



**FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA, NIGER STATE, NIGERIA**

**SCHOOL OF ENVIRONMENTAL TECHNOLOGY
INTERNATIONAL CONFERENCE (SETIC) 2018**

CONFERENCE *Proceedings*

**CONTEMPORARY ISSUES
AND SUSTAINABLE PRACTICES
IN THE BUILT ENVIRONMENT**

EDITORS:

**Asimiyu M. JUNAID
Olatunde F. ADEDAYO
Richard A. JIMOH
Luqman O. OYEWOBI**

**School of Environmental
Technology International
Conference
(SETIC) 2018**

10-12 APRIL 2018

**Federal University of Technology Minna, Niger
State, Nigeria**

CONFERENCE PROCEEDINGS

Volume 1

Editors

**Asimiyu M. JUNAID,
Olatunde F. ADEDAYO,
Richard A. JIMOH,
Luqman O. OYEWABI,**

ISBN 978-978-54580-8-4

Conference Proceedings of the School of Environmental Technology International Conference (SETIC) 2018

Editors

Asimiyu M. JUNAID,	Federal University of Technology, Minna, Nigeria
Olatunde F. ADEDAYO,	Federal University of Technology, Minna, Nigeria
Richard A. JIMOH,	Federal University of Technology, Minna, Nigeria
Luqman O. OYEWOBİ,	Federal University of Technology, Minna, Nigeria

Published by:

School of Environmental Technology
Federal University of Technology
Main Campus, Gidan Kwano
Minna, Niger State, Nigeria.

© Copyright. SETIC 2018.

Correspondence:

All correspondence pertaining to the SETIC 2018 should be sent to:
Chairman SETIC 2018 LOC
School of Environmental Technology
Federal University of Technology, Minna
Main Campus,
P.M.B. 65
Minna, Niger State, Nigeria.
setconference@futminna.edu.ng: www.futminna.edu.ng

10th – 12th APRIL 2018

School of Environmental Technology,
Federal University of Technology, Minna, Niger State, Nigeria.

TABLE OF CONTENTS

Table of Contents	iv
Foreword	v
Acknowledgement	vi
Copyright Statement	viii
Declaration of peer review and scientific publishing policy	ix
Review Panel	x
Local Organising Committee	xv
Scientific Committee	xvi
Profile of Keynote Speakers	xviii
Programme for SETIC 2018	xix
List of papers in SETIC 2018 Conference Proceedings	xlii
Keynote Addresses	1
Conference Papers	1

FOREWORD

The organising committee of the 2nd School of Environmental Technology International Conference is pleased to welcome you to Federal University of Technology Minna, Niger State Nigeria.

The conference provides an international forum for researchers and professionals in the built and allied professions to address fundamental problems, challenges and prospects that affect the Built Environment as it relates to Contemporary Issues and Sustainable Practices in the Built Environment. The conference is a platform where recognised best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. The scope and papers are quite broad but have been organised around the sub-themes listed below:

- Architectural Education and ICT
- Building Information Modeling
- Construction Ethics
- Energy efficiency and Conservation
- Environmental Conservation
- Facility Management
- Green Construction and Efficiency
- Health and Safety Issues
- Information Technology and Building Maintenance
- Information Technology and Construction
- Information Technology and Design
- Innovative Infrastructure Development
- Resilient Housing Development
- Smart Cities Development
- Social Integration in Cities
- Sustainable Building Materials Development
- Sustainable City Growth
- Sustainable Cost Management
- Sustainable Property Taxation
- Sustainable Architectural Design
- Sustainable Urban Transportation Systems
- Theory and Practices for Cost Effectiveness in Construction Industry
- Urban Ecology Management
- Urban Land Access
- Disasters, Resilient Cities and Business Continuity

We hope you enjoy your time at our conference, and that you have the opportunities to exchange ideas and share knowledge, as well as participate in productive discussions with the like-minded researchers and practitioners in the built environment and academia.

Local Organising Committee
School of Environmental Technology International Conference (SETIC) 2018
APRIL 2018

ACKNOWLEDGEMENTS

We have tried to build on the success of the maiden of SETIC held in 2016 which came with good feedbacks and memories. The success of the 2nd School of Environmental Technology International Conference holding at the Main Campus of the Federal University of Technology Minna, Nigeria is predicated on the support and goodwill from Vice-Chancellor of Federal University of Technology, Dean School of Environmental Technology and many other highly motivated people.

I sincerely wish to appreciate you for attending this Second edition of SETIC and to warmly welcome you to the city of Minna the capital of the *POWER STATE*. It is a great honour to have you in the beautiful campus of Federal University of Technology Minna, Nigeria. I am aware of the great sacrifices made by many of you to be present in this occasion and I will definitely not overlook the long distances some of you have had to cover to get to the conference venue. We genuinely appreciate all your efforts. It is our singular hope and desire that this 2nd edition of the conference (SETIC 2018) meets your expectations and gives you unquantifiable experience and tremendous developmental networking opportunities for a life fulfilling career.

We are grateful for the presence of the Vice Chancellor of the Federal University of Technology Minna Professor Abdullahi Bala whose leadership and distinguished academic career has served as inspiration and encouragement to many academics within and outside Nigeria. His desire to continue on the path of greatness for this Humble University of ours has seen the University become a destination for International conferences, Public lectures, Book Development, Presentations and Seminars that meet International standards. We are happy to have you as the Chief host to declare the conference open and deliver the welcome address.

We are grateful to the former Dean of School of Environmental Technology, Federal University of Technology Prof A.M. Junaid and the Ag. Dean of School of Environmental Technology Prof. S.N. Zubairu for providing the healthy platform, academic backing, management and guidance for the organisation of the conference. You increased the level of challenge from 2016 and provided the required resources, direction, energy and strategies for achieving its success, it is a great honour of having the opportunity to work closely with you and learning never to give up.

I wish to thank also all the special guests particularly leaders of the Industry, Built Environment and Academia.

A special thanks goes to the Bursar of Federal University of Technology, Mrs. Hajara Kuso for the timely responses to all our requests regarding the financial aspects of access to funds for the conference.

SETIC is beginning at the foundation this year and for this I wish to thank all those who have supported us through various forms of participation. Specifically I wish to thank the delegates and the partners for contributing significantly to the conferences. I wish to thank Prof. S.N. Zubairu Prof. A.M. Junaid, Prof. O. O. Morenikeji and Prof. Y.A Sanusi, who all genuinely and consistently monitored the progress of the conference preparations. My desire in 2016 was for SETIC to become a constant feature in the calendar of the University and global conference listings, am a happy person today seeing this desire fulfilled with the SETIC 2018 edition.

Delegates to SETIC 2018 are from different academic and research institutions that are spread across different countries. This offers participants a wonderful opportunity for exchange of cultural, social and academic ideas during the conference periods. It is also an opportunity to create awareness about programmes and events at the participants' individual institutions. I encourage you all to make good use of the networking opportunities that are available.

