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The Africa Habitat Review Journal strives to impart knowledge and facilitate exchange of ideas among stakeholders in the built environment to keep abreast of new technology, research and development so that they can improve the efficiency and effectiveness of their services. Further, it is intended to enable both academicians and non-academicians in the built environment to publish, lobby and influence policy formulation. The Journal links theory and practice in the built environment within the Kenyan, regional and International context.

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## CONTENT

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**Editorial**

# Urban Built Form, Public Space, Street Design and Development

Welcome to the eleventh edition of the Africa Habitat Review Journal of the School of the Built Environment, University of Nairobi, Kenya. The eleventh issue of Africa Habitat Review has presented ten papers on issues relating to Urban Built Form, Public Space, Street Design and Development.

The first paper on *Micro-Temperature Change in Relation to Urban Built Form: Use of Isotherm Distribution Maps for Sustainable Development in a Temperature Changing Environment* presents a study into the use of isotherm distribution maps for sustainable development in a temperature changing environment. The paper shows location, distribution and frequency of the dependent variable and analyzes the road proximity (building and open space) variable in relation to the micro-temperature change dependent variable, with the objective to establish the influence of these urban built forms on the micro-temperature change. Findings of the study related to the building and open space road proximity of the urban built form variable of 30 plots and 16 open spaces in a structured neighbourhood of Komarock Infill B Estate (Nairobi) between 8th June 2013 and 19th September 2015. The paper suggests that the negative and descending line of regression relation between the distance of the building to the main road and the temperature change, was geographical rather than linear in nature. Developed isotherm distribution maps showed the development of steep contours or thermal ridges near the main road with temperature change readings of 6.0 degree Celsius and thermal depressions around open spaces of 1.0 degree Celsius. It was therefore recommended that architects should use the approximated micro-temperature change data using isotherm distribution maps in the design of sustainable buildings instead of temperature data from predominantly open ground meteorological stations.

The paper on *Architectural Reconstruction and Re-interpretation of Thimlich Ohinga and Gundni Buche Archaeological Relics of the Luo Cultural Landscape* explores the original settlements of the Luo community in Kenyan Luoland, namely: *Thimlich Ohinga*, a model which was probably appropriated from the Bantu people whose territory they acquired after conquests; and *Gundni Buche* moat settlements, which were built as fortifications to resist attack during invasion by hostile neighbouring tribes. Evidence for these pioneering architectural typologies- novel to Kenyan architectural academia- is readily sourced from archaeological texts of the region, which have initiated rudimentary interpretations of ontological existence within these artefacts, and from historical accounts and arguments provided by authoritative Luo historians and academics, who have attempted to reconstruct 'prehistoric' Luo life from available oral traditions of the community. This study therefore provides direction for future analysis and comprehension of the rich indigenous vernacular architectural heritage of other Kenyan tribes, through its employment of broadened and inclusive methods of cultural inquisition.

*Effects of Informal Land Development on the Urban Environment: A Case Study of Langas in Eldoret Municipality, Kenya* paper notes that majority of urban residents in sub-Saharan Africa live in slums often characterized by deplorable housing conditions. Informal settlements are not homogeneous and the dynamics which explain such informality vary from country to country. This paper attempts to unravel the origin of urban informality in Eldoret Municipality, Western Kenya. Further, the paper discusses how the informality in land development affects the urban environment. The study used Langas, a low-income estate in Eldoret Municipality as a case study. The study relied on secondary data sourced from the review of literature and primary data obtained through observations, questionnaires administered to household respondents, key informants and focused group discussions. The analysis of the data shows that there is no policy provision for planning and development control in the rural areas including the urban fringe. It is therefore recommended that policy makers subject all areas of the country to planning and development control.

The paper on *Establishing Evolution in Connectivity of Public Open Space in Nairobi CBD (1963-2015)* recognises that public open spaces play a significant role in the life, form, and experience of cities. Urban growth means an increased number of people who require access to public open spaces. Multiple public open spaces in Nairobi's Central Business District (CBD) are under-utilized, not fully performing their role as areas for commerce, transportation, and recreation. There is therefore a dichotomy comprising the need for adequate public open spaces on one hand, and the non-optimized use of existing public open spaces on the other. The overall research from which the paper is derived investigated fifteen public open spaces in Nairobi CBD. This paper is focused on connectivity, which is a variable of the built physical environment. Good connectivity provides easy access to public open spaces for pedestrians and vehicles thereby increasing the potential number of users of the space. The study concludes that the number of

services in ground floors surrounding the space, the number of connectors to the space, and the number of users of surrounding sidewalks influence the number of users arriving at the space and thus in turn its social sustainability.

*The Use of Urban Public Space in the Rapidly Urbanizing East African Communities: A Case Study of Kigali, Rwanda* paper explores the importance of public spaces in urban environments as a place of encounter where public life unfolds. Recognizing the prominence of the role and function of urban public spaces and resonating to the concept of the street as urban public space, this paper shall describe the dialectic relation between the physical and social aspects of urban public space. The evident rapid urbanization of postcolonial Kigali City has resulted in the haphazard development of a city with significant consequences, creating a mismatch between the economic and social pillars of development in Kigali City. Whereas the economic aspect of the city is actively and rapidly growing, there seems to be poor provision for key elements that support the social pillar; such as pubic urban space. The research underpinning is conducted on a continuing fieldwork exercise on Kigali City, with an empirical focus of the recently created 'Car Free Zone' (CFZ) within Kigali's Central Business District (CBD); a pedestrianization exercise aimed at formally introducing urban public space into the city. The study established that the commercialized spaces lacked social amenities and public services, benches, shelters and fountains that would enhance the attraction of the CFZ. The study found that people aged between 18 – 34 years, 60% women and middle income ($100-499) earners were the most frequent CFZ users. In conclusion, the authors recommended that public spaces should be pedestrianized by making them safe, accessible, manoeuvrable and accommodative to social group activities. Appropriate amenities, shaded enclosed areas and public services should be put in place to enhance urban activities.

In the paper on *Micro-Temperature Change in Relation to Urban Built Form: Use of the Predictive and Remedial Building Nomogram Diagrams for Sustainable Development in a Temperature Changing Environment*, the authors explore the use of predictive and remedial building nomogram diagrams in approximating the micro-temperature change of two or three urban built form variables in interrelated scales and trends, with the objective of establishing the influence of these urban built forms on the micro-temperature change. Findings of the study conducted on 30 plots in a structured neighborhood of Komarock Infill B Estate (Nairobi) between 8th June 2013 and 19th September 2015, identified and determined that several building variables; building type, plot size, building orientation, building classification, road proximity, ground coverage and plot ratio of the urban built form had a significant impact on the dependent micro-temperature change. In the multivariate analysis, the scatterplots indicate that the lower the building orientation, plot coverage, plot ratio and the larger the plot size and distance from the road, the lower the temperature change. Architects are recommended to use the approximated micro-temperature change data using the building nomograms instead of temperature data from predominantly open ground meteorological stations in the design of sustainable buildings in a temperature changing environment.

The paper *Inadequate 'Police Power' over Land Tenure as a Factor in Ineffective Urban Development: Evidence from Nairobi Metropolitan* explains that 'Police power' is the authority held by all sovereign states to enable them plan and control the use of land for the sake of promoting public interest. Policy must, however, have such powers embedded in the statutes in order to facilitate effective state control over individual land tenure rights. Studies show that urban planning in Kenya is ineffective, and, consequently, this paper posits that part of the failure of the western-borrowed planning instruments to facilitate proper urban planning in Kenya is due to land tenure regimes that have no/or inadequate provision for State control. The research carried out sought to find out what policy options are available for effective urban planning in Kenya. A review of five land tenure case studies established that it was only in government land where planning and control was provided for. This means that four out of five land tenure regimes occupying 80% of the urban space in Nairobi proceed without State control. This then can explain why urban planning in Kenya, and Nairobi in particular, is ineffective.

*A Need for New Housing Policies in an Entrenched Neoliberal Economic Environment in Sub-Sahara Africa* paper delves into the search for a housing solution for the urban poor. In a decidedly neoliberal environment, the urban poor in countries of Sub-Sahara Africa (SSA) cannot afford to live in adequate housing, and as such, they will continue to be accommodated in the ever-expanding informal settlements in urban areas. Over the years, the consistent search for this housing solution, despite frequent shifts of strategy in housing policy, has remained elusive and housing challenges have persisted and are getting worse for the low-income population in a liberalized economic context. This paper is a contextual evaluation of housing policy within a neoliberal environment in Sub-Saharan African countries and Kenya in particular. Embracing neoliberalism in seeking a housing solution for the urban poor has faced challenges such as a result of shifts in economic paradigms, unfulfilled policies, poor economic performance, limited and inaccurate information, regulatory constraints and tenure challenges. This paper has argued for a review of housing policies in view of the challenges and suggests that this can be redressed in ways such as; developing capacity for information gathering, social support for the urban poor, incentivising formal housing, formulating

enabling regulations and secondary policies, changing social perceptions about poverty and institutional reforms.

*Phenomenological Epistemology as an Indispensable Component in the Resolution of Challenges Encountered in the Architectural Production of Urban Space* paper highlights the Christian Norberg-Schulz's appropriation of the *Genius Loci* concept (spirit of place) —inspired by Heideggerian phenomenology— into mainstream architectural discourse, in his seminal publication *Genius Loci*: Towards a phenomenology of architecture (1980). In this text, the author has presented Norberg-Schulz's compelling place-postulate model that argues that man can only dwell [comfortably] on earth if he/ she seeks and achieves an existential foothold, through effective orientation within the existential space, which though cosmologically derived, may even be considered to be exemplified by any harmonious urban space in the Kenyan context. This paper is an outline synopsis of phenomenological epistemology as an initial step to providing an alternative yet valid method of comprehending the architectural production of urban space and it raises timely questions regarding the tensions that emanate from entrenched power relations within Kenyan urban spaces. The contributions of the classical phenomenologists are outlined in a synoptic manner. The case for a broadened and more inclusive phenomenology is presented on the basis of ontological dimensions; levels of intentionality; and aspects of phenomenological consciousness. The production of urban space is discussed from the perspectives of cognition; truth and reality, understanding and memory. Finally, aspects of phenomenology within urban space are exposed within the Kenyatta International Convention Centre (KICC), a seminal Kenyan architectural artefact. The study finds that an expanded phenomenology—beyond the embryonic place postulate of Norberg-Schulz—is indispensable to the holistic comprehension of urban space production in Kenya. Phenomenological aspects should be employed in the analysis of built forms and urban spaces, as architectural artefacts. The study proposes application of phenomenological epistemology in the explication of meanings that are embodied in other Kenyan urban spaces. This will yield a greater subjective understanding of these spaces by exposing the intentionality imbued in the ontological existence of their users.

