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Assessment of the Factors that Influence Land Use Transition in Epetedo, Lafiaji/Ebute, and Sandgrouse Communities From 2002-2022

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ABSTRACT

Unregulated land use transition creates hostile environment. This study assessed factors that influences land use transition in Epetedo, Lafiaji/Ebute and Sandgrouse communities in Lagos Island. Ullman theory of spatial interaction was used to explain the interaction that exist among different land uses. Both qualitative and quantitative techniques were used in measuring the transition in land use from year 2002-2022. The study employed observation and survey method to facilitate the realization of the objectives of this study. The whole of the study area (33 Streets) was studied, using base map to delineate the study area; checklist of streets and house numbers were used to take inventory of land uses; and questionnaires were administered to collect data related to individual perception on the subject matter. The study revealed that majority of the respondents strongly agreed that population growth, higher economic return, increase in rental value, location, and specific priorities are the major factors responsible for land use transition with the mean score of 4.49, 4.13, 4.07, 3.74, 3.69 respectively. With the mean value of 2.33. This study concluded land use transition is influenced by physical, social, and economic factors. Policy measures on population growth; capacity building; and balancing between maximizing economic return on land and land use regulatory framework were recommended to curb unplanned land use changes.

Keywords: Lagos Island, Land use, Residential Use, commercial & Transition

INTRODUCTION

Land use refers to the surface utilization of a vacant or developed land for a clear purpose, at a given time. These uses include agriculture, residential, commercial, industrial, institutional, transportation, communications and general utilities (Balasubramanian, 2015). Land use transition refers to how land has been used over a period of time, usually emphasizing the

functional role of land for physical, and socio-economic activities (Paul & Rashid, 2017). It can be measured by changes in both the dominant morphology (e.g., quantity, structure, and spatial patterns) and the recessive morphology (e.g., quality, property rights, management mode, fixed input, productive ability, and function) of land use (Long, Kong, Hu, & Li, 2020).

Over time, it becomes imperative to note that the pace and pattern of land use transition may vary considerably across regions globally. Some regions, such as Africa and parts of Asia, are experiencing particularly rapid land transition (Seto, *et al*, 2012). This trend in land use transition may involve conflict among different stakeholders with competing interests, such as farmers, residents, developers, conservationists, and government agencies, especially when land use transition prevails without adequate plan, supporting infrastructure and services as observed in the study area.

Unregulated land use transition could create hostile environment which allows for slum proliferation, loss of open space, traffic congestion, increased disaster risk, reduction of housing stock, waste pollution, and drainage channel obstruction. Data on land use transition are important for planning, managing and monitoring by government agencies, town planners, and other professionals in the built environment in Lagos Island. Also, it helps to understand how urban areas are evolving over time. The recommendations of this research will aid policymakers and city officials to make informed choices about how to allocate resources and prioritize development projects in the study area over time.

Hence, this study focused on assessing the factors influencing land use transition from year 2002-2022 in Epetedo, Lafiaji/Ebute, and Sandgrouse communities with a view of using the information gathered to suggest recommendations that would aid policymakers and city officials to make informed choices on how to achieve sustainable management of urban land uses. The objectives of the study are;

i. To analyse land use transition in the study area from 2002 - 2022
ii. To assess the factors that contributes to land use transition in the study area

LITERATURE REVIEW

Land Use Transition

Land use transition refers to the temporal changes of land use morphology corresponding to socioeconomic transitions, where land use morphology is the quantity and spatial structure of land use in a region at a specific period (Grainger, 1995; Long & QU, 2018). Wang, Tian & Wang (2022) explained land use transition process as the evolution of functional levels and spatial patterns at different stages of socioeconomic development, and changes in the coordination relationship between multiple functions. The study further explained that primary activities occupied natural landscape at inception which later transitioned to industrialization coupled with rapid urbanization.

