MEASURING THE POST-PANDEMIC SUSTAINABILITY OF URBAN LAND AFFORDABILITY IN NIGERIA USING MuCompE and DiBDAss MATRICES

[1]KAZEEM .B. AKINBOLA, ***PhD, ANIVS, RSV*** **& [2]OLUFEMI .P. FIDUDUSOLA,** ***MSc, ANIVS,RSV***
[1]DEPARTMENT OF ESTATE MANAGEMENT AND VALUATION,
THE FEDERAL POLYTECHNIC, ILARO, NIGERIA
kazeem.akinbola@federalpolyilaro.edu.ng; +2348030494742.

[2]DEPARTMENT OF ESTATE MANAGEMENT,
OSUN STATE COLLEGE OF TECHNOLOGY, ESA OKE, NIGERIA
fidudusolaop@oscotechesaoke.edu.ng; +2348037026333.

ABSTRACT

Dilemma that involves comprehensive assessment of affordability issues which surround land as an invaluable life supporting resource, dates back to decades. Sadly, the unsustainability of the situation becomes prominent due to increasing urbanisation, demographic soaring, etc, leading to expensiveness and scarcity of land across all spatial divides, urban centres especially, where covid19 pandemic affects citizens' land supply-demand transactional dynamics, phenomenally. Unfortunately, multi-dimensional frameworks that are to sustainably superintend the emerging unfavourable socio-economic scenarios associated with 'pandemised 2020 era', have been weakened, leading to reduced purchasing power and poor affordability in general. Three contexts were referenced: postcovid19's land loan payment serviceability, postcovid19's outright land price purchaseability and postcovid19's real income earnings spendability on land, they helped to thoroughly examine, understand and address the affordability challenges through sustainable approaches. As a quantitative research, 17 measurement constructs were evolved, against which land issues that have to contend with affordability were gauged, vis-à-vis application of sustainability matrices of MuCompE and DiBDAss upon gathered data. Using purposive and simple random sampling techniques, 250 copies of 5-point Likert scaled questionnaire were distributed upon land officials, land transactions consultants and land developers of various categories, within the six states' capital cities of Nigeria's southwest. Out of the 211 copies of questionnaire that were retrieved, 193 were found to be valid, translating to 84% of distribution-retrieval rate, thus were used for analysis, using normalisation scaling and decision ranking matrices, the outputs of which were further established, through mean items score tool, for measuring the degree to which sustainability is adversely affected, thus resulting to poor affordability of urban lands in Nigeria. Among the findings is that, sustainability criteria of land localisation, with p-th cumulative average mean item score of 8.3076 and land physiognomy, with p-th cumulative average mean item score of 7.5412 rank highest and lowest respectively, thus appeal most and least to stakeholders, leading to greatest and least strengths on the affordability of urban lands with respect to its three contexts. The research concluded that sustainability of urban land affordability is greatly affected by covid19 pandemic, hence canvassed for rich cocktail of carefully selected multiple sustainability criteria, with a great promise in succouring the potential adversity that unsustainable situation revolving around land affordability presents.

KEYWORDS: Measurement Matrices, Pandemic, Sustainability, Urban Land Affordability, Nigeria

1.0 INTRODUCTION AND BACKGROUND RATIONALE

Past studies which were conducted during stable healthy conditions around the world, have sufficiently shown largely the fact that, a number of factors beset affordability potency, irrespective of the climes within which the economic goods, that are being sought by human beings for their continual existence are located, though socio-economic factors topped such research findings, amongst others like physiognomy of the available land, policy and administrative frameworks, etc. In a period of turbulence such as the *pandemised* era during when covid19 ravaged the planet, it became evidently clear that businesses were shut and loss of jobs ensued, due to struggling survival trends that citizens of several socio-economic classes were thrown into, coupled with their inability to cover cost. Predicted situation became far from actual, so much that plans were crashing and potentials to revive back to normal situation keeps eluding all investments, which has resultantly led to dwindling economic stamina, thereby preventing investment organisations and net worth individuals, from muscling requisite ability to procure needed items, which are life-supporting and investment-expanding, the chief of which land and its vast resources are (Enemark *et al*, 2014).

Along the same vein, it must be acknowledged that the concept of sustainability is relatively new, as it is certainly taking some time before gaining its desired eminence in Nigeria, sadly it has been put to strong but discreet critical situation of relevance (Akinbola, 2017). However, it is being believed that Nigerian land developers, are now beginning to embrace the concept of sustainability, as part of their commercial advocacy and strategic differentiation of their finished developments, which set them apart from their competitors. Recognising the necessity to further brightened up and rationalise the interconnectedness among the trio of economic developmental actions, efforts on social-cultural institutionalisation and physico-environmental conservation, at various levels of political and administrative leadership, multiples of strategies, actions and efforts have been launched to at least lessen the effects of economic developmental actions on the environment (Borras and Franco, 2008; Adiaba, 2014). Although sustainable land affordability generates much interest among researchers in other countries, none of the local studies has focused on sustainable land affordability.

Thus, it would be ideal to state that the main focus of this study is to evolve series of sustainability yardsticks against which land affordability after covid19 pandemic era is being measured, using *multi-characteristics complex evaluation* MucompE and *diversity based decision assessment* DiBDAss matrices. In order to achieve the aim and secure deeper understanding of the sustainability of land affordability, the research adopts the ethical sequence of evolving a set of research queries, so as to help with better insight into how *pandemised* situation can impact adversely upon affordability potency of stakeholders, as well as to better provide possible solutions to address the adversity that follows therefrom. This effort is further marshalled by the reviewing of relevant literature, which encompass the concept of sustainability, sustainability of land affordability as well as those factors that described as drivers or inhibitors. Also, there was segment on the explanation of the justification of evolved yardsticks, which were being used to measure the sustainability of land affordability, as well as the vehicles with which

sustainability are being understudied and understood. Thereafter, analysis of the data that were gathered from perceptual responses of stakeholders were displayed, while the discussion of findings took place prior to presentation of conclusion from the research and finally the recommendations for improvement were suggested.

