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Model For Effective Housing Finance In Nigeria: A PLS-SEM Approach

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Housing plays a key role in the quality of our lives, as it can shape our fortunes and overall welfare. Despite its universally declare importance to human health and well-being, housing still has numerous problems part of which is finance. Notable, there is a lack of a workable financing model to support the housing market operations in developing nations like Nigeria. The absence of such a model has further heightened the problem of housing across Nigeria, with several scholarly reports of housing inadequacy and homelessness across the country. This paper aims to develop a model for effective housing finance operation in Nigeria through Smart PLS statistical tool. The study adopted a mixed-method approach through a desk literature review search, mini-interview \ focus group discussion, and subsequently, a quantitative method which is the main method for the study. 365 questionnaires were administered with 209 adopted for further analysis after screening. Normality, exploratory factor analysis, measurement, and structural models along with other required analyses were done to aid the model development. The results indicated that NHF is positively affected by credit policy and Financial Structure and Land Accessibility. Hence, the variables became essential for model development and implementation. This study supersedes other scholarly report of housing finance situation in the country, as it presents a holistic analysis on the vital factors needed to promote the country's housing finance through a multi-variant analysis. Recommendations are made on the incorporation of the model into the Nigeria housing finance system to stimulate and guide to the government, related experts and citizens towards housing mortgages, development, delivery and ownership. Future studies should consider the essential factors required for promoting other housing finance means in the country.

Keywords: Housing Finance; Credit Policy; Financial Structure; Land Accessibility; Partial least squares.

1 Introduction

The housing sector has been a fundamental institution that typically provides a complex set of purposes other than housing delivery. It offers a social unit of space for human dwellings irrespective of an individual's status, age, and sexual differences (Aribigbola, 2005; King et al., 2017; Richardson, 2018). More so, it is an essential link to the health, economic operation, and productivity of people. With the importance of housing to man and the economies of the world, external finance plays a huge role in the realization of any housing delivery and ownership program. However, in most developing countries the huge finance requirement for housing often goes beyond the affordability of most households (Nubi, 2015; Pawson et al., 2020; Warnock &Warnock, 2008).

In developing nations like Nigeria, housing finance for citizens is mostly funded through informal sources with little support from the government. Having a population of over 200 million, about 10% of its population can manage to own their desired houses either through personal construction or by way of purchase (Ojapinwa & Adegoriola 2022). This is against the homeownership percentage rate in countries like Korea 54; China 60%; USA 72% UK 78% and 92.0% in Singapore (Moore, 2019 ; Oluwatosin, 2021). Noteworthy is that only 5% out of the existing housing stock was delivered through formal mortgages while 95% of the homes are built with equity/savings in relation to a dead asset (FSS, 2020). Banks within the country are often reluctant to venture into housing loan disbursement owing to the perceived risks and the mismatch between short-term and long-term housing loans. This scenario has subjected citizens to usual incremental and substandard housing development with over 80% urban residents living in slums, shattered houses, or degraded environments unfit for human habitation. Notably, a yearly projection of 4.55% slum increase has been further proposed to affect citizens dwelling in this country (Bah et al., 2018). More so, the absence effective secondary market and sufficient finance instruments also pose a challenge to the country's housing finance system. The lack of efficient and supportive housing finance cannot also be ignored across the country if citizens' welfare is to be promoted (Nubi, 2015; Oni-Jimoh et al., 2018). As at 1991 there existed 7 million housing deficits in the country, this unceasingly rose to 12 million in year 2007, 14 million in year 2010 and 17 million in 2019, with a proposal of it reaching 22 million in the year 2030 (Ojapinwa & Adegoriola, 2022).

Considering the several requirements for housing loan accessibility in the country, housing finance in Nigeria could be stressful as it requires the effective operation of interrelated factors like enabling regulatory and legal frameworks, a promising macroeconomic environment, a good land titling base that enhances tenure security, property right enforcement with long-term contractual maturity, and effective functioning of the capital market. Accessibility to land/property titles; mortgage and credit policies; financial structures and structures secondary market operations are noted to cause housing finance challenges in Nigeria. Aside from the poor earnings of the citizens, the delay and cost of land ownership and related process, the dearth of long-term housing finance capital all pose a big challenge to

the country's housing sector. According to Amao & Odunjo, (2014) and Makind, (2014), this issue amidst other issues calls for an urgent need for a workable model that can support the Housing finance of the citizens in the country. Such a model is expected to consider the socio-economic background of the country for better housing delivery rather than adopting the financing models of other countries (Amao & Odunjo, 2014 Nubi, 2000). This model is expected to simplify housing finance legal procedures for finance acquisition for formal and informal housing development in the country.

Meanwhile, despite the recommendations for the development of a viable housing finance model in the country, there is still a paucity of holistic housing finance models in the country. Hence, this study aims to develop a hybrid model for effective Housing Finance in Nigeria. The study also aims to develop a hierarchical construct model application through the usage of partial least squares-structural equation modeling (PLS-SEM), with multi-dimensional constructs in relation to the literature study of Wetzels et al., (2009), this approach has also been adopted in modelling a specific concept that is above the first-order constructs under a hierarchical formative or reflective construct (Wetzels et al., 2009). As reviewed in the literature, the hierarchical latent variable model represents a multidimensional construct existing at a high level of abstraction and connected to constructs with a similar degree of abstraction with a complete mediator effect to the fundamental dimension. It is in the interest of developing a hierarchical construct for an effective Housing Finance model in Nigeria that this work is presented with a focus on the National Housing Fund (NHF) scheme. The relevance of PLS-SEM path modeling in estimating the variables of the higher-order model results in developing a holistic housing finance model will be shown. Lastly, the factors required for the model was hierarchically developed for effective housing finance in Nigeria.

2 Literature Review

Housing extends beyond ordinary shelter as it connects with utilities and essential social services that make up a liveable environment (Lukuman et al., 2017; Skalicky & Čerpes, 2019). This serves the role of a marginal line for varied socio-economic activities, offering an opportunity for wealth accumulation, social recognition, and element for city development (Mendez & Gayo, 2018; Forrest et al., 2021). Renaud, (1984) stated in his finance theory that the design and development of a city are directly related to the degree of capital disbursement. Meanwhile, the factors of the housing finance systems, as well as mortgage transactions, differ across countries with regards to socio-economic situation. Likewise, housing policies are also seen to directly feedback on any economy through market operations. This indicates the strong linkage between the duo.

