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Research Paper

Urban Sprawl and Land Speculation in Contemporary Land Administration in Bauchi Nigeria

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ABSTRACT

Urban sprawl and land speculation in Bauchi is ever on the rise and posed problems like high cost of infrastructure, farmland invasion, high commuter cost as well as real estate unattractively developed in patchy and strung out manner. This study investigates the impact of urban sprawl and land speculation on land administration in Bauchi metropolis, using multiple regression analysis and Partial Least Squares (SmartsPLS). Both urban sprawl and land speculation significantly influenced land administration, but land speculation alone tremendously influenced land administration as it accounts for 82% of the variance in the endogenous variable. Two-rate property tax is therefore recommended for curbing land speculation in the study area.

Key Words: Urban sprawl, land speculation, land administration & two-rate property tax.

1.0 INTRODUCTION

Urban sprawl is an eminent phenomenon in the Bauchi metropolis due to increase in population and real property development, culminating to deforestation and land degradation (Musa, Hashim & Reba, 2017). Asadi and Habibi (2011) have reported urban sprawl as an eminent phenomenon in many cities but is not viewed as a problem if the expansion is commensurate with increase in density per capita. It tends to post problems like increase in the cost of infrastructure, reduction in farmland area, increase in commuter's cost and time, low-density property development (Song & Zenou, 2006). Urban sprawl is seen by the European Environmental Agency (EEA) as the physical pattern of low-density expansion of urban and industrial areas invading agricultural lands and countryside; such expansion is characterized as unorganized, unattractive and scattered; property developed in patchy and strung out manner (Downs, 1999; European Environment Agency, 2006).

Urban sprawl according to Gordon and Richardson (2000) leads to increasing income inequality, longer commuting time with high cost, extinction of species, loss of agricultural land, isolation, psychological disorientation and environmental problems; these are issues of great concern to municipal land administration. Furthermore, sprawling leapfrog real property developments constitutes a waste of resources by inevitably increasing public expenditures for the provision of neighbourhood infrastructure, facilities and services (Song & Zenou, 2006).

Land speculation is land hoarding, and its impact is noticed when land supply is inelastic (as is always been its characteristics), land speculation is linked to upward change in land price (Malpezzi & Wachter, 2005), and speculators fetched huge profit, thus viewed by some people as an investment (Malpezzi & Wachter, 2005). While in Nelson and Duncan (1995), Bruegmann (2005), Bhatta (2010) and Thad (2010) land speculation is viewed as one of the leading causes of urban sprawl. Sprawl or isolated real estate development is associated with poor land administration, poor land use and development control, uncoordinated planning (Handy *et al.*, 2002), both urban sprawl and land speculation have many causes, but the level of impact on contemporary land administration Bauchi has been identified. This may constitute impediments to land administration, thus, against this background; the study investigated the impact of urban sprawl and land speculation in contemporary land administration in Bauchi metropolis.

2.0 LITERATURE REVIEW

Urban sprawl in Bauchi metropolis began to show since 1976, its extent increased exponentially in the last two decades, it was reported that from 1976 to 2015 the extent of sprawl reached about 77.55km^2 (Modibbo, Shahidah, Abdulkadir & Wali, 2017). Song and Zenou (2006) characterized urban sprawl as a sparsely-located unplanned developments of low density across large expanse of urban periphery, this is associated with some socio-economic and environmental problems in that the expansion is not commensurate with density per capita, as land taken over by building outweigh population growth. Specific instance in United States raised by American Farmland Trust was that the population Los Angeles' increase by 45% but the developed land increased by 300%; and between the year 1982 to 1997 the Upstate New York gained 2.6% in population but witnessed a 30% expansion in urbanized land (Song & Zenou, 2006). This made urban sprawl a serious problem in United States, as it raises cost of infrastructure since low-density development sprawls beyond the level of existing services.

Burchfield et al. 2006 outlined that urban sprawl can be attributed to many causes, like ground water availability, rugged terrain, and so on. Skaburskis and Tomalty (1997) found property tax might be one of the causes of urban sprawl, according to Song and Zenou (2006) this proposition was supported by convincing argument put forward by Arnott and MacKinnon (1977), Case and Grant (1991), Oates and Schwab (1997), Mills (1998), and Brueckner and Kim (2005) that property tax alone may influence developments on land leading to unorganized and scattered developments. Along this line of argument, Kahn (2001) outlined housing affordability and housing opportunity among low income earners.