In this 2nd edition we received 258 abstract submissions because we had a wide distribution outlet as compared to the 1st edition which is an indication of growth. Using a rapid review system we accepted a total of 209 abstracts and the authors were communicated on what issues they were to examine while developing the full papers based on their titles and aim of the paper. Two hundred (200) full papers were received and reviewed. We sent back the reviewed papers and reviewers comments forms to each of the prospective authors to assist

in the preparation of the revised papers. It was after this rigorous and time consuming process that we were able to accept 172 papers for presentation at the conference. It gives me great joy therefore to congratulate all the authors whose papers made it to the conference. It is my sincere believe that the presentation of the different ideas in your paper would go a long way in improving the knowledge of the participants and also generate meaningful discussions over the tea beaks, lunch and beyond.

I wish to express my utmost gratitude to each of the Seventy-three (73) reviewers for a wonderful job done well and for tolerating our deadlines and Oliver Twist syndrome. It is your dedication and expertise that has ensured that the conference is a success.

Special thanks to all our keynote speakers, Arc. Umaru Aliyu, (ficiArb, fnia, ppnia) (*President, Architects Registration Council of Nigeria (ARCON)*), Prof. Stella N. Zubairu (*Former Dean Postgraduate School, Federal University of Technology Minna*), Dr. Julius A. Fapohunda, (*Editor-in-Chief: International Journal of Sustainable Energy Development & Leader: Sustainable Building and Urban Growth Research Unit, Cape Peninsula University of Technology*).

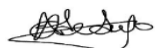
It is important to appreciate the roles and efforts of the following people for their selfless and very significant contributions made towards the successful organization of the conference: Oyetola Stephen, Alonge Olubunmi, Lynda Odine, Adedokun John, Idowu Oqua, Bamidele Eunice and Muhina Lami (for being available to run around at very short notice),

The organisation of this conference would not have been this easy without dedicated individuals offering to serve. My heartfelt gratitude goes to Dr. Taibat Lawanson, Dr. R.A. Jimoh, Dr. L.O. Oyewobi, Dr. N.I. Popoola, Dr. Lekan Sanni, Dr. I.B. Muhammad, Dr. A.A. Shittu and Dr. A. Saka for their unflinching support all through the process.

It is our sincere hope that this conference will serve as a forum for the advancement of research in the urban sphere towards achieving a sustainable environment. It is our sincere believe that academics and professionals in practices will continually participate in this forum.

Worthy thanks goes to the members of the Local Organising Committee for the tireless effort. The success of the conference goes to these wonderful people. You have made SETIC 2018 to ROCK.

Once again I wish to thank you all for creating time out of your busy schedule to attend this conference. Please do enjoy your stay at Federal University of Technology Minna, and the city as a whole. Ensure that you make use of the different fora created throughout the conference to build new relationships for the future and strengthen existing relationships. I look forward to seeing you all in future.



Olatunde Folaranmi ADEDAYO
SETIC 2018 LOC Chairperson
APRIL 2018

COPYRIGHT STATEMENT

© Copyright. School of Environment International Conference (SETIC) 2018. The copyright for papers published in the SETIC Conference Proceedings belongs to authors of the papers.

Authors are allowed to reproduce and distribute the exact format of papers published in the SETIC Conference Proceedings for personal and educational purposes without written permission but with a citation to this source. No unauthorized reproduction or distribution, in whole or in part, of work published in the SETIC Conference Proceedings by persons other than authors is allowed without the written permission of authors or organizers of the SETIC Conference.

We have taken all necessary cautions to comply with copyright obligations. We make no warranties or representations that material contained in the papers written by authors do not infringe the intellectual property rights of any person anywhere in the world. We do not encourage support or permit infringement of copyrights / intellectual property rights by authors. Should you consider any violation of your copyrights please do not hesitate to contact the conference secretariat at setconference@futminna.edu.ng

SETIC accepts no liability for copyright infringements or inappropriate use of material in any paper published. All authors developed their papers in line with the guiding principles of academic freedom and are responsible for good academic practice when conducting and reporting scientific research.

Correspondence relating to copyrights and requests for permission to use material from the SETIC Conference Proceedings should be made to: Secretariat of SETIC Conference email: setconference@futminna.edu.ng.

DECLARATION

PEER REVIEW AND SCIENTIFIC PUBLISHING POLICY STATEMENT

10th APRIL 2018

TO WHOM IT MAY CONCERN

I wish to state that all the papers published in SETIC 2018 Conference Proceedings have passed through the peer review process which involved an initial review of abstracts, blind review of full papers by minimum of two referees, forwarding of reviewers' comments to authors, submission of revised papers by authors and subsequent evaluation of submitted papers by the Scientific Committee to determine content quality.

It is the policy of the School of Environmental Technology International Conference (SETIC) that for papers to be accepted for inclusion in the conference proceedings it must have undergone the blind review process and passed the academic integrity test. All papers are only published based on the recommendation of the reviewers and the Scientific Committee of SETIC

Names and individual affiliation of members of Review and Scientific Committee for SETIC Conference 2018 are published in the SETIC 2018 Conference Proceedings and made available on www.futminna.edu.ng

Olatunde Folaranmi ADEDAYO
Chairman SETIC 2018
Federal University of Technology, Minna, Nigeria

Papers in the SETIC 2018 Conference Proceedings are published on www.futminna.edu.ng.

REVIEW PANEL

We wish to express our deepest and sincere gratitude to the following people in no particular order who provided comprehensive scientific reviews and made commendable suggestions towards improving the over 258 abstracts and 182 full papers submitted to SETIC 2018. They provided constructive comments to authors regarding their papers, it is necessary to state that there was no reported case of conflict of interest by any of the reviewers or the authors.

Prof. Lekan Sanni,	Department of Urban and Regional Planning, University of Ibadan, Ibadan
Dr. Taibat Lawanson,	Department of Urban and Regional Planning, University of Lagos, Lagos
Dr. Joy Maina,	Department of Architecture, Ahmadu Bello University Zaria
Dr. Yemi Adewoyin,	Department of Geography, University of Nigeria, Nsukka
Dr. Micheal A. Olukolajo,	Department of Estate Management, Federal University of Technology, Akure
Dr. Naomi I. Popoola,	Department of Estate Management, Federal University of Technology, Minna
Dr. O.K. Akande,	Institute of Public Health and Environmental Engineering, University of Leeds, UK
Dr. Philip Ayuba,	Department of Architecture, Federal University of Technology, Minna
Arc. Stephen Oyetola,	Department of Architecture, Federal University of Technology, Minna
Dr. Joel A. Ojekunle,	Department of Transport Technology, Federal University of Technology, Minna
Dr. Sani Khalil,	Department of Architecture, Bayero University, Kano
Arc. O. A. Adebayo,	Department of Architecture, Bells University of Technology, Ota
Dr. Anita Adamu,	Quantity Surveying, Federal University of Technology, Minna
Dr. Abubakar D. Isah,	Department of Architecture, Federal University of Technology, Minna
Dr. Bala I. Muhammad,	Department of Architecture, Federal University of Technology, Minna
Dr. Fakere, A. Adeyemi,	Department of Architecture, Federal University of Technology, Akure
Dr. Abdulkarim Saka,	Department of Chemical Engineering, Federal University of Technology, Minna
Dr. M.T.A. Ajayi,	Department of Estate Management, Federal University of Technology, Minna
Dr. O.A. Kemiki,	Department of Estate Management, Federal University of Technology, Minna
Dr. Samsideen Ojoye,	Department of Geography, Federal University of Technology, Minna
Dr. Isa Babtunde,	Department of Building, Federal University of Technology, Minna
Mr. Abdulganiyu Oke,	Department of Quantity Surveying, Federal University of Technology, Minna