Factors that Contribute to Land Use Transition

Land use transition is a human process aimed at transforming the natural landscape and emphasizing the role and function of land for socio-economic activities (Tuan,2022). Chen, Sun, Chen, XinWu, Guo, & Wang (2014) opined there has been enormous changes in the pattern of

land use either from one form to another or in the intensity of uses in cities globally in the last five decades. Transition in any form perceived as a natural phenomenon, it is unavoidable and it is pari-passu with urban growth of developing economies including Nigeria.

In a related study, Ibrahim, *et al.* (2020) examined the effect of uncontrolled land use changes on neighborhood quality in Karu, Nasarawa. The study revealed that profit maximization, economic hardship, personal choice, entrepreneurial opportunities, decision of developers, loose legislation, nature of the land, availability of technology, and government are factors influencing uncontrolled land use changes. Bosikun, Owoeye & Olasemojo (2021) revealed location, increase in economic activities, growth in population of the area, age of structures, stern demand for land uses, ignorance, and collaboration with investors as the principal factors inducing land use conversion in the Apete, Ibadan.

Several researches have been conducted on land use transition and factors that contributes to its proliferation by different authors. Ibrahim *et al* (2020) examined the effect of uncontrolled land use change on neighbourhood quality in Karu, Nasarawa; and Bosikun *et al* (2021) focused on socioeconomic factors influencing incidences of land use conversion in Apete, Ibadan. However, this study focused on assessing the factors influencing land use transition from year 2002-2022 in Epetedo, Lafiaji/Ebute, and Sandgrouse communities with a view of using the information gathered to suggest recommendations that will aid policymakers and city officials to make informed choices on how to achieve sustainable management of urban land uses.

Theoretical Framework

Theory of Spatial Interaction:

Spatial interaction is a concept that considers the dynamics of flow of people, freight, services, energy, or information between locations generated by economic activities. This model is associated with Ullman (1957 & 1980). According to this model, complementarity, transferability, and intervening opportunities are three interdependent conditions for a spatial interaction to occur.

The model further explained the three independent conditions for the occurrence of spatial interaction as thus;

i. **Complementarity**: refers to the supply and a demand between the interacting locations. In essence, a residential zone is complementary to a retail store (commercial zone) because the former is supplying customers while the latter is supplying goods.
ii. **Intervening opportunity:** refers to a location that may offer a better alternative as a point of origin or as a point of destination. For instance, in order to have an interaction of a customer to a store, there must not be a closer store that offers a similar array of goods.
iii. **Transferability**: Freight, persons or information being transferred must be supported by transport infrastructures, implying that the origin and the destination must be linked. Costs to overcome distance must not be higher than the benefits of related interaction, even if there is complementarity and no alternative opportunity.

In relation to this study, the theory of spatial interaction explains the complementarity of land uses in the study area, in essence there are enough population (customers) to patronize the retail activities that are spreading rapidly in the study area. In addition, entrepreneurs tend to locate their business in proximity to their targeted market thereby taking advantage of the intervening opportunity. Finally, the availability of affordable transportation links to the study area facilitates the process of transferring goods and services.

STUDY AREA AND METHODOLOGY

The study area is located in Lagos Island Local Government Area, Lagos State, Nigeria. Lagos Island is bounded in the west by Lagos Harbour, in the North and Northeast by Lagos Lagoon, in the south by Five Cowry creek, and towards the southeast by Macgregor Canal. Administratively, it shares its northern boundary with Lagos Mainland L.G.A and the Lagos lagoon, to the east it is bounded by Eti – Osa L.G.A. and to the west by Apapa L.G.A(see figure 3.1).