Land speculation is ranked among the first key factors that cause urban sprawl as speculators envisaged appreciation in the value of real properties; according to Ranjan and Tapsuwan (2008) in Perth, Australia land owners including farmers often halts productivity and await for their lands to be considered for urban use; this is a speculative motive that inspire urban sprawl as it does not conform with land management paradigm, in this regard, land use principles are not adhered to, as posited by Enemark, Williamson and Wallace (2005). This study investigated the influence of urban sprawl and land speculation on land administration in Bauchi metropolis of Nigeria.

3.0 MATERIALS AND METHODS

This study derived its themes for investigation from existing relevant literature, these themes were used to develop instrument for data collection. Stakeholders in land use, land valuation, land development, land administration as well as scholars in related field within Bauchi metropolis formed the population;

however, due to the fact that, exact numbers of these stakeholders has not been established due to dearth of literature, the study has apportioned equal number of questionnaires to the aforementioned five (5) groups that formed the population; and the samples were randomly picked within each group, and 200 questionnaires were distributed, 168 were retrieved. These constitute 84% samples. Reliability analysis was conducted to check the level of consistency in the measuring items, while Multiple Regression and Partial Least Squares (SmartPLS) was simultaneously used to analyse the impact of the exogenous variables (Urban Sprawl and Land Speculation) on the endogenous variable (Land Administration) in Bauchi metropolis.

4.0 ANALYSIS: RELIABILITY ANALYSIS

The study consists of two (2) exogenous variables and one (endogenous variable), the analysis involved 37 measurement items for the three (3) constructs and were subjected to reliability analyses so as to achieve high level of consistency between the items, all inconsistent items were expunged before further analysis; the items were sieved and reduced to 29 (Table 1). The internal consistency of the measurement items was tested using Cronbach's Alpha; in Gliem and Gliem, 2003; Gencturk *et al.* 2010; Tavakol and Dennick, 2011 alpha value from 0.7 to 0.95 depicts good internal consistency of items.

Table 1 Reliability Analysis

S/N	Exogenous and Endogenous Constructs	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
1.	Urban Sprawl	0.966	0.965	10
2.	Land Speculation	0.977	0.979	10
3.	Land Administration	0.737	0.722	9
	Total			29

4.1 MULTIPLE REGRESSION ANALYSIS

High relationship exists between the two predictor variables (Urban Sprawl & Land Speculation) and dependent variable (Land Administration) as shown on Table 2 below where 'R' of 0.637 means the correlation is about 64%; with R^2 of 0.405 depicts that 41% of the variance in dependent variable is explained by the predictor variables, and the influence is significant at P Value less than 0.05.

Table 2 Model Summary (Urban Sprawl, Land Speculation & Land Administration).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.637[a]	.405	.398	.48139	.405	56.544	2	166	.000

Predictors: (Constant), LandSpeculation, UrbanSprawl

The unique effects of the predictors showed very low and negative correlation between urban sprawl and land administration (-0.10) with P value of 0.216 > 0.05, this is not significant. But high and positive correlation exists between land speculation and land administration (0.700) with P value of 0.00 < 0.05, thus, is significant (Table 3). This is an indication that land speculation has more influence on land administration than urban sprawl, this can be verified in subsequent analysis in the study.

Table 3 Coefficients Table

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.675	.086		19.440	.000	1.505	1.845					
	UrbanSprawl	-.049	.040	-.101	-1.241	.216	-.128	.029	.372	-.096	-.074	.544	1.839
	LandSpeculation	.368	.043	.700	8.627	.000	.284	.453	.632	.556	.516	.544	1.839

a. Dependent Variable: LandAdministration

The next model summary on Table 4 considered the influence of urban sprawl against land administration, the correlation is 37%; and urban sprawl account for only 14% of the variance in the dependent variable (land administration) as such 86% of the variance are explained by other things else, as a result the influence is very weak though significant.

Table 4: Model Summary (Urban Sprawl against Land Administration)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.372[a]	.139	.133	.57761	.139	26.854	1	167	.000

a. Predictors: (Constant), UrbanSprawl

High correlation of up to 63% exist between the second predictor variable (land speculation) and the dependent variable (land administration) with R square of 0.400 which means 40% of the variance in land administration is explained by land speculation alone in Bauchi metropolis, this is significant at 0.00 < 0.05 (Table 5).

Table 5: Model Summary of Land Speculation and Land Administration.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.632a	.400	.396	.48217	.400	111.188	1	167	.000

a. Predictors: (Constant), LandSpeculation

The two exogenous variables (urban sprawl and land speculation) significantly correlated and land speculation influencedurban sprawl by 46% and vice versa (Table 6).

