units were completed (FGN, 2012). Furthermore, the federal government also earmarked to construct 121,000 housing units between 1994- 1995, but by the end of 1995 only 1014 were successfully completed representing 0.8% achievement (Makinde, 2013). From 2003 -2007 government have planned to produce 18,000 housing units in which 500 housing will be built in each of the 36 states.

However, presently most of these projects have been abandoned (Ihuah et al. 2014).

The foregoing discussions reveal that the performance of the various housing programmes in Nigeria was very poor. This has been attributed to a number of factors which includes: inconsistencies and poor implementation of national housing policy and programmes, ineffective housing finance system, lack of effective legal and institutional framework, lack of political will, and unstable political environment among others (Ademiluyi, 2010; Aribigbola, 2013; Ibem et al., 2011; Jiboye, 2011; Makinde, 2013).

The first national housing policy in Nigeria was launched in 1991 with the main goal of ensuring that all Nigerian own or have access to decent housing at affordable cost by the year 2000. This goal was not realised due to poor implementation of the policy in addition to many other problems. In 2012 a new national housing policy was launched which emphasizes on the participation of private sector in housing provision in Nigeria, while government provides enabling environment. However, government has reinstated its commitments toward the provision of subsidised public housing to low income earners (FGN, 2012; Aribigbola, 2013; Makinde, 2013).

2.2 Project Success Criteria

The studies of project success have been carried out by many researchers in various field of knowledge such as information technology (IT), business development, manufacturing industries and construction sector (Toor and Ogunlana, 2009). However until now there is no agreement among researchers on the accepted definition of project success or standard methodology for assessing it (Baccarini, 1999).

De Wit (1988) distinguishes between project success and project management success. Project success concerns with the achievement of overall project objectives. Conversely, project management success concerns with the achievement of project management objectives measured in terms of time, cost and quality. A project can be completed on time within budget but considered as a failed project if it did not satisfy client or end users. Thus, project success and project management success are not the same. Similarly, Bacarrini (1999)

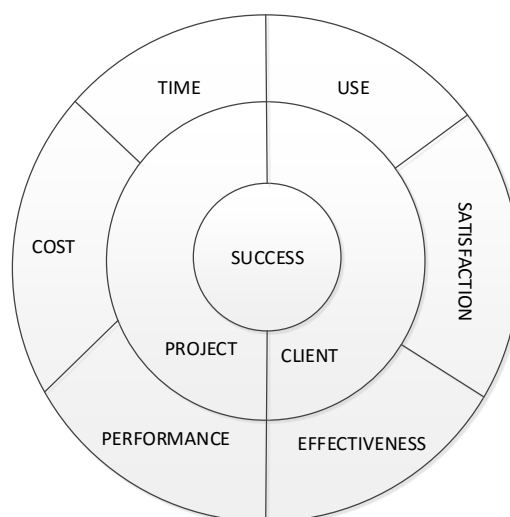


Figure 1: Model of Project Success Criteria (Source: Pinto and Slevin, 1988)

divides project success into two major components, project management success that concern with the achievement of project management objectives and product success that concern with the success of the final product. Thus, criteria for measuring project management success is different from those used to measure the final product success. Success criteria are defined as standard or measures by which project success or failure can be judged (Lim and Mohamed, 1999; Cookie-Davies, 2002). They are measures which can be used to evaluate project success or failure.

Pinto and Slevin (1988) develop a model for assessing project success, which consists of two components 'Project and Client' as shown in Figure 1. The first component 'Project' comprises of three criteria, *time, cost* and *performance*. These assess whether the project performs as intended, in terms of schedule, budget and technical specification. The second component consists of three criteria '*use, satisfaction* and *effectiveness*'. These assess whether the project is being used by its intended users, whether the intended users satisfied with the project and whether the project directly benefits the end users respectively.