Dr. A.A. Shittu,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Aliyu Kawu,	Department of Urban and Regional Planning Federal University of Technology, Minna
Mrs. D.O. Alonge,	Department of Architecture, Federal University of Technology, Minna
Dr. N.T.A. Abd'razack,	Department of Urban and Regional Planning Federal University of Technology, Minna
Dr. Sunday B, Gognaje,	Department of Urban and Regional Planning Federal Polytechnic, Bida
Dr. Lekan Sanni,	Department of Urban and Regional Planning Federal University of Technology, Minna
Dr. Emmanuel Daniya,	Department of Crop Production, Federal University of Technology, Minna
Dr. Hassan Ogiri,	Department of Building, Federal University of Technology, Minna
Dr. Luqman Oyewobi,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Rasheed Ojutiku,	Water Aquaculture & Fisheries Technology, Federal University of Technology, Minna
Dr. Adedayo Adebayo,	Department of Estate Management, Federal University of Technology, Akure
Dr. Adeiza Onumanyi,	Telecommunication Engineering, Federal University of Technology, Minna
Dr. Paul Bajere,	Department of Building, Federal University of Technology, Minna
Dr. Yetunde Arigbede,	Department of Geography, Ahmadu Bello University, Zaria
Dr. Richard Jimoh,	Department of Building, Federal University of Technology, Minna
Mr. Shien Kuma,	Department of Estate Management, Federal University of Technology, Minna
Dr. E. B. Ogunbode,	Department of Materials and Structure, Universiti Teknologi Malaysia, Malaysia
Bldr Calistus Ayegba	Department of Building, Federal University of Technology, Minna
Dr. Ahmed Emigilati	Department of Geography, Federal University of Technology, Minna
Dr. Aishetu Abdulkadir,	Department of Geography, Federal University of Technology, Minna
Surv. J.O. Odumosu,	Department of Surveying & Geoinformatics, Federal University of Technology, Minna
Dr. Mairo Mohammed,	Department of Geography, Federal University of Technology, Minna
Dr. Yahaya Tayo Iyanda,	Department of Geography, Federal University of Technology, Minna
Dr. B. J. Olawuyi,	Department of Building, Federal University of Technology, Minna
Dr. Aka Adefemi,	Department of Building, Federal University of Technology, Minna
Dr. M.E. Abdurahman,	Department of Architecture, Federal University of Technology, Minna

Dr. Bashir O. Ganiyu,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Maroof Anifowose,	Department of Quantity Surveying, Federal University of Technology, Minna
Mr. Imam Paiko,	Department of Entrepreneurship Management, Federal University of Technology, Minna
Arc. Jasper C. Eze	Department of Architecture, Federal University of Technology, Minna
Dr. Ibrahim Saidu,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Abbass S. Iyanda,	Department of Estate Management, Federal University of Technology, Minna
Dr. Yusuf D. Opaluwa	Department of Surveying and Geoinformatics, Federal University of Technology, Minna
Dr. Jude T. Kur,	Information and Media Technology, Federal University of Technology, Minna
Esv. R.A. Ogunbajo,	Department of Estate Management, Federal University of Technology, Akure
Arc. Shola C. Aremu,	Department of Architecture, Federal Polytechnic Bida, Bida
Dr. Bushrah Sakariyah	Department of Entrepreneurship Management, Federal University of Technology, Minna
Dr. Maroof Alabi	Department of Urban and Regional Planning, University of Ibadan, Ibadan
Dr. Juliet A. Obaje,	Department of Architecture, Kaduna Polytechnic, Kaduna
Dr. M.S. Oluwole,	Department of Transport Technology, Federal University of Technology, Minna
Dr. Idowu Owoeye,	Department of Urban and Regional Planning, Federal University of Technology, Minna
Dr. J. Oyedele,	Department of Estate Management, Obafemi Awolowo University, Ile-Ife
Engr. James Ambafi,	Department of Electrical Engineering, Federal University of Technology, Minna
Dr. M. Y. Suleiman,	Department of Geography, Federal University of Technology, Minna
Dr. Jide Babatunde,	Department of Estate Management and Valuation, Niger State Polytechnic, Zungeru
Dr. C. Ohadugha,	Department of Urban and Regional Planning, Federal University of Technology, Minna
Dr. Sani Habibu,	Department of Estate Management, Kaduna Polytechnic, Kaduna
Dr. O. F. Adedayo,	Department of Architecture, Federal University of Technology, Minna

LOCAL ORGANISING COMMITTEE

Dr. Bala I. Muhammad,	Department of Architecture, Federal University of Technology, Minna
Surv. E.A Adesina,	Department of Surveying and Geoinformatics, Federal University of Technology, Minna
Dr. B.J. Olawuyi,	Department of Building, Federal University of Technology, Minna
Dr. Abdulateef A. Shittu,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Lekan Sanni,	Department of Urban and Regional Planning Federal University of Technology, Minna
Dr. Abbass S. Iyanda,	Department of Estate Management, Federal University of Technology, Minna
Dr. Naomi I. Popoola,	Department of Estate Management, Federal University of Technology, Minna
Dr. Olurotimi Kemiki,	School of Environmental Technology, Federal University of Technology, Minna
Dr. O.F. Adedayo,	School of Environmental Technology, Federal University of Technology, Minna