Furthermore, research ruminations and real life discourse during the very period of covid19 had it that, shifting of the business model, recalibration of investment options, as well as reconfiguration of strategies could make economic activities, be given safety valve, thus leading to some levels of economic buoyancy, but how active and sufficient such econo-financial revival is, tells so much on sustainability of every single life sustaining assets, especially in their procurement, without inflicting pains upon citizens (Popović *et al*., 2012). Unfortunately, real-life scenarios have proved largely enough, that sustained economic revival of post covid19 era, shall take some time to fully come back, hence the affordability quotients of players in the land market continues to be badly hit, thus it puts a question mark and cast a doubt on how sustainable is the affordability levels, that are struggling to come up. Hence, it becomes very discernible by curiously asking questions such as: (a) What pandemic-related factors beset affordability potentials of Nigerians? (b) To what extent had the factors in (a) above adversely impacted upon the sustainability of urban land affordability in particular? (c) What hope does land market have in terms of affordability in post covid19 period? (d) How sustainable can land affordability become during post covid19 era?

Therefore, an attempt to provide answers to some or all of the research queries above, assisted in achieving both the main aim and objectives, which are the thrust of this study, among other background rationale.

2.0 LITERATURE REVIEW

As a concept, sustainability is though diverse, but it is made up of goal-directed meanings that are of constituent contributive parts, which are interconnected in a manner that is strongly suggestive of achievement of harmony, among the trio of economic development and prosperity, equitable dimension to socio-cultural goods and of course pleasantness and conservation of environmental resources (De Soto, 2000; Drexhage & Murphy, 2010). Beyond this, it makes further sense to aver that sustainability encapsulates features of social characteristics, covering health and equity, idiosyncrasies of human beings, including but not limited to respect for nature, tolerance of the behaviours of other creatures and granting of freedom for the exhibition of their nature and ecological balancing, which includes quality of air and water, climatic friendliness and efficiency of resource use, such as land (Kates *et al*., 2005). Along the same vein, a system referred to as cloud tagging was employed to define sustainability as a concept that is not only aggregately representing, but visually pleasing and unendingly occurring, for the attainment of target that seeks to draw comparisons, which analytically create the most common ground, upon which those aspects of the environment, social and economic, life, system and nature, can be better conceived (White, 2013; Dahl, 2012).

Additionally, sustainability in terms of affordable land is the end product of the degree to which capacity of human beings and other users of resources from lands are able to get involved in its procurement and development, without being

subjected to negativity in the areas of economic worsenment, de-enhancement of health, de-improvement of resources efficiency, as well as escalation of the adversity associated with unsustainability and their negative impacts on land and its vast natural and man-made resources (MacKillop, 2012). Furthermore, sustainability defies precise meanings, as one meaning is attached to it and thus gives an interpretation, another usage of it in some other contexts might lent its very entirety to another conception, thus makes it an all-time target-attaining concept which may take on a near-vague colouration, hence, it would not be fallacious to posit that, there exists no specific interpretation of the concept of sustainability. For example, it was averred that there is a greater need to be cautious in the definition of what constitutes sustainability, lest a sort of backwardness may be unwittingly introduced into the operational elegance of sustainability of whatever system, actions, strategies, policies, etc (Deininger *et al*, 2010b; Gao *et al*, 2014; Olajide *et al*, 2018).

In the same vein, it is being recognised that absence of any conception that can be termed autonomous, makes sustainability a concept that is of sufficient capacity to flexibly lend itself to multiple usage in differing contexts. In other words, it can be adopted locally to suit the local context and any situation. Sustainability in the views of Gillingham and Buckle (2014), is being metaphysically conceived to connote a natural phenomenon around which the perception of insistent necessity about the characteristically-wired standpoints of organisations, people, societies, etc., in respect of the ecological system, upon a sizeable length of time, is being driven. The held standpoint is all about the series of interconnectedness that exists among people vis-a-vis their habitats. As canvassed by Medineckiene *et al*. (2010b) and Bennett *et al* (2013), they highlight that there is every necessity to checklist acceptable approaches to sustainability, such that there would be incorporation of the concept of sustainability into every single policy making and strategy formulation in manner that recognises the need to ensure every creature on the planet appreciates the need for pleasant, calm and hitch-free co-existence, which relies strongly of sustainable shelter that is underpinned by harmonious interrelationship among geo-physical, socio-economic, psycho-cultural and bio-environmental milieus, among other systemic layers associated with land and its vast resources (Maliene and Malys, 2009).

Further to the above, is in respect of position that was being maintained by McNeill *et al* (2014) in which notion of land sustainability was measured from the perspectives of availability, high quality natural deposit, economy, ecological pleasantness, morphological aesthetism, physiognomic richness and usage flexibility, among others. Sustainable land affordability is also being immensely appreciated if capital requirement in respect of developments on such lands, both in mediate and immediate terms, is not only affordable but also resource use-efficient, showcasing excellence in the prudent use of water, containment of waste and management of energy, etc (Mulliner and Maliene, 2011). The foregoing is further based on the context that land affordability can only be made sustainable if the well set out criteria that are meant to draw on measurement, are synchronised into one another, so much that there is no silo, rather they are able to marry such other factors such as environment, social, economic and location, etc (Mulliner *et al*, 2013; Kato, 2014), as sustainability of land affordability goes far beyond the reasoning of low pricing of land and its vast resources.

Also, it was further argued by several scholars that quite a number of indices are responsible for the sustainability of land, as well as affordability that is resultant therefrom. It is pertinent to note that domains of delicate linkage in terms of interconnectedness in the basic elements of sustainability that are driven by affordability quotients, with which strength of common alignment between the two are underpinned (Loehr, 2012). Though, (Magis and Zevenbergen, 2014) opined that it is slim to achieve affordability of land in practically sustainable terms, simply because real life situations such as operationalisation of environ-physical sustainability are being checkmated by eco-existential variables, such as principal goals of providing inexpensive lands, as well as life-surviving assets attached therewith (Yates, 2008). Every evidence points to the fact it is economically draining offer full scale sustainability measure, as this will in no distant time be can be absorbed as lands cost (Owen *et al*, 2015). In addition, it must be stated that sustainability is gathering some momentum towards having highly desirable level recognition and application in the land and landed profession, virtually in all of aspects, such as appraisal and valuation, administration and management, taxation, development to mention but a few (Warren-Myers, 2013; Potel, 2014), sadly that this scenario continues to deter would be investors, be low, medium or high ends developers to commit into large-scale development of huge net worth, just for the ill-treatment being accorded sustainability of land, at least presently. Thus impacting adversely on affordability that would have naturally been associated with economies of scales that large scale delivery chain heralds MacKillop (2012).