Traditionally, construction project success is measured by three criteria, on time, within budget and to specified quality standard (Atkinson, 1999; Hughes et al., 2004). These criteria are referred to as iron triangle. However, it has been argued that the measures of success in construction projects are beyond the iron triangle (Low and Chuan, 2006; Toor and Ogunlana, 2010). Thus, new criteria have been suggested by various researchers in addition to the traditional measures of time, cost and quality. For instance client satisfaction (Rad, 2003; Jha and Iyer, 2007), end users satisfaction, (Toor and Ogunlana, 2010), project team members satisfaction (Jha and Iyer, 2007); contractor's profit (Sanvido, et al. 1992; Atkinson, 1999), safety (Ahadzie et al., 2009; Toor and Ogunlana, 2010), environmental impact (Ahadzie et al., 2008), Marketability of the final product (Sanvido et al. 1992), meeting the project purpose (Baccarini, 1999; Turner, 2009), absence of dispute or legal claim (Jha and iyer, 2007; Toor and Ogunlan, 2010), and aesthetic appearance of the project (Sanvido et al. 1992; Pheng and Chuan, 2006).

This study proposed 12 criteria for measuring public housing project success based on:

- The model of project success criteria (Figure 1) developed by Pinto and Slevin (1988).
- Literature review of project success criteria presented above.
- The meaning and purpose of public housing project.

However, there is a need to identify which criteria can be used to measure project management success and which can measure product success. Baccarini (1999) simplify this by dividing project success into two distinct components. The project management success and product success as mentioned earlier. The projects management success criteria are completion on time, within cost and to specified quality, stakeholders' satisfaction (client satisfaction, team members' satisfaction). The product success criteria are customers'/ end users' satisfaction and meeting the projects' goals/ purpose. Thus, the two components must meet stakeholders' satisfaction based on their interest in the respective components.

Lim and Mohamed (1999) classified project success into two viewpoints, micro and macro viewpoints. The micro viewpoint concerns the achievement of project success at the completion of construction phase

of a project. The criteria for measuring project micro viewpoints of project success include completion on time, within budget, to specified quality, performance (efficiency) and safety. The macro view point of project success concerns with the achievement of original project concept/ goal which can only be known at the operational phase of a project. The criteria for measuring macro viewpoints project success are the end users satisfaction and meeting the project's goal.

Atkinson (1999) divides success criteria into two main categories, those measure project success at the delivery stage and those at post-delivery stage. Success criteria at delivery stage are time, cost and quality, they measure project management performance. Success criteria at post-delivery stage are benefit to organisation (improved efficiency and effectiveness, and increased profits etc) and stakeholders benefit which include end users' satisfaction, environmental impact, contractors profit, professional learning etc. Toor and Ogunlana (2010) suggest that performance measures of construction project (project management success) include on time, within budget, to specify quality standard, safety, stakeholders' satisfaction, and minimum dispute. Therefore the foregoing discussions suggest that, the proposed measures of public housing project success can be classified into two categories.

The first category relates to success criteria that measure project management success or performance. These include completion on time, on cost, to the quality standard, safety, client satisfaction, project team members' satisfaction, absence of dispute or legal claim as shown in Table 1.

The second category relates to success criteria that measure the final product success. These include end users' satisfaction, environmental impact of the project, aesthetic appearance, marketability of the product and meeting the project purposes as shown in Table 2.

3. Methodology

This section explains the methodology adopted in conducting this study. It describes the entire research design which includes method of data collection, questionnaire development, sampling technique, and data analysis process.

3.1 Method of Data Collection

This study conducted an intensive literature review in order to identify success criteria/measures for public housing project and to develop a survey questionnaire. Based on the literature review, twelve (12) success criteria were identified. Before developing the questionnaire, a

Table 1: Measures for Public Housing Project Management Success

Items	Descriptions
PMS1	Project completed on time
PMS2	Project completed within budget
PMS3	Absence of disputes or any legal claims
PMS4	Client satisfaction with the project
PMS5	Project team members' satisfaction with the project
PMS6	Project completed with a low accident rate
PMS7	Project completed to the specified quality standard.