In Nigeria, the housing sector comprises of the private which involves non-governmental organization and individual households, and the public sector which is directly linked to the government housing scheme. Despite government involvement in housing delivery through mass housing schemes and policies, the private sector remains the dominant housing delivery sector in the country. The limitation in the delivered public houses across the country has stimulated the constant increase of housing development in the private sector where households incrementally construct their own houses. The result of this the constant increase in house rents. Consequently, the housing policy recognize the private sector as having over 90% of houses in the country's housing market (Oluwatosin, 2021). The players in this sector consist the commercial housing estate developers, individual households, banks and non-

banking intermediaries connected to housing development, small-scale housing developers, and industrial or commercial who engages in housing investment for profit purposes. On the other hand, the public housing sector are the government owned housing estates which is provided to the benefit of the government officials and civil servants, and the mass public housing that is delivered to public based on merit. The government houses are also divided into low-income those category and government residential areas (GRA), and this exists across the states of the country. These houses however, is mostly occupied by federal government employees or civil servants with a monthly deductible rent payable based on staff grades.

The country's housing finance system has a superstructure of laws, institution and linkage between non-institutional and institutional divisions who engages in the facilitation of financial intermediation process and capital formation across the housing sector (Adedeji & Olotuah, 2012). Meanwhile the housing finance consist of corporate construction mediators like the Federal housing authority and private housing developers, state housing corporation, government agencies, organizations, individual and corporate financial mediators. While the finance source can be classified as formal and informal sources. Similar to other economy, the formal sources is under the government control with policy or market driven oriented funding channels (Deng & Fei, 2008). The major player in the market driven housing finance scheme are the merchant and commercial banks while the policy driven players are mainly the mandatory housing saving scheme such as the National housing fund scheme which Is a key focus of this study. Noteworthy is that, key factors such as credit policy, financial structure, land administration system and secondary mortgage operations are usually considered in Housing finance operations regardless of the players involved in the finance scheme (Adeboye et al., 2014; Ganiyu et al., 2018; Makin, 2014; Nubi, 2015; Siyan et al., 2019). As credit policy serves as a common factor monetary and fiscal policy, it is also a valuable tool for financing human capital acquisition such as home loans (Brunnermeier & Krishnamurth, 2020). In their study on credit policy and housing market liquidity, Wang et al., (2022), argued the relevance of effective credit policies on housing development and related transactions. Using a time series of housing mortgage transactions in Beijing in China between 2013 and 2018, the authors reported an improved housing market liquidity through a loosened credit policy while the tightened credit policy was said to reduce the housing market liquidity. The duration and direction of such policies is discovered to significantly impact the housing market conditions. Wang and Zhao maintained that the confidence of any housing market stands between the housing market liquidity and credit policy. Hence, an increased credit supply vis-à-vis the lower of interest rate on housing loan promote an efficient with a reduced duration of housing in the market and improved housing market liquidity. Notably, related policies adjustment requires timely action to meet the required improvement, effectiveness and efficiency of any housing credit policy. What is more, housing-related credit policies must be consistent to avoid any market disturbance due to frequent adjustments. Reporting from the Guardian newspaper 11 july, 2022 ascribed the Nigeria real estate sector's problem to monetary and credit policy, pointing out the financial institutions' exorbitant interest rates. He emphasized the focus of the government on the agricultural and manufacturing company. The government allows these industries' related operators to obtain mortgages at a single digit with little or no focus on the real estate sector. Ariyibi then maintained that such policy further poses the risk of increasing

building material cost emanating from Imported and domestic inflation, supply chain disruption and scarcity in foreign exchange. Remarkably, the upsurge level of credit and monetary policy direction in the country as affected the real estate market, especially the residential and commercial real estate market' finance and macroeconomic standpoint. The Credit policy effect is linked to the unbearable interest rates, exchange rates and inflation rate that exists in the country. This is however connected to the lapses and weakness in her credit management policy, the ineffective institutional framework, reduction in economic base and monetary resources, and dearth of planning data, thereby affecting finance allocation into the housing and building sectors (Ojoko et al., 2016; Alabi & Bako, 2018; Alhammadi et al., 2024). Hence, Jogunola et al., (2018), maintained the need for a credit/monetary policy formulation to support the housing and entire real estate operation in the country. This is expected to encourage the delivery of housing finance and restoring stronger economic growth, while reducing accumulated mortgage debt.

On the one hand, financial structure refers to the way an asset is financed. The financial structure concerning the Housing finance system differs in many countries. Such differences arise from macro-economic performance metrics such as credit policies, access to loans, and local Housing finance traditions. Other pertinent factors include the types of mortgage products, capital sources for loan extensions, interest rates as well as the varying levels of intervening factors (Aturamu & Wood, 2017). In their study on the role of mortgage market growth and housing finance, Agnello et al., (2020) studied the length of housing booms and busts vis-à-vis the normal time across 20 countries between 1970 Q1 and 2015 Q4. The authors disclosed the essence of an effective and supportive financial structure in promoting liberalized mortgage sector whereby housing finance can encourage longer housing booms. Financial structure directly affects the level to which the housing finance system can influence the linkage between real economic activity and the actual housing sector. Further, In their study on the financial Architecture, real estate market and economic development in Nigeria. Adetiloye and Eke, (2016) noted the impediment in the housing and entire real estate development due to the existing weakness in the country's financial structure, whist is seen to intensify the poverty syndrome on the citizens. The ineffectiveness of the country's mortgage system towards homeownership was reported vis-à-vis the complex structure of its financial and mortgage system which hinders the operations of the primary mortgage bank towards housing finance transactions (Ayedun & Oluwatobi, 2011; Ram et al., 2024; Ganiyu et al., 2018). Hence, authors recommended the advancement of market driving financial structure with a long-term funding commitment into the real estate sector such as the pension scheme and a sovereign wealth fund, while providing housing related infrastructures.

On the other hand, land is recognized as a foundation of every human activity and it offers the opportunity for power, wealth, social status and most importantly the basis for human shelter (Housing) (Nubi, 2000; Oni-Jimoh et al., 2018). Access to housing is directly linked to access to land rights, particularly across African nations where houses are mostly developed and delivered by the private sector or individuals (Agunbiade et al., 2013). The accessibility to land and its value determines the desirability for homeownership and the operation of the housing market. however, the inadequate provision of developable land or lack of accessibility to land rights for mortgage transactions can affect housing development and subsequent transactions (Turok & Scheba, 2019; Moulaei et al., 2024 Rahmani et al., 2022; Jagun et al., 2020). Hence, any policy solution developed for housing finance affordability may not work

without effective land administration and accessibility. In Nigeria, several problems are regularly reported to affect the Housing finance system. These challenges include the lack of supportive policy, poor access to mortgages, and irregular and income of citizens. Others include the government's weaknesses in sof individuals or groups. These issues have constituted challenges within the entire system such as land bureaucracy and related titles transactions, which also hamper housing transactions, (Adeboye et al., 2014; Ankeli et al., 2017; Oni-Jimoh et al., 2018). Oni-jimoh et al., (2018) further suggested a critical review of individual element of the entire housing policy including the land policy and National housing policy as this will go a long way in promoting effective housing finance as well as meeting the urbanization problem across the country (Adediran & Ali, 2021; Ebekozien,et al., 2022). More so, Odoyi, Riekkinen, (2022) did not just re-iterate the importance of supportive secondary mortgage system in a housing sector, authors also maintained that a well-established secondary mortgage market enhances long-term housing finance accessibility towards homeownership and well-defined city. With the current housing situation in Nigeria Ebekozien, (2021) then suggest the implementation of a participatory and mortgage-based policy with focus on the secondary mortgage system and sustainable housing loans towards the housing finance and delivery.