In the work of Simbizi *et al*. (2015), affordability of lands is best measured with respect to relativity of the peculiar spatio-temporal attributes of any given parcel of site, both in space and in time. Literature searches and empirical standpoints have largely scored very high, the trio of land loan payment serviceability, outright land purchaseability and real income earnings spendability on land, as the most vibrant contexts of urban land affordability, against which the sustainable approaches of urban land can be measured. Assessment of sustainability from whatever perspectives and for all aspects of humans' endeavours, the fact remains that it is by no means an easy kernel to crack, though quite a number of scholars have convoked branded ideas on how best to evaluate the efficiency and robustness of various applications that are meant for sustainability measurement. Typically, the description of the evolvement and application of sustainability upon urban lands affordability, have been variously emphasised in respect of its multidimensional relevance to inbuilt system-optimised approach that represents a bolder quest for sustainability applications that are rugged enough to withstand the enormity of expectations, that are associated with a more demanding scape such as urban lands and its affordability related issues (Pullen *et al*, 2010; Akinbola *et al*, 2018).

In the same vein, much as Medineckiene *et al*. (2010a) birthed the measurement of the significance of what procedural prism sees in the deployment of sustainability as a conceptual integral part of decision-making process, Mulliner and Maliene (2011) advanced the frontier by canvassing for a series of parameters that truly portray sustainable urban land affordability. A multi-characteristics complex evaluation (MuCompE) matrix is thus hereby deployed to evaluate and weigh the set of parameters with which the sustainability of urban lands affordability, which this study examined and it

is an advancement to earlier study conducted by Mulliner *et al*., (2013) and Akinbola, *et al* (2016a). Also, some scholars have at the same time concerned themselves with researching on positives and negatives of other several but salient multidimensional parameters in evaluating the sustainability of urban land affordability (Mori & Christodoulou, 2012; Hak *et al*., 2012).

It is pertinent to stress that several findings, which were collated through intensive empirical excursions have abundantly revealed most of sustainability studies in respect of residential housing price regimes, as against the much expected research undertaking on the gamut of assessments that focus on attributes of neighbourhood and their analyses, situational measurement, as well as establishing the locational characteristics of housing fabrics within urban and supra-urban spheres (Zevenbergen *et al*, 2013). A diversity based decision assessment (DiBDAss) matrix is deployed to examine the multitudes of frameworks and studies in an attempt to assess the sustainability of lamd affordability, on the basis of parameters that are systemic, which allow for evaluation, with the use of intervals as suitable form for the representation of data sets and cases (Popović *et al*, 2012), which are thereafter being deployed to establish the degree to which the extent of land parcel utility and satisfaction priority coefficients are being optionalised (UN-Habitat, 2012; Zavadskas *et al*, 2008). It could be furthered in the views of Ustinovichius *et al* (2007), that DiBDAss matrix is bold in its relevance to integrated decision that focuses on sustainability of land prices affordability, it must be also emphasised that its salient variants are meant to report the evaluation, with significance as well as weightage of both the direct and indirect option of a sustainability measurement platforms with concurrence to ranking of priorities (Aruldoss *et al*, 2013), which is composed of the need to carefully selected resources, so as to guarantee some high degrees of correctness in the considered parameters, options and / or factors (Haarstrick & Lazarevska, 2009), as advanced through the calibration that represents contents of items that are contained in table 1 below, thus:

Table1: Developed Parameters As Benchmarks for Measuring the Sustainability of Urban Lands Affordability

S/N	Parameters' Codes	Parameters' Notations	Scholarly Sources
1	Location of the Land	PN1	Kato, 2014
2	Localisation of the Land	PN2	Zevenbergen *et al*, 2013
3	Physiognomy of the Land	PN3	UN-Habitat, 2012
4	Infrastructural Gap of the Land	PN4	Borras & Franco, 2008
5	Commuting Costs into and from Land	PN5	Simbizi *et al*, 2015
6	Price Regime of the Land	PN6	Pullen *et al*, 2010; Loehr, 2012
7	Associated Land Development Cost	PN7	Maliene & Malys, 2009
8	Encumberances	PN8	Owen *et al*, 2015
9	Environmental Quality	PN9	McNeil, 2014; RTPI. 2018

10	Land Convertibility Potentials	PN10	Zhu *et al*, 2006; Akinbola, 2017
11	Land's Yield Earning Potentials	PN11	Mulliner & Maliene, 2011
12	Land Value Rising Propensity	PN12	Hipp, 2010; Potel, 2014
13	Land Ethnographical Dictates	PN13	Akinbola *et al*, 2016a
14	Land Physical Planning Requiremt	PN14	UN-Habitat, 2012; RTPI, 2018
15	General Socio-Economic Conditions	PN15	Majis & Zevenbergen, 2014
16	Land Developability Quotients	PN16	Thuo, 2013;
17	Land Post-Development Charges	PN17	Deininger *et al*, 2008

Source: Researchers' Literature Review and Empirical Excursion

3.0 MATERIALS AND METHODS

3.1 Research Design and Data Collection

The research setting within which the area of this study falls, lies within the south western Nigeria, a geopolitical zone that is comprised of six well established and clearly defined states. The capital cities of these six states have about the highest values of land in Nigeria, except the capital city of the country, which is Abuja and perhaps PortHarCourt. (NIESV, 2019). Hence, it is in a bid to better understand and address the affordability-driven downturn challenges through the development of sustainable approaches, by evolving 17 measurement constructs against which land issues that have to contend with affordability are gauged, vis-à-vis the application of sustainability matrices of MuCompE and DiBDAss upon gathered data, which were quantitatively drawn from 250 copies of well-structured 5-point Likert scaled questionnaire, that were distributed with the use of purposive and simple random sampling techniques upon land officials, land transactions consultants and land developers of various categories within the six capital cities of southwestern states. Out of the 211 copies of questionnaire that were retrieved, 193 were found to be valid, translating to 84% of distribution-retrieval rate, thus were used for analysis, using normalisation scaling and decision ranking matrices, the outputs of which were further established, through mean items score tool for measuring the degree to which sustainability is adversely affected, thus weak in guaranteeing the affordability of urban lands in Nigeria.

3.2 Data Analysis, Evaluation and Interpretation of Results Using Normalisation Scaling and Decision Ranking Matrices of MuCompE, DiBDAss and Mean Items Score

The analysis of gathered data during the course of field survey for this research, was done via the deployment of calibrated measurements of normalisation scaling and decision ranking matrices of MuCompE and DiBDAss, which were advanced by the likes of Dey *et al* (2011) and further corroborated by the likes of Mulliner *et al* (2013), as well as mean item score statistics. In strict observance of the dictates and requirements of the measurements matrices that were used, the following two under-listed phases are important and deserve being written upon, so as to demonstrate their applications to the research under consideration, thus:

a. Firstly, identify and chose factors and the matrices that are meant to showcase the normalisation scaling, as well as that of ranking of the decision-making, bearing in mind that it is the focus of this research to measure the sustainability of urban lands affordability, hence, it becomes important that both factors of beneficial impacts and those of adversity are amplified. Thence, this formula is being deployed by making use of the overall mean score, with a view to ensuring smooth, easy and pure substitutability via comparing and contrasting of all measurement criteria that are involved, thus:

$$\text{Overall Mean Item Score [MISps]} = \frac{\text{SIps}}{\text{SULandA}\sum_{s=1}^{n} Xps} \quad Xps \ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where Xps is the weight of the p-th factor of the s-th alternatives, and SIps is the strength of influence of the p-th substitutability factor of sustainable urban land affordability, SULandA.