Table 2: Measures for Public Housing Product Success

Items	Descriptions
FPS1	End users satisfaction with the project
FPS2	Environmental impact of the housing project
FPS3	Marketability of the completed housing unit
FPS4	Aesthetic appearance of the housing units
FPS5	Meeting the project's purpose

list of the identified success criteria was presented to ten experts who have at least 15 years' experience involving in public housing projects. They include developers, consultants, contractors and those working in public housing agencies. The experts were asked to indicate their views on the relevance and adequacy of the success criteria with regards to developing countries using five point Likert Scale ranging from 1 to 5, with 1 representing least important criterion and 5 extremely important criterions. They were also asked to modify the wording and suggest additional success criteria were necessary. Analysis of the results indicates that all the experts agreed that 12 success criteria are comprehensive and important measures of public housing project in developing countries. Based on these results a preliminary questionnaire was developed. Tables 1 and 2 present the proposed measures of public housing projects success.

In order to test the clarity and comprehensiveness of the questionnaire a pilot survey was conducted in Nigeria with 52 construction professionals including architect, quantity surveyors, engineers and builders who work as developers, consultant, contractors and public servants. After minor modifications the final survey questionnaire was developed.

The questionnaire consists of three sections. The first section elicits information on the respondents' background, the second section consists of questions related measures of project management success of public housing, while section three consist of questions related to public housing product success measures. The questionnaire survey was carried out in Nigeria in March 2014. Five hundred and fifty (550) questionnaires were administered to construction professionals including architects, quantity surveyors, engineers and builders who have experience in public housing projects.. The sample was drawn using purposive sampling technique. This is because it was not possible to use probability sampling methods since no sample frame exist of people with experience in public housing projects.

The respondents were requested to indicate their views on the importance of each success criteria in measuring the success of public housing project management or product success as the case may be. They were asked to use five point Likert Scale ranging from 1 to 5

where 1 represent least important success criteria and 5 extremely important success criteria. A total of 276 usable questionnaires were returned completed representing 50.2% response rate. The response rate is high in comparison with "the norm of 20-30% with most questionnaire survey in the construction industry" (Akintoye, 2000).

3.2 Data Analysis and Results

The data collected were analysed with the aid of Statistical Package for Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) computer software. Before the analyses were carried out the data collected were screened to ensure important assumptions of multivariate techniques have been met. These include sample size, missing data and normality. The normality of the data was evaluated by observing skewness and kurtosis statistics. The values of both statistics were found to be within the range of ± 1 indicating normality of the data as suggested by Xiong et al. (2015). Five cases were found with missing data. Analyses of the extent of missing values show that about 50% of the variables in each of the five cases have missing values. Therefore based on the recommendation of Hair et al. (2009), these cases were dropped for analysis.

Descriptive statistics were used to analyse the respondents' profiles using SPSS. Whereas confirmatory factor analysis (CFA) was performed based on the responses to test how well the success criteria (success measures) represent their constructs. The CFA enables a researcher to test how well measured variables represent a smaller number of constructs (Hair et al. 2009). These methods had been used by other similar studies (Chileshe and Haupt, 2005; Huang and Lai, 2012; Musa et al. 2015).

Table 3 present the summary of the respondents' profile. The results indicate that 30.4% of the respondents work in public housing agencies, 22.5% are developers, 22.8% are consultants while 24.3% are contractors. Their professional affiliations include architecture 28.6%, quantity surveying 30.8%, engineering 15.9%, building technology 22.5%, other professions account for 2.2%. The highest academic qualifications of the respondents range from Higher National Diploma (HND) to Doctor of Philosophy (PhD). About 50% have Bachelor of Science (BSC) and 26% possess Master of Science (MSC) as their highest academic qualifications. Majority of the respondents (64.1%) have more than 10 years' experience involving in public housing projects. Therefore, based on their professional background, academic qualifications and experience, the respondents were capable of providing reliable information.