Table 6: Model Summary for Exogenous Variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.675a	.456	.453	.93882	.456	140.073	1	167	.000

a. Predictors: (Constant), LandSpeculation

4.2 SMART PLS ANALYSIS

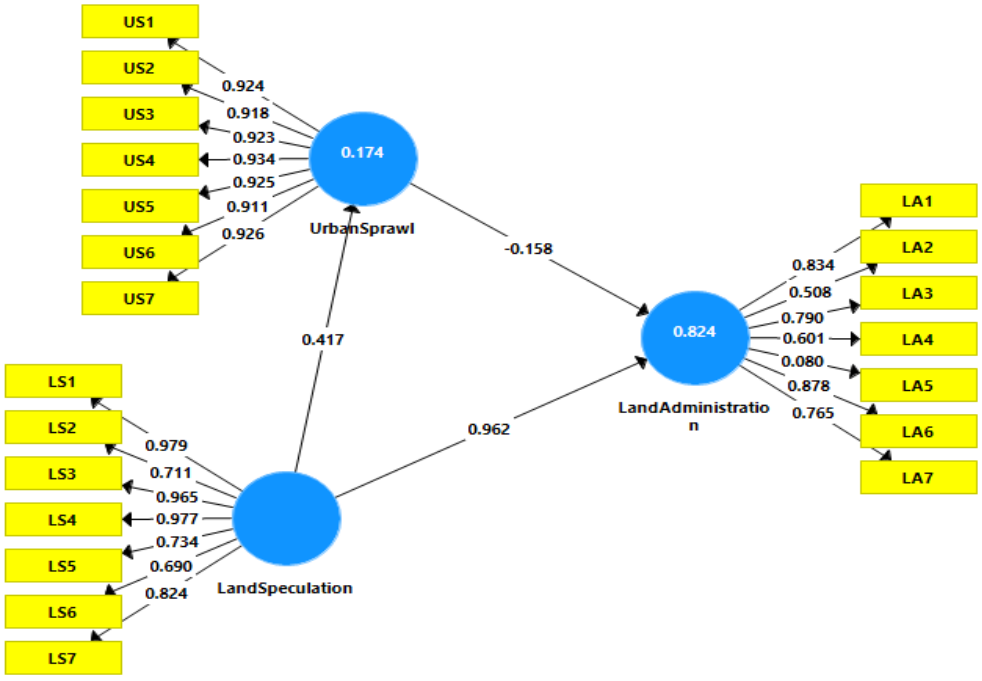

Figure 1: Initial Model of two Exogenous Variables and one Endogenous Variable in the study area.

The two exogenous latent variables (urban sprawl and land speculation) are both considered as reflective construct in that changes in the latent constructs can directly cause changes in their respective indicators, except for one indicator under land speculation that can be seen to have satisfied what formative measure requires. The endogenous latent variable (land administration) has indicators that can be seen as reflective on one hand and formative on the other; however, due the fact that, all the indicators are vulnerable to be influenced by the latent variable, the variable is therefore considered as a reflective construct. The factor loadings as can be seen on Figure 1, are generally good at ≥ 0.70 except for LA5 with 0.080 which is to be deleted, while 0.508 and 0.601 for LA2 and LA4 respectively are accepted and retained since such indicators have contributed to the content validity of the model, and also the Average Variance Extracted (AVE) of the latent variables shows a good value up to 0.5 and above. While all the reliability values calculated using Smart PLS revealed good results as in Table 1 above.

The standardized regression weights of 0.962 and 0.417 are significant (> than 0.2) but -0.158 is not only negative but is slightly less than the requirement, however, the P Value computed from these regression weights are strongly significant (Table 7).

Table 7: Path Coefficients.

	Regression Weights	T Statistics	P Value
LS → LA	0.962	36.172	0.000
LS → US	0.417	6.194	0.000
US → LA	-0.158	3.140	0.002

The internal consistency (Cronbach´s Alpha) and the composite reliability are well above 0.70, and AVE of ≥ 0.5 was achievable, though 0.472 needs to be improved (Table 8).

Table 8: Initial Construct Reliability and Validity

	Cronbach´s Alpha	Composite Reliability	Average Variance Extracted (AVE)
Land Administration	0.781	0.843	*0.472*
Land Speculation	0.931	0.946	0.720
Urban Sprawl	0.972	0.976	0.852

In the final structural model, all the factor loadings are accepted (Figure 2), and the AVE for the endogenous latent variable (land administration) has improved to 0.549 above the threshold of 0.5 (Table 9).