The final paper is entitled *Economics of Urban Space: Are the Street Vendors in Nairobi City Spared?* It was noted that although city governments have changed over time, the perception of street vendors as a city menace has persisted through all regimes of the capital city. Various attempts of both legal and spatial approaches to resolve the menace have been made by successive city governments with little success. The paper has presented the history of street vending in Nairobi City and an analysis of the current situation and characteristics of street vending in Nairobi. It has classified the various types of hawkers who operate within Nairobi CBD and laid out an evaluation of the past and existing state interventions and policy developments on street vendors' space allocation along with an account of the existing strategies for street vendors' space allocation by Nairobi County Government. Furthermore, the paper outlines an evaluation of the underpinning urban economic principles to be considered in allocation of space for street vendors and a review of urban management challenges that hinder space allocation for street vendors in Nairobi. The paper concludes that it is important for urban managers to study street vending as a unique business venture that requires specific conditions to thrive. There is also a need to undertake a comprehensive study of the city dwellers' behavior in relation to urban space in order to understand what sustains street vending. In summary, policy recommendations are given on how economics of urban space principles can be used as a guide for the space allocation of street vendors in the City of Nairobi.

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# Micro-Temperature Change in Relation to Urban Built Form:

*Use of Isotherm Distribution Maps for Sustainable Development in a Temperature Changing Environment*

*** Yusuf H. Ebrahim and Robert W. Rukwaro**

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**Abstract**

*A study into the use of isotherm distribution maps for sustainable development in a temperature changing environment has the purpose of information as to show location, distribution and frequency of the dependent variable and to analyze the road proximity (building and open space) variable in relation to the micro-temperature change dependent variable, with the objective to establish the influence of these urban built forms on the micro-temperature change. Method uses geospatial analysis using plot attributes of nodes, roads and paths, districts, edges and landmarks to analyze and display the collected data. Findings of the study related to the building and open space road proximity of the urban built form variable of 30 plots and 16 open spaces in a structured neighbourhood of Komarock Infill B Estate (Nairobi) between 8th June 2013 and 19th September 2015, suggests that the negative and descending line of regression relation between the distance of the building to the main road and the temperature change, was geographical rather than linear in nature. Developed isotherm distribution maps showed the development of steep contours or thermal ridges nearer the main road with temperature change readings of 6.0 degree Celsius and thermal depressions around open spaces of 1.0 degree Celsius. Road proximity variable was related to light angle, hard landscape coefficient, plot size and open space area. Recommendation for architects to use the approximated micro-temperature change data using isotherm distribution maps in the design of sustainable buildings instead of temperature data from predominantly open ground meteorological stations.*

Key Words: Sustainable city planning, tropical building design and urban heat islands.

## INTRODUCTION

Micro-temperature change forms a part of the broader discussion on climate and environment change, and forms a part of building science and thermal design taught in architectural schools. This is because temperature is the sensation that humans associate with heat and spatial ambience (Allen, 1985). Temperature can be conveniently measured by both analog and digital techniques. Documented evidence is available to relate it to thermal comfort and its mode of comparison to a particular climatic region (Szokolay, 2011).

Some scholars claim that observations on the phenomena associated with micro-temperature change have either been misrepresented in terms of the relationship between built form and micro-temperature change (Shuckburg, 2007; Littlefield, 2008; Meffert, 1981), or that not enough research has been done to justify a valued judgment on the degree of change or its causes. By using temperature data from predominantly open ground meteorological stations in climatic design, the built form in urban areas has failed to respond to the temperature changing environment (Environment & Urbanization, 2015).

The climate of an area and technological capability seem to have a positive long-term correlation with the architecture of a place and in turn the built form, as depicted in the work of Capeluto (2002) on the hot and dry climate of Israel, Lam (2004) on work in China and Rosenlund (1995) on the desert climates, and as such the research has as yet to be undertaken in the study area related to uplands climate of Nairobi.

Nairobi's built environment as the study region of concern is classified as tropical upland climate and corroborated meteorological data is available at the Kenya Meteorological Department (1984) for the period including July 1984 and historically from the then East African Meteorological Department (1970) for the period 1959 to and including 1968. Jomo Kenyatta International Airport is the largest airport in east and central Africa, and is located about 18 kilometers to the east of Nairobi Central Business District (Kenya

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Laborum, 2016). The Jomo Kenyatta International Airport Nairobi office of the Meteorological Department is the nearest meteorological station to the Komarock Estate study site and is listed as being on latitude $01^0$ 18'South, longitude $36^0$ 45' East and with an altitude of 1798 metres above sea level.

The problem and challenges posed by micro-temperature change can be contextualized by showing its manifestation on the built form in urban areas. In the early nineteen sixties until the mid-nineties, the government concentrated on the provision of site and service schemes whereby citizens could purchase a plot or site for constructing a house and the services such as water and electricity were also provided, and thereafter pursued a single dwelling of either a single (villa) or double storey building commonly referred to as a maisonette. These included estates such as Dandora, Doonholm, Umoja, Buruburu and Komarock. This principle formed the thrust for similar schemes in the other cities and towns of Kenya (Kimani & Musungu, 2010; Nairobi Urban Study Group, 1973, 1973a).

With respect to planning of cities like Nairobi, the study notes that physical planners do not adequately take into account the densification as required by the physical planning regulations as outlined in the planning handbook Chapter 303 (Laws of Kenya, 1968) and Chapter 286 (Laws of Kenya, 2009) of the Land Planning Act (Littlefield, 2008; Neufert & Neufert, 2000). As a result of this failure to comply with planning guidelines and laws, the urban built form is not responsive to micro-climate, and hence temperature change.

In Kenya, sixty to seventy percent of the urban population lives in unplanned structures (African Population and Health Research Center, 2014). Living with less than a dollar per day or Kenya Shillings 102 per day based on current exchange rates (Kenya Bureau of Statistics, 1999; Kenya Population Clock, 2016).

The Architectural Association of Kenya estimates that only thirty percent of the structures in urban areas are designed and supervised by professionals thereby implying that seventy percent are implemented by non-professionals, and further estimates that the building industry requires the construction of a hundred and forty thousand housing units to be added to the building stock per annum for the next twenty years just to meet the current housing deficit (Gakuru, 2006). These studies suggest an opportunity for use of isotherm distribution maps for sustainable development in a temperature changing environment.

## THEORY

A theory or theoretical is a framework of explaining phenomenon by stating constructs and the laws that inter-relate these constructs to each other. A construct is a concept, abstraction or idea drawn from the specific, while a framework refers to the main structure or skeleton that not only gives form and shape to the whole system, but also supports and holds together all the other elements in a logical configuration (Mugenda, 2011).

Understanding the theory of temperature change and isotherm distribution would assist the study in identifying and operationalizing assessment of the dependent variable. Temperature change ($\Delta T$) and especially micro-temperature change in degree Celsius is the difference between the measured air temperature ($T_o$) and the temperature readings from the local meteorological station developed as the baseline temperature ($T_B$).

Isotherms are lines on a map connecting places with equal temperature (Allen, 1985). Distribution relates to divide and give share of to each of a number, spread about, scatter, put at different points, arrange or, classify (Allen, 1985). A map is a representation, usually on flat surface, of earth's surface or part of it (Allen, 1985). Isotherm distribution maps are representations, usually on a flat surface, of the earth's surface or part of it of lines connecting places with equal temperature and showing how the isotherm lines are numbered, divided, spread, scattered, placed, arranged and classified (Allen, 1985).

Researchers use planning controls in the sampling technique to achieve the objective of identifying the urban built form (isotherm distribution) variables which have an influence on the temperature change. The study used the Lynch (1960) planning method to identify built form (isotherm distribution) attributes related to the plot and open spaces associated with nodes, roads and paths (Others were districts, edges and landmarks). The following was a conceptual definition of plot attributes of the built form (isotherm distribution):

Nodes are strategic spots in a city into which an observer can enter and which are intensive foci to and from which he is travelling. Nodes may be primarily junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another (Lynch, 1960). Meeting points, convergence of paths, roads and axis, termination of points, places of rest such as courtyards etc. were identified as nodes within the Komarock Infill B Estate. **Figure 1** shows a road intersection as a node in the form of an open space (OG5).

Paths are the channels along which the observer customarily, occasionally or potentially moves (Lynch, 1960). Paths may include the streets, walkways, transit lines, canals and railways which serve the city, and other spatial units that the viewer perceives. **Figure 2** shows a road (R7).

**FIGURE 1**
A road intersection as a node in the form of an open space (OG5)
**Source:** Field survey 2013

**FIGURE 2**
A road
**Source:** Field survey 2013

## RESEARCH METHODS

Exploration of the development and use of isotherm distribution maps for sustained development in a temperature changing environment commences with defining the physical scope of the study as being limited to the geographic urban setting of Nairobi which is located on the main road from Mombasa on the Kenya coast to the Uganda border town of Malaba. Nairobi is the capital city of Kenya and **Figure 3** shows Nairobi in relation to the other cities and towns of Kenya of Lamu, Malindi and Mombasa on the coast of Kenya bordering the Indian Ocean, the city of Kisumu at the edge of Lake Victoria, Eldoret in the Rift Valley and Lodwar at the edge of Lake Turkana. Nairobi is approximately on the 2 degree south of the Equator, 37 degree longitude and exhibits generally a highland climate (Hooper, 1975).

Nairobi City County has three main districts made up of the Central Business District, Core Nairobi and the Nairobi Metropolitan Region as shown in **Figure 4**. Most of the structured neighbourhoods such as Buru Buru, Kayole and Komarock were mainly built towards the East of the city. A ring road encircles the Nairobi Metropolitan Region with Komarock Estate accessed from the Eastern Bypass and onto the Kangundo Road. Scholars and institutional documentation of the history of Nairobi include the African Population and Health Research Center (2014) work on the population and health dynamics in Nairobi's informal settlements, Commission for the Implementation of the Constitution (2010) on the innovations in urban planning for the Nairobi Metropolitan Area, Erring and Ismail (1980) on notes on the urban planning of Nairobi, Kimani and Musungu (2010) on reforming and restructuring the planning and building laws and regulations in Kenya for sustainable development, King'oriah (1980) on policy impacts of urban land use patterns in Nairobi, Nairobi Urban Study Group (1973 and 1973a) on the Nairobi Metropolitan Growth Strategy, Ng'ayu (2015) on the challenge of sustainable land uses in a rural-urban fringe with a case study of the Nairobi-Kiambu Corridor and Thornton White et al. (1948) on the master plan for the municipal council of Nairobi.

Due to time and financial constraints, this study limited itself to a case study of a structured neighbourhood comprising two hundred and forty plots, mainly concentrated in an area called the Infill B Phase within the Komarock area. **Figure 5** shows the location of Komarock Estate in relation to the Nairobi Central Business District and the Jomo Kenyatta International Airport. Nairobi Metropolitan Region is reported to have an area of thirty two thousand square kilometers by the UNEP Global Resource Information Database (Commission for the Implementation of the Constitution, 2010). The meteorological station located at the Jomo Kenyatta International Airport was used to set the baseline temperature and to establish the change factor in the study.

**Figure 6** shows the location plan and context of the Komarock Infill B Estate in relation to the neighbouring estates and infrastructure such as Komarock Phase One and the community facilities, and is flanked by the Kenya Power and Lighting Company Limited way leave, Kangundo Road (New Komarock Road) which leads to Matungulu Town which falls within the Proposed Nairobi Metropolitan Region and flanks the other counties and towns. A comparative study with other neighbourhoods or other estates in Nairobi goes beyond the scope of this study and can form the case for future research.