3.3 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) model for project management success criteria with seven indicators (success measures) and product success criteria model with five indicators were specified and analysed

Table 3: Summary of Respondents' Profile

Profession	%	Qualification	%	Experience (years)	%	Organisation	%
Architecture	28.6	HND	19.2	1-5	5.1	Public Sector	30.4
Quantity Surveying	30.8	BSC	49.3	6-10	30.8	Developer	22.5
Engineering	15.9	MSC	26.1	11-15	36.6	Consultancy	22.8
Building Technology	22.5	PHD	1.8	16-20	18.8	Contracting	24.3
Others	2.2	Others	3.6	> 20	8.7		

separately. The aim was to test how well the corresponding success measures represent the constructs. The indicators have been shown in Table 1 and 2 respectively. Evaluations of GOFs model indicate that there is need to re-specify the two models, because the sample data did not fit the hypothesised models well.

The possible sources of misspecification can be identified by evaluation of standardised factor loading, standardised residual and modification indices as suggested by (Byrne, 2010; Hair et al. 2010; Kline, (2011)). However, due to limitations of space the details of the modifications process have not been reported in this study.

Precisely, for CFA model of project management success criteria, the modifications involve deletion of one measure variable (Project team members' satisfaction with the project) from the model because it has high standardised residual value (larger than 2.58) as suggested by Kline (2011). Moreover, two error covariances related to PMS4 and PMS6 as well as PMS3 and PMS1 have modification index of 16.2 and 11.6 respectively which are considered large. Thus, these two parameters have been added to the measurement model (Byrne, 2010; Kline, 2011). The re-specified has shown in Figure 2.

For CFA model of product success criteria, the modification also involve deletion of one measure variable (Marketability of the completed housing unit) from the model because it has high standardised residual value (larger than 2.58) as suggested by Kline (2011). No modification index has been found in this model; hence, no parameter was added. The re-specification of the model involves only the deletion of one measure variable as shown in Figure 3.

3.4 Assessing Validity of CFA measurement model

Validity is defined as the extent to which research is accurate (Hair et al. 2009). Measurement model validity is evaluated based on establishing acceptable level of goodness of fit indices and finding specific evidence of construct validity (Hair et al. 2009).

3.4.1 Goodness of Fit Indices

Goodness of fit (GOF) compares the theory and reality by assessing how well the specified model reproduces the observed covariance matrix among the indicators items (ie the similarity of the observed and estimated covariance matrices (Hair et al. 2009)).

The fundamental statistical measure of GOF in any CFA model that assesses the difference of the observed and estimated covariance matrices is Chi Square (X^2). However, because assessment of GOF with chi square value alone is complicated by several factor, researchers have developed a number of alternative GOF measures. These are classified into three main groups: absolute fit indices, incremental fit indices and parsimony fit indices (Hair et al. 2009). Despite there are a number of GOF measures in each group, a researcher is not expected to report all the GOFs in the assessment of model fit.

Hair et al. (2009) suggest that using three to four indices provide adequate evidence of model fit. This should include at least one incremental index and one absolute index in addition to chi square value and degree of freedom. Thus, they assert that reporting, Comparative Fit Index (CFI), Tucker Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA), Chi Square (X^2)

value and Degree of Freedom (df) are sufficient to provide information to evaluate model fit. Therefore, this study in addition to the recommended GOF measures also reports Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI). The CFI assess model fit relative to independent/null model whose variables are completely uncorrelated. The CFI values > 0.90 are indicative of a good fitting model. The TLI is an incremental fit indices, it is a comparison of normed chi square of value of an independent/null model (one that assumes all observed variables are uncorrelated) and specified model which take account of model complexity. TLI values > 0.90 suggest a better fit. The RMSEA estimate the lack of fit in a model compared to a perfect model. Thus, it estimates how well a model fit a population. The RMSEA values < 0.08 indicate a good fit. The GFI calculate a weighted proportion of variance in the sample covariance accounted for by the estimated population covariance matrix, the GFI values > 0.90 were considered good. The AGFI is GFI index adjusted for number of parameters estimated in the model. The recommended values of AGFI for a good fit are > 0.90 (Hair et al. 2009; Tabachnick and Fidell, 2013).