SCIENTIFIC COMMITTEE

Prof. Stella N. Zubairu,	Department of Architecture, Federal University of Technology, Minna
Prof. A.M. Junaid,	Urban and Regional Planning, Federal University of Technology, Minna
Prof. O.O. Morenikeji,	Urban and Regional Planning, Federal University of Technology, Minna
Prof. Yekeen A. Sanusi,	Urban and Regional Planning, Federal University of Technology, Minna
Prof. I. J. Nwadiakor,	Surveying and Geoinformatics, Federal University of Technology, Minna
Prof. Lekan Sanni	Department of Urban and Regional Planning, University of Ibadan, Ibadan
Dr. Joy Maina,	Department of Architecture, Ahmadu Bello University Zaria
Dr. J.E. Idiake,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Naomi I. Popoola,	Department of Estate Management, Federal University of Technology, Minna
Dr. Taibat Lawanson,	Urban and Regional Planning, University of Lagos, Lagos
Dr. Samsideen Ojoye,	Department of Geography, Federal University of Technology, Minna
Dr. Abdulkareem Saka,	Department of Chemical Engineering, Federal University of Technology, Minna
Dr. Olurotimi Kemiki,	Department of Estate Management, Federal University of Technology, Minna
Dr. M.T.A. Ajayi	Department of Estate Management, Federal University of Technology, Minna
Dr. Hassan Ogiri,	Department of Building, Federal University of Technology, Minna
Dr. Luqman Oyewobi,	Department of Quantity Surveying, Federal University of Technology, Minna
Dr. Paul Bajere,	Department of Building, Federal University of Technology, Minna
Dr. Richard Jimoh,	Department of Building, Federal University of Technology, Minna
Dr. O.F. Adedayo,	Department of Architecture, Federal University of Technology, Minna

PROFILE OF KEYNOTE SPEAKERS

SETIC 2018 organisers wishes to thank our keynote speakers for accepting to create time to share from their rich wealth of knowledge and interact with delegates and participants on varied issues being examined at this year's conference. A brief profile of each keynote speaker is provided here, this would allow for future interaction and networking with them.

Prof. ZUBAIRU, Stella Nonyelum
Federal University of Technology, Minna

Academic Qualifications: PhD (Building Maintenance, 1999); MSc (Facilities Management, 1989); BArch (Architecture, 1980).

Professional Registration: Registered Architect with Architects Registration Council of Nigeria (F/483, 1985); Member, Nigerian Institute of Architects; Member, International Federation of Facilities Managers.

Contact email stellazubairu@gmail.com; stellazubair@futminna.edu.ng



Prof Stella Nonyelum Zubairu is a lecturer in the Department of Architecture, School of Environmental Technology, at the Federal University of Technology, Minna, Niger State, Nigeria. She obtained a second class upper division degree (BArch) in Architecture from the University of Nigeria, Enugu Campus in 1980. She served in the National Youth Service Corps in Niger State Housing Corporation, Minna, after graduation (1980 -1981), then she worked briefly for a private architectural firm, SWACON, in Lagos before joining the Niger State Ministry of Housing and Environment in 1983 as an architect II. The Ministry later merged with the Ministry of Works and was renamed Ministry of Works and Housing. She rose through the ranks in the Ministry and reached the position of principal architect. During this time, she was involved in many projects in the State including the design and construction of the Government House, extension of the Governor's office, supervision of all health projects in the State and later the design and construction of the Old Peoples' Home and other social welfare projects in the State. In 1988, she was granted study leave to go to Strathclyde University, Glasgow, where she obtained an MSc degree in Facilities Management in 1989. In 1991 she left the Ministry to join the Federal University of Technology, Minna as a lecturer I. In 1995 she was granted a study fellowship to study for her PhD at the University of Lagos which she completed in 1999 with a PhD in Building Maintenance. She was appointed Head of the Department of Architecture, Federal University of Technology, Minna (1999 – 2006). She was promoted to the rank of professor in October 2006. She served as Deputy-Dean Postgraduate School (2008); then she was appointed as Director, Centre for Human Settlements and Urban Development (2008 – March 2011) in the same University. She was then appointed Dean of the Postgraduate School (March 2011 – March 2015).

ASSESSMENT OF THE RELATIONSHIP BETWEEN HOUSING AND LIVELIHOOD PATTERN OF URBAN RESIDENTS OF BIDA, NIGER STATE, NIGERIA

Sulyman, A.O. & Dzukogi, U.A.

Department of Urban and Regional Planning, Federal University of Technology, Minna, Nigeria

This study assesses the relationship between housing and livelihood pattern of urban residents of Bida South. Cluster Random Sampling method was adopted in selection of wards and households across the entire sample frame in the application of questionnaires. In all, a total of 379 copies of questionnaires were administered for data collection on housing quality and livelihoods of the residents in terms of quality and condition of housing components, basic facilities and livelihood problems encountered by the residents. Pearson Product-Moment Correlation was used to analyse the relationship between housing quality and livelihoods. Spatial relationship was also established using Spatial Autocorrelation (Kriging). It was found out that there is a strong relationship between housing quality and livelihood of the residents, The correlation between the Occupancy Ratio and Livelihood is significant at 0.955; between the Age of Building and Livelihood is 0.975; between the Structural deficiency and Livelihood is 0.987; between Building Coverage and Livelihood is 0.936 and between Condition of Toilet and Livelihood variables is -0.879. The findings show strong spatial relationship between housing quality and livelihood in the spatial auto-correlation analysis. It was concluded that the housing condition in Bida South in terms of adequacy, quality of structures, safety and habitability fail to impact positively on the livelihood of its residents. It was therefore recommended that there is the need to improve the economy, human capital development, generation of employment opportunities and income that are capable of improving housing quality and living standard. The study also recommends the need for local government to grant housing loans for the interested participants at an interest rate lower than that of similar loans from commercial banks in order to develop quality housings.

Keywords: Housing quality, Basic facilities, Livelihood pattern, Spatial relationship

INTRODUCTION

Housing has profound influence on the health, efficiency, social behaviour, satisfaction and general welfare of the community. It reflects the cultural, social and economic values of a society, as it is the best physical and historical evidence of the civilization of a country (Omole, 2010). Quality housing has always been one of the very basic human needs. Overtime, its provision has been met in the form of dwellings which are temporary or permanent, natural or adapted (Wahab, 1983; Ojo, 1998; Oladapo, 2006; Listokin and Burchil, 2007). However, it has been argued that the efforts of Government in quality housing provision, particularly direct house construction, have largely been unsuccessful because the real needs of the target group (most times the poor) have often been misunderstood by government and thus are not catered for. Also that housing quality is grossly deficient in urban centres in Nigeria. An important criterion in evaluating housing quality is meeting the needs of particular families and therefore the value of a house is determined by the extent to which it satisfies or frustrates the needs of its users. Three basic needs of families (low, middle or high income, are identified as opportunity (proximity to work), security (home ownership) and identity (high quality standards of design and construction), which could be traded off against one another. These needs supposedly have impact upon quality of housing (Olotuah, 2015).

sulymanlance@gmail.com

Sulyman & Dzukogi, (2018). ASSESSMENT OF THE LEVEL OF INTEGRATION OF ORGANIC ARCHITECTURE IN HOTEL BUILDINGS IN MAKURDI, BENUE STATE. Contemporary Issues and Sustainable Practices in the Built Environment. School of Environmental Technology Conference, SETIC, 2018

However, housing quality is measured in terms of its physical components and the related basic facilities that make the houses functional. Quality housing is fundamental to healthy, social, economic and political relationships while poor housing inflicts serious problem on the livelihoods of individuals and the entire community. These, along with others, have been grouped into six categories of indicators by Alkay (2009) as social, economic, accessibility, perceived problems of the housing environment, the satisfaction from the housing environment, and the dwelling characteristics. The Aforementioned problems are peculiar to housing quality phenomena in Bida town. The specific objectives of the paper therefore include examination of quality parameters of housing, determination of carefully selected livelihood criteria and the relationship between housing and livelihood pattern in the study area.