2.1 Primary mortgage Institutions (PMI), as a major means of housing finance in Nigeria.

The framework that established PMI in Nigeria emanated through the promulgation of mortgage Institution Decree No 53, 1989. Notably, this decree gave the Federal mortgage bank of Nigeria (FMBN) the power to license and regulate the operations of the PMIs being the 2nd tier of housing finance institutions in Nigeria (Sanusi, 2003). According to its license, the PMI is permitted to perform mortgage finance transactions, real estate development finance with some limits, drawing from mortgage capital such as National housing fund (NHF), related mortgage schemes, or on lending and financial advisory activities towards mortgage customers, savings collection, demand and term deposit. PMIs are also charged with the responsibility of granting housing/mortgage-related consume loans, finances rent-own-properties, house improvement loans, incremental housing finance and other activities given by the central bank of Nigeria (CBN) (Bichi et al., 2019). As reported by Ikekpeazu, (2018) even with the effort of repositioning the mortgage sub-sector by the CBN, there still exists a gap between the performance and key mandate of the PMIs, their holistic operations are still low and ineffective in the current housing situation in Nigeria. Out of the 195 PMIs handed over to the CBN at the beginning by the FMBN IN 1999, only 115 PMIs were listed as distressed due to diverse operational weaknesses and regulatory breaches. 97 were later revoked, 5 of them restructured and 13 PMIs granted an extra period for their recapitalization plans. However, in 2005 December, 43 PMIs were listed to have met the statutory minimum paid-up capital of 100million, this further dropped to 34 in 2019 December with the sum of 19 billion being disbursed so far through the NHF platform, which was created in 1992 under the umbrella of the FMBN, as a contributory scheme to close up the housing delivery and ownership gap in the country. Noteworthy is that more than 80% of Nigerians either lives in a shattered environment or are homeless, this is projected to increase by year 2030 (Chidi-Okeke & Nwanna, 2020; Ekhaese et al., 2021). Particularly the NHF which is subjected to the provision

of cheap housing mortgages towards the citizens homeownership has been incapacitated in meeting its demands due to several reasons as reported by (Oyewobi, 2022; Ojapinwa & Adegoriola; 2022; Abdulrasheed, 2019). Asides the problem attached to the NHF, the FMB is reported to also lack the power to promote effective home loan transactions, due to government's failure in completing the mortgage sector's reformation and provision of necessary incentives towards the expansion of housing delivery process across the country (Oluwatosin, 2021). Even if the mortgage is accessible, the necessary land certificates towards home mortgages and ownership is a big obstacle to housing loan transactions, due to prolonged bureaucratic stages of receiving a certificate of occupancy (C of O), high cost, and accessibility to registered and titled land. The entire property registration is Slow, despite the improvement made to it since 2008, governors' consent on land still takes around 52 days compare to the 1-day period that it takes in countries like Singapore.

Noteworthy is that many scholars have studied housing finance through subjective pointers that have helped to report their studies as desired. Most of the studies, adopted self-reported measures in collecting their data with little reliability. However, this study uses self-reported objective and subjective measures where the issues relating to Housing finance in Nigeria are investigated through the cardinal stakeholders in the Housing finance system, this involves the real estate developers, housing-related financial institutions, housing related academics, and individual contributors who are particularly in connection with the NHF scheme. The hypothesis of the paper which is to test if the individually identified constructs have a role to play in the effective operation NHF and a model development for housing finance in Nigeria, with emphasis on the National housing fund were tested using the P value calculation for each path coefficient where the P value can be represented by one or two-tailed tests depending on the sign associated coefficient (knock, 2015b). Lastly, the respondents' perception is measured to develop the hierarchical factors in the model.

3 Methodology

A hybrid research method was iteratively used in this study for a better understanding of the results. Figure 1 shows the stages involved in the study. This included interviews, focus group discussion (FGD), and questionnaire administration, which are considered suitable research tools for the investigation of this type of study Andalib et al., (2020). The first stage involved a literature search, followed by a qualitative mini-interview and focus group discussion with housing-related professionals to confirm the literature reported issues affecting housing finance in Nigeria. A purposive sample was further employed to capture the housing-related professionals and public servants for the quantitative study, all within the southwest of Nigeria. This region was considered important for the research since a higher percentage of the real estate professionals operate within the region compared to other parts of Nigeria (Nubi, 2015). A conceptual model was previously developed based on 50 inhibiting factors identified through literature and subsequent interview and FGD. The factors were further classified into four (3) factors namely, exogenous latent variables, Credit Policy which is represented as issues of government housing finance system (IGHF), Financial structure which is represented as causes of complexity in mortgage loan transactions (CMLT), Land Accessibility which is represented as causes of complexity in land ownership (CCLO) and Effective national housing

fund (ENHF), all based on literature search and initial interview carried out with housing related professionals.

The study adopts the application of multi-variant statistical analysis (PLS-SEM) in connection with statistical package for social sciences (SPSS) version 22. A total of 365 structured questionnaires were distributed to public servants within southwest Nigeria out of which 329 were returned. This further dropped to a total of 209 responses which were deemed usable after running the normality test and outlier's detection. The number of questionnaire samples used for the final analysis is considered sufficient according to Hair et al., (2014) and the Hai et al., (2011) rule of thumb on the required sample size for Smart-PLS and the report of Samani (2016). The results of the analysis of the individual factors were validated by 27 housing-related professionals to confirm the suitability of the developed model Figure 1 indicates the operational framework.