3.4.2 Construct validity

Construct validity is the extent to which a set of observed or measured variables truly represent theoretical latent construct which they are assigned to measure. Construct validity can be assessed by establishing convergent validity of the construct. This can be confirmed if the items that are the indicators of a specific construct converge or share high proportion of variance in common (Hair et al., 2009).

Convergent validity can be estimated by examinations of size of factor loadings and assessment of reliability. High factor loadings indicate that the items converge at a common point, the latent construct (Hair et al., 2009). It has been recommended that the standardised factor loadings should be at least 0.5 and statistically significant. Standardised and unstandardized estimates are interpreted just as regression coefficient in multiple regressions (Hair, et al., 2009; Kline, 2011).

Reliability which indicates internal consistency in the construct is also a measure of convergent validity. Coefficient of reliability can be estimated using Cronbach Alpha. Reliability coefficient should be at least 0.7 to suggest good reliability (Hair et al., 2009).

3.5 Validity of Measurement Model for Project Management Success Criteria

Figure 2 shows measurement model for project management success criteria, while Table 4 shows the model fit. Analysis of GOF indices as shown in the Table 4 reveals that, the $X^2= 17.928$, $df= 7$, $p = 0.012$ (<0.05), $CFI = 0.977$, $TLI = 0.950$, $RMSEA = 0.075$, $GFI = 0.980$, $AGFI = 0.940$. All the GOF indices apart from chi square p value are within the recommended values of a good fit suggested by Hair et al. (2009).

Convergent validity of the model was assessed through examinations of size of factor loadings and reliability. The results in Table 5 reveal that all the standardised factor loadings of the indicator items are greater than 0.5 and they are all significant that is their critical ratios (C.R) > 1.96 . These are consistent with recommendations of Hair et al. (2009). The reliability coefficients shown in Table 6 indicate that the reliability of project management success criteria construct is 0.813 which is considered as good (Hair et al. 2009).

Table 4: Fit Indices for Measurement Model of Project Management Success Criteria

Fit Indices	Recommended	Measurement Model
χ^2	-	17.928
Df	-	7
P	> 0.05	0.012
CFI	> 0.90	0.977
TLI	> 0.90	0.95
RMSEA	< 0.08	0.075
GFI	> 0.90	0.980
AGFI	> 0.90	0.940

Table 5: Parameter Estimates for Measurement Model of Project Management Success Criteria

Relationship	Standardized	Un-standardized	C. R	P
PMS1—Success	0.707	1.016	10.047	Sig.
PMS2—Success	0.577	0.837	8.532	Sig.
PMS3—Success	0.638	0.919	9.157	Sig.
PMS4—Success	0.747	1.102	10.229	Sig.
PMS6—Success	0.632	0.923	8.798	Sig.
PMS7—Success	0.680	1.000		Sig.

Table 6: Reliability Estimates

Constructs	Cronbach's Alpha
Project Management Success Criteria	0.813
Product Success Criteria	0.766

These results show that the convergent validity of the measurement model is confirmed. Thus, based on the assessment of the factor loadings and convergent validity, it can be concluded that the validity of measurement model for project management success criteria has been established.