Study Area

Bida is a Local Government Headquarter of Bida Local Government in Niger State, located on the A124 highway (a regional road) which links Ilorin to Minna and Abuja. The LGA has an area of 1,698 km² and a population of 266,008 (NPC, 2006) with 9°05'N, 9.083°N, 6°01'E, 6.017°E Coordinates. Bida is the second largest town in Niger State. It is located southwest of Minna, Capital of Niger State. The major ethnic group is the Nupe. Bida is the headquarters of the Nupe Kingdom led by the Etsu Yahaya Abubakar and consisting of many districts, such as Katcha, Lapai, Mokwa, Enagi, Baddeggi, Agaie, Pategi, Lemu, Kutigi, and others. The leadership style of the ancient town of Bida is Emirship, and the head of the town is addressed as Etsu Nupe. The town is known for its production of traditional crafts, notably glass and brassware. Bida is also known for its Durbar festival. It is also the home of the Federal Polytechnic, Bida (Max Lock, 1980). The locational map of the study area is shown in Figure 1.

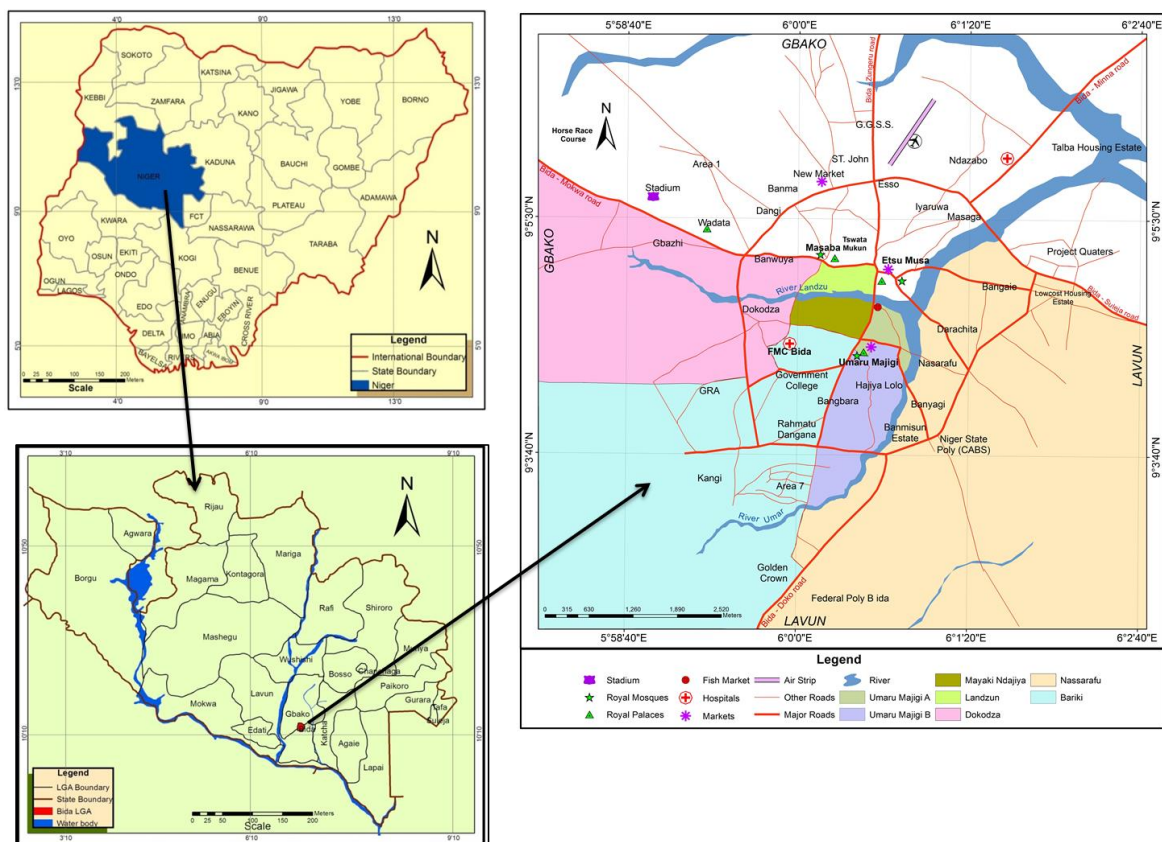


Figure 1: Locational Map of the Study Area
Source: Niger State Ministry Lands and Housing, 2015

METHODOLOGY

Data needed for this research were collected through questionnaire administration, Interview and physical observation. The questions in the questionnaire include wall condition, roof condition, physical structure condition, age of building, sewage facilities, bathroom facilities, kitchen facilities, water facilities and solid waste disposal facilities amongst others. One out of ten houses was served with questionnaire.

The study area (Bida South) covered seven (7) Wards i.e. Bariki, Umaru Majigi A, Umaru Majigi B, Nassarafu, Dokodza, Landzun and Mayaki Ndajiya respectively. Total estimated number of households in the study area is 29,667. However, a total of 379 households were adopted as the sample size of the residential buildings for the study. Descriptive statistical techniques used include percentages, charts, tables and cross tabulation to analyse the socio-

Table 1: Condition of Buildings

Building components	Very Good		Good		Fair		Poor		Very Poor	
	Frequency	%	No	%	No	%	No	%	No	%
Roof	32	9.1	51	14.5	153	43.6	86	24.5	29	8.3
Wall	102	29.1	89	25.4	72	20.5	59	16.8	29	8.3
Doors	129	36.8	103	29.3	52	14.8	50	14.2	17	4.8
Windows	39	11.1	83	23.6	78	22.2	84	23.9	67	19.1
Floors	72	20.5	88	25.1	61	17.4	72	20.5	58	16.5
Total	374	106.6	414	117.9	416	118.5	351	99.9	200	57

Source: Author's fieldwork, 2015



Plate I: Building With Collapsed Wall in the Study Area

Source: Author's fieldwork, 2015

Plate I shows a mud building that is partly collapsed and cracked in the study area.

Building Occupancy Ratio in the Study Area

The number of persons who stays per room is one of the tools used in assessing housing quality in this study. The study considered 1 – 2 persons/room, 3 – 4 persons/room, 5 – 6 persons/room and Above 6 as occupancy ratio range in the study area.

The study revealed in Figure 3 that 111 (31.6%) of the respondents have occupancy ratio of 5 - 6 persons per room, followed by 96 (27.4%) of respondents who have above 6 persons per room. However, 61 (17.4%) and 83 (23.6%) have 1 – 2 persons and 3 – 4 persons per room respectively. This shows that the occupancy ratio is high in the study area, which in one way or the other may have relationship with the livelihood of the residents.