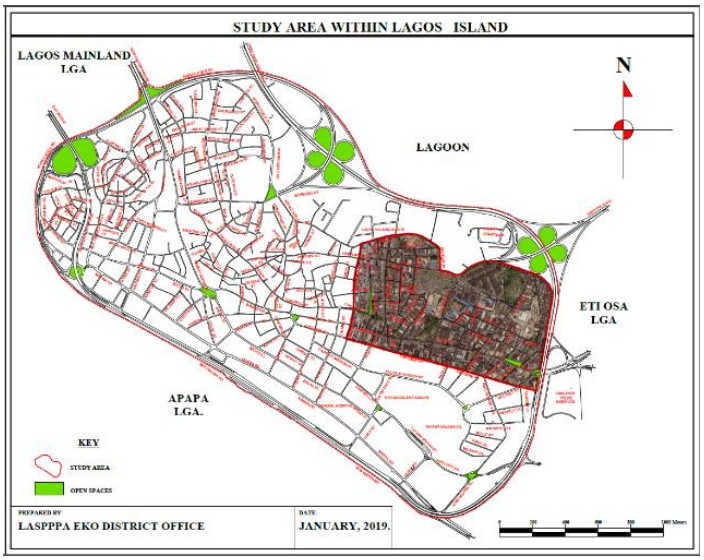


Figure 3.1: Map of Study Area within Lagos Island
Source: Lagos State Physical Planning Permit Authority (2019).

According to Independent National Electoral Commission Directory of Polling Units (INEC, 2015) Epetedo, Lafiaji/Ebute, and Sandgrouse communities are three of the nineteen registration areas in Lagos Island Local Government Area. These three communities constitute the study area, and they are located in the eastern part of Lagos Island. Geographically, the study area lies between latitude 6° 27'04" N to 6° 27'23"N and latitude 3°23'49"E to 3°24'27"E. It is bounded by Popo Aguda Community in the west, in the North by Lagos State Property Development Corporation Estate (LSDPC) Phase 1-4, in the East by Obalende Community, and in the South by Igbosere road (See fig 3.2).

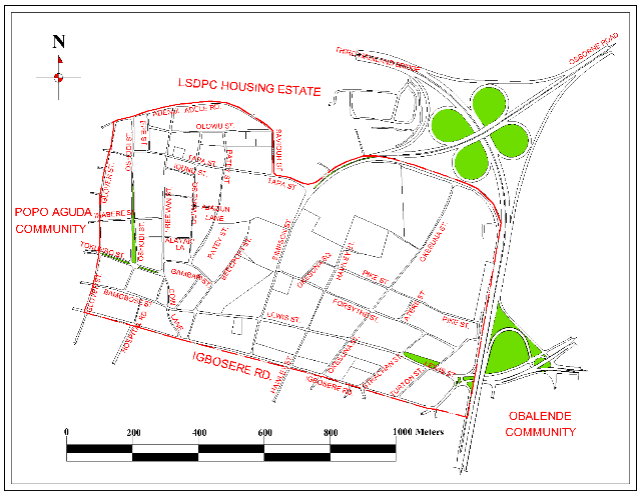


Figure 3.2: Map of the Study Area
Source: Field Survey, 2022.

Methodology

The study utilized qualitative and quantitative techniques in analyzing land use transition from year 2002-2022. The study employed observation and survey method as the most appropriate to facilitate the realization of the objectives of this study. The 100 respondents from the entire study area (33 Streets) were purposively selected; checklist of streets and house numbers were used to take inventory of land uses; and questionnaires were administered to obtain data related to individual perception on the subject matter. Data obtained from field survey were analysed using descriptive statistics such as tables and digitized maps.

FINDINGS

Land Use Transition in the Study Area.

Land use analysis of the study area in year 2002 revealed that residential land use was the predominant land use in the study area occupying 398,052.57m^2 (49.66%). Institutional / Public land use occupied 182,147.12m^2 (22.72%), Commercial 105,520.21m^2 (13.16%), Circulation 77,282.02m^2 (9.65%), Industrial 33,245.38m^2 (4.15%), and Open Space/Recreational use occupied 5299.59m^2 (0.66%).

However, in year 2022; 147,701.96m^2 (37.10%) of the initial residential land use area (398,052.57m^2) has been converted. Institutional/Public land use occupies 177,353.90m^2 (22.72%) of the overall area, this indicates 4,793.22m^2 (2.63%) loss from the initial 182,147.12m^2. Commercial land use gained 36,273.11m^2 which is equivalent to 34.38% of its initial 105,520.21m^2 as a result of the land use change. Hence, commercial land use covers 141,793.32 (17.69%) in year 2022. Field survey revealed that mixed use development is the major beneficiary of land use transition in the study area. It covers 114,082.13m^2 (14.23%) of the overall land area (801,546.89m^2) of the study area.