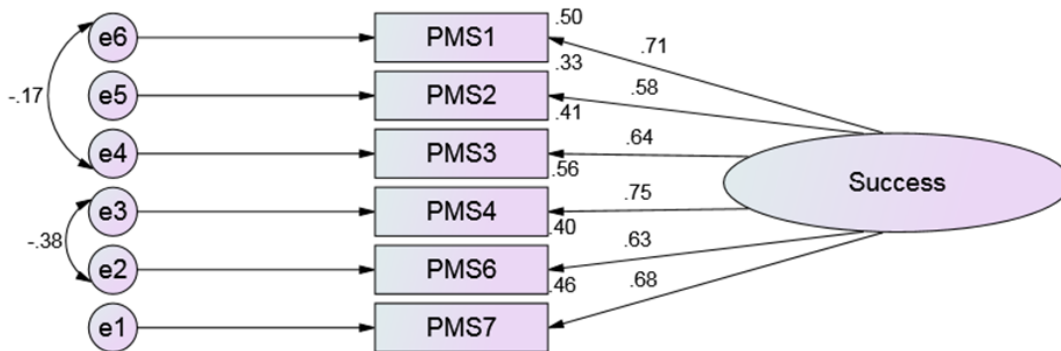


Figure 2: Measurement Model for Project Management Success Criteria for Public Housing

Table 7: Fit Indices for Measurement Model of Product Success Criteria

Fit Indices	Recommended	Measurement Model
χ^2	-	5.262
Df	-	2
P	> 0.05	0.072
CFI	> 0.90	0.988
TLI	> 0.90	0.963
RMSEA	< 0.08	0.077
GFI	> 0.90	0.990
AGFI	> 0.90	0.951

Table 8: Parameter Estimates for Measurement Model of Product Success Criteria

Relationship	Standardized	Un-standardized	C. R	P
FPS1—Success	0.666	0.944	8.800	Sig.
FPS2—Success	0.658	0.909	8.735	Sig.
FPS4—Success	0.625	0.854	8.421	Sig.
FPS5—Success	0.739	1.000		Sig.

3.6 Validity of Measurement Model for Product Success Criteria

Figure 3 shows measurement model for product success criteria, whereas Table 7 indicates the model fit. Analysis of GOF indices as shown in the Table 7 reveals that, the $\chi^2 = 5.262$, $df = 2$, $p = 0.072$ (> 0.05), CFI = 0.988, TLI = 0.963, RMSEA = 0.077, GFI = 0.990, AGFI = 0.951. The model passed the chi square test, as the p value is > 0.05 which indicates that there is no significant difference between the observed and estimated covariance matrices (no significant difference between the specified model and reality). Moreover, all the other GOF indices are within the recommended values of a good fit suggested by Hair et al. (2009).

As explained earlier convergent validity of a model is assessed through

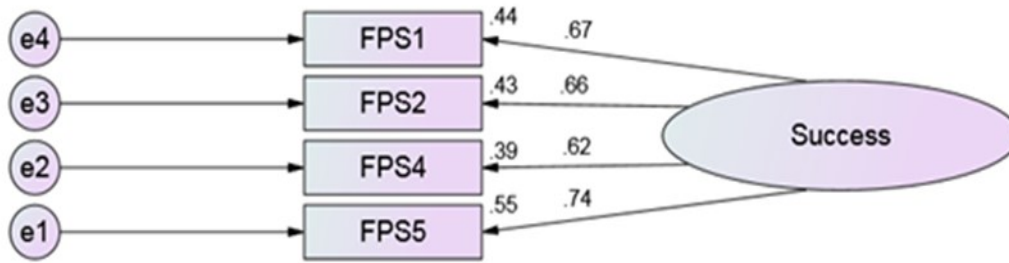


Figure 3: Measurement Model for Product Success Criteria for Public Housing Project

examinations of size of factor loadings and reliability. The results in Table 8 reveal that all the standardised factor loadings of the indicator items are greater than 0.5 and they are all significant that is their critical ratios (C.R) > 1.96. These are consistent with recommendations of Hair et al. (2009).

The reliability coefficients shown in Table 6 indicate that the reliability of product success criteria construct is 0.766 which is considered as good (Hair et al. 2009). These results show that the convergent validity of the measurement model is confirmed. Thus, based on the assessment of the factor loadings and convergent validity, it can be concluded that the validity of measurement model for product success criteria has been established.

4. Conceptual Model for Public Housing Project Success Criteria

Figure 4 shows a conceptual model for public housing project success criteria. The model is divided into three phases. The first phase comprises public housing project success criteria; the second phase contains project management success and product success while the third phase represents the overall success of public housing project. It can be noted that the first phase of the model is made up of ten success criteria which have been divided into two parts.