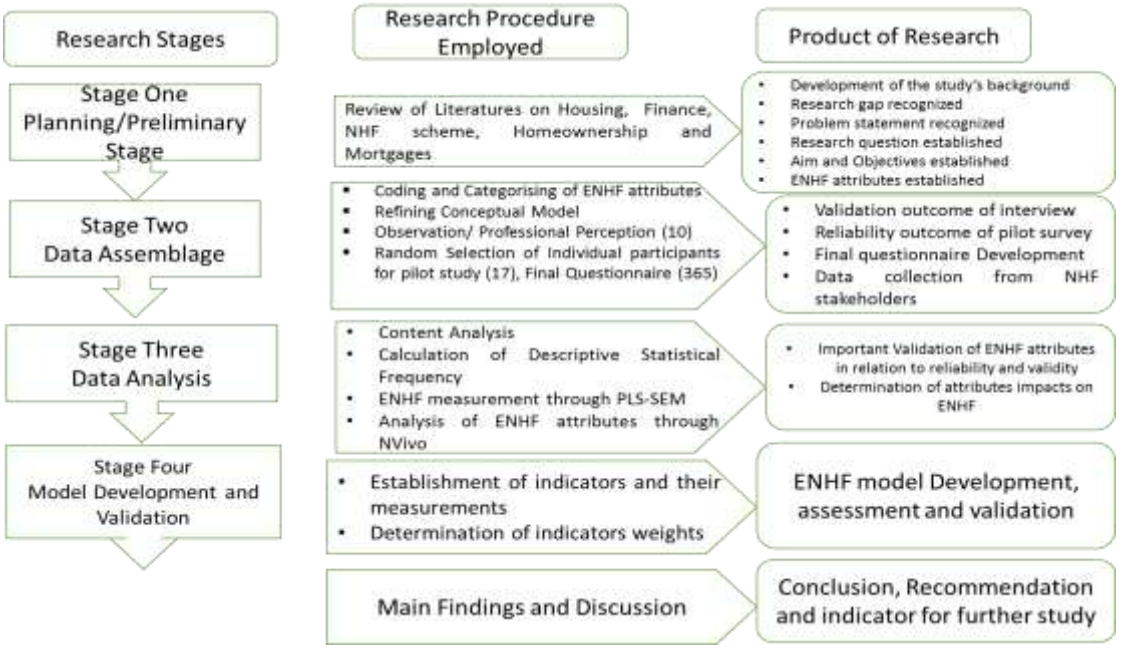

Figure 1. Effective National Housing Fund Operational Framework

Statistical Description of the Questionnaire sample

A multi-phased sample with different stages was adopted with the initial stage been a stratified sampling, followed by purposive sampling and finally a systematic random sampling. In the initial stage, the southwest states in Nigeria were zoned into 6 alongside with the existing higher institutions. Next, these states were further zoned into three according to their proximity, while selecting the three oldest higher institutions there. this is followed by the categorization of the staff in the selected institution into non-teaching and teaching staff. Hence figure 2 indicates the multi-sampling stages

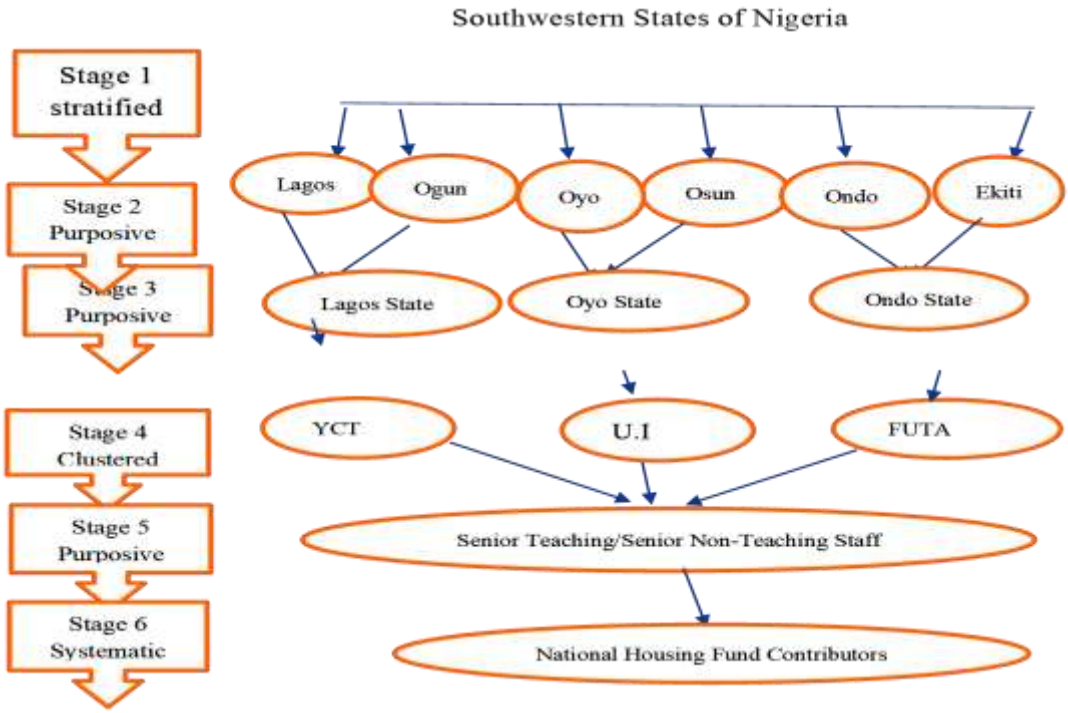

Figure 2 The Multi-Stage Sampling Technique

More so, a total of 415 questionnaires were employed for information gathering across the selected institutions, this is indicated in Table 1 while the statistical response is represented in Table 2.

Table 1 presents the questionnaire distribution figures within the three selected old existing higher institutions in southwest of Nigeria while Table 2 Indicates the response rate of the questionnaire survey, the number of unreturned questionnaires, and a total number of obtained questionnaires. Other data included the initial cases excluding the missing values, eliminated outliers, and finally analysed questionnaires are all indicated. Outliers, as described by several researchers, are the statistical observations which are irregular with other observations within a set of analyses. This often have a negative effect on statistical analyses such as increasing

the variance error(s) and reducing the statistical test's power'; decreases normality; alters the odd of creating type I and type II errors while making bias or influence that can stimulate another concern (Onisokumen, & Ijomah, 2020; Osborne & Overbay, 2004). Hence this was removed during the initial analysis to avoid any form of distortion on the set data in terms of increasing the variability and altering the key performance, as reported by (Cousineau & Chartier, 2010).

Table 1 Distribution of Questionnaire within Individual Institutions

Name of Institution	State	Total Senior Staff	Total Sample
Federal University of Technology, Akure	Ondo	1851	94
Yaba College of Technology	Lagos	1499	77
University of Ibadan	Oyo	3818	194
Total		**7,168**	**365**

Table 2. Statistical Response to Questionnaire Survey.

Participant's Classification	**Numbers**	**Percentages**
Number of Distributed questionnaires	365	100%
Number of Unretrieved questionnaires	36	9.86%
Entire Number of questionnaires received	329	90.14%
Partly completed questionnaire	32	8.77%
Preliminary cases	297	81.37%
Number of Outliers (-)	88	24.11%
Overall survey analysed	209	57.26%

4. Data Analysis

4.1. Data Analysis

In this study, the retrieved data were analysed using descriptive analysis, PLS Structural Equation Model (PLS-SEM, version 2.0) and statistical package for social sciences (SPSS, version 22.0).

4.1.1 Reliability analysis

The construct reliability analysis is typically performed to measure the internal consistency of the measurement instrument through its Cronbach's alpha. In this study, the reliability analysis for a single construct taken from the descriptive statistics all indicated an adequate degree of reliability ($\alpha > 0.70$) as shown in Table 2.