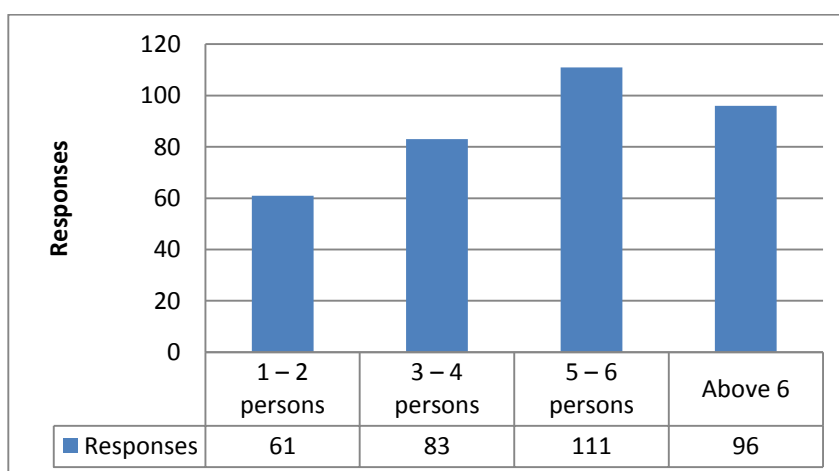


Figure 3: Occupancy Ratio of Buildings in the Study Area

Source: Author's fieldwork, 2015

Number of Windows/room

The study revealed in Figure 4 that close to 3/4 of the houses in the study area have two windows with 249 (70.9%) responses, while 98 (27.9%) of respondents have 1 window in their house. Finally, only 1.1% of the respondents do not have any window in their house.

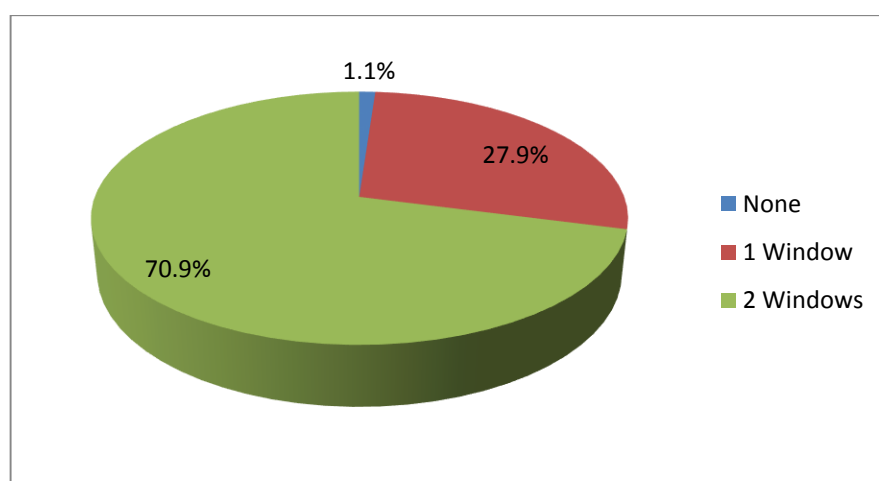


Figure 4: Number of windows/room

Source: Author's fieldwork, 2015

Types of Toilet Facility Used by Respondents

The study revealed in Table 2 that 138 (39.3%) of respondents used squat flush type of toilet, followed by 112 (31.9%) who used pit latrine type of toilet. For those households who used water closet were 98 (27.9%), while those that do not have toilet in their house were only 3 (0.9%) of the respondents.

Table 2: Type of Toilet Facility Used by Respondents

Type of toilet facility	Number of Respondents	Percentage
Water closet	98	27.9
Squat Flush	138	39.3
Pit latrine	112	31.9
None	3	0.9
Total	351	100.0

Source: Author's fieldwork, 2015

Sources of Water for Domestic Use

Provision of water is one of the functions of a good housing, therefore the study looked into various sources to which households sourced their water for domestic uses. This is shown in Table 3.

The study revealed in Table 3 that out of 351 respondents, 214 (61.0%) sourced their water for domestic uses from borehole. This is followed by 87 (24.8%) who sourced their water from well. However, 9 (2.6%), 13 (3.7%), 23 (6.6%) and 5 (1.4%) of the respondents sourced their water from pipe borne inside the house, pipe borne outside the house, water vendor and pond/stream respectively. The high utilization of borehole sourced water is as a result of increased number of boreholes drilled in recent times in the study area. However, it was observed the supply of water from Niger State Water Board was not regular.

Table 3: Sources of Water for Domestic Use

Source of water	Number of Respondents	Percentage
Pipe borne inside the house	9	2.6
Pipe borne outside the house	13	3.7
Well	87	24.8
Borehole	214	61.0
Water vendor	23	6.6
Pond/Stream	5	1.4
Total	351	100.0

Source: Author's fieldwork, 2015



Plate II: Public Motorised Borehole in the Study Area

Source: Author's fieldwork, 2015

Overhead tanks connected with a motorised borehole in the study area are shown in Plate II. This is one of the major sources of water for domestic uses in the study.

Livelihood Characteristics of Respondents

Households Opportunity to Improved Social Well-being

Household's opportunity to improved social well-being is assessed through access to formal education, access to healthcare, improved perception of safety and security.

The study revealed in Table 4 that 334 (95.2%) of the respondents have access to formal education while only 17 (4.8%) of the respondents do not have access to formal education in the study area. In terms of access to healthcare, 198 (56.4%) of the respondents have access while 153 (43.6%) do not have access. Table 4 also shows that 223 (63.5%) of the respondents do not have improved perceptions on safety and security while 128 (36.5%) have improved perceptions on safety and security. In the study area 209 (59.5%) of the respondents claimed to have access to strengthened social networks while 142 (40.5%) of them did not have access.

Table 4: Households Opportunity to Increased Social Well-Being

Increase social well-being	Accessible		Not Accessible	
	No	%	No	%
Access to education	334	95.2	17	4.8
Access to healthcare	198	56.4	153	43.6
Improved perceptions of safety and security	128	36.5	223	63.5
Strengthened social networks	209	59.5	142	40.5
Total	869	247.6	535	152.4

Source: Author's fieldwork, 2015

Households Opportunity to Improved Environmental Conditions

Access to basic services, adequate and effective solid waste disposal, low exposure to pollution and low disaster vulnerability are used in assessing improved environmental conditions.

Table 5 shows that 262 (74.6%) of the respondents do not have access to basic services while only 89 (25.4%) of the respondents have access to basic services. According to the Table 5, 319 (90.9%) of the respondents do not have adequate and effective solid waste disposal while only few have access with 32 (9.1%) responses. The Table 5 also reveals that 258 (73.5%) respondents are highly exposed to pollution while 93 (26.5%) have low exposure to pollution. In the same vein, majority of the respondents are highly vulnerable to disaster with 250 (71.2%) of responses, while 101 (28.8%) of the respondents have low disaster vulnerability.

Consequently, the result implies that households' opportunity to improved environmental conditions is very low and provides an indication that this has contributed to the poor livelihood condition of the residents.

Table 5: Households Opportunity to Improved Environmental Conditions

Improved environmental conditions	Accessible		Not Accessible	
	No	%	No	%
Access to basic services (water and sanitation)	89	25.4	262	74.6
Adequate and effective solid waste disposal	32	9.1	319	90.9
Low exposure to pollution	93	26.5	258	73.5
Low disaster vulnerability	101	28.8	250	71.2

Total	315	89.8	1089	310.2
-------	-----	------	------	-------

Source: Author's fieldwork, 2015

Households Opportunity to Enhanced Living Conditions

There is enough evidence no doubt that enhanced living conditions contribute to livelihood of households. Therefore, the study considers good quality of housing, access to public transport and access to open/communal space to assess households' living conditions.

The study revealed in Figure 5 that 248 (70.7%) of the respondents do not have good quality of housing, while only 103 (29.3%) have access to good quality of housing. In terms of access to public transport, 226 (64.4%) do not have access while 125 (35.6%) have access. In the same vein 299 (85.2%) of the respondents do not have access to open/communal space while 52 (14.8%) have access to open/communal space.

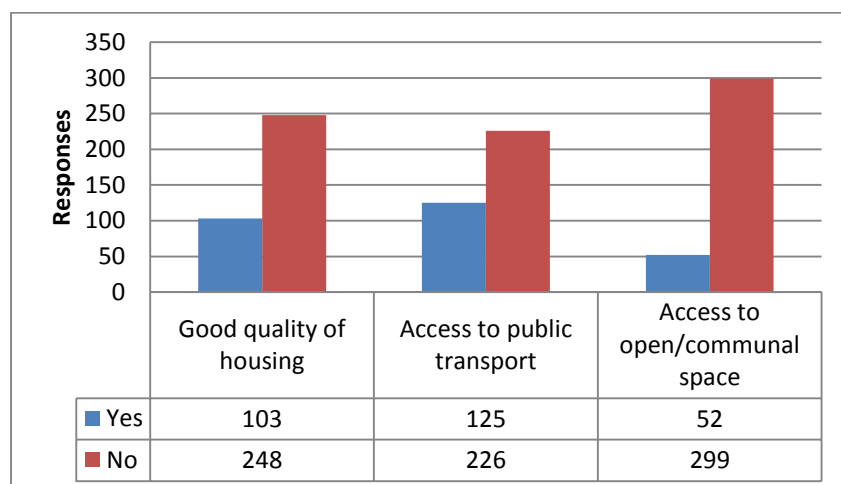


Figure 5: Households Opportunity to enhanced living conditions

Source: Author's fieldwork, 2015

Relationship between Housing Quality and the Livelihood of Urban Residents

Pearson's r is used to determine the relationship between the housing quality and the livelihood of the residents in the study area. In Table 6, Pearson product-moment correlation coefficient was computed to assess the relationship between five livelihood indicators and five housing quality variables. It was found out that all five livelihood indicators have significant positive correlations with housing quality variables. The empirical analysis result is that Pearson's r for all five livelihood indicators and five building conditions are close to 1. For this reason, it can be inferred that there is a strong relationship between Building Conditions and Livelihood of the residents.

Table 6: Relationship between Housing Quality and Livelihood

Housing Quality		Livelihood Indicators				
		Enhance Living Conditions	Improve Economic Condition	Greater Political Recognition	Increase Social Well-being	Improve Environmental Condition
Occupancy Ratio	Pearson Correlation	.985**	.814	.958	.921**	.985
	Sig. (2-tailed)	.002	.093	.010	.026	.002
	N	5	5	5	5	5
Age of the Building	Pearson Correlation	1.000	.809	.911**	.870	1.000
	Sig. (2-tailed)	.000	.097	.032	.055	.000
	N	5	5	5	5	5
Structural deficiency	Pearson Correlation	.809	1.000	.882	.915	.809
	Sig. (2-tailed)	.097	.000	.048	.029	.097
	N	5	5	5	5	5
Building Coverage	Pearson Correlation	.733	.870	.927	.949	.733
	Sig. (2-tailed)	.158	.055	.023	.014	.158
	N	5	5	5	5	5
Condition of Toilet/Bathroom	Pearson Correlation	1**	.809	.911**	.870**	1**
	Sig. (2-tailed)	.000	.097	.032	.055	.000
	N	5	5	5	5	5

Source: Author's fieldwork, 2015

The correlation between the Occupancy Ratio and Enhanced living Condition is 0.985, between Age of Building and Greater Political Recognition is 0.911, between Structural Deficiency and Increased

Social Well-being is 0.915, between Building Coverage and Increased Social Well-being is 0.949. The result reveals that all housing quality variables and livelihood variables are strongly correlated.

Spatial Relationship between Housing Quality and the Livelihood

The essence of this approach is to examine the performance of each area with respect to relationship between housing quality and livelihood of the residents in respect to space.

Spatial result shown in Figure 6 indicate that houses that are located within the filled contour value of 2.8 – 3 are better in terms of their quality, those that are located within the range of 1–1.2 filled contour value are poor in terms of their qualities.

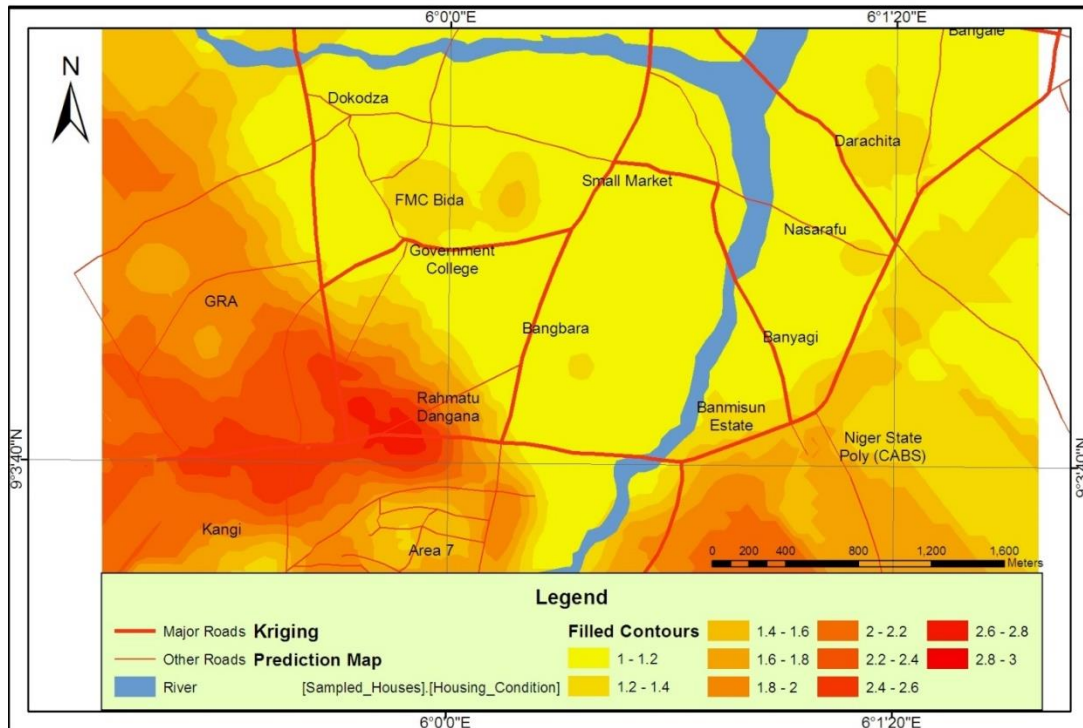


Figure 5: Auto-correlation of Housing Quality
 Source: Author’s fieldwork, 2015

Figure 6 revealed that people who live in the houses that are located within the range of filled contour value of 2.8 – 3 have better livelihood, likewise those people that live in the houses that are located within the range of filled contour value of 1 – 1.2 have poor livelihood.

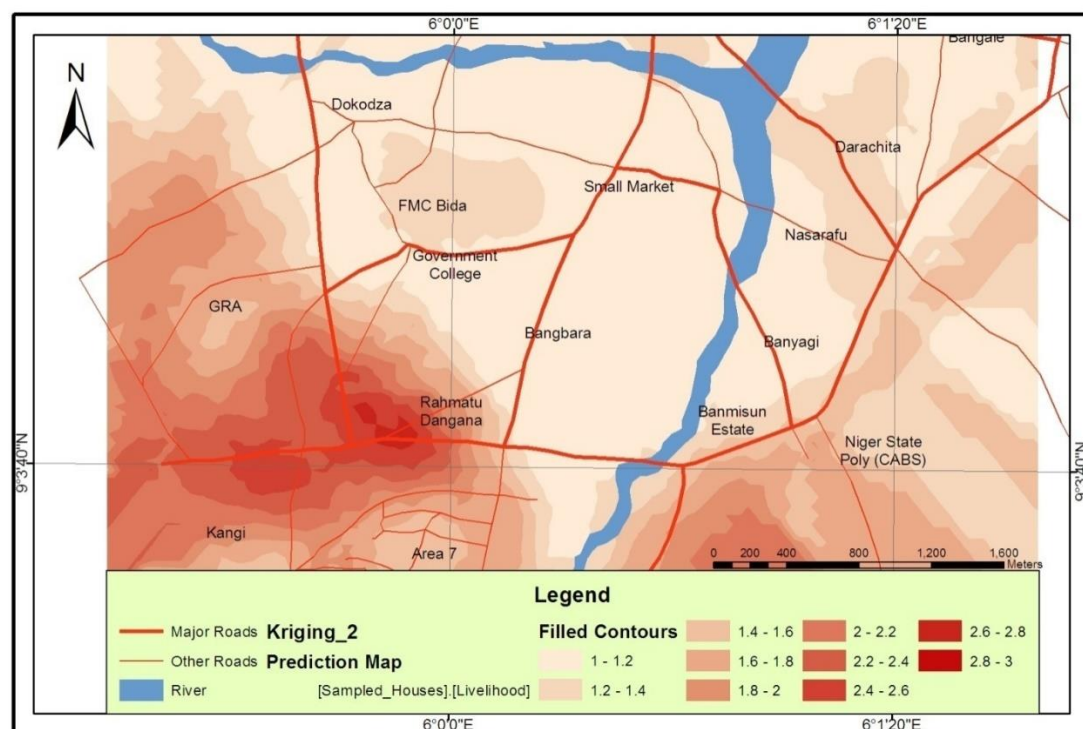


Figure 6: Auto-correlation of Livelihood of Residents
 Source: Author’s fieldwork, 2015

However, Figure 5 and 6 have similar characteristics in terms of their filled contour. Both maps have their highest filled contour values mostly in south western parts. This established a strong

relationship between the areas with better housing quality and the areas that have better livelihood in the study area.

CONCLUSION

It was concluded that the housing condition in Bida South in terms of adequacy, quality of structures, safety and habitability fail to impact positively on the livelihood of its residents. However, there is a strong relationship between livelihood and housing quality, with the former affecting the latter.

The following recommendations are put forward as policy guidelines toward a sustainable management of housing in the study area.

- i. Maintenance of residential housing should be encouraged in order to keep quality attributes of the houses and avoid failure before the designed life of such buildings.
- ii. Residential housing owners should use specified standard materials during construction of houses and thereafter make funds available for their periodic and corrective maintenance in order to achieve quality housing.
- iii. Efforts should be made by the residential housing owners to adhere to building codes and regulations in order to achieve quality housing.
- iv. There is the need to improve the economy, human capital development, generation of employment opportunities and income that are capable of improving housing quality and living standards of the residence of the area.
- v. Housing loans should be granted to interested house owners at an interest rate lower than that of similar loans from commercial banks in order to encourage development of quality housing that will improve the living standard of the people.

REFERENCES

- Alkay, E. (2009). The Relationship Between Environmental Quality Level and Housing Sale Prices in the Istanbul Metropolitan Area. *ITU A/Z*, 6(1), 60-76
- Listokin, D. and Burchill, R. (2007). Housing (Shelter). Microsoft student (DVD) Redmond. W.A. Microsoft Corporation.
- Max Lock (1980). Bida Master Plan Final Edition. Max Lock Group of Company Limited.
- National Population Commission (2006). Population Census, Official Gazette (FGP 71/52007/2, 500(OL24, also available on www.nigerianstat.gov.ng)
- Ojo, J. R. O. (1998). Description of Houses in Nigeria by Travelers and Explorers – 1823 -1892. In: Amole B (ed.), *Habitat Studies in Nigeria. Some Qualitative Dimensions*, 48-63. Ibadan: Shaneson Publishers Nigeria Ltd.
- Oladapo, A. A. (2006). A Study of Tenant Maintenance Awareness, Responsibility and Satisfaction in Institutional Housing in Nigeria. *International Journal of Strategic Property Management*, 10, 217-231.
- Olotuah, A. O. (2015). Assessing the Impact of Users' Needs on Housing Quality in Ado-Ekiti, Nigeria. *Global Journal of Research and Review*, 2(4).
- Omole, K. F. (2010). An Assessment of Housing Condition and Socio-Economic Life Styles of Slum Dwellers in Akure, Nigeria. *Contemporary Management Research*, 6(4), 272-290.
- Wahab, K. A. (1983). More than Shelter. Inaugural Lecture Series No. 59. University Press. University of Ife, Ile -Ife, Nigeria.