The first part has six success criteria which measure project management success and comprises of client satisfaction, project completed on time, to specified quality standard, absence of disputes/conflict, safety (project completed with low accident rate) and completion on cost (within budget). The second part has four success criteria that measure public housing product success, and comprise of meeting the project's purpose, end users' satisfaction, environmental impact and aesthetic appearance of the project.

This model indicates that different set of success criteria measure public housing project management success and product success. However, despite the traditional measure of project management success of completion on time, on cost and to specified quality are still in use, other criteria also emerged. This model can assist project managers of public housing in effective utilisation of resources by focusing on the achievement of their projects' objectives.

5 Discussions

The results from this study indicate that six success criteria can be used to measure project management success of public housing project. These are client's satisfaction; project completed on time, to specified quality standard, absence of disputes, safety, and

completion on cost (within budget). This is consistent with the previous studies (Ahadzie, 2008; Baccharini, 1999; Toor and Ogunlana, 2010).

The standardised factor loading presented in Table 5 can be used to assess the importance of each success criteria in measuring the project management success. For instance, based on the results it can be noted that client satisfaction with the project (PMS4) has the highest value of standardised estimates (747), this indicates that it is the most important criteria for measuring project management success in public housing projects. Completion of the projects on time is the second most important project management success criteria with standardised estimates (0.707), followed by project completed to specified quality standard (0.680), absence of disputes/ conflicts (0.638), safety (0.632) and project completed on cost (0.577).

Thus, on project management of public housing projects, the respondents are more conscious about clients' satisfaction of the projects, completion on time and to specified quality standard. These criteria are important in preventing disputes. The absences of disputes are also very important issues suggested by this study. The present of dispute among project participants may lead to delay in completion and cause overrun and these may affect the efficiency of project management. Completion of project with low accident rate is also an important measure of project management success. It is hardly to achieve success of a project if there are no safe working conditions to the workers. This is in agreement with Toor and Ogunlana, (2010). Project completion within budget is very essential in measuring project management success as cost overrun may lead to delay in completion. This is consistent with Ahadzie (2008).

The results from this study also reveal that, four success criteria can be used to measure public housing product success. These are meeting the project purpose, end users' satisfaction, environmental impact and aesthetic appearance of the project. The results are consistent with the previous findings (Baccarini, 1999; Lim and Mohamed, 1999; Pheng and Chuan, 2006). Table 8 indicates that meeting the project purpose (FPS5) has the highest standardised estimates (0.739), meaning that it is the most important criteria for measuring public housing product success. End users' satisfaction (FPS1) is the second most important factor having standardised estimates (0.666), followed by environmental impacts of housing projects (0.658) and then aesthetic appearance of the projects (0.625).

The purpose of public housing projects is to assist low income earners who cannot compete on a marketplace to own or have access to decent housing. If the original purpose of the project is not achieved then the project may be regarded as unsuccessful. Thus, for public housing product to be successful, the housing must be affordable to low income