Table 3. Reliability Analysis

Construct	**Code**	**Cronbach's Alpha**
Issues of Government Housing Finance	IGHF	.887
Causes of Complexity in Land Ownership	CCLO	.848
Causes of Complexity in Mortgage Loan	CMLT	.899
Effective National Housing Funds	ENHFS	.768

4.1.2 Convergent Validity

According to Hair et al., (2011), measurement models are used to observe the validity of indicators. The exploratory factors analysis that shows a satisfactory degree (FA < 0.05) was removed, while the outcome was considered as the reserved factor loading items. The indicators with loading values below the accepted level were removed to increase the composite reliability (CR) or average Variance Extracted (AVE) in the first-order constructs. The outcome of the indicators' reliability is reported in Table 4. More so, the internal-correlation assumption shown in the table indicates the importance level based on analysis done in SPSS and Bartlett's test of sphericity.

Table 4. Inter-Correlation Assumption

Credit Policy: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.832
Bartlett's Test of Sphericity	Approx. Chi-Square	2064.139
	df	210
	Sig.	.000
Financial Structure: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.889
Bartlett's Test of Sphericity	Approx. Chi-Square	1665.405
	df	120

	Sig.	.000
Land Accessibility: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.832
Bartlett's Test of Sphericity	Approx. Chi-Square	1179.814
	df	78
	Sig.	.000
Effective National Housing Finance: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.710
Bartlett's Test of Sphericity	Approx. Chi-Square	380.111
	df	66
	Sig.	.000

The research adequacy was confirmed using the reliability indicator; internal consistency reliability; convergent validity and discriminant validity. The study adopted the established formula (AVE is equal to (ΣK2/n), where K is the factor loading of every item while n is the number of items in a construct. For instance, the factor loading of items that indicated the construct retention towards the development of the Housing finance model. k2= (i.e., IGHF14, IGHF20, IGHF13, IGHF12, IGHF11, and IGHF19), AVE = (4.4992)/6 which resulted to (AVE >0.5). the construct are Regulatory policy rigidity, bureaucratic bottlenecks in NHF scheme, inappropriate fund from PMIs and FMBN, and encumbrances on land due to statutory provisions and perceptions of individuals on NHF loan in relation to regulation and provision of down payment. This is similar to another construct. The composite reliability was calculated with the formula (ΣK2/n) / [(ΣK2) + ((Σ1-K2)], required values achieved (CR> 0.7) as described in Clark and Watson (2019). The internal consistency reliability was supported by a relatively high Cronbach's Alpha (CA) where the lowest value is 0.768 as indicated in Table 5.

The Fornell-Lacker criterion was employed to confirm the discriminant validity of each reflective construct and their extracted AVE were high, as shown in Table 5. The first method shows that the indicator's outer loading for the endogenous construct and first-order construct exceeds the set minimum threshold of 0.6. Next, the composite reliability of reflective constructs exceeded the set condition of 0.7. Hence, the overall outcome of the analysis supports the conceptualized idea of credit policy, financial structure and land policy as key factors required in stimulating an effective housing finance model in Nigeria, particularly from the angle of the NHF, as shown in Table 5.

The PLS-SEM algorithm estimated for the structural model's relationship, such as the path coefficients, were also achieved. This implies that a hypothesized connection exists among the constructs. As stated by Hair et al., (2014), path coefficients have a standardized value between -1 and +1. In the current study, the path coefficients indicating the connection between the entire constructs are 0.174, 0.272 and 0.196.

4.1.3 Measurement Model

The measurement is typically analysed using confirmatory factor analysis (CFA) to establish the model fit and subsequent validity. To obtain the discriminant validity of individual constructs, item(s) that are redundant must be deleted to establish a strong correlation between the constructs. For this study, the capability and level of the established model were based on standardized estimates that involve, (Probability: P< 0.05 and square multiple correlations: (R^2), regression weight with an assessment of Normed chi-square: $0 \leq$ CMIN/DF <5; Critical ratio: (CR) > ±1.96, p<0.05 (Sheridan et al., 2006; Gravetter & Wallnau, 2012; Preacher & Hayes, 2008; Michel, 2008; Zainudin, 2012). Table5 below confirms the validity of the measurement model, however, the name for each factor is presented in table 9 under the model validation component.

Table 5. Calculation of measurement models of the Endogenous and reflective first-order constructs

Constructs	Dimension	Indicators	Factor Loading	CR	CA	AVE
Credit Policy	IGHFF_1	IGHF05	0.884	0.904	.887	0.704
		IGHF01	0.748			
		IGHF04	0.807			
		IGHF06	0.907			
	IGHFF_2	IGHF16	0.754	0.826		0.543
		IGHF17	0.692			
		IGHF18	0.744			
		IGHF19	0.752			
	IGHFF_3	IGHF10	0.668	0.858		0.55
		IGHF12	0.692			
		IGHF13	0.803			
		IGHF14	0.845			
		IGHF15	0.683			
	IGHFF_4	IGHF07	0.829	0.855		0.665
		IGHF08	0.882			
		IGHF09	0.728			
	IGHFF_5	IGHF02	0.618	0.805		0.583
		IGHF11	0.793			
		IGHF20	0.860			
Financial Structure	CMLTF_1	CMLT01	0.756	0.926	.848	0.612
		CMLT02	0.797			
		CMLT03	0.611			
		CMLT04	0.817			
		CMLT05	0.857			
		CMLT06	0.853			
		CMLT11	0.829			
		CMLT15	0.707			
		CMLT08	0.765			
		CMLT09	0.709			

	CMLTF_2/3a	CMLT10	0.730	0.839		0.566
		CMLT13	0.802			
	CMLTF_2/3b	CMLT07	0.727			
		CMLT12	0.837	0.809		0.586
		CMLT14	0.729			
Land Accessibility	CCLOF1	CCLO01	0.729			
		CCLO02	0.837			
		CCLO03	0.766	0.861		0.555
		CCLO04	0.676			
		CCLO06	0.706			
	CCLOF2	CCLO08	0.903			
		CCLO09	0.944	0.937	.899	0.832
		CCLO10	0.888			
	CCLOF3	CCLO07	0.645			
		CCLO11	0.781			
		CCLO12	0.766	O.833		0.504
		CCLO13	0.787			
Effective National Housing Fund	ENHFF1	ENHF01	0.760			
		ENHF02	0.790			
		ENHF03	0.783			
		ENHF12	0.625	0.83		0.552
	ENHFF2	ENHF05	0.716			
		ENHF06	0.808	0.793	.668	
		ENHF10	0.720			0.561
	ENHF	ENHF1	0.790			
		ENHF2	0.432	0.795		0.362

4.1.4 Structural Model

The structural model was purposely developed to examine and confirm the proposed hypotheses. The result of the standardised regression weight with its significance for the path model as well as the summary of the hypotheses tested in the study is also presented in Table 5.