Table 2 displays the totality of mean item score [MISps] for each of the parameters, as well as their respective associated strength of influence [SIps].

Table 2: Totality of Parameters' Mean Item Score and their Strength of Influence

S/N	Parameters	Parameters Notation	Total Parameter Mean Item Score	Parameters' Influence Strength
1	Location of the Land	PN1	8.2129	6.4653
2	Localisation of the Land	PN2	8.3076	6.3942
3	Physiognomy of the Land	PN3	7.5412	6.1597
4	Infrastructural Gap of the Land	PN4	7.6697	6.1254
5	Commuting Costs into and from Land	PN5	7.9414	6.1167
6	Price Regime of the Land	PN6	7.8595	5.2838
7	Associated Land Development Cost	PN7	7.8026	6.1099
8	Encumberances	PN8	7.9367	6.1903
9	Environmental Quality	PN9	7.8862	6.1644
10	Land Convertibility Potentials	PN10	7.7916	4.6172
11	Land's Yield Earning Potentials	PN11	7.8640	6.1716
12	Land Value Rising Propensity	PN12	7.8329	6.1175
13	Land Ethnographical Dictates	PN13	8.0077	4.8781
14	Land Physical Planning Requirements	PN14	7.8569	6.1598
15	General Socio-Economic Conditions	PN15	7.6281	6.2686
16	Developability Quotients of Land	PN16	7.8529	6.1897
17	Land Post-Development Charges	PN17	7.7695	4.5859
	Gross Summation		133.7613	100.0000

Source: Researchers' Field Outcomes, December 2020

As depicted from table 2, out of the seventeen [17] scaled parameters that are subjected to benchmarking of sustainability of urban land affordability, against which the trio of the contexts of *land loan serviceability*, *land price purchaseability* and *income spendability on land* are being evaluated, the actual *location of the land* with code PN1, expouses the greatest strength in terms of what influences the degree to which individual's propensity to meet up with the specifics, which are of the three contexts of sustainable affordability are being dovetailed, with 6.4653 for strength of influence weightage for the parameter, while *land post-development charges* PN17 flaunts the least of requisite strength in influencing the extent to which individuals are of the tendencies towards being encouraged or discouraged in land's consumption or transactional activities that thus goes to measure how sustainably affordable specific parcel of land should be, with 4.5859 strength of influence weightage, thus further casts doubt on the attainment of the trio of land loan serviceability, land price purchaseability and income spendability on land. Though *land ethnographical dictates* PN13 flaunts some great determinacy by its mean item core of 8.0077 on the extent by which urban land affordability can be determined, as it has an implication that sustainability in terms of land loan serviceability, land price purchaseability and income spendability on land, are of larent connection with ethno-socio-cultural leanings, by which land and its resources are being understood.

Table 3 expresses those mean item scores in a spreadsheet form that details for parameters of all alternatives with their strength of influence weightings.

Table 3: Each Parameter's Strength of Influence and Respective Mean Item Score of Affordability Contexts Measured By Sustainability Matrices on Each of the Six Cities

Parameters and Strength of Influence		**Parameters' Respective Mean Item Score Measuring Land Loan Serviceability, Land Price Purchaseability and Income Spendability on Land**					
Parameters with their Codes	**Parameter Strength of Influence, SI**	**S_{aIKJ} Lagos**	**S_{bABK} Ogun**	**S_{cIBD} Oyo**	**S_{dOSG} Osun**	**S_{eAKR} Ondo**	**S_{fADK} Ekiti**
Land Location**PN1**	6.4653	8.4239	8.5414	8.5756	8.3423	7.1412	8.2531
Land Localisation**PN2**	6.3942	8.2515	8.4656	8.4239	8.2294	8.2571	8.2182
Land Physiognomy**PN3**	6.1597	7.1437	7.1524	7.9879	7.9132	7.9103	7.1397
Land Infrastructural Gap**PN4**	6.1254	7.9538	7.9623	7.1315	7.8953	7.9253	7.1497
Land Commuting Costs**PN5**	6.1167	8.2127	7.8568	7.9879	7.8315	7.8448	7.9148
Lands Price Regime**PN6**	5.2838	7.9875	7.7895	7.9594	7.7543	7.7694	7.8968
Land Development Costs**PN7**	6.1099	7.9313	7.9717	7.9683	7.8745	7.8939	7.1756
Land Encumbrances**PN8**	6.1903	7.9547	7.1986	8.1217	7.9767	7.9553	8.4132

Environmental Quality**PN9**	6.1644	7.8751	7.9147	8.1215	7.1356	7.9141	8.3562
Land Convertibility**PN10**	4.6172	7.9379	7.1789	8.1869	7.1246	7.9487	8.3723
Land's Yield Earning Potentials**PN11**	6.1716	7.9838	7.9784	8.1443	7.9862	7.9315	7.1597
Land Value Rising Propensity**PN12**	6.1175	7.8589	7.8632	7.1969	7.9486	7.8915	8.2385
Land Ethnographics**PN13**	4.8781	7.9524	8.1797	8.3296	8.1556	7.1697	8.2593
Land Physical Planning Reqmt**PN14**	6.1598	7.9839	8.3224	7.1557	7.8156	7.8956	7.9683
General Socio-Economy**PN15**	6.2686	7.9435	8.3759	7.1689	7.1958	7.1879	7.8968
Land Developabilities**PN16**	6.1897	7.8291	7.9187	7.9417	7.8246	7.9556	7.6479
Land Post-Development **PN17**	4.5859	7.5628	7.7534	7.7889	7.6797	7.8596	7.9723
Cummulatives	100.0000	134.7865	134.4236	134.1906	132.6835	132.4475	134.0324
MIS Averages		7.9286	7.9073	7.8936	7.8049	7.7910	7.8845