Table 9 Final Construct Reliability and Validity

	Cronbach´s Alpha	Composite Reliability	Average Variance Extracted (AVE)
Land Administration	0.828	0.876	*0.549*
Land Speculation	0.931	0.946	0.720
Urban Sprawl	0.972	0.976	0.852

In the final model, an indicator LA5 was deleted, thus the AVE for endogenous latent variable has appreciated. The R Square of 0.824 depicted that 82% of the variance in land administration is accounted for by both urban sprawl and land speculation in Bauchi metropolis; and R Square of 0.174 indicated that only 17% of the variance in urban sprawl was influenced by land speculation in the Bauchi metropolis (Figure 2). The influence of urban sprawl and land speculation on land administration is substantial, as according to Hair, Ringle and Sarstedt (2011) R Square results of 0.20 are considered high in predicting consumer behaviour, while in marketing research studies, R Square values of 0.75, 0.50, or 0.25 for endogenous latent construct in the structural model can be described as substantial, moderate, or weak based on the rule of thumb.

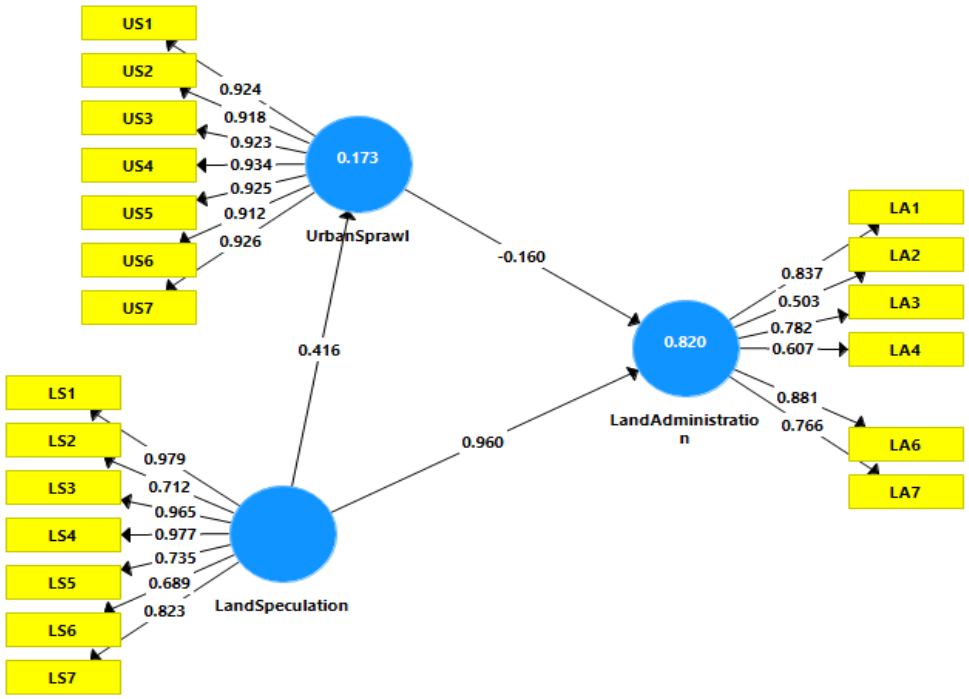

Figure 2: Final Structural Model of two Exogenous Variables and one Endogenous Variable in the study area.

The regression weight at ≥ 0.2 is significant, though the regression between urban sprawl and land administration is negative but a T Statistics greater than 1.96 is significant. Also, the P Values are all significant at less than 0.05 level (Table 10). The R Squares in the final model is almost the same as in the initial model; land speculation accounts for about 17% of the variance in urban sprawl, while both urban sprawl and land speculation accounts for about 82% of the variance in land administration in Bauchi metropolis, which means that only 18% of the variance is explained by some other factors not considered in this study. Thus, influence of the exogenous variables on the endogenous variables is highly substantial.

Table 10: Final Path Coefficients

	Regression Weights	T Statistics	P Value
LS → LA	0.960	38.166	0.000
LS → US	0.416	7.028	0.000
US → LA	-0.160	3.542	0.000

Further analysis on the individual effect of exogenous variable on the endogenous variable revealed that the effects of Urban Sprawl on Land Administration with a standardized regression weight of 0.379 >0.2 is significant, while the R Square of 0.144 depicts that Urban Sprawl account for just 14% of the variance in Land Administration, thus, 86% of the variance is explained by other factors (Figure 3).