4.2 Test of Hypotheses

As specified, the hypotheses were tested using the P value calculation for each path coefficient where the P value can be represented by one or two-tailed tests depending on the sign-associated coefficient.

4.2.1. Hypothesis One

H_o: There is no positive effect of credit policy on the effective operation of (NHF) and related model development in Nigeria.

H_1: There is a positive effect of credit policy on the effective operation of (NHF) and related model development in Nigeria.

4.2.2 Hypothesis Two

H_o: There is no significant effect of financial structure on the effective operation of (NHF) and related model development in Nigeria.

H_2: There is a significant effect of the financial structure on the effective operation of (NHF) and related model development in Nigeria.

4.2.3 Hypothesis Three

H_o: There is no significant effect of land policy on housing finance and related model development in Nigeria.

H_3: There is a significant effect of the land policy on housing finance and related model development in Nigeria.

Table 6. Discriminant validity assessment for each construct (Fornell Lacker Criterion)

	IGHFF_1	IGHFF_2	IGHFF_3	IGHFF_4	IGHFF_5
IGHFF_1					
IGHFF_2	0.228				
IGHFF_3	0.343	0.754			
IGHFF_4	0.368	0.499	0.658		
IGHFF_5	0.517	0.775	0.789	0.464	

	CMLTF_1	CMLTF_2/3a	CMLTF_2/3b
CMLTF1			
CMLTF2/3a	0.535		
CMLTF2/3b	0.858	0.828	

	CCLOF1	CCLOF2	CCLOF3
CCLOF1			
CCLOF2	0.522		
CCLOF3	0.698	0.307	

	ENHF1	ENHF2
ENHF1		
ENHF2	0.423	

There are items of a similar construct in the convergent validity that exhibit a high correlation. However, when the discriminant validity differs from the construct, it serves as a measure between the constructs (Valmohammadi & Rahmani, 2022). In this study, the Heterotrait-Monotrait ratio correlations (HTMT) was adopted to evaluate the discriminant validity of the existing constructs.

Table 6 shows the discriminant validity for the individual constructs with HTMT values below 0.90. As emphasized in the literature, an HTMT of 0.90 has an advanced specificity when

compared to 0.85 in situations when the sample size exceeds 100. The sample size of this study exceeds 100, which indicates that the obtained values below 0.90 are acceptable but subject to discriminant validity.

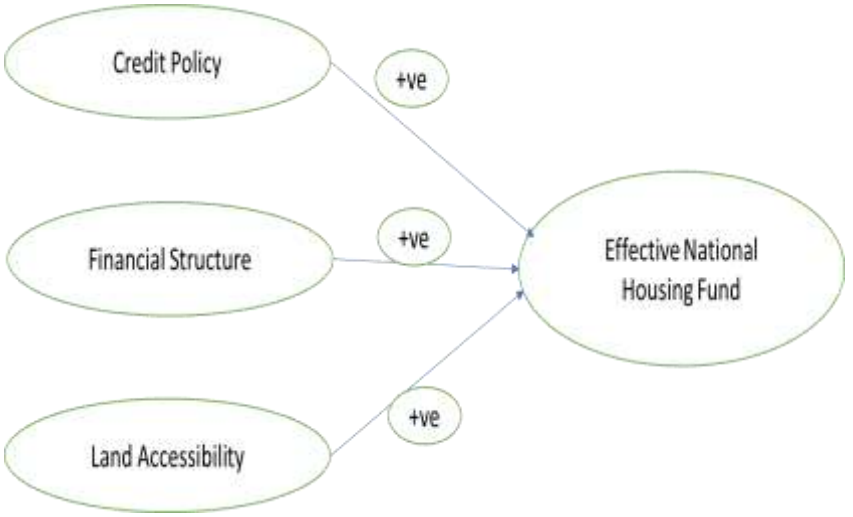

Figure 3. Hypothetical Model relating with Smart-PLS 3 Confirmation

The measurement models are reflective but exclude the Effective NHF variable that is formative and directly connected to the reflective constructs.

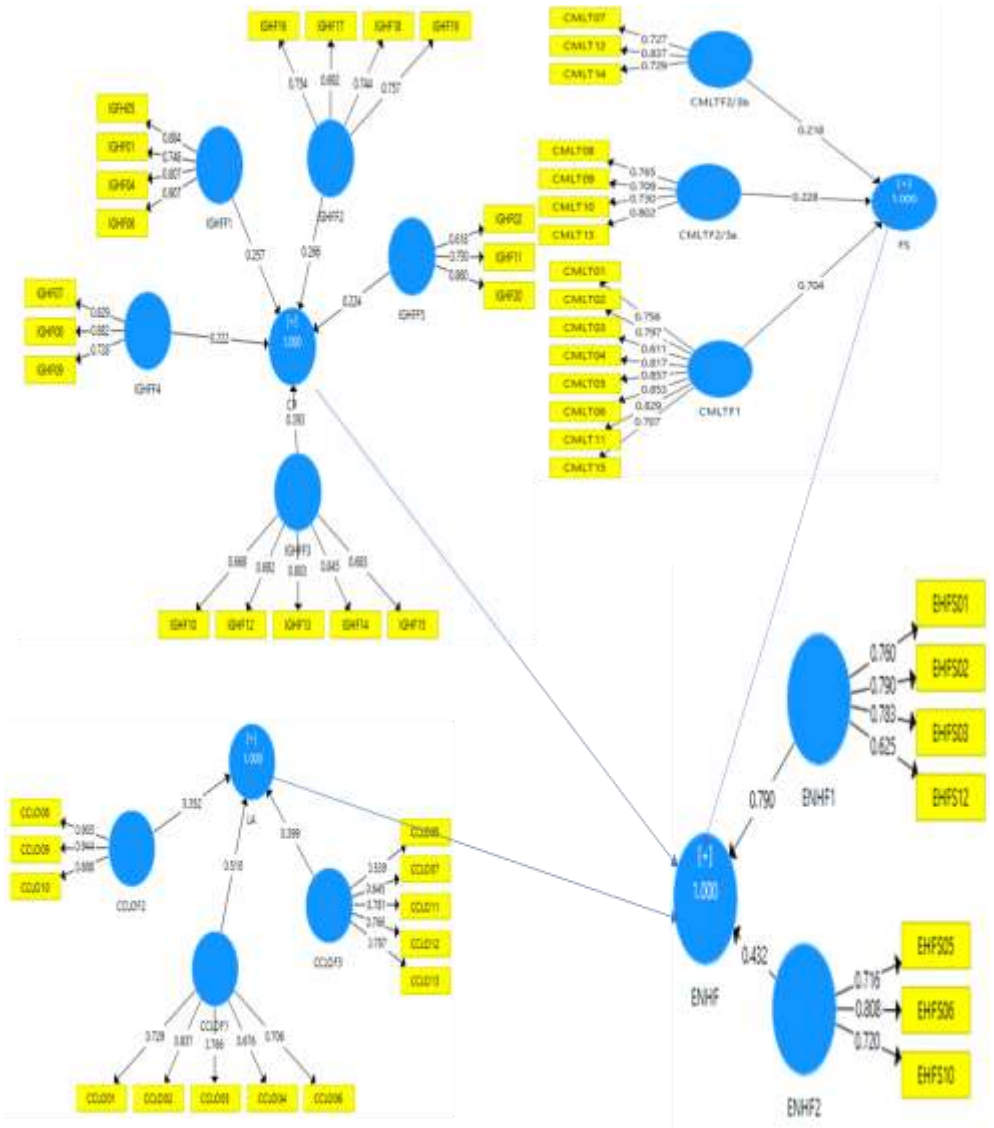

Figure 4. Structural Path Model connecting the Latent Variable Scores of the Exogenous to Endogenous Constructs