Source: Researchers' Field Outcomes, December 2020

Table 3 depicts the fact that the degree to which affordability of urban land can be sustainably achieved, rests on the parameter of *land location* PN1 with mean item score weightage of 8.4239 for Ikeja city in Lagos State, thus making it as the most important of all the parameters against which decisions on propensity of securing land loan, purchasing of certain regime of land price[s] and finally portion of one's income that can be spent on land, are being measured. It is clear, that though the same parameter of *land location* has its greater determinacy on the decision scaling, with respect to sustainability measurement of urban land affordability in Ibadan city, with mean item score weightage of 8.5756. Also noted, is the fact that *land physiognomy*PN3 has the least mean item score weightage of 7.1524, thus being the parameter with the least propensity to decision scaling of individuals, who are considering land as an economic good, in respect of sustainability of the land affordability in terms of land loan serviceability, land price purchaseability and income spendability on land of Abeokuta is of low determinacy as dictated by *land physiognomy*. Meanwhile, it is quite interesting to note that *land convertibility* PN10 with a mean item score of weightage of 7.1246, contributes as lowest parameter to the determinacy of sustainability decision scaling, which dictates the affordability of urban land in Osogbo city.

Further to the above, is the fact that *land localisation* PN2 is the parameter with mean item score weightage of 8.2571, which makes it the highest level of determinacy on the sustainability decision scaling of land's supply-demand dynamics of land loan serviceability, land price purchaseability and income spendability on land, which aggregately determine the affordability of urban land within Akure city in Ondo State. Different scenarios played

out in AdoEkiti where the *land encumberances* PN8 as the parameter with mean item score weightage of 8.4132, determines mostly the decision scaling of what sustainability level is being achieved in terms of affordability three-some contexts of land loan serviceability, land price purchaseability and income spendability on land. It is important to say that the parameter with the highest determinacy on sustainability, which ultimately dictates the affordability of urban lands in all the six southwest states' capital cities, is *land location*PN1, with mean item score weightage of 8.5756 and it is within the Ibadan city in Oyo State, while the parameter with such lowest determinacy on decision scaling in respect of sustainability and ultimately dictates on the land supply-demand dynamics, with its three-some contexts of land loan serviceability, land price purchaseability and income spendability on land, is *land convertibilty*PN10, with mean item score weightage of 7.1246 and it is found in Osogbo, Osun State.

Lastly and above all, the city of Ikeja in Lagos State has the highest level of cumulative and average mean item score weightage indices of 134.7865 and 7.9286 respectively, which means that decision scaling of all parameters and their determinacy in dictating sustainability and resultantly the affordability of urban lands, with respect to the three-some contexts of land loan serviceability, land price purchaseability and income spendability on land, are at their greatest within Ikeja city of Lagos State, while the lowest cucumulative and average mean item score weightage indices of 132.4175 and 7.7910 respectively, which means that decision scaling of all parameters and their determinacy in dictating sustainability and resultantly the affordability of urban lands, with respect to the three-some contexts of land loan serviceability, land price purchaseability and income spendability on land, are at their lowest within Akure city of Ondo State.

b. Secondly, there must be evaluation of both the positives and the negatives of the optionalised parameters, which is being done essentially to get strength of influence via normalisation matrix of scaling, this is better understood as displayed in table 3. Thereafter, there follows by the addition of the positive S measuring the value attributes of each city location's sustainability coefficients, which are of greater maximisation and are far better when juxtaposing them with those of other attributes. Considering the nature and direction of other attributes of value S against which sustainability s is being measured, they tend to turn out to be of negatives s, which denote that there is minimisation coefficient and thus are acceptable in that regard. Furthermore, it is noteworthy that sign of negative which depicts minimisation nature of the of the normalisation matrix of MuCompE signposts greater sustainability indices for each of the cities involved and it is consistently guaranteed whenever the negatively directionally exhibited affordability coefficients that occur in each of the cities' land locations. Therefore, the formula below is being used to generate the additions in terms of positives and negatives of the coefficient of maximisation and minimisation that are being expressed as functions of ranking sustainable approaches which are meant to be taken as decisions in respect of land affordability at various cities' locations, thus:

The formula to calculate the sums are as follows:

The normalisation decision scaling matrix summation Š of sustainability of land affordability =

$$\check{S}_s^{+ve} = \sum_{neP=+ve\ 0}^{rPs} \binom{n}{k} \quad \text{.....2a}$$

$$\check{S}_s^{-ve} = \sum_{neP=-ve\ 0}^{rPs} \binom{n}{k} \quad \text{.....2b}$$

Where rPs is the admixture of radius of influence, together with parameter being measured and their associated strength of influence, while neP is a function that denotes the nature and exponent of the direction to which the decision scaling follows, whereby n is the number of the point(s) for consideration for such parameter(s) and k is a constant.

Table 4 depicts the totality of normalisation decision scaling matrix of multi-characteristics complex evaluation, which is depicted by summation Š for sustainability measurement and ranking which applies to land affordability among the six southwest cities' locations, thus:

Table 4: Multi-Characteristics Complex Evaluation [MuCompE] Matrix for Sustainability of Urban Land Affordability

Parameters [P]	Pn	Average MIS of P	$\check{S}_aLG_{IKJ}$	$\check{S}_bOG_{ABK}$	$\check{S}_cOY_{IBD}$	$\check{S}_dOS_{OSG}$	$\check{S}_eOD_{AKR}$	$\check{S}_fEK_{ADK}$	R
Location of the Land	>+ <-	8.2129	0.898	0.973	0.918	0.876	0.929	0.997	2nd
Localisation of the Land	>- <+	8.3076	0.913	0.851	0.987	0.947	0.916	0.987	1st
Physiognomy of the Land	>+ <-	7.5412	0.908	0.898	0.863	0.938	0.829	0.892	17th
Infrastructural Gap of the Land	>- <+	7.6697	0.879	0.985	0.816	0.913	0.871	0.938	15th
Commuting Costs into and from Land	>- <+	7.9414	0.827	0.869	0.915	0.871	0.862	0.931	4th
Price Regime of the Land	>+ <-	7.8595	0.931	0.972	0.849	0.843	0.879	0.911	8th
Land Development Cost	>+ <-	7.8026	0.916	0.879	0.952	0.953	0.940	0.879	12th
Encumberances	>+ <-	7.9367	0.879	0.915			0.879	0.854	5th
Environmental Quality	>+ <-	7.8862	0.892	0.994	0.982	0.850	0.949	0.893	6th
Land Convertibility Potentials	>+ <-	7.7916	0.967	0.987	0.894	0.957	0.839	0.869	13th