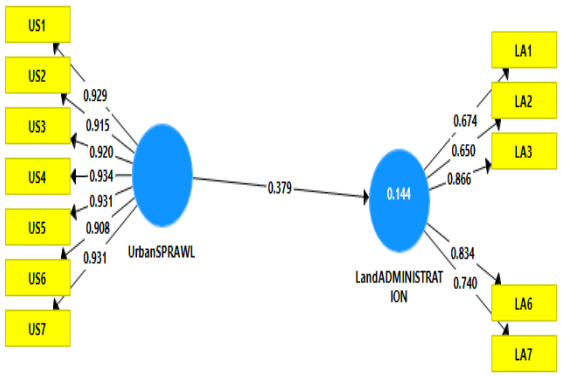

Figure 3: A Model depicting the influence of Urban Sprawl on Land Administration in the study area.

The internal consistency in the variables (Urban Sprawl & Land Administration) are good with Cronbach´s Alpha value of 0.826 and 0.972; and Composite Reliability of 0.869 and 0.976 were all significant as the values are greater than 0.70; the AVE on the other hand, are

both greater than 0.5 thus accepted; the T Statistics at 5.238 > 1.96, and P Value of 0.000 < 0.05 are both significant.

The impact of Land Speculation on Land Administration in the study area based on the empirical data collected and analyzed in this study revealed that the influence is very high, with a regression weight of 0.907 > 0.2 is absolutely significant; and the value of R square 0.823 indicates that Land Speculation alone as predictor variable explained about or account for 82% of the variance in Land Administration (Figure 4), as such only 18% of the variance is explained by other factors not considered in this study.

The consistency and composite reliability in the variables (Land Speculation & Land Administration) greater than 0.70 were good; the AVE of 0.719 and 0.549 >0.5 were both acceptable; and T Statistics and P Values of 68.640 and 0.00 respectively were very significant.

However, it can be discerned that Land speculation has a tremendous influence on land administration.

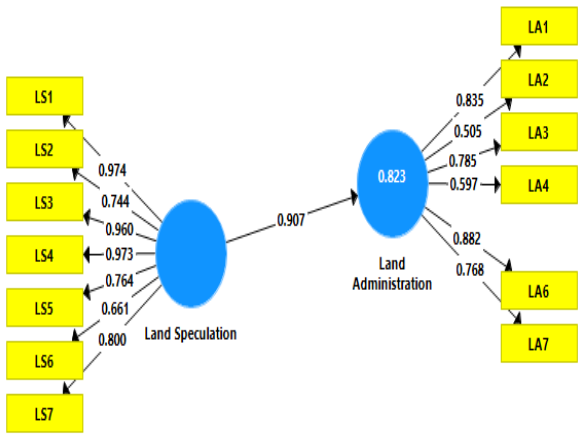

Figure 4 A Model depicting the influence of Land Speculation on Land Administration in the study area.

5.0 CONCLUSION

Using multiple regression analysis, the two predictor variables accounts for 41% variance in land administration; but individually, urban sprawl accounts for only 14%, while land speculation alone account for up to 40% of the variance in land administration. It can be deduced that land speculation correlates very high with land administration than urban sprawl with land administration, thus, land speculation strongly influences land administration, however, both predictors significantly influence one another.

Similarly, in Smart PLS, the impact of land speculation on land administration has the highest regression weights (0.960 >0.2) and T Statistics (38.166 >1.96) indicated that land speculation accounts for almost all the variance in land administration; as against the impact of urban sprawl on land administration, whose regression weights is very low, negative and insignificant; and again with T Statistics is as low as 3.542 though significant being greater than 1.96 (Figure 2); generally, land speculation in Bauchi influences land administration more than urban sprawl given the individual analysis of urban sprawl on land administration has low R^2 and low standardized regression weights (Figure 3); while impact of land speculation on land administration has very high R^2 and regression weights (Figure 4). This finding has conformed to the position of Nelson and Duncan (1995), Bruegmann (2005), Bhatta (2010) and Thad (2010) who viewed land speculation as one of the leading causes of urban sprawl and is associated with poor land administration, poor land use and development control as well as uncoordinated planning (Handy *et al.*, 2002).

In line with this results, two-rate property taxation is therefore recommended as a tool for curbing land speculation in Bauchi metropolis; as in Lavery and Banzhaf (2010) and Baba, Kasim, Adam *et al.* (2018) posited the alternative land administration tool for effective control of urban sprawl and land speculation is the graded land-improvement tax (split-rate tax or two-rate property rating).

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