Validation of Land Fragmentation and Rural Sustainability Assessment Scale

Abba Saleh[a], Mohammad Rafee Bin Majid[b]

[a,b]Faculty of the Built Environment and Surveying, Universiti Teknologi Malaysia, Malaysia.

Abstract: This study was conducted to assess the validity of land fragmentation and rural sustainability assessment scale (LFRSS). To achieve the purpose a cross-sectional survey design was adopted with a sample of 40 selected from local governments in Yobe State Nigeria. The instruments contained 71 items spread among the 3 constructs of land fragmentation, causes of land fragmentation and rural sustainability. The data collected was entered into Microsoft Excel 2016 and SPSS 25 was used for the Analysis. The scale was evaluated through content validity with experts and Reliability with Cronbach's Alpha technique. The results indicated that, the scale has substantial content validity and acceptable reliability values of 0.77 (land fragmentation), 0.74 (causes of land fragmentation) and 0.75 (rural sustainability). However,8 items on the overall failed to satisfied the condition to be certified as valid and thus, entirely removed form the scale (4 in causes of land fragmentation and 4 in rural sustainability). Accordingly, with the satisfaction of measurement requirements by 63 items, it can be concluded that, the developed LFRSS validated in this study can be used to assess the extent of land fragmentation and rural sustainability in Yobe state Nigeria.

Keywords: Land Fragmentation, Rural Sustainability, Validity, Reliability, Cronbach's Alpha.

1. Introduction

The effect of land as a resource to human is immeasurable. It is a limited, non-reproducible natural resource that is indispensable for the existence and upkeep of humanity and preservation of all universal ecosystems. It is, therefore, a form of wealth that is transferable from one generation to another. Globally, land as a resource, is one of the significant factors of production, whereas on the other hand worlds' population is increasing at an alarming rate thereby impacting on the processes of acquisition and the use of land which subsequently results in a phenomenon called land fragmentation. Fragmentation of land is noted to be a worldwide phenomenon (Demetriou, Stillwell, & See, 2012; Iheke, O. R. and Amaechi, 2015; Kadigi, et al., 2017).

Farmlands distribution according to equity principles, without first considering farm management aspects, the result is that the parcels which farmers received are either too small or poorly shaped. For instance, in length-to-width ratio. 0.5 to 2.5ha is the average farmland size in some European countries, which has made it difficult for the implementation new production patterns or to utilise machinery and appropriate technologies (Chakwizira, Mashiri, Nyoni, & Mokonyama, 2013; Reinmann, Hutyra, Trlica, Olofsson, 2016). The occurrence of fragmented farmland holdings is one of the distinctive characteristic of less developed nations through their cultivation practices Nigeria inclusive. It is, therefore, a substantial impediment to the mechanisation of agriculture, causing various agricultural productivity inefficiencies and requires a substantial cost to improve its effects (Balogun, Akinyemi, & Adam, 2017). Kadigi, et al., (2017) Sikk & Maasikamäe, (2015) asserted that globally, Land fragmentation poses numerous detrimental effects on agricultural mechanisation efficiency and productivity subsequently leading to abject poverty thereby affecting rural sustainability. Rural sustainability is a continuous search for development strategies to produce and maintain "healthy" rural communities in which economic, socio-cultural, political and environmental values are compatible and which respond to any imperatives in these dimensions, at least in the long run. It is thus fundamentally the same as "urban sustainability", only the differences in the type of environments present, population densities and activity bases yield differences in the way in handling the issues and solutions (Copus & Lima, 2014; Boluk, Cavaliere & Higgins-Desbiolles, 2019).

In Nigeria, the land is the most valued asset of most rural dwellers whose primary occupation is agriculture, and it employs over 80 per cent of the rural population (Ifegbesan, Rampedi, & Annegarn 2016; National Planning Commission 2013). Extant literature has expressed the concern of some scholars such as Fabiyi, (1978) and Oloyede, Ayedun, Oni and Ibisola, (2015) on the problems of the traditional land tenure system and land fragmentation. The assertion of the scholars concerning the problems of land tenure could be interpreted based on the duplicity of ownership of land with indirect excessive transaction costs. The challenges of land fragmentation in the state lead to the lingering widespread of poverty, high unemployment and rural-urban migration in the state. Additionally, grazing reserves areas and routes demarcated for animals are regularly facing encouragement by farmers, and this stimulates clashes between farmers and cattle breeders. Therefore, the challenges above constitute

a significant threat to rural economic sustainability in the communities in the state (Drvenkar, Marosevic, & Odak, 2017; Zemba, Umar, & Binbol, 2018).