Land's Yield Earning Potentials	>- <+	7.8640	0.918	0.871	0.856	0.897	0.972	0.987	7th
Land Value Rising Propensity	>+ <-	7.8329	0.957	0.894	0.957	0.951	0.863	0.943	11th
Land Ethnographical Dictates	>+ <-	8.0077	0.911	0.878	0.872	0.875	0.916	0.893	3rd
Land Physical Planning Requirements	>+ <-	7.8569	0.896	0.873	0.812	0.907	0.911	0.871	9th
General Socio-Economic Conditions	>+ <-	7.6281	0.939	0.931	0.979	0.843	0.853	0.978	16th
Developability Quotients of Land	>+ <-	7.8529	0.943	0.894	0.879	0.933	0.895	0.873	10th
Land Post-Development Charges	>- <+	7.7695	0.839	0.951	0.973	0.879	0.939	0.964	14th
Cummulatives		133.7613	15.413	15.615	14.504	14.433	15.242	15.660	

Source: Researchers' Field Outcomes, December 2020

Table 4 speaks more on the nature [Pn] with which each parameter responds to dynamics of the market, as well as showcasing of the requisite tendencies that are necessary for bouncing back on track, for a revived, stable and better market scenario, which thus impact on the sustainability effects and its attendant affordability of urban land generally. The following observations are noted, viz: While *localisation of land*PN2 is the parameter that shapes the decision scaling of sustainability, with which the three-some contexts of land's supply-demand dynamics of land loan serviceability, land price purchaseability and income spendability on land, are being measured and against which affordability of urban lands is dictated, with *average mean item score weightage* of 8.3076, it is dramatic to note that land in Ibadan, Oyo State and Ado Ekiti, Ekiti State, each with *MuCompE statistical loading* of 98.7% respectively, has the highest propensity to bounce back fully from the shock of covid19 pandemic and the effects of its associated economic vagaries on land as a commodity good, though the Pn is of greater negative than positive, which signifies that the attainment of this bright sustainability status after covid19 pandemic is fully over, shall be slow still.

A further look at table 4 reveals that *land price regime*PN6 is the eight most important determinant parameter that shapes the decision scaling of sustainability, with which the three-some contexts of land's supply-demand dynamics of land loan serviceability, land price purchaseability and income spendability on land, are being measured and against which affordability of urban lands is dictated, with average *mean item score weightage* of 7.8595, as well as *MuCompE statistical loading* of 97.2% and the land falls within Abeokuta city, Ogun State. Interestingly, the Pn is of greater positive than negative, which signifies that though the bouncing back of the land market to sustainably make urban land affordable as expected, because it ranks eight, however, its positivity sign being greater than negativity sign speaks volumes, as it is going to be very speedy and spontaneous.

Also, on a general note, it is heart-warming to submit that 20.000 p-th statimetric point is being stipulated, as the most ideal cumulative MuCompE index for gauging the degree by which the phenomenon under measurement, exhibits desirable responsiveness to dynamics of the system under consideration [Dey *et al*, 2011; Mulliner *et al*, 2013]. Hence, in this wise, with southwest land market being held as the system, it won't be illogical to calibrate as follows, viz: That the cumulative MuCompE of 15.660, which was found in AdoEkiti land market, though lower than the 20.0000 that is the ideal index, it shows the greatest level of promise towards rapid responsiveness at bouncing back of the market and improved sustainability level and urban land affordability. Abeokuta city with cumulative MuCompE index of 15.615 shows the next prominent level o recurperation of the market towards attaining an improved level of sustainability of urban lands affordability, while Ikeja city shows the next propensity for a fully bounced back market, with MuCompE index of 15.413, which confirms the fact that sustainability of urban land affordability shall become a reality, being the third in the line. The fourth and fifth cities with propensity for a bounced back land market with sustainability of urban land affordability being redeemed after covid19 pandemic are Akure and Ibadan cities, with cumulative MuCompE indices of 15.242 and 14.504 respectively. The sixth and the least of the MuCompE indices goes to Osogbo city in Osun State, with the lowest propensity for land market to respond quickly to post covid19 dynamics, thus the slowest rate of bouncing back of sustainability of urban land affordability.

Table 5 captures further the level of sustainability and affordability through diversity based decision assessment matrix used in scaling the land supply-demand dynamics of the six cities, measured against the seventeen parameters as contained in table 4 and it is being expressed as presented in the table and interpretation that follows thereunder, thus:

Table 5: Diversity Based Decision Assessment [DiBDAss] Matrix for Sustainability of Urban Land Affordability

S/N	City	Cumm. Parameters MIS	City Cumm. MuCompE	City Cumm MuCompE Cumm.MIS	Cumm.SI [Multiplier Index]	Sustainability /Affordability Measures %	Remark
1	LG_{IKJ}	133.7613	15.413	0.1152	100.0000	11.52	**Low**
2	OG_{ABK}	133.7613	15.615	0.1167	100.0000	11.67	**Low**
3	OY_{IBD}	133.7613	14.504	0.1084	100.0000	10.84	**Low**
4	OS_{OSG}	133.7613	14.433	0.1079	100.0000	10.79	**Low**
5	OD_{AKR}	133.7613	15.242	0.1139	100.0000	11.39	**Low**
6	EK_{ADK}	133.7613	15.660	0.1171	100.0000	11.71	**Low**

Source: Researchers' Field Outcomes, December 2020.

Table 5 clearly reveals without any trace of being miserly with truth, as expressed through the facts and figures, that generally the sustainability level of urban land affordability is damn low across all the six states' capital cities of Nigeria's southwest, as DiBDAss index for Ado-Ekiti, which shows the present level of sustainability of urban lands affordability as 11.71%, a case of slightly higher than one-tenth of expected level of capacity for sustainable affordability of market under ideal situation, that is stable and undistorted by any pandemic, etc. The next in rank is Abeokuta city with DiBDAss index of 11.67% being the present level of sustainability of urban land affordability, which is also a similitude of slightly higher than one-tenth of expected status under stable market situation that is devoid of any uncertainties of whatever form. The next in hierarchy is Ikeja city with DiBDAss index of 11.52%, an output which is fairly greater than one-tenth of required level that is needed for sustainability of urban land affordability in an ideal transactionary condition. In the ranking ladder are the fourth and fifth cities of Akure and Ibadan, with 11.39% and 10.84% DiBDAss indices respectively, a scenario that is tantamount to very low sustainability statuses in respect of urban land affordability, while the the sixth ranked of the cities is Osogbo, with DiBDAss index of 10.79 is the very least of present level of sustainability of urban land affordability within the southwest Nigeria.