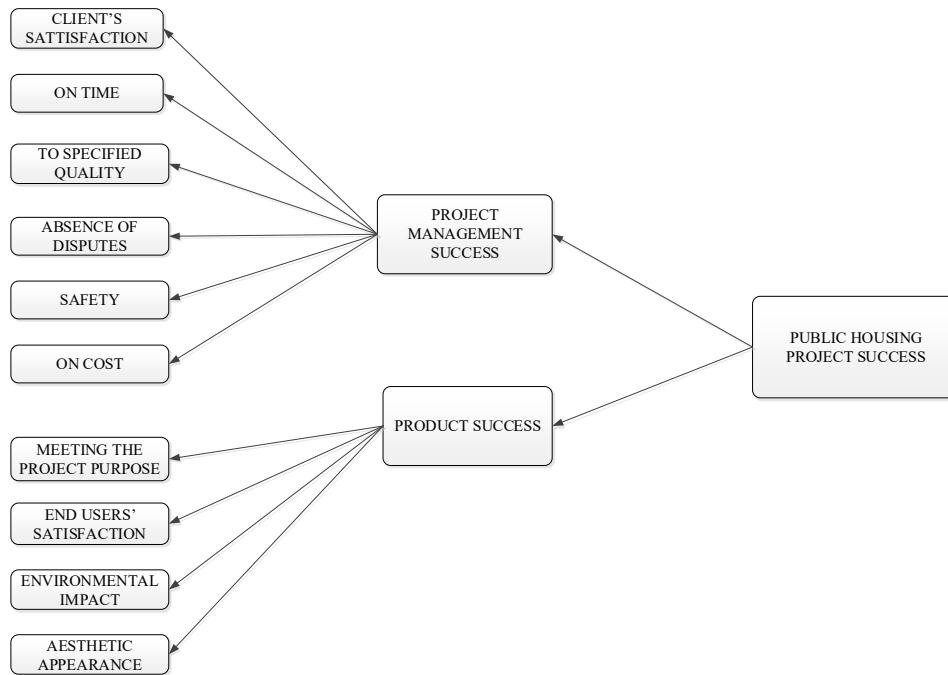


Figure 4: Conceptual Model for Public Housing Project Success Criteria

earnings and allocated to people based on needs. The results also suggest that end users' satisfactions are vital to the success of the final product. End users are the people who occupy the housing; hence, their satisfaction with the projects is vital. Therefore, the housing should be designed and constructed in such a way that will give the end users maximum satisfactions.

The respondents also considered environmental impact of the project as an essential measure of public housing product success. The environmental quality and its sustainability to the needs of people of the area are very essential. It is therefore important that public housing construction should not lead to a detrimental effect on the community or environment. All construction waste should be appropriately managed, and construction materials usage should be in accordance with the directives of relevant state protection agencies which are aimed at protecting the environment. This finding is consistent with that of Ahadzie (2008). The respondents also opined that, aesthetic appearance of the housing units is a principal measure of public housing product success. Generally, if public housings are designed to have appealing appearance it will preserve respect to the occupants and this will increase the acceptability of the projects by the end users. This is supported by previous studies (Sanvido et al., 1992).

6 Conclusions

The study established ten criteria that can be used to measure the success of public housing projects in developing countries. These criteria have been classified into two groups. The first group measures project management success, and comprises of client's satisfaction, project completed on time, to specified quality standard, absence of disputes/conflicts, safety (project completed with low accident rates) and project completed on cost (within

budget). The second group measures public housing product success and comprises of meeting the project purpose, end user's satisfaction, environmental impact and aesthetic or appealing appearance of the housing units.

The study reveals that client's satisfaction, completing the projects on time and to the specified quality standard are three most important criteria for measuring project management success in public housing projects. On the other hand, meeting the project success and end users' satisfaction are the two most important criteria in measuring public housing product success. All participants in public housing projects should understand these success criteria clearly at the initial stage, so that they can focus in the same direction to achieve overall success in their projects. This study can guide project managers and developers in effective and efficient utilizations of resources in public housing projects. The project managers are informed on the specific areas that must be satisfied in order to achieve success in project management. For instance, completion on time, within cost and to specified quality standard. The study can guide executives and senior managers in public housing projects to understand specific areas that must be satisfied in order to obtain overall success in public housing projects.

Moreover, end users can also benefit from this study by having public housings that satisfy their need. The major limitation of this study is that the data collection was carried out in northern Nigeria. Thus, only views of construction professionals whose organisations were based in northern Nigeria are represented in this study. Since this study is meant for developing countries, the results should be interpreted with consideration of this limitation. Future studies are recommended to be carried out using the same methodology and collect more sample data to cover the whole Nigeria both northern and southern regions. Future studies should also be carried out in other developing countries using the same methodology, to find out whether the criteria for measuring public

housing projects are the same in the countries.

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