The socio-economic development of humankind is dependent on land as a central supporting focus. Land fragmentation is one of the main changes associated with lands uses and changes globally. In this process, land fragmentation as a result of land-use conversion from its original state for human use become perpetual and most at times irreversible. Human action transformation thereby exerts a further effect on land-use change and associated with land allocation and regulations. Johnson, et al., (2014); Apata (2017) posit that notwithstanding several positives originating from urbanisation just as in rural land fragmentation, a fast urbanising environment is facing increased resource insufficiency, environmental degradation, and rural land fragmentation. Rural dearth is a worldwide problem and has undoubtedly accentuated through growing global levels of unsustainable land use. It is a fact that globally, migration is prominent from rural to urban centres and as such the development capacities of rural communities are collapsing and threaten their sustainability and resilience. Therefore, there is a greater need to theoretically and practically to study relevant aspect of land fragmentation, land-use policies, and mechanisms which may benefit adaptations to the revolution of socio-economic development and strategic change (Apata, 2017; Iheke & Amaechi, 2015)

Objective

This study aims at evaluating the quality of validation of land fragmentation and rural sustainability assessment scale

2. Methodology

2.1. The Research Instrument/Scale

The instrument for this study is a constructed and validated questionnaire. The instruments titled '*Land Fragmentation and Rural Sustainability Scale (LFRSS)*' was divided into four (4) sections; A-D. Section A contained information about the respondents Demographic Information, Section B contained items to measure respondent perception on land fragmentation situation, section C contained items to measure causes of land fragmentation and Section D contained items to measure Rural Sustainability. All the items were generated were developed using established procedures in the literature and the stakeholders' perspectives, who are specialist in the field of this study.

2.1.1. Land Fragmentation Situation

This section of the instruments contains items to measure respondent perception on land fragmentation situation. The developed instrument was structured to suit the current research on closed ended responses in different categories. The section contained 9 carefully selected items rated to assess land fragmentation situation in the study area. With the few modifications, the instrument was subjected to the content validity, construct validity and reliability. The report of construct validity and reliability are presented in this report.

2.1.2. Causes of Land Fragmentation

This section of the instruments contains items to measure the causes of land fragmentation. The developed instrument was structured to suit the current research on a closed ended with Likert-Type scale. This section consists of 27 carefully selected items rated on a 4 point Likert scale (**NI**=Not Influential, **SI**=slightly influential, **I**=Influential, **VI**=Very Influential). With the few modifications, the instrument was subjected to the content validity, construct validity and reliability. The report of construct validity and reliability are presented in this report

2.1.3. Rural Sustainability

This section of the instruments contains items to measure the Rural Sustainability aspect of this research. The developed instrument was structured to suit the current research on a closed ended with Likert-Type scale. The section consists of 35 carefully selected items rated on a 4 point Likert scale (Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). With the few modifications, the instrument was subjected to the content validity, construct validity and reliability. The report of construct validity and reliability are presented in this report.

2.2. Participants

To achieve the construct validity and the reliability of the questionnaire a pilot test was conducted, a sample of forty (40) respondents participated in the pilot testing. The sample size comprises male and female in a selected local government in Yobe State Nigeria. According to Baker (1994) a sample size of 10–20% of the actual sample size for the study is considered as a reasonable number to participate in a pilot study.

2.3. Content Validity of the Scale

An instrument is said to be valid if it essentially measures what it is intended to measure. The content validity of the scale (*Land Fragmentation and Rural Sustainability Scale)* was content validate by 2 professional researchers in geography and environmental sciences as well as one other expert in related behavioural research (measurement and evaluation) for proper scrutiny. The experts validated the instruments in terms of clarity of language, ambiguity of the statement, relevance to the topic and appropriateness of the items. After scrutinizing the instruments some constructive suggestions and corrections which were made by the experts were effected before producing the final draft of the instruments.

2.4. Administration of the Scale

The content validated and modfied final draft of the scale was administered to the sample by the researcher after given specific instructions for the survey with the help of some residents in the selected areas. The questionaire were retrieved directly, scored, entered and used as data in this pilot study.