Figure 4 shows the outcome of the PLS-SEM analysis, which cconnects the Endogenous (Dependent variable) and Exogenous (independent variable) constructs. The causes of complexity in mortgage loan transactions relating to the financial structure of mortgage institutions (CMLT); Issues of government Housing finance schemes relating to credit policy (IGHF); and Causes of complexity in Land ownership relating to Land Accessibility (CCLO) are all contained in the Exogenous construct. All the analyzed constructs are positively connected to the Endogenous construct i.e. the Effective National Housing Fund construct. This is presented as the Hypothetical Model based on the Smart-PLS 2 Confirmation in Figure

3, while the standard coefficient path that indicates the weight of individual independent variables to the dependent construct and their R^2 values are presented in Figure 5.

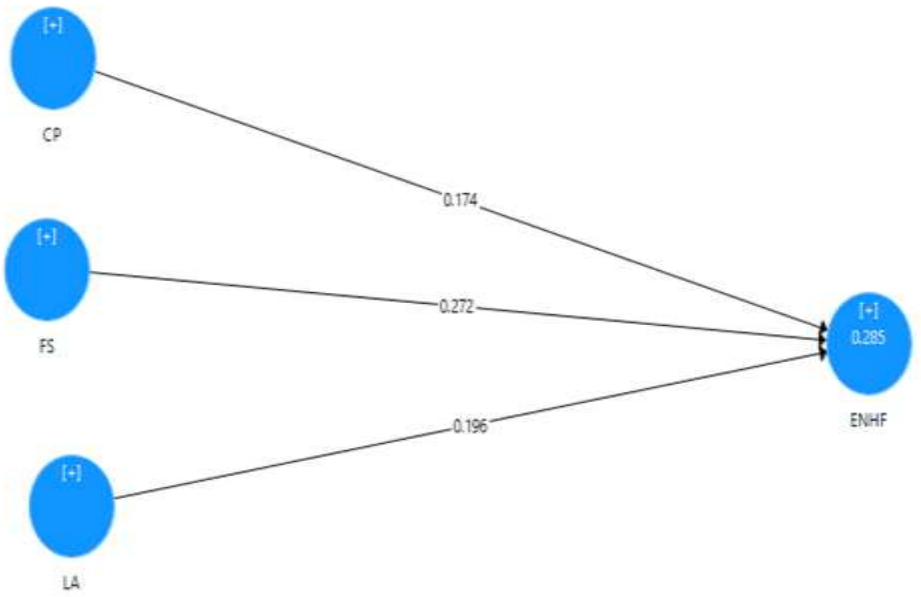

Figure 5. Standardization coefficient path indicating the path weights and R^2 values through SmartPLS3

The study adopted Bootstrapping to attain the statistical importance of the path co-efficient estimates (Hair et al., 2014). The path coefficient estimates and the statistical degree of importance in the empirical model are shown in Table 7. Hair et al., (2011) maintained that a coefficient can be significant at a specific error of probability when a critical value is below that of empirical T value (i.e., significance level). In particular, the commonly described critical values of the two-tailed test are 2.57 (significance level = 1 %), 1.96 significance level = 5%), and 1 .65 (significance level= 10%). In this study, the error probability was set at 5% thereby given 1.96 adds to the significant degree. With regards to each construct's hypothesis and the T-value, the NHF is seen to be positively affected by credit policy by $\beta = 0.031$, T-value 2.162 > 1.96, P < 0.005 and, = 0.01), Financial Structure ($\beta = 0.008$, T-value 2.682 > 1.96, P < 0.005 and, = 0.01), and Land Accessibility ($\beta = 0.144$, T-value 1.463 < 1.96, P < 0.005 and = 0.01). hence, hypothesis H_1, H_2 and H_3 is confirmed through the analysis. Aaccordingly, the result of the size effect indicates that financial structure, credit policy, both have a significant effect on the Effective NHF operation based on the following values F2 = 0.021, 0.074. The land policy on the other hand falls below the threshold having a value of 0.023. This factor is however considered in the model development due to scholars's report of

it as a key factor in housing finance transactions in Nigeria and its reconfirmation in the model validation by professionals (Ebekozien et al., 2022; Olawore &Otegbulu, 2022; Moore, 2019; Olawumi et al., 2019; Nwuba & Chukwuma-Nwuba, 2018). Hence, Hair et al., (2014) and Wong, (2013) both reported an effect size to either be large, medium, or small when the values are 0.35, 0.15, and 0.02 respectively.

Table 7. Analysis of Bootstrapping

Factors	**Path coefficient**	**T.Statistics (|O/STDEV|)**	**Significant level**	**F2 Test (Effect Size**
Credit Policy -> Effective National Housing Fund	0.031	2.162	Significant /Accepted	0.021
Financial Structure -> Effective National Housing Fund	0.008	2.682	Significant /Accepted	0.074
Land Accessibility -> Effective National Housing Fund	0.144	1.463	Significant /Accepted	0.023

5 Findings and Discussion

The significant factors that influence the model development were identified and evaluated. First, the quantitative analysis revealed the correlation matrix for the research construct as indicated in Table 3, for Issues of government housing finance (IGHF) (.887), Causes of complexity in land ownership (CCLO) (.848), Causes of Complexity in mortgage loan (CMLT) (.899) and Effective National Housing Fund (ENHF) (.768). Hence, it can be inferred that the factor loadings, composite reliability (CR) and average variance extracted (AVE) of all the constructs shown in Table 3 fulfilled the recommended standard. This observation confirms that the structural model achieved the goodness of fit, which is considered valid through the study of (Jagun, 2020). Similarly, the hypothesis outcome clearly indicated that the assessed constructs have significantly affects the development of the NHF model whereby the Financial Structure has ($\beta = 0.008$, T-value 2.682 > 1.96, $P < 0.005$ and, = 0.01), Land Accessibility (0.144, T-value 1.463 > 1.96, $P < 0.005$ and = 0.01), credit policy ($\beta = 0.031$, T-value 2.162 > 1.96, $P < 0.005$ and, = 0.01). Likewise, the effect size positively influenced the NHF with a value F2 = 0.021, 0.074 and 0.023 as shown in Table 7. The outcome of the analysis was further developed into a set of questionnaires that was served to 27 housing professionals for clarification and validation of the model development for effective housing finance through the National housing fund in Nigeria.