**Figure 7** shows the site plan of Komarock Infill B Estate. Komarock Infill B Estate is approximately 4.72 Hectares with a length of 478.8 metres and a general width of ninety seven metres, with orientation of forty six degrees north and with a six metre fall across the site.

It is not easy to understand the nature of a particular climate by merely looking at the vast amount of data

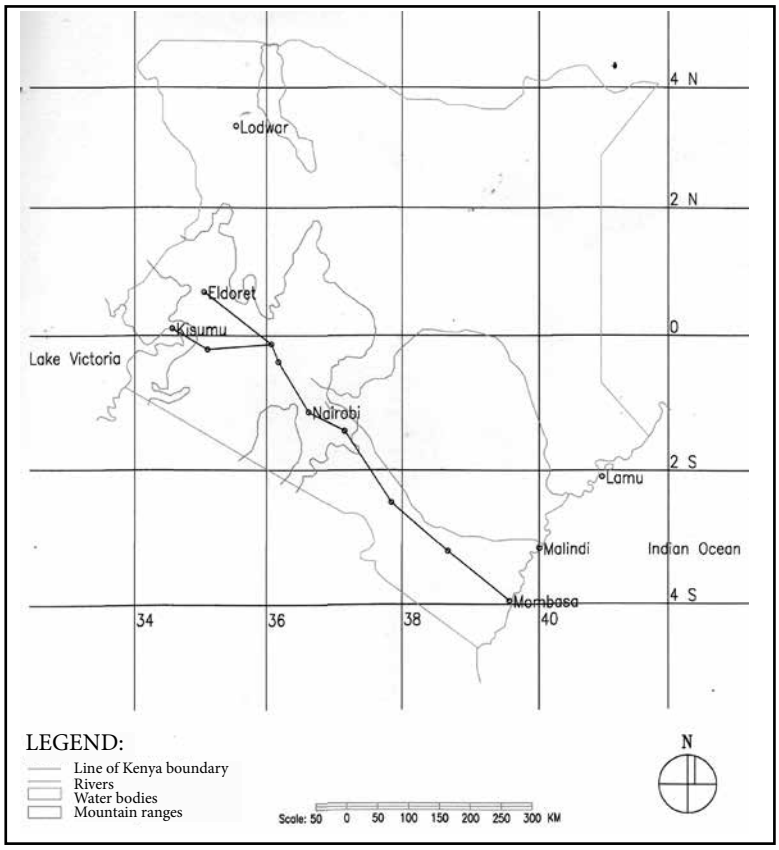


**FIGURE 3**
Location of city of Nairobi
**Source:** Modified from Kenya Meteorological Department 1884

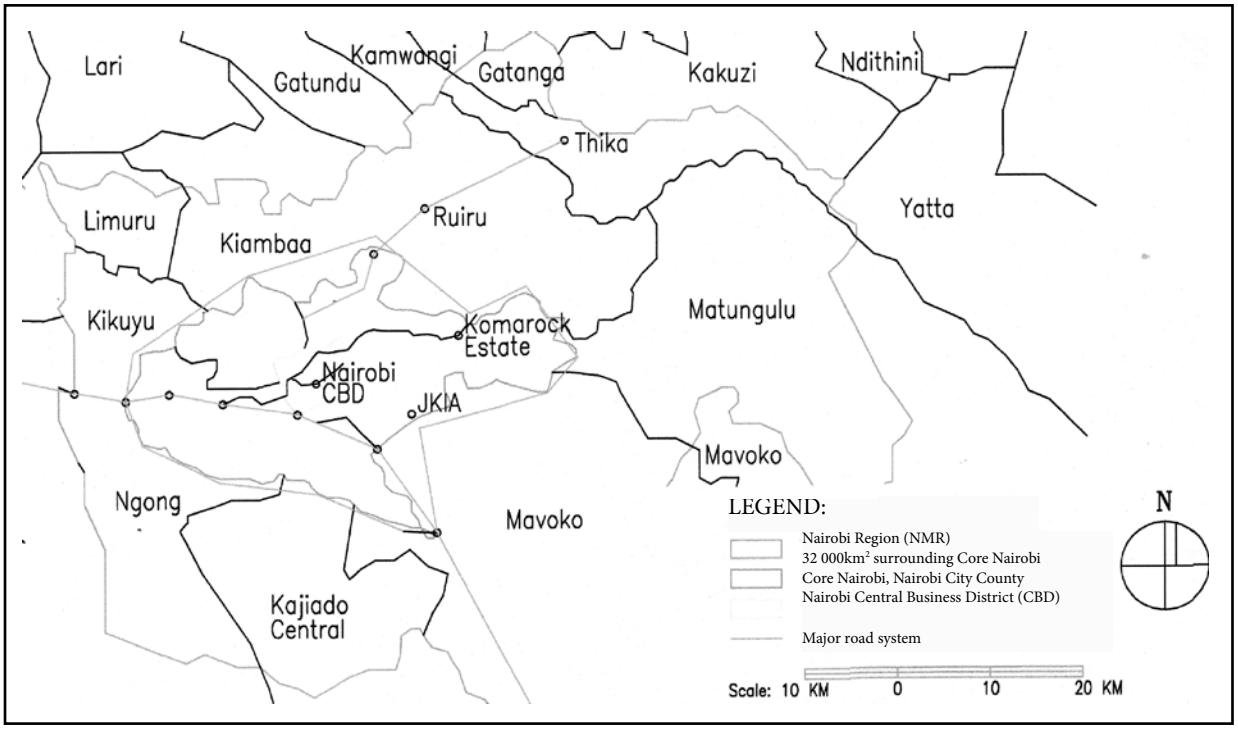


**FIGURE 4**
Nairobi Metropolis Region and location of Komarock Estate
**Source:** Modified from Figure Proposed Nairobi Metropolitan Region (Commission for the Implementation of the Constitution, 2010)

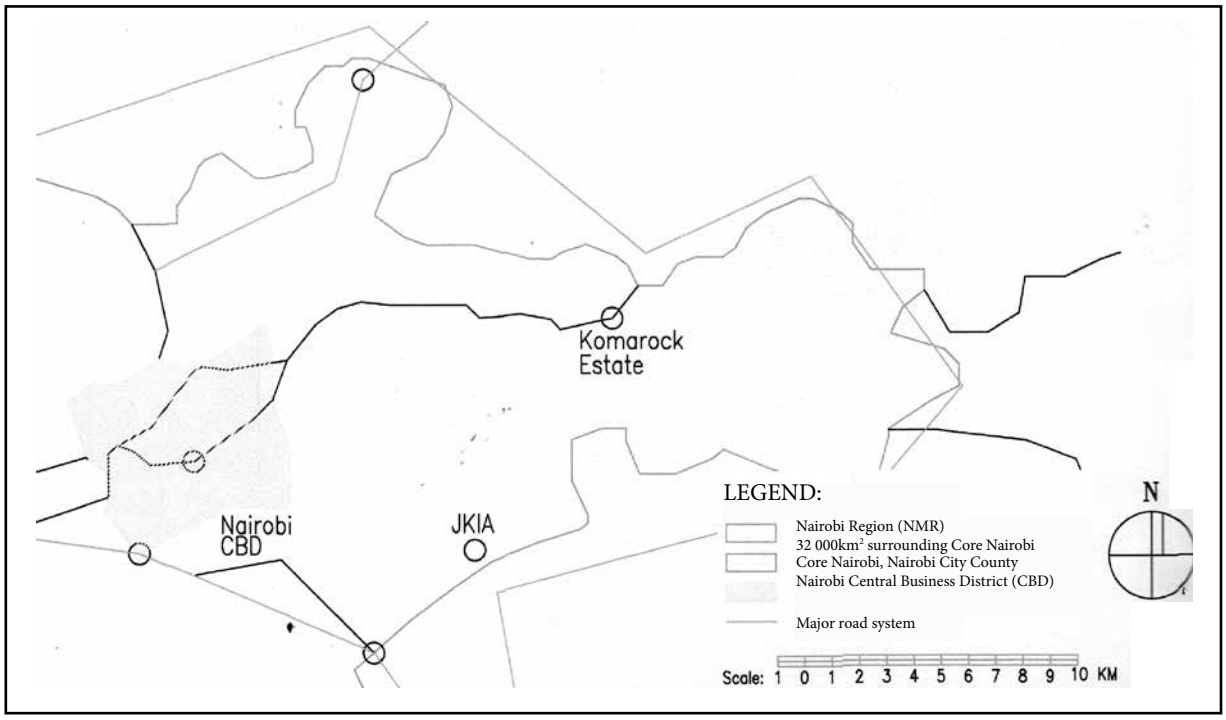


**FIGURE 5**
Location of Komarock Estate and Jomo Kenyatta International Airport Meteorological Station
**Source:** Modified from Figure Proposed Nairobi Metropolitan Region (Commission for the Implementation of the Constitution, 2010)