2.5. Data Analysis

To examine the internal consistency reliability of the research instrument in this study, the data collected from the pilot testing were analysed using SPSS 25 to conduct test of reliability of the instrument using Item-Total Statistics with Cronbach's Alpha coefficient. The results of the analysis provide a preliminary information on the suitability or otherwise of the research instrument

3. Results

3.1. Summary Statistics

The Scale reliability was used estimate the reliability of the '*Land Fragmentation and Rural Sustainability Survey Questionnaire (LFRSSQ)*'. The summary statistics is the descriptive information generated using descriptive statistical analyses. Summary statistics are presented on Table 1. The results show Mean, Minimum, Maximum and Variance.

Table 1. Summary of Item Statistics

Construct	Mean	Minimum	Maximum	Variance	N of Items
Land Fragmentation	4.30	3.93	4.60	0.09	9
Causes of Land Fragmentation	3.48	2.49	3.97	0.09	25
Rural Sustainability	3.50	2.95	3.95	0.06	35

3.2. Item-Total Statistics (Reliability/Internal Consistency)

The results of the scale reliability analysis were conducted using item-total statistics with the Cronbach's Alpha coefficient. The analyses were run in two different stages: (i) Initial, which was obtained at the first stage of the validation that include all items including the poor ones. (ii) Modified which were obtained after removing the poor items that are not contributing to the overall reliability of the instruments. The results are presented in the following order:

a) Land Fragmentation Situation (Initial)

The result of the analysis as presented in Table 2 revealed the items' Cronbach's Alpha reliability coefficients of 0.731. This parameter is considered satisfactory reliability because according to Hair, Anderson, Tatham & Black (1995) and Cohen et al. (2010), a Cronbach's alpha scale of at least 0.70 is acceptable for the internal

consistency reliability of the items and can therefore be accepted for study's purpose. These criteria served as the guidelines in interpreting the internal consistency-reliability coefficients in this research.

Table 2. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.731	0.767	9

As established by the result of analysis based on reliability statistics, the Land Fragmentation sub-scale showed that, all the 9 items are retained and are to be used in the final draft of the questionnaire. The item total statistics presented in Table 3 shows no need of deleting any of the 9 items since the Cronbach's Alpha value is adequate for the entire items.

Table 3. Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
LF1	34.12	12.728	.420	.711
LF2	34.27	11.846	.372	.714
LF3	34.15	12.079	.544	.693
LF4	34.15	12.182	.422	.706
LF5	34.12	12.728	.420	.711
LF6	34.72	11.692	.429	.703
LF7	34.75	11.064	.417	.707
LF8	34.80	11.036	.350	.727
LF9	34.70	10.933	.464	.697

b) Causes of Land Fragmentation (Initial and Modified)

The result of the analysis as presented in Table 4 revealed the items' Cronbach's Alpha reliability coefficients of 0.686 at the initial stage, the result showed unsatisfactory parameter and therefore some items we recommended for deletion (*See* Appendix). The analysis was run after removing the 4 poor items (Item1, 3, 23 and 24).

The new reliability coefficient after removing the 4 items is presented in Table 5, the items' Cronbach's Alpha reliability coefficients became 0.740 after modification. This parameter (0.740) is considered satisfactory reliability because according to Hair, Anderson, Tatham & Black (1995) and Cohen et al. (2010), a Cronbach's alpha scale of at least 0.70 is acceptable for the internal consistency reliability of the items and can therefore be accepted for study's purpose. These criteria served as the guidelines in interpreting the internal consistency-reliability coefficients in this research.

Table 4. Reliability Statistics *(Initial)*

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.686	0.697	27

Table 5. Reliability Statistics (Modified)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.740	0.728	23

As established by the result of analysis based on reliability statistics showed that, the Causes of Land Fragmentation sub-scale showed that, 23 out of 27 items are to be retained in the final draft of the scale. The item total statistics presented in Table 6 revealed that, no need of further deletion of any items among the remaining 23 since the Cronbach's Alpha value is sufficient for the entire items.