5.1 Model Validation

The housing finance model was validated by 27 Real Estate experts through a self-administered questionnaire. The validation was carried out to confirm its appropriateness. The respondents' preference for individual listed factors were highlighted. This was further analysed through SPSS and the relative important index (RII) to get the level of importance. The first five factors in each variable based on their ranks are reported in Table 8. The average

mean score is also indicated in the table. The overall mean score of each variable is (3.50) (4.00) (4.14) (4.07) and (3.60) respectively. Hence, the experts confirmed the significance of each construct in enhancing housing finance through the NHF and also that the model can be understood by everyone.

Table 8 Analysis of Model Validation Variables

Codes	**Factors**	**Ave. Mean Score**	**RII**	**Rank**
IGHF	**Issues Relating to Government Housing Finance Scheme**			
IGHF16	Loan transaction delay owing to cumbersome application processes	4.74	.948	1st
IGHF07	Exploitation from officials	4.64	.928	2nd
IGHF05	Individual's Remoteness to loan due to strict guidelines and Policy.	4.52	.904	3rd
IGHF14	Old mortgage transaction laws	4.3	.860	4th
IGHF08	Shortage of adequate professionals and facilities	4.26	.852	5th
CMLT	**Causes of Complexity in Mortgage Loan transactions**			
CMLT01	High Interest charges affect housing loan	4.74	.948	1st
CMLT14	Application process delay affect loan acquisition	4.48	.896	2nd
CMLT03	Low level of worker income affects loan procurement	4.44	.888	3rd
CMLT15	Bundling of primary mortgage institutions in specific locations deters easy loan accessibility	4.19	.838	4th
CMLT13	Unbundled mortgage market system affect loan transaction	4.15	.830	5th
CCLO	**Causes of Complexity in Land Ownership**			
CCLO12	Shortage of Cheap communal Land towards big housing development affect the loan	4.74	.948	1st
CCLO02	Problem of Land Title documentation process	4.63	.926	2nd
CCLO10	Land title perfection delay is a problem	4.44	.888	3rd
CCLO11	Excessive cost of land title perfection is a problem	4.33	.866	4th
CCLO01	Rigorous conditions in accessing land is a problem	4.30	.860	5th

ENHF	**Measures of Effective National Housing Fund**			
ENHF06	Increase in mortgage institutions services during loan application will encourage effective housing finance	4.52	.904	1st
ENHF01	The re-assessment of the National Housing Policy (NHP) for loan mobilization will support effective financing of houses	4.48	.896.	2nd
ENHF12	Provision of timely online data from mortgage institutions should be aided and efficiently supervised to towards ENHF	4.30	.860	3rd
ENHF02	The land policy must be reviewed to support land title documentation processes towards an effective housing finance operation	4.22	.844	4th
ENHF2	There must be supervision of the whole process involved in loan acquisition to encourage ENHF transaction	4.15	.830	5th

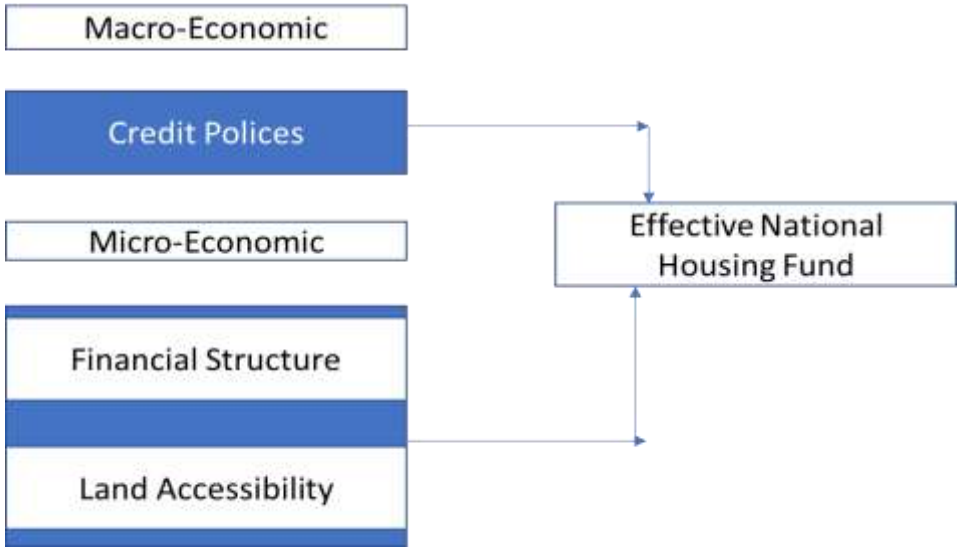

Figure 6 Model for Effective National Housing Fund in Nigeria

The outcome of this study is the development of a model for housing finance transactions in Nigeria in connection with the NHF scheme, as indicated in Figure 6. This is in line with the recommendations of Nubi, (2003) and Amao and Odunjo, (2014) who maintained the need to develop a workable housing finance model to support housing delivery and citizens'

homeownership in Nigeria. It serves as a guide for private housing developers and the civil servants' housing funding medium as key stakeholders of the government housing finance scheme (NHF scheme).

6. Conclusion

The study developed a workable model for housing finance operations in Nigeria and highlighted the problems affecting the NHF scheme in the country. Based on the operational focus of the scheme, the study examined the key factor required for developing a model for effective housing finance transactions in the country. Literature disclosed that the debacle in the Nigerian housing sector and related finance system have existed for years with long-term consequences on the economy, welfare and liveability of the citizens. This scenario has thus imposed a need to investigate the issues affecting the housing finance system of the country while stimulating the need to develop a model that supports the effective operation of the finance system, as such a model is lacking in the country. Hence, it was conceptualized through literature that credit policy, financial structure, and land accessibility are key factors required to promote the housing finance system in the country vis-à-vis the support of an action plan from the government. The information obtained from literature was further investigated as a latent variable factor that was been measured as a reflective variable and analysed in developing the housing finance reflective-formative model. The outcome of the developed model was validated by experts to confirm its user-ability for housing finance, delivery and ownership across the country. The study also offers a vital methodological contribution through PLS-SEM for developing a hierarchical model for the housing finance system in Nigeria. This will help the authorities to better understand and address the essential factors needed to support the operation of the nation's mortgage and housing finance system. In comparison with the current practice where an aggregate technique is used in measuring multiple items in a low order, the hierarchy developed in the model offers an advantage in identifying and explaining each separate dimension precisely. The model outcome can also assist in reducing the complexity of housing mortgages and similar transactions while assisting other researchers across developing nations in terms of focusing on the path relationships.

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