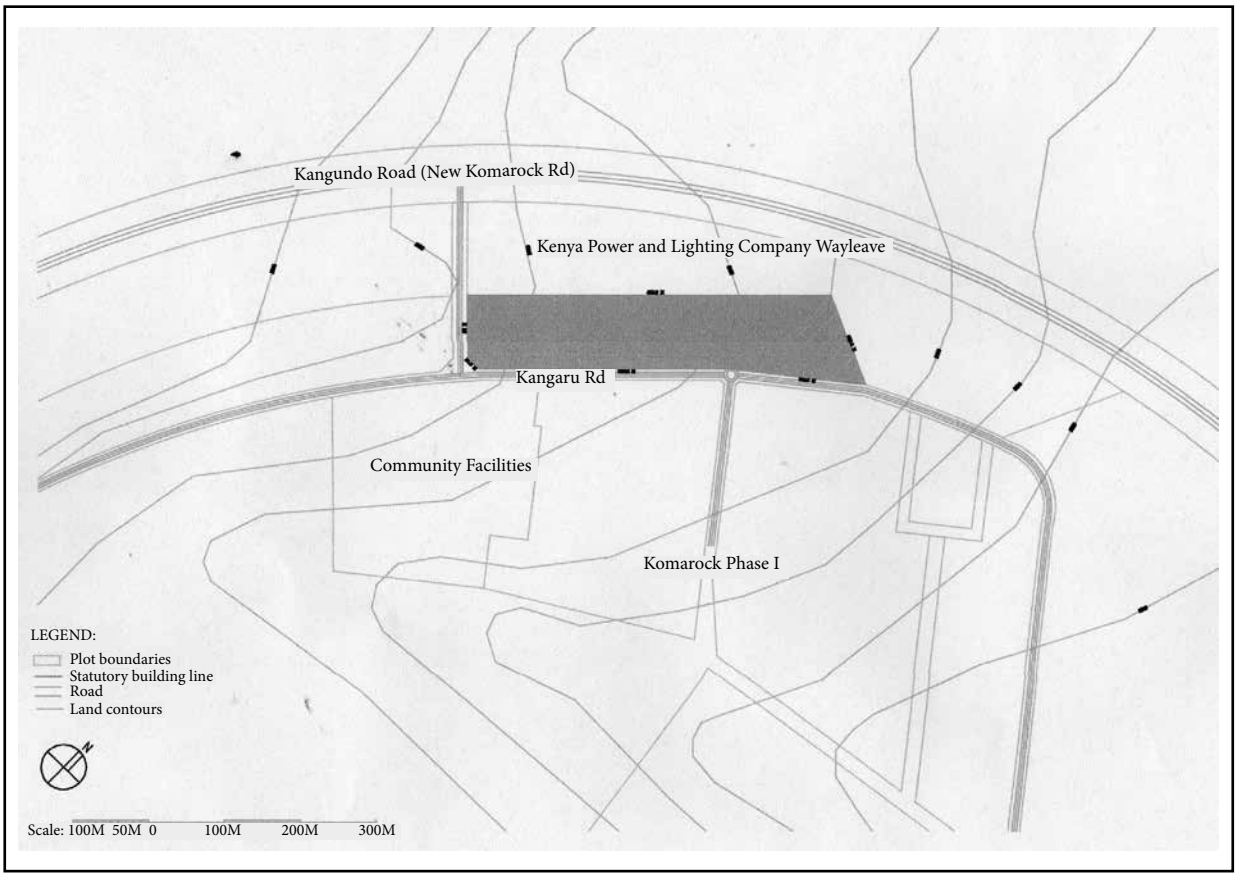


**FIGURE 6**
Komarock Infill B Estate location plan
**Source:** Modified from MMI Architects drawings 2010

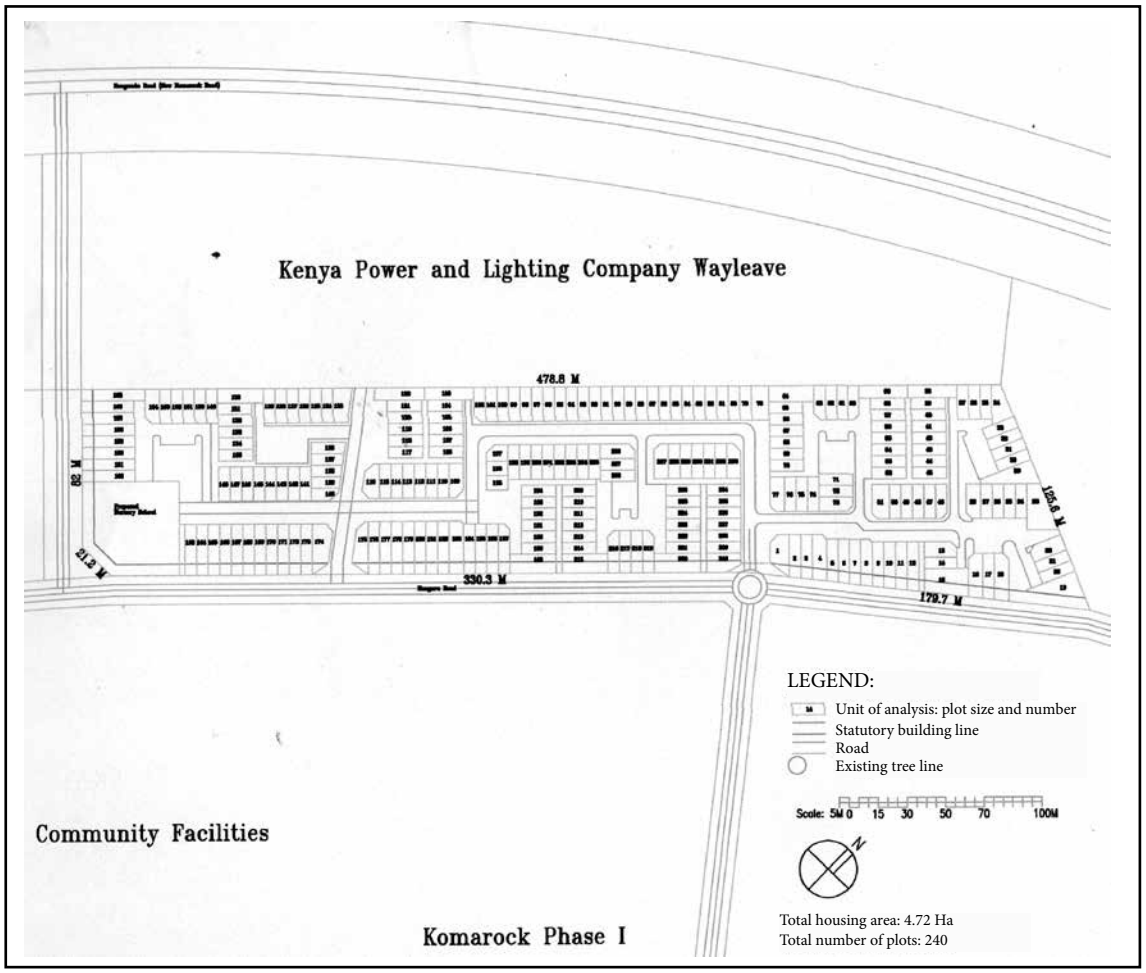


**FIGURE 7**
Master plan showing sample population
**Source:** Modified from MMI Architects drawings 2010

published in the records of the nearest meteorological station and other data collected by the study. It was necessary to sort, summarize and simplify collected data with reference to the objectives and requirements of the study. This was accomplished best by adopting a standardized method of data collection, processing, analysis and graphic presentation techniques (Koenigsberger et al., 1973).

Isotherm distribution map as a graphic option of the study had purpose of information as to show location and distribution of dependent variable frequency. Isotherm distribution maps are a form of geospatial maps and uses geospatial analysis to analyze and display the collected data. Geospatial data analysis explicitly takes account of the spatiality in geography and environmental data variously called spatial statistics or geo-statistics (Montello & Sutton, 2013).

Isotherm distribution maps were used in the study to analyze the road proximity (building and open space) variable in relation to the micro-temperature change dependent variable.

Isotherm distribution maps were used in climatic design to understand a new and unfamiliar climate and especially micro-temperature (i.e. Komarock Infill B Estate micro-temperature climate), whereby one must relate the unfamiliar climate to a familiar one (i.e. Jomo Kenyatta International Airport Metrological Station temperature recordings) then measure and note essential differences (i.e. temperature change). This is best done by using the standard graphic presentation first for the climate of one's home-town (i.e. software projections to establish a baseline temperature) and then for the strange climate being investigated (i.e. data logged temperature measurements). When the two graphs are placed side by side or superimposed (i.e. micro-temperature change) similarities and differences become apparent and characteristic features can be identified. Even the comparison of simplified climate graphs can reveal the most important differences (Koenigsberger et al., 1973).

Collected micro-temperature change data and logged observations were marked at the locations sampled in relation to the plots, open space, road and paths on

a site plan. Further spot observations at the road and its surroundings were also marked on the same site plan. Using interpolation techniques of averaging two respective points and marking the resultant on the plan, the study was able to extrapolate lines of equal temperatures (i.e. isotherm distribution map) (**Figure 8**).

## RESULTS AND DISCUSSION

The Average building road proximity was 51.9 metres and correlated to an average temperature change of 3.4 degree Celsius (ºC), while the minimum road proximity was 11.4 metres correlating to 7.2ºC, maximum road proximity was 98.2 metres with 1.4ºC temperature change, and a negative and descending line of regression relation between the distance of the building to the main road and the temperature change.

The data seems to suggest that the shorter the distance from the main road, the higher the temperature change values. However, location and distribution of the dependent variable frequency was best represented on isotherm distribution map (**Figure 9**). Finding was consistent with Singh and Singh (2010) which identified building as planning and design attitude to urban built forms.

Average open space road proximity was 61 metres and correlated to an average temperature change of 3.7 degree Celsius (ºC), while the minimum open space road proximity was 24.9 metres correlating to 7.5ºC, maximum open space road proximity was 97 metres with 1.6ºC temperature change, and a negative and descending line of regression relation between the orientation of the open space and the temperature change.

The data seems to suggest that the shorter the distance from the main road, the higher the temperature change values. However, location and distribution of the dependent variable frequency was best represented on isotherm distribution map (**Figure 10**).

High temperatures were recorded in open spaces within the plots near the main roads. Open space of Plot 19 had temperature reading of 3.3ºC (**Figure 11**).

Findings of this study of isotherm lines showed the development of steep contours or thermal ridges nearer the main road with temperature change readings of 6.0 degree Celsius and thermal depressions around open spaces of 1.0 degree Celsius. Thereby establishing a relation between the road proximity, with the extreme high temperatures measured at those locations. Buildings located further away from the roads, recorded lesser temperatures, and open spaces depicting the least thermal impact as related to the micro-temperature change.