Table 6. Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CLF2	78.51	32.625	.363	.725
CLF4	77.74	32.985	.268	.735
CLF5	77.72	31.682	.464	.716
CLF6	77.82	34.730	.123	.748
CLF7	77.13	37.220	-.106	.748
CLF8	77.03	36.868	.001	.742
CLF9	77.08	36.336	.149	.739
CLF10	77.31	33.903	.403	.725
CLF11	77.28	34.050	.321	.729
CLF12	77.51	34.414	.187	.740
CLF13	77.33	34.175	.295	.731
CLF14	77.38	33.927	.297	.731
CLF15	77.33	35.018	.184	.739
CLF16	77.38	35.190	.142	.742
CLF17	77.51	31.941	.544	.711
CLF18	77.46	31.939	.625	.708
CLF19	77.64	31.605	.694	.704
CLF20	77.46	32.781	.409	.722
CLF21	77.64	32.394	.416	.721
CLF22	77.51	35.730	.098	.744
CLF25	77.46	35.992	.075	.745
CLF26	77.54	34.308	.265	.733
CLF27	77.21	35.746	.166	.738

c) Rural Sustainability

The result of the analysis as presented in Table 7 revealed the items' Cronbach's Alpha reliability coefficients of 0.669 at the initial stage, the result showed unsatisfactory parameter and therefore some items we recommended for deletion (*See Appendix*). The analysis was run after removing the 4 poor items (Item5, 10, 11 and 12).

The new reliability coefficient after removing the 4 items is presented in Table 8, the items' Cronbach's Alpha reliability coefficients became 0.726 after modifications. This parameter (0.726) is considered satisfactory reliability because according to Hair, et. al (1995) and Cohen et al. (2010), a Cronbach's alpha scale of at least 0.70 is acceptable for the internal consistency reliability of the items and can therefore be accepted for study's purpose. These criteria served as the guidelines in interpreting the internal consistency-reliability coefficients in this study.

Table 7. Reliability Statistics *(initial)*

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.669	0.696	35

Table 5. Reliability Statistics (Modified)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.726	0.749	31

Based on the result of analysis based on reliability statistics showed that, the Rural Sustainability sub-scale showed that, 31 out of the 35 items are to be retained for inclusion in the final draft of the questionnaire. The item total statistics presented in Table 9 revealed that, no need of further deletion of any items among the remaining 31 since the Cronbach's Alpha value is sufficient for the entire items.

Table 9. Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
RS1	105.32	51.661	.059	.728
RS2	105.37	52.292	-.038	.732
RS3	105.25	51.218	.210	.723
RS4	105.27	51.230	.253	.722
RS6	105.60	51.785	.003	.733
RS7	105.57	50.456	.110	.728
RS8	105.60	50.862	.072	.731
RS9	105.57	50.046	.188	.723
RS13	106.05	51.177	.023	.737
RS14	106.25	49.679	.123	.730
RS15	105.60	49.477	.200	.722
RS16	105.62	49.163	.228	.721
RS17	105.62	47.112	.475	.705
RS18	106.02	49.769	.117	.731
RS19	106.02	49.769	.117	.731
RS20	105.62	47.266	.526	.703
RS21	105.60	47.323	.522	.704
RS22	105.80	47.241	.495	.704
RS23	105.65	46.592	.500	.702
RS24	105.72	46.974	.435	.706
RS25	105.65	50.900	.105	.727
RS26	105.65	50.849	.099	.728
RS27	105.82	49.635	.253	.719
RS28	105.65	47.618	.395	.709
RS29	105.82	48.353	.291	.716
RS30	105.70	48.779	.344	.714
RS31	105.72	48.461	.331	.714
RS32	105.72	48.974	.298	.716
RS33	105.65	48.849	.367	.713
RS34	105.72	48.974	.298	.716
RS35	105.70	48.779	.344	.714

4. Conclusion

In most cases, land fragmentation is a major inhibiting factor that affects rural sustainability. However, an in-depth study of the relationship between land fragmentation and the rural sustainability of the rural communities in Nigeria is neither determined nor fully documented. Thus, this pilot study provides the validation report of *'Land Fragmentation and Rural Sustainability Survey Questionnaire (LFRSSQ)'* that is proposed to be used to ascertain the extent and effect of land fragmentation on rural sustainability in Yobe state, Nigeria. Therefore, the results of the validity and reliability studies shows that, based on the established standards the instrument is valid and reliable and can be considered as a valid measuring instrument to collect relevant data in the present study.

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