4.0 SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

4.1 Summary of Findings

1. Specific location of a parcel of land is of the greatest potency among all the seventeen parameters against which the three contexts of land loan serviceability, land price purchaseabiity and income spendability on land are being measured, thence, this parameter is of greatest determinacy of sustainability of urban land affordability.
2. Post-development charges associated with land development is the parameter with the least potency against which the three contexts of land loan serviceability, land price purchaseability and income spendability on land are being measured, thence, this parameter is of lowest determinacy of sustainability of urban land affordability.
3. Sustainability of urban land affordability is driven at its peak by land location parameter and this is found within Ikeja city, based on the decisions ranking of the players in that land market.
4. Land convertibility is the parameter that least determines the sustainability decisions of players' urban land affordability and this is found within Akure city.
5. Land localisation is the parameter that mostly drives the propensity of players and thus determines the pace of bouncing back of sustainability of urban land affordability after pandemic.
6. Land physiognomy is the parameter that least drives the propensity of players and thus determines the pace of bouncing back of sustainability of urban land affordability after pandemic.
7. Ibadan city in Oyo State and AdoEkiti city in Ekiti State exhibited the greatest potency to have a fully bounced back sustainability of urban land affordability among the six states of the southwest after pandemic.
8. Osogbo city in Osun State has the least potency in attaining a fully bounced back sustainability of urban land affordability among the six states of the southwest after pandemic.

9. At moment, the city with the greatest level of sustainability index attesting to urban land affordability is AdoEkiti in Ekiti State.
10. Presently, the city with the least level of sustainability index attesting to urban land affordability is Osogbo in Osun State.

4.2 Conclusion

Arising from the empirical excursion, as distilled from the field outcomes and analyses variously associated therewith, it was concluded that the sustainability of urban land affordability has been adversely impacted by covid19 pandemic across the southwest Nigeria.

4.3 Recommendations

After careful analyses and closer look at the various findings associated therewith, it is important to generate the following suggestions in addressing the issues inherent in the findings, viz:

1. For an improved sustainability during post covid19 in enhancing the affordability of urban lands, serviceability of land loan should be seriously worked upon, by ensuring that all parameters that are considered in driving the decisions of land market players, especially location of land and the way it impacts adversely on sustainability is solved by making every parcel of land to enjoy premium location through government's increased developmental efforts that open up all lands.
2. It is pertinent that government addresses issues of sustainability as they relate to lower capacity of citizens in respect of urban land affordability in terms of ability to outrightly purchase and pay for land price by improvement on general level of prosperity of the citizens, so that requisite minimal capital balance that is needed to turn around land markets into a fully turn around scenario can be attained.
3. It is important that government and enabled players of the land market spectrum, works and extends to all other cities and of course the entire southwest, the level of vigour that is possessed by Ikeja as the city with the parameter that mostly determines the highest level of sustainability of urban land affordability.
4. It is undoubtedly significant, that government and everyone that is concerned about what becomes of Nigeria's urban land market vibrancy, to articulate all necessary frameworks in making sure that parameters that are of least strengths and those that of great strengths, are appropriately worked upon through cocktail of socio-economic reforms to bring them to full relevance, which is appropriate to every of the aspects of sustainability, by working upon the parameters, so as improve the urban land affordability across the length and breadth of the southwest Nigeria.
5. It is strongly suggested that there is every need for actual injection into the economy of the southwest to activate vibrancy in economic activities, so as to ensure the extension of the strength that is possessed by two of the six cities to other cities and towns across the length and breadth of the southwest, with a resultant impact in making the cities' levels of sustainability be improved upon and thus increases the affordability prowess of people in the urban land markets.

REFERENCES

Adiaba, S.Y (2014). A Framework for land information management in Ghana. An Unpublished PhD Thesis, University of Wolverhampton, UK.

Akinbola, K.B; Babarinde, J.A and Oloyede, V.O (2018). Inquiry into the Stamina of Nigeria's Land Administration System Towards Sustainable Delivery of Urban Lands. *Melanesian Journal of Geomatics and Property Studies* 4(1): pps 74-92.

Akinbola, K.B (2017). Land Administration and Regulation Model for Improved Formal Delivery and Accessibility of Urban Lands in Nigeria. An Unpublished PhD Thesis, submitted to the Department of Real Estate and Facilities Management, Universiti Tun Hussein Onn, Malaysia.

Akinbola, K.B; Yassin, A.M and Olajide, S.E (2016a). Evolving a contemporary framework for accelerated urban lands delivery in Nigeria. *In Consolidating the Future.* Proceedings of 2nd international conference on science, engineering and the social sciences (ICSESS2016), jointly organised by Universiti Teknologi, Malaysia and UTM's International Students' Congress-Nigeria, held at B12, Faculty of Built Environment, Universiti Teknologi, Malaysia on 29th May to 1st June, Johor Bahru, Malaysia.

Aruldoss, M., Lakshmi, T. M., & Venkatesan, V. P. (2013). A survey on multi criteria decision making methods and its applications. American Journal of Information Systems, 1(1), 31-43.

Bennett, R. M., Van Gils, H. A. M. J., Zevenbergen, J. A., Lemmen, C. H. J., and Wallace, J (2013). Continuing to bridge the cadastral divide. In: Proceedings of Annual World Bank Conference on Land and Poverty, April 8–11, 2013, p. 22. Washington, DC: the World Bank.

Borras, S. M. Jr., and Franco, J. C (2008). Land Based Social Relations: Key Features of a Pro-Poor Land Policy. Oslo Governance Centre Brief 2. Oslo, Norway: United Nations Development Programme, Oslo Governance Centre.

Dahl, A. L. (2012). Achievements and gaps in indicators for sustainability. Ecological Indicators, 17, 14-19.

De Soto, H (2000). *The mystery of capital: Why capitalism triumphs in the west and fails everywhere else*, BlackSwan Books, London, P 6.

Deininger, K., Augustinus, C., Enemark, S., Paul, M. F., & Munro-Faure, P. (2010a). Innovations in land rights recognition, administration, and governance. (S. Enemark, C. Augustinus, K. Deininger, & P. Munro-Faure, Eds.). The annual conference of land policy and administration (pp. 121-133). Washington: *The World Bank*.

Dey, P. K., Ghosh, D. N., & Mondal, A. C. (2011). A MCDM approach for evaluating bowlers performance in IPL. Journal of Emerging Trends in Computing and Information Sciences, 2(11), 563-573

Drexhage, J., & Murphy, D. (2010). Sustainable Development: From Brundtland to Rio 2012.

Enemark, S., Bell, K. C., Lemmen, C. H. J., and Mclaren, R (2014). Fit-for-Purpose Land Administration: Open Access e-book. Copenhagen, Denmark: International Federation of Surveyors (FIG).

Gao, B. Y., Liu, W. D. and Dunford, M. (2014). State land policy, land markets and geographies of manufacturing: the case of Beijing, China. *Land Use Policy*, 36, 1–12.

Gillingham, P., and F. Buckle. (2014). Rwanda Land Tenure Regularisation Case Study. Hertfordshire, United Kingdom: HTSPE Limited for Evidence on Demand and UK Department for International Development (DFID).

Haarstrick, A., & Lazarevska, A. (2009). Multi Criteria Decision Making (MCDM)- A conceptual Approach to Optimal Landfill Monitoring Paper presented at the 3rd International Workshop "Hydro-Pysico-Mechanics of Landfills", Braunschweig, Germany.

Hak, T., Kovanda, J., & Weinzettel, J. (2012). A method to assess the relevance of sustainability indicators: application to the indicator set of the Czech Republic's Sustainable Development Strategy. Ecological Indicators, 17, 46-57.

Kates, R. W., Parris, T. M., & Leiserowitz, A. A. (2005). What is Sustainable Development? Goals, Indicators, Values and Practice. Environment: Science and Policy for Sustainable Development, 47, 8-21

Kato, H. (2014). "Foreword of Confronting Land and Property Problems for Peace." *In Confronting Land and Property Problems for Peace*, edited by S. Takeuchi. London, United Kingdom: Routledge.

Loehr, D. (2012). Capitalization by formalization?—challenging the current paradigm of land reforms. *Land Use Policy*, 29, 837–845.

MacKillop, F. (2012). Sustainable as a basis of affordable? Understanding the affordability 'crisis' in Australian housing. Australian Planner, 50(1), 2-12.

Magis, M., and Zevenbergen, J. A (2014). Towards sustainable land administration systems: Designing for long-term value creation + powerpoint. *In: Engaging the Challenges, Enhancing the Relevance*, p. 11 and 15 slides. Proceedings of XXV FIG Congress, 16–21 June 2014, Kuala Lumpur, Malaysia.

Maliene, V., & Malys, N. (2009). High quality housing- A key issue in delivering sustainable communities. *Journal of Building and Environment*, 44, 426-430.

McNeill, D., Bursztyn, M., Novira, N., Purushothaman, S., Verburg, R. and Rodrigues, S. (2014). Taking account of governance: the challenge for land-use planning models. *Land Use Policy*, 37, 6–13.

Medineckienė, M., Turskis, Z., Zavadskas, E. K., & Tamošaitienė, J. (2010b). Multi-Criteria Selection of The One Flat Dwelling House, Taking Into Account The Construction Impact on Environment. Paper presented at the The 10th International Conference, Vilnius, Lithuania.

Mori, K., & Christodoulou, A. (2012). Review of sustainability indices and indicators: Towards a new City Sustainability Index (CSI). Environmental Impact Assessment Review, 32, 94-106.

Mulliner, E., & Maliene, V. (2011). Criteria for sustainable housing affordability. Journal of Environmental Engineering, 3, 966-973.

Mulliner, E., Smallbone, K., & Maliene, V. (2013). An assessment of sustainable housing affordability using a multiple criteria decision making method. Omega-International Journal of Management Science, 41(2), 270-279. doi: 10.1016/j.omega.2012.05.002

Olajide, S. E., Lizam, M., & Kasim, R. (2018). Proposed SEDeF model as a panacea for residential neighbourhood crime towards boosting housing values. *Advanced Science Letters*, *24*(6): 4110-4115.

Owen, T., Duale, G., & Vanmulken, M. (2015). Land and political corruption in Sub-Saharan Africa. Commissioned by: Transparency International. URL: http://corruptionresearchnetwork.org/courses-trainings/land-and-political-corruption-in-sub-sharan-africa.

Popović, G., Stanujkić, D., & Stojanović, S. (2012). Investment projects selection by applying copras method and imprecise data. *Serbian Journal of Management*, 7(2), 2570269

Potel, J. (2014). Displacement and Land Administration in Post-Conflict Areas—Case of Rwanda. MSc theses. Enschede, The Netherlands: Faculty ITC, University of Twente.

Pullen, S., Arman, M., Zillante, G., Zuo, J., Chileshe, N., & Wilson, L. (2010). Developing an Assessment Framework for Affordable and Sustainable Housing. Australasian Journal of Construction Economics and Building, 10(1/2), 48-64.

Royal Town Planning Institute (RTPI) (2018). RTPI Annual Report. https://www.rtpi.org.uk/media/3482688/RTPI%20RA%202019%20Final%203.pdf, accessed 9 July, 2020.

Simbizi, M. C. D., Zevenbergen, J. A., and Bennett, R. M (2015). Beyond economic outcomes. A pro—poor assessment of land tenure security after regularization in Rwanda. *In: Linking land tenure and use for shared prosperity*, proceedings of the annual World Bank conference on land and poverty, 23–27 March 2015, Washington DC, United States.

Thuo, A. D. M. (2013). Impacts of urbanization on land use planning, livelihood and environment in the Nairobi rural-urban Fringe, Kenya. *International Journal of Scientific and Technology Research*, 2(7), 70–79.

UN-Habitat (2012). "State of the World's Cities Report 2012/2013: Prosperity of Cities." Nairobi, Kenya, UN-Habitat.

Ustinovichius, Zavadskas, E. K., & Podvezko, V. (2007). Application of a quantitative multiple criteria decision making (MCDM-1) approach to the analysis of investments in construction. Control and Cybernetics, 36(1), 251-268.

Warren-Myers, G. (2013). Real estate valuation and valuing sustainability: a case study of australia. Pacific Rim Property Research Journal, 19(1), 81-100.

White, M. A. (2013). Sustainability: I know it when i see it. Ecological Economics, 86, 213217

Yates, J. (2008). Australia's housing affordability crisis. *Australian Economic Review*, 41(2), 200-214.

Zavadskas, E. K., Kaklauskas, A., Turskis, Z., , & Tamosaintinei, J. (2008). Multi-Attribute Decision-Making Model by Applying Grey Numbers. Institute of Mathematics and Informatics, 20(2), 305-320.

Zevenbergen, J., C. Augustinus, D. Antonio, and R. Bennett (2013). Pro-poor land administration: Principles for recording the land rights of the underrepresented. *Land Use Policy* 31: 595–60.