Land use transition occurred in the study area significantly between the period of year 2002-2022. The transition process has benefited commercial land use, and it has paved way for proliferation of mixed land use. Residential land use was greatly impacted, and institutional

land use was also slightly impacted (Akinluyi et al., 2021). This finding corroborates the position of Wang *et al,* (2022) that land use transition process follows the process of evolution of functional levels and spatial patterns at different stages of socioeconomic development.

Factors responsible for Land Use Transition in the Study Area.

In assessing the factors responsible for land use transition in the study area as shown in table 4.1 below, analysis revealed that majority of the respondents strongly agreed that population growth, higher economic return, increase in rental value, location, and specific priorities are the major factors responsible for land use transition with the mean score of 4.49, 4.13, 4.07, 3.74, 3.69 respectively. With the mean value of 2.33, respondents disagree that availability of labour is a factor responsible for land use transition. Therefore, it can be deduced that population growth is the most important factor responsible for land use transition the study area.

Table 4.1 Factors Responsible for Land Use Transition in the Study Area.

S/N	Variables	SA	A	N	D	SD	Sum of Weighted Value	Mean Score
1	Affordability	25	44	120	20	34	243	2.43
2	Agglomeration of allied services	35	100	69	76	7	287	2.87
3	Availability of labour	45	44	60	48	36	233	2.33
4	Availability of physical infrastructure	105	76	66	46	15	308	3.08
5	Business opportunities	15	140	159	10	4	328	3.28
6	Demand for a particular land use	150	76	60	36	10	332	3.32
7	Ease of movement	60	92	60	54	18	284	2.84
8	Favourable terrain	160	112	33	28	15	348	3.48
9	Higher economic return	75	336	0	2	0	413	4.13
10	Ignorance of the effect of land use change	90	144	39	34	16	323	3.23
11	Increase in rental value	25	364	12	6	0	407	4.07
12	Location	70	204	93	6	1	374	3.74
13	Marketability	20	264	81	2	4	371	3.71
14	Nearness to major road /Accessibility	35	236	75	14	2	362	3.62
15	Nearness / Proximity to market	20	260	51	24	2	357	3.57
16	Political influence	160	112	33	28	15	348	3.48
17	Population growth	345	76	12	16	0	449	4.49
18	Redevelopment	65	88	60	46	22	281	2.81
19	Security	65	68	57	44	29	263	2.63
20	Specific priorities	60	216	84	6	3	369	3.69
21	Transportation cost	95	84	60	24	15	278	2.78
22	Weak enforcement of land use regulations	60	92	60	54	18	284	2.84

Source: Field Survey, 2022

K.M.O and Bartlett's Test:

Table 4.2 below revealed the results Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity for factors responsible for land use transition. It indicates K.M.O value of 0.726 with Bartlett's test significance level of 0.000 as presented in the table below. This implies that the data is suitable for structure detection in factor analysis.

Table 4.2 K.M. O and Bartlett's Test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.709
Bartlett's Test of Sphericity	1112.831	1254.712
	231	231
	.000	.000

Communalities of Variables using Principal Component Analysis as Extraction Method:

Communality values revealed weakness of land use regulations with extraction value of .497(49.7%) as the least, while increase in rental value with extraction value .787 (78.7%) has the highest value. Factor analysis finally revealed increase in rental value, nearness to market, population growth, availability of physical infrastructure, and business opportunities as factors responsible for land use transition.

Table 4.3 Communalities of Variables using Principal Component Analysis as Extraction Method.

Communalities			
S/N	**Factors**	**Initial**	**Extraction**
1	Increase in rental value	1.000	.787
2	Nearness to market	1.000	.738
3	Population growth	1.000	.727
4	Availability of physical infrastructure	1.000	.693
5	Affordability	1.000	.677
6	Business opportunities	1.000	.666
	Ignorance of the effect of land use change	1.000	.641
	Political influence	1.000	.637
	Specific priorities	1.000	.637
	Security	1.000	.632
	Favourable terrain	1.000	.629
	Demand for a particular land use	1.000	.614
	Higher economic return	1.000	.611
	Transportation cost	1.000	.587
	Location	1.000	.586
	Marketability	1.000	.575
	Availability of labour	1.000	.566
	Ease of movement	1.000	.558
	Redevelopment	1.000	.553
	Nearness to major road	1.000	.547
	Agglomeration of allied services	1.000	.536

	Weakness of land use regulations	1.000	.497

Extraction Method: Principal Component Analysis.

Rotated Component Matrix of the Factors Responsible for Land Use Transition in the Study Area:

Table 4.4 below reveals that there are various factors responsible for land use transition in the study area however, major reasons for the transition can be attributed to marketability, business opportunity, population growth, nearness to major road, and higher economic return according to the result given by the rotated component matrix.

Table 4.4 Rotated Component Matrix of Factors Responsible for Land Use Transition in the Study Area

Rotated Component Matrix						
	Component					
	1	2	3	4	5	6
Marketability	.732	-.088	.102	.087	-.052	.101
Business opportunities	.694	.409	-.019	.024	.113	.065
Population growth	.675	.468	-.123	.005	.192	.026
Nearness to major road	.481	.251	.251	.379	.049	-.208
Higher economic return	.169	.687	-.047	.231	-.014	.233
Transportation cost	.070	.655	.021	.084	.361	.123
Availability of physical infrastructure	.002	.633	.035	.339	.384	.173
Ignorance of the effect of land use change	.106	.527	.481	.007	-.324	-.128
Favourable terrain	-.047	.001	.727	.109	.275	.104
Nearness to market	.463	.122	.704	-.112	.018	.010
Redevelopment	-.132	-.014	.639	-.133	.286	.181
Location	.488	-.181	.540	.062	.107	-.089
Increase in Rental Value	-.194	.299	.042	.796	.051	-.151
Political influence	-.269	-.137	.173	-.693	.144	-.122
Affordability	-.103	.052	.386	.552	.334	.313
Agglomeration of allied services	.330	-.012	-.071	.538	-.122	.344
Demand for a particular land use	.068	.064	.253	.061	.730	-.061
Ease of movement	.251	.072	.064	.038	.688	.103
Weakness of land use regulations	-.135	.212	.158	-.149	.621	.000
Specific priorities	.026	.178	.130	.051	.046	.764
Security	.192	.414	.048	.188	.150	.603
Availability of labour	.201	.378	-.028	.401	.153	-.444

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 20 iterations.

In conclusion, factor analysis revealed that there are various factors responsible for land use transition in the study area, however, major reasons for the transition are attributed to marketability, business opportunity, population growth, nearness to major road, location, specific priorities, and higher economic return. This finding to an extent is corroborates Ullman

(1957,1980) three independent conditions (complementarity, transferability, and intervening opportunities) for the existence of spatial interaction.

CONCLUSION AND RECOMMENDATION

Conclusion

In conclusion, land use transition is influenced by physical, social, and economic factors. This research revealed marketability, business opportunity, population growth, nearness to major road, location, specific priorities, and higher economic return as factors that influences land use transition. However, much progress has been made in understanding the factors that contributes to land use transition, there is still much that we do not know. Nonetheless, the literature provides a solid foundation for policymakers and stakeholders to make informed decisions about land use transition and to work towards more sustainable and equitable land use practices in the future.

Recommendation

i. Policy measures on population growth: population growth and higher economic return are perceived as top two factors responsible for land use transition, government should affirm policy measures on population growth, and also provide new jobs to meet up with the projected increase in labour force population.
ii. Capacity building: Skill based training and job creation is needed for the teeming population to earn income that will commensurate with the high rental value.
iii. Also, there is need to balance between maximizing economic return on land, and land use regulatory framework.

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