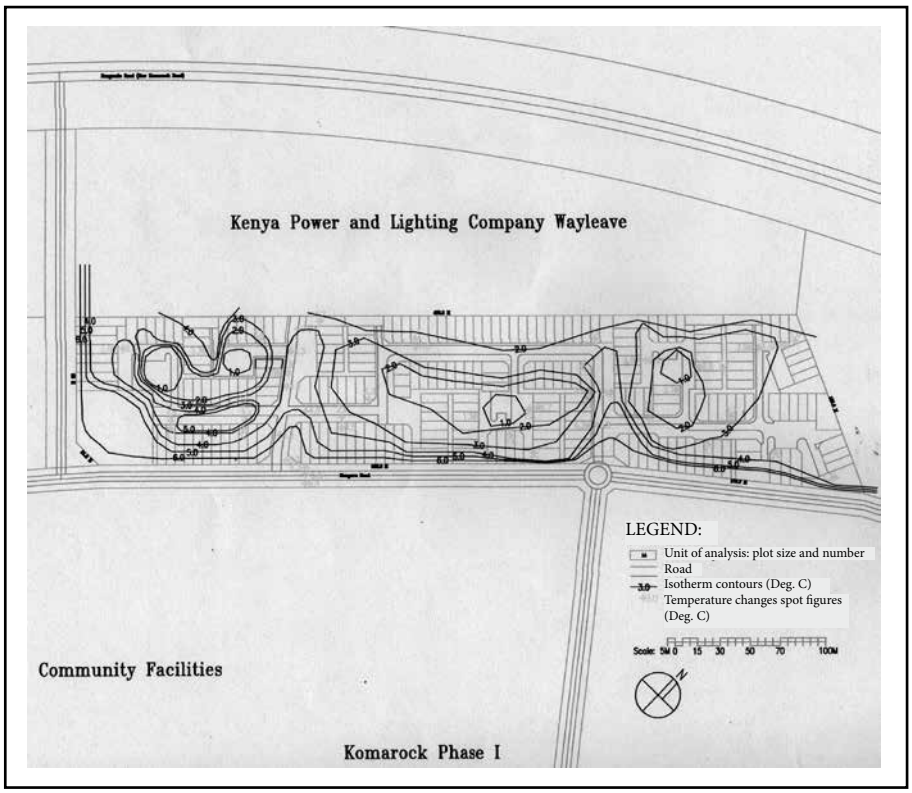


**FIGURE 8**
Isotherm distribution map
**Source:** Field work results 2015

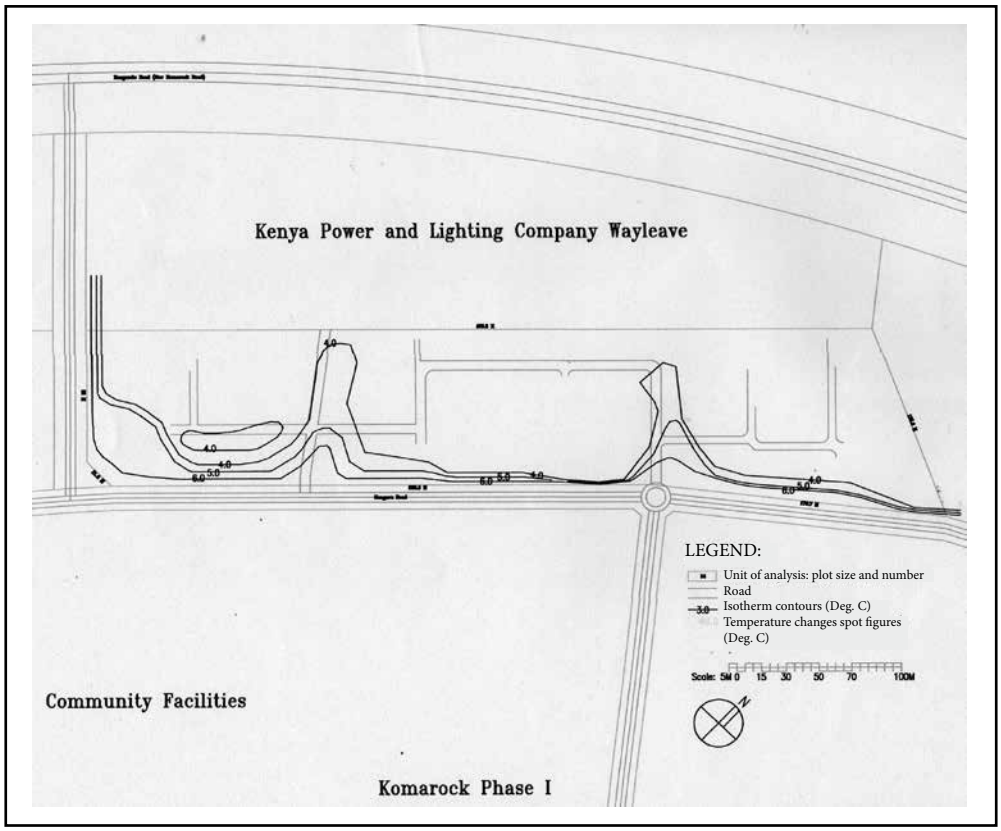


**FIGURE 9**
Isotherm distribution compared to road proximity analysis for buildings
**Source:** Field work results 2015

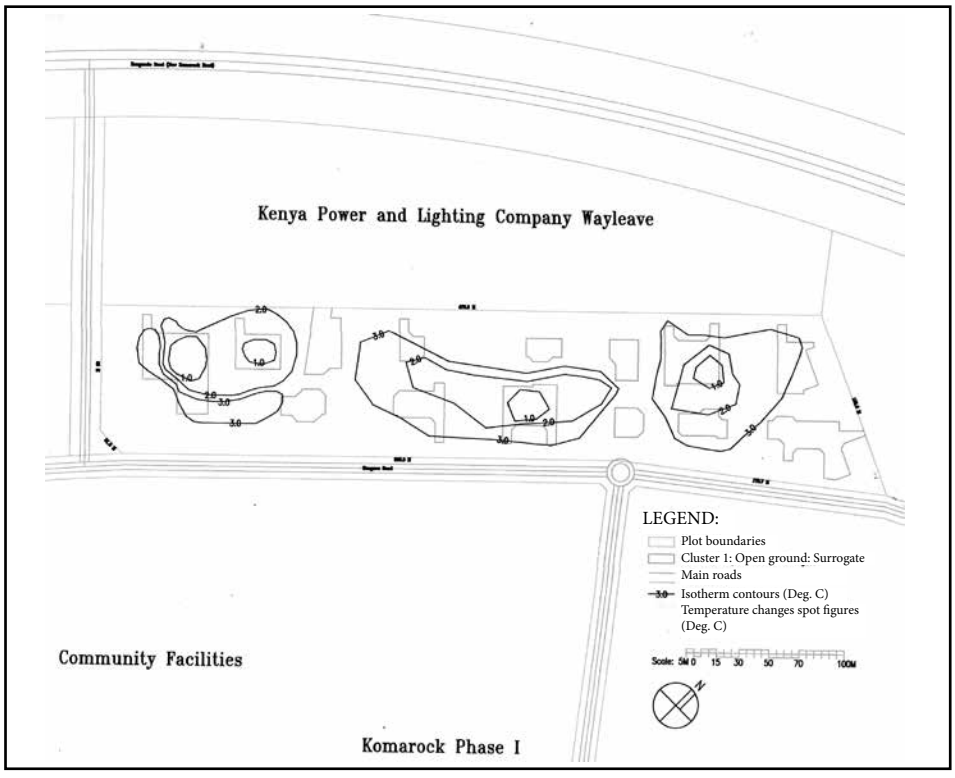


**FIGURE 10**
Isotherm distribution compared to open space road proximity analysis
**Source:** Field work results 2015

**FIGURE 11**
The usage of garden areas for a school Plot 19
**Source:** Field survey 2015

Findings of this study related the road proximity variable with isotherm contours of increasing intensity of 4 to 6 degree Celsius running parallel to the primary roads and following the secondary roads into the estate at the entrances and exits. Tertiary system was affected by light angle and hard landscape coefficients. Heat sinks were related to the open space size and its proximity to the road.

Finding of this study made observations on urban heat sinks around open spaces and isotherm contours related to the road network, and is in conformity with work by Meffert (1981) on development of heat islands in Nairobi and Lamu made observations related to urbanism and human health.

Finding of this study on observations of urban heat islands were in conformity with those achieved by Mumina and Mundia (2014), who related surface temperature increase with the development of heat islands.

On the issue of the study of open spaces using statistical and geospatial analysis, the findings suggests that the open spaces acted as heat sinks while the roads had heat ridges projected as isotherm contours running parallel to the road. This is in conformity with Choi Lee and Byun (2012), who noted that the relationship between urban climate and open space had not been examined in previous studies and attempted to fill this gap using spatial and seasonal variation analysis.

Finding of the study suggests a minimum temperature change of 1.4 degree Celsius (°C), maximum temperature change of 7.2 degree Celsius and average temperature change of 3.4 degree Celsius. Koenigsberger et al. (1973) reported an average of eight degree Celsius and a high of eleven degree Celsius between the city and its surrounding countryside. Copenhagen (2009) recommended 1.5 to 2 degree Celsius above baseline temperature as the limit for temperature change.

Finding from the study suggests that if the mode and pace of the urbanization process continues unabated, on average 3.4 degree Celsius temperature change would prevail, and as such exceed the limit of 2 degree Celsius set in Paris 2015. Minimum standards in regard to building and open space variables are to be adhered to for the recommendation of the study finding are to have any meaningful deliverance of sustainable built form. The study notes that the United Nations Framework Convention on Climate Change (UNFCCC, 2015a, 2015b and 2015c), United Nations Climate Change Secretariat (UNCCS, 2015) and Inter Governmental Panel on Climate Change (UNFCCC, 2015) reviewed global temperature changes from preindustrial times and showed that the global temperature increased from 1.5 to 2 degree Celsius, and recommended the establishment of a 'Limit of Global Warming' of 2 degree Celsius recommended at Paris 2015 to come into effect in 2020 (UNCCS, 2015a).

Finding of the study established an average temperature change of 3.4 degree Celsius and a range of 5.8 degree Celsius micro-temperature change. Taha (1997) work on urban climates and heat islands in low and mid-latitude areas showed that air temperature were on average 2 and 4 degree Celsius. Taha (1997) also noted that it was related to characteristics of the local climate and examined three variables of surface albedo, evapotranspiration from vegetation and anthropogenic heating from mobile and stationary sources, with the greatest impact achieved by increasing the albedo of roofing and paving materials, and afforestation of urban areas.

## CONCLUSION AND RECOMMENDATIONS

Since the perceived observations on the phenomena associated with micro-temperature change either have been misrepresented in terms of the relationship between built form and micro-temperature change or that not enough research has been done to justify a valued judgment on the degree of change or its causes, planning and design guidelines need to be developed based on minimum distances of buildings and open spaces to the primary and secondary roads based on isotherm distribution maps. Plots should have a minimum distance to the nearest main road of 70 metres, while open spaces with a minimum of 42.5 metres.

Secondly, since the climate of an area and technological capability seem to have a positive long-term correlation with the architecture of a place, schools of architecture need to incorporate lessons in the building science curricula on standards for light angles, hard landscape coefficient and open space size based on the proximity to the tertiary roads. Open spaces should have a maximum light angle of 61.5 degrees, maximum hard landscape coefficient of 25.5 percent and a minimum

open space of 730 square metres.

Thirdly, since Nairobi's built environment is classified as tropical upland climate and is related to urbanism, human health and the development of heat islands, study results and findings to be used to bridge the knowledge divide. Geospatial and digital technology should be used to update teaching and practice materials for architects through the development of digital software, databanks and libraries, support of research and development in educational and allied institutions, facilitation for the attendance and presentation of research results and findings in relevant local and international seminars.

Fourthly, since physical planners do not adequately take into account the densification as required by the physical planning regulations as outlined in planning handbooks, relevant Acts of Parliament and Laws of Kenya, thereby rendering urban built forms to be non-responsive to micro-temperature change, practice notes for practitioners to be updated on the need to adhere to the limit for micro-temperature change of 1.5 to 2 degree Celsius.

Further, since there is a disparity between the unplanned structures where the majority of Kenya's urban population living on less than a dollar per day, the demand and supply of structured neighbourhoods, minimum standards in regard to building and open space variables are to be adhered to for the recommendation of the study finding are to have any meaningful deliverance of sustainable built form.

Threshold for each of the urban built form variables were minimum plot size of 108 square metres (open space: 730 metres), building and open space orientation of between 46 to 136 degrees of the North (i.e. N-E direction), plots should have a minimum distance to the nearest main road of 70 metres (open space: 42.5 metres), maximum height of 5.3 metres, minimum width of the rows for housing of 72 metres, maximum ground coverage of the plot of 37 percent, maximum plot ratio of 34 percent, minimum shading coefficient of 91.5 percent, minimum open space length of 54.5 metres, maximum hard landscape ratio of 25.5 percent and maximum light angle of 61.5 degrees.

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Africa HABITAT REVIEW

# Architectural Reconstruction and Re-interpretation of *Thimlich Ohinga* and *Gundni Buche* Archaeological Relics of the Luo Cultural Landscape

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**Abstract**

*This study presents the original settlements of the Luo community in Kenyan Luoland, namely: Thimlich Ohinga, a model which was probably appropriated from the Bantu peoples whose territory they acquired after conquests; and Gundni Buche moat settlements, which were built as fortifications to resist attack during invasion by hostile neighbouring tribes. Evidence for these pioneering architectural typologies- novel to Kenyan architectural academia- is readily sourced from archaeological texts of the region, which have initiated rudimentary interpretations of ontological existence within these artefacts, and from historical accounts and arguments provided by authoritative Luo historians and academics, who have attempted to reconstruct 'prehistoric' Luo life from available oral traditions of the community. Architectural reconstruction and re-interpretation of these two models as valid typologies and cultural texts of the Luo is conducted within this study- through a critical review of relevant literature- on the basis of speculation, intuition and addition, in a hermeneutic and subjective manner, as methodology, which provides rationalisation of their inherent spatial appropriation, in order to achieve a richer explication of their semiology (meanings), as result. This effort is an initial step towards the recommended holistic description of multiple identities of the Luo- from the perspective of their built forms within their cultural landscape- including traditional and contemporary aspects of its underlying epistemology. This study therefore provides direction for future analysis and comprehension of the rich indigenous vernacular architectural heritage of other Kenyan tribes, through its employment of broadened and inclusivist methods of cultural inquisition.*

Key Words: Gundni Buche, hermeneutic explication, Luo archaeological relic, re-interpretation, reconstruction, Thimlich Ohinga, typology.

## INTRODUCTION

The onset of the great southward trek (migration) of the Luo was due to overpopulation of Bahr-el-Ghazal region (Ndisi, 1974), their original homeland in the Sudan. The migratory path was along the River Nile which sustained these Luo ancestors- in transit- by its huge supply of fish and plenty of grazing pasture along its banks (Miruka, 2001). Due to internal conflicts, the large community was subdivided during this long journey, with splinter groups settling in Uganda, around the region occupied by present day Banyoro peoples (Ndisi, 1974).

The Luo were led into Kenya by their legendary tribal leader, Ramogi, settling first at Kadimo location around Ramogi Hill. Here, they fought fierce battles and repulsed the Maasai, Nandi, Maragoli and Abagusii communities, passing through Kano plains and Kajulu region. After Ramogi's death, the tribal leadership was decentralised and the Luo spread around the Lake Victoria region, in the area of Uyoma Peninsula, crossing the Kavirondo Gulf to occupy the South Nyanza area, between 1730AD and 1760AD.

### The Contemporary Luo Situation

The modern Luos have adopted Western lifestyles- which they mistakenly perceive as superior to their traditional cultural heritage. Their architecture has been transformed, due to British Imperialism and the Christian Missionary effort, which introduced new architectural tastes, leading the Luo to adopt stereotypical and fashionable architectural forms and styles. Mazrui (1986) argues that "things are not working in Africa [Kenya]" because "the ancestors had [have] pronounced the curse of cultural sabotage" on the Luo who continue to pursue modernisation "without consulting cultural continuities". The price for this cultural abandonment has been "social turbulence" emanating from "rapid social change". The Luo must be reminded about their rich cultural heritage and the need for its conservation and continued expression in architecture.

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Ogutu (1995) proclaims that "today, the Luo community is in crisis: the crisis of identity, of purpose, of legitimacy, of trust, of direction and of survival". This crisis is evident with regard to the traditional architecture of the Luo, which lacks academic legitimisation as it is not included in mainstream architectural pedagogy from a holistic perspective. Issues of spatial appropriation arising from the practice of intangible Luo culture and its inclusion in mainstream architectural pedagogy have not yet been addressed within Kenyan academia.

Thus, Ogutu (1995) urges the Luo to embark on "setting priorities right" because "only our past can give meaning to our present and direct our future". This is consistent with Mazrui (1986), who calls for "re-establishing contacts with landmarks of yester-year and then re-starting the journey of modernisation under indigenous impetus" through ancestral consultation imbued in local traditions and customs. The comprehension of *Thimlich Ohinga* and *Gundni Buche* archaeological relics- as valid architectural typologies of traditional Luo architecture- through architectural reconstruction and re-interpretation within this study will provide the modern Luos with the opportunity to realise that meaningful Luo architecture must demonstrate contextualism, through the provision of a sustained fit with the cultural ecology of its locale.

The objectives of the study were:

To restore African pride and confidence in indigenous culture (Mbeki, 2009), shattered by colonial incursion, through reference to what "is good and inspiring in our past".

To expand the domain of architectural history and theory in Kenya with the aim of reinvigorating debate on Kenyan vernacular architecture paradigms and their inclusion into mainstream Kenyan architectural pedagogy.

## RESEARCH METHODS

This study is qualitative, hence the rationale of employing research strategies- as research design- that include observational, analytical and subjective critical judgements directed at seminal texts about the Luo and their culture, as well as physical images of *Gundni Buche* and *Thimlich Ohinga* archaeological relics of the Luo community in the form of photographic images and artistic sketches or drawings. The common attribute of these relics lies in their use as initial community settlements in the period immediately after the Luo arrived in Kenya, as well as during their dispersal into the rest of Luoland.

Architectural research *lacuna* has deprived these relics of academic interpretation, providing a gap that this study intends to fill. The scattered nature of these relics in many areas of Kenyan Luoland makes it difficult for their location to be mapped out accurately in the physical landscape. Thus, they will be discussed collectively, and the unit of analysis will be the typical settlements in these relics, with a focus on a typical homestead and the typologies of built forms therein, which are postulated to be identical, in both relics.

Other methods that guided the study include:

Speculative reconstruction through hermeneutic interpretation, involving subjective "intervention, insertion or addition" (Bakker, 1999); conjecture (Fisher & Clarke, 2007) and intuition (Frescura, 1985), as valid research tools.

Data collection through iconological reading of sketches, drawings and photographs- perceived to be objective iconographic representations of archaeological residues of built forms (Fisher, 2003; Kammeyer, 2010)- attained through observation, documentation (or illustration) and interpretation (Frescura, 1980).

Analysis of archival material- as data- to critically extract architectural content that is relevant to the topic at hand (Fisher, 2004), including those derived from history (Frescura, 1985), as a discipline.

**Justification of the adopted approach**

Although *Gundni Buche* have been researched in the past, there is little or no information of an architectural nature, as such, because past research has often been characterised by iconographic description rather than iconological synthesis, as it was conducted by non-architects, who were therefore incapable of providing rigorous architectural interpretation or re-interpretation of these relics. Archaeological excavations and surface analysis of these "single or multiple ditch-and-bank earthworks" have yielded cultural artefacts such as "grinding stones, house daub and faunal material" as well as ceramics (Odede, 2009). These efforts have enabled the shapes and dimensions of Gundni Buche to be accurately documented; hence this study will focus on architectural interpretation rather than documentation of these settlements.

Presently, the methods of analysing the spatial appropriations and manifestations of intangible culture within Kenyan architecture have not yet been debated and included within the limits of architecture, as a discipline, by researchers in Kenyan architectural academia, even though some researchers have worked on tangible (material) culture. Therefore this study will broaden theoretical boundaries of the discipline and contribute to future methodologies of engaging cultural manifestations in Kenyan architecture.

For John Pemberton III (1990), the study of African art [and architecture by extension] "must be intensive and local", and should be presented "in the context of a historical perspective", through according "priority to the languages of the phenomena", thereby allowing

these phenomena "to explain themselves in their own terms". This position explains the manner in which these traditional typologies are presented below, including the use of Luo names- of these artefacts as archetypes- that are derived from Luo culture. Rowland Abiodun (1990) reiterates the need for this indispensable approach by arguing that "to leave out these African names and terms, for whatever reasons" will create insurmountable obstacles to present and future research studies that focus on art [and architecture by extension].

**Definition of key terms as used in this study**

Architecture: May be broadened and re-defined as "any people's spatial response, comprising the patterns of its appropriation and use" (Osman, 2004), in addition to the many existing definitions that refer to paradigmatic content, art-science dialectic, and process- product binary oppositions, to mention but a few.

Culture: Clifford Geertz (2000 [1973]), a leading modern anthropologist, outlines the various definitions of culture, according to Clyde Kluckhohn who adopts a rather broad approach in developing these definitions, indicating the vast domain of the term. These definitions of culture are: "the total way of life of a people", "the social legacy the individual acquires from his group", "a way of thinking, feeling and believing", "an abstraction from behaviour", "a theory…about the way in which a group of people in fact behave", "a storehouse of pooled learning"; "a set of standardized orientations to re-current [sic] problems", "learned behaviour", a mechanism for the normative regulation of behaviour", "a set of techniques for adjusting both to the external environment and to other men" and "a precipitate of history".

These definitions reveal that cultural studies within the discipline of architecture must be anchored in context (community, philosophy of life and history), to portray community learning (norms, values, taboos and prohibitions)- as expressed in their oral traditions (Mazrui, 1977; 1980), and in the case of the Kenyan Luo- premised in community behaviour, consistent with Amos Rapoport's Environment Behaviour Studies (1998).

Text (cultural text): This is "a consciously designed system of signification" that embodies "principles by which possible meanings can be generated" (Imbo, 2002). Such meanings are only valid if they emerge from "the conventions of the system" [the text itself].

**A brief history of the original Kenyan Luo settlement**

The history of the Kenyan Luo must be understood in its greater context. It is a history "that is concerned with the interaction between ideas and [the] environment" (Oloo, 1969)- a symbiotic relationship that exhibits "how the settlers changed the environment and how the environment modified their ideas"- and this spatio-temporal evolution originates and develops from the onset of their prolonged migration into their present land in a diachronic as well as synchronic manner.

The first Luo settlement in Kenya was at Ramogi Hill in Alego, Siaya County, and this was due to its strategic location within the region. Ramogi Hill was located "on a raised ground from which the [Luo] settlers could command a wide view of the land below", and this was reinforced by the presence of extensive fertile lands, rich pastures as well as rivers and lakes that were sources of plenty of water for both the inhabitants and their livestock.

The Luo populace that remained at Ramogi Hill became known as Joka-Ramogi and their settlement patterns were nucleated, within three main villages, namely: *Bungu Ugadhi*, *Bungu Oburu* and *Mbaga Hills*. Each of these villages were built as large defence forts from the outset, indicating the intention of the inhabitants to establish permanent residency as well as effectively countering any attacks from hostile neighbours. The enclosure was "a wall of earth ten to fifteen feet high and about three feet in diameter [elliptical or circular in shape]… leaving only one opening as the gate". These fortified structures were known as *Gundni Buche* [*Gunda Bur-* singular] (Atieno-Odhiambo & Cohen, 1989), and the fortification concept was effectively disseminated by other Luo peoples that continued with their migration to the rest of Luoland. The grand earth wall enclosure "was surrounded by a ditch of seven to ten feet" depth as an additional defence strategy (Oloo, 1969). The interior of the extensive enclosures contained "hundreds of huts in which lived large numbers of men, women and children", indicating a communal existence with a collective destiny, in multiple integrated yet separate homesteads.

The land immediately surrounding these Luo village homesteads "was reserved for cultivation by women and their daughters, while the elders and male warriors grazed their flock in areas farther away from the homestead[s]", a division of labour that was gender based and informed by the need to protect the Luo settlements through constant surveillance on a daily basis, as well as providing buffer zones between the three main villages thereby ensuring a harmonious co-existence. Therefore, there was no restriction on the extent of grazing land. This contrasts with present day existence where the land is cultivated by both men and women.

***Thimlich Ohinga***

According to extracts from the submission dossier, by the Department of Museums, Sites and Monuments of the National Museums of Kenya- hereafter NMK- to the UNESCO world Heritage Tentative Lists on

The *Thimlich Ohinga Cultural Landscape*, proposing its recognition as a World heritage Site, the *Thimlich Ohinga* (*Ohingni*, plural) site(s) refer(s) to "a number of old villages and settlements" that exhibited characteristic "dry stone walling" (UNESCO (NMK), 2010), as evidence of dry construction (without mortar on the joints of natural stone courses). The translation of the name *Thimlich Ohinga* reveals the connotation "refuge in the wilderness", and this suggests that the 138 sites that contain 521 *Ohingni* structures were situated within deep forests. These sites are located in the "Kadem-Kanyamkago areas, Karungu, Gwasi and Kaksingri Lake headlands, and Kanyamwa and Kanyidoto areas", within present day Kenyan Luoland. The *Thimlich Ohinga* sites have been protected by the Government of Kenya, since their collective 'gazettment' in 1981, as Kenyan cultural heritage sites, and are presently managed by the National Museums of Kenya (NMK), who give guided tours to local and international visitors, in collaboration with members of the surrounding (neighbouring) Luo community, as a sustainable cultural intervention strategy.

These *Ohingni* have been subjected to extensive destruction by the vagaries of weather, apart from those that were located on higher ground. The stone walls of the preserved *Ohingni* have heights that range from 1.0 to 4.2 metres, and widths that range from 1.0 to 3.0 metres, and their construction was achieved through the vertical stacking of "loose blocks and stone without any dressing or mortar", as mentioned previously. Archaeological excavations within the *Thimlich Ohinga* sites have revealed that the exhumed artefacts are at least five hundred years old, and this suggests that the creators of the most significant and original *Ohingni* were, perhaps, not of Luo origin- as the Luo peoples only arrived in present day Luoland a little more than three hundred years ago- hence their origin is inevitably traceable to the Bantu peoples, who were the initial inhabitants of the region. Nevertheless, the fact that the Luo inhabited these *Ohingni*, and constructed their own versions of this architectural typology in other areas of Luoland, implies that the Luo had indeed internalised these structures, prior to their appropriation into community architecture, and validating their incorporation into the Luo cultural landscape, possibly upon recognition of their efficacy- as defensive shelters- in the event of invasion by enemies. The resident Luo conquerors altered the spaces inside and outside these walls, clearing land for homestead construction and enhancing external vegetation to further conceal the *Ohingni*. This appropriation then makes them valid for presentation and analysis, within this study, as key artefacts within pre-colonial Kenyan Luo traditional architecture. The presentation of *Thimlich Ohinga* as a valid architectural typology is consistent with Paul Oliver's (2006) assertion that in the absence of any other data, "the history of a building type has often to be inferred, or deduced from archaeological remains", and this will be extended to architectural reconstructions and re-interpretations by the ongoing study.

***Architectural reconstruction of Thimlich Ohinga fort***

Comparisons, in the form of similarities, have been drawn between the *Thimlich Ohinga* Luo relics and the Great Zimbabwe ruins, and these have indicated that although the concept of stone walling, is common to both regions, the Kenyan Luo *Ohingni* are spread out (dispersed) over a much greater geographical area (UNESCO (NMK), 2010), with the Kenyan stone walls being much smaller in magnitude (height)- hence the inability to provide a physical map of these *Ohingni* in their entirety.

The key concepts in the design of *Thimlich Ohinga* settlements of the Luo evolved from the need for effective defence strategies that targeted protection from invasion by both internal (other Luo sub-tribes) and external (neighbouring non-Luo tribes) enemies. Fortification of the settlements, coupled with the elevation of the homesteads for efficient surveillance of the surrounding terrain, yielded a key advantage for the Luo persons who resided within these *Ohingni*, because they would have the upper hand during combat, as their enemies would approach from below, and could not therefore gain easy access into the *Ohinga*. Evidence for *Thimlich Ohinga* types of structure amongst the Luo can be discerned from Henry Okello Ayot's (1977) account of the fortified dwellings of the Wakisori Luo-Abasuba sub-tribe in Rusinga Island, and their tumultuous interactions with their neighbours, who included the Wakula and Kaksori sub-tribes. This particular Ohinga (structure) was located on a hill and exhibited a concealed gate. **Figure 1** indicates the disposition of enclosures within one *Thimlich Ohinga* site.

Although some of the forts were constructed out of wood, thorns and stones, the term Ohinga refers to the stone settlements specifically. A typical *Ohinga* had several gates: some gates were used in the course of performance of daily chores by their Luo occupants- during peaceful co-existence- while others were only used during emergencies, such as escaping from enemies when the warriors within a particular *Ohinga* were overwhelmed by the attackers, and defeat was inevitable. Each *Ohinga* contained several houses, in order to accommodate their Luo inhabitants, and these houses- in homesteads- were the places where women and children would hide as men rushed out of the *Ohinga* to wage war on their enemies, externally, in a bid to preserve the fortification. The interior of a typical *Thimlich Ohinga* settlement exhibited various partitions that included "small enclosures, depressions and corridors" (UNESCO (NMK), 2010), which "were used as cattle kraals, pens for smaller animals or garden fence structures", providing evidence for human occupation

of these settlements. The stones for construction of the *Ohingni* was sourced from "abundant rock on the hilly areas, that were located close to these forts (see images of *Thimlich Ohinga* in this study).

The *Ohingni* that were approximately four metres high, offered additional protection from numerous wild animals that co-existed with the inhabitants in the thick forests that surrounded each fort. **Figure 1** shows that these *Ohingni* were interconnected. Such linkages enabled Luo community members to escape from one *Ohinga* to another, if the sub-tribe was under siege by the enemy. These routes could also be sealed during escape in order to trap the enemy within a particular *Ohinga* and either burn them down or starve them to death, or provide the Luo warriors with opportunities to launch counter attacks from the rear, on the unsuspecting enemy. The entrance to each *Ohinga* was approximately one metre high- a deliberate opposition to anthropomorphic requirements- which apart from humbling the individual inhabitants of the fort, by forcing them to crouch as they entered or left the fort, indicated a purposeful and effective design strategy, which ensured that the enemy could only enter the *Ohinga* in a single file, rather than *en masse*. Upon gaining entry, they would meet the Luo warriors who would be waiting patiently on the inside, to counter the invasion through providing a stiff challenge, eliminating the enemy, one by one.

The pertinent question remains: why were the *Ohingni* abandoned by the Luo, despite their high efficiency as forts which secured the safety of the inhabiting sub-tribes? Possible reasons for the abandonment include the desire for freedom by the Luo, who were tired of being confined to fortified existence. Secondly, *pax Britanica* (Atieno-Odhiambo and Cohen, 1989), as the peaceful co-existence that ensued between the Luo and their neighbouring tribes with the onset of colonisation, guaranteed that there would be no more inter-tribal conflicts, wars and conquests, and this was achieved through implementation of strict territorial definition that was enforced by Crown Land Ordnances by the British colonialists. The propagation of the doctrine of 'loving thy neighbour'- by the Christian missionaries- which was done through new institutions like schools and churches that usurped the traditional community education systems- was also a significant contribution to the decline of the *Ohingni* settlements. **Figure 2** is a reconstruction of one possible spatial permutation within a typical *Ohinga*, while **Figures 3** and **4** are photographic images of the mundane *Ohinga* entrance and the existing perimeter wall respectively.

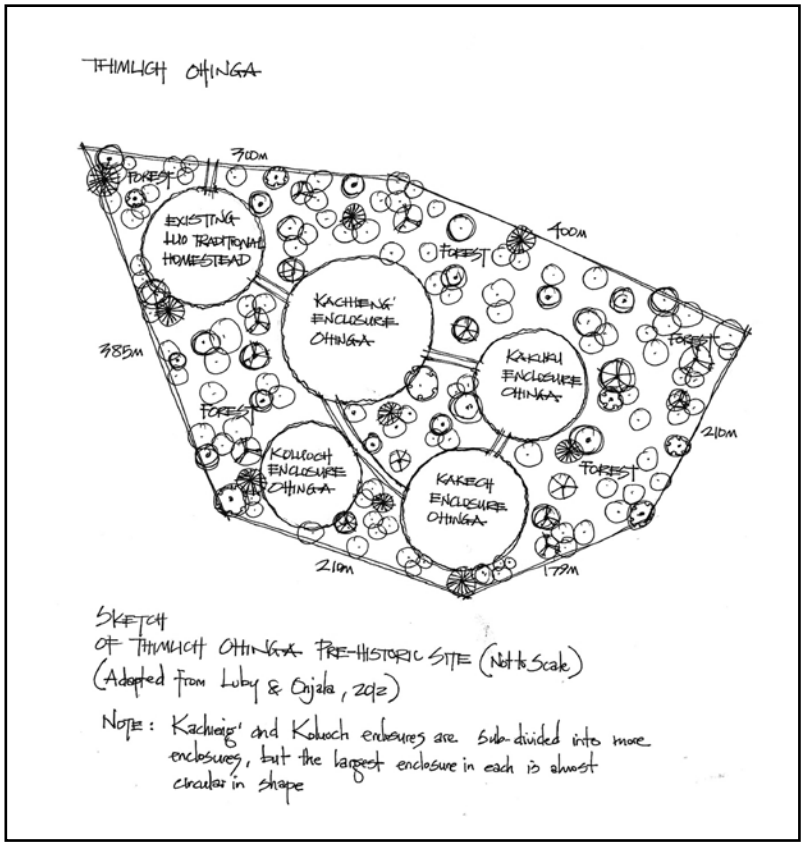


**FIGURE 1**
A sketch of a typical *Thimlich Ohinga* 'pre-historic' site
**Source:** Adapted from Luby and Onjala 2012

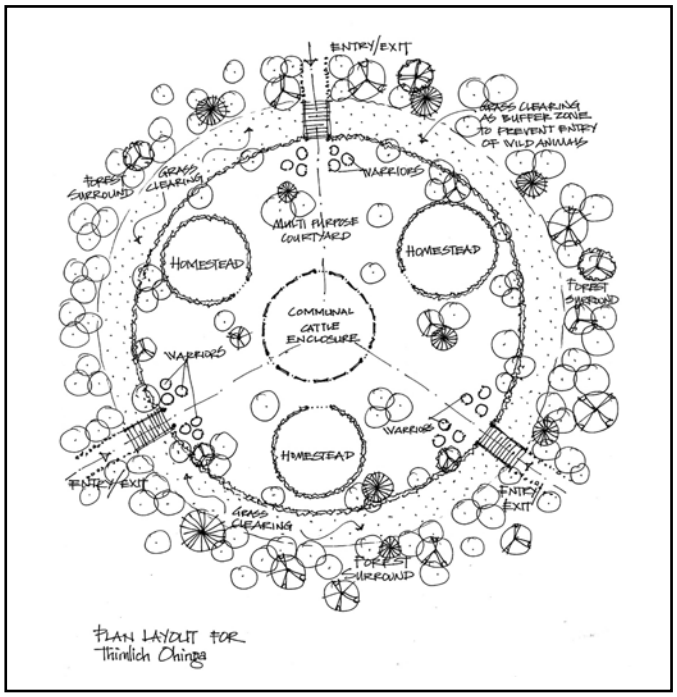


**FIGURE 2**
Architectural reconstruction of *Thimlich Ohinga* fort
**Source:** Author 2016

**FIGURE 3**
Walls and gate entry to enclosure
**Source:** Luby and Onjala 2012

**FIGURE 4**
General view of main wall
**Source:** Luby and Onjala 2012

***Gunda Bur* (*Gundni Buche*)**

The remnants of *Gundni Buche* settlement relics of the Luo are still discernible in many regions within present day Luoland. **Figures 5** and **6** are a reconstructed plan and section respectively, of one possible permutation of a typical *Gunda Bur*, indicating the disposition of built forms and the inherent spatial appropriation within the fort.

However, the dilapidated and vandalised nature of these settlements have conferred upon them a ruinous appearance, which indicates that an "entire corpus of an ancient tradition", was eliminated, and this resulted in the loss of "a vast amount of information", prior to comprehensive "archaeological analysis" (Blier, 1990).

The attempted recoveries of such redundant information within the ongoing study, through the method of architectural re-interpretation of these settlements is therefore ground breaking and timely, and is thus a critique of the perpetuated stigmatising myths within academia which proclaim that "African art [architecture] has no real history". T.J.C. Anyamba has confirmed that this is the first comprehensive presentation of the semiology of *Gundni Buche* by an architect to the Kenyan, as well as global architectural academia (Personal communication, January 26, 2016).

The earliest examples of *Gundni Buche* are located to the "north of Lake Gangu in western Siaya" (Atieno-Odhiambo and Cohen, 1989), a region that is "wedged between river and swamp" where significant groups

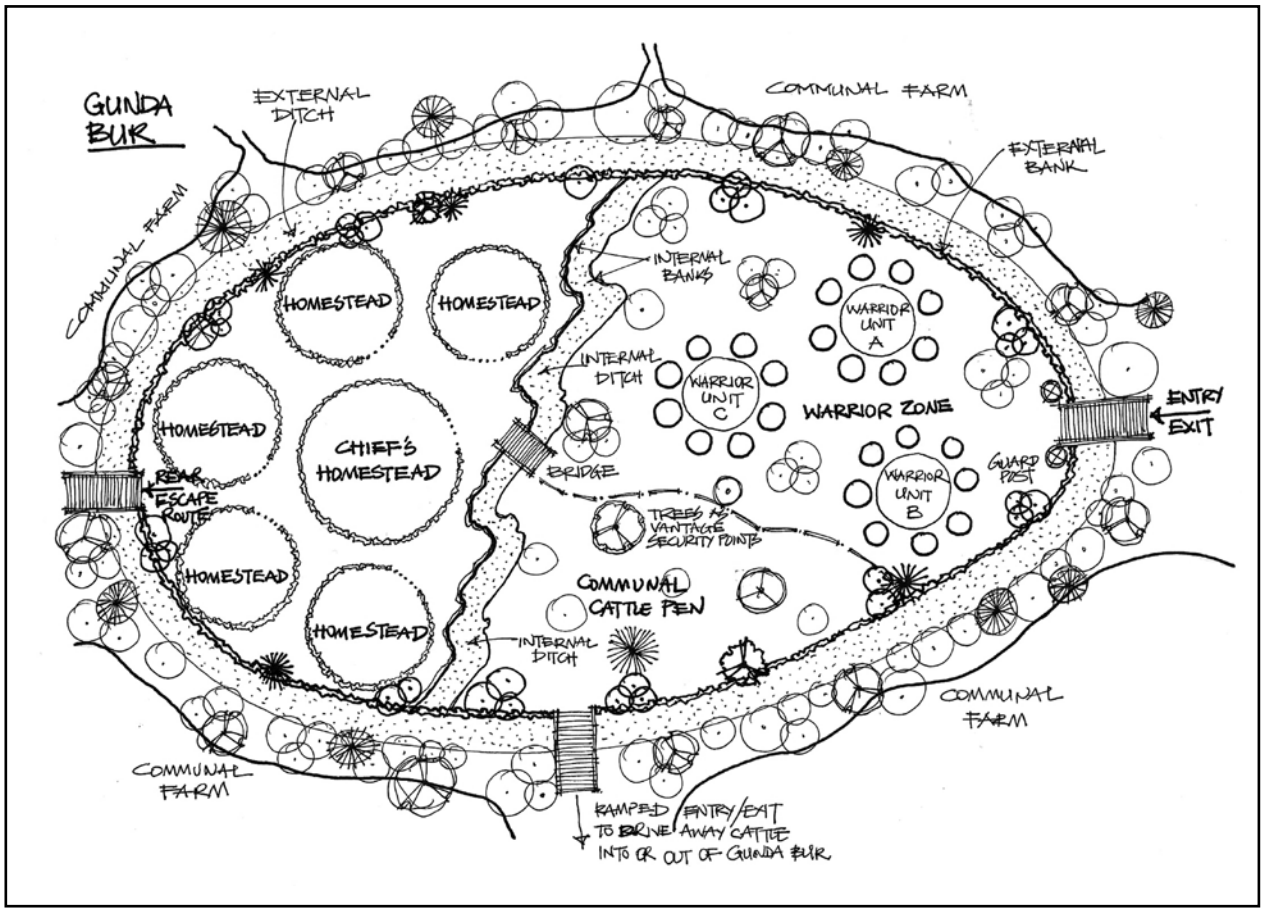


**FIGURE 5**
Architectural reconstruction of *Gunda Bur* typology
**Source:** Author 2016

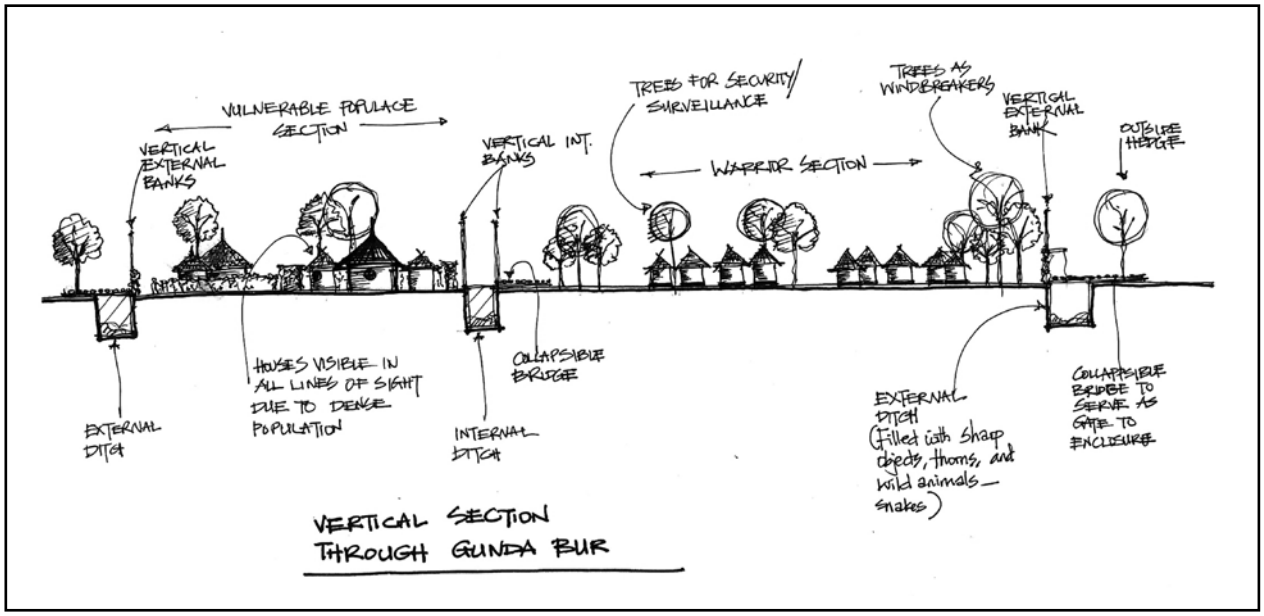


**FIGURE 6**
Section through reconstructed *Gunda Bur* fort
**Source:** Author 2016

of Luo peoples travelled through during the great migration. Seven of these abandoned "trenched and walled settlements"- which are approximately two to four hundred years old- have been "located, mapped [out], and diagrammed", and this has been confirmed by radiocarbon dating (Odede, 2009).

The architect Kaj Blegvad Andersen (1974) has given an account of his original encounter with a relic of *Gunda Bur*, which he describes as "an ancient moat" that was "approximately four metres wide and 1.5 metres deep. The sides were no longer steep, but it was apparent that it had been a very effective form of defence". Andersen's preliminary estimates of the dimensions of a typical *Gunda Bur* are questionable as they conflict with other dimensions of *Gundni Buche* that were obtained through extensive archaeological efforts (Odede, 2009). However, his assessment of the efficacy of these fortifications with regard to defence is not disputable.

Prior to colonisation of Kenya, Luos could not build "just anywhere on the terrain" (Atieno-Odhiambo and Cohen, 1989), because of prevalent conflicts, warfare, invasions and conquests. Community "land was rationally organised, and people were settled in concentrated residential units" known as *Gundni Buche* (*Gunda Bur*, singular). This was the first phase of Luo occupation, where settlement location and 'design' was determined by critical requirements of defence, as a community strategy, that could only be achieved through cooperative planning of land use, in order to ensure collective settlement.

*Gundni Buche*, as "ancient fortified settlements" (Atieno-Odhiambo and Cohen, 1989), have been described as "compact settlements, providing a modicum of security for sizable groups, stores of foodstuffs, and cattle". Each *Gunda Bur* was "a large defence fort" with a perimeter "wall of earth ten to fifteen feet high and about three feet in diameter" with "only one opening as the gate". The number of gates within each *Gunda Bur* has been an object of contestation by Luo historians, although archaeological evidence from other *Gundni Buche* within Bondo area of Siaya County indicates that most of these settlements had at least two gates (Odede, 2009). This perimeter wall "was surrounded by a ditch of seven to ten feet in depth" (Atieno-Odhiambo and Cohen, 1989). However, some *Gundni Buche* had two such ditches, exemplified by Kibuye in Sakwa, Bondo and Mahaya in West Asembo, Rarieda (Odede, 2009).

Within each *Gunda Bur*, "were hundreds of huts in which lived large numbers of men, women and children", and the land that surrounded the fortification was cultivated by women, while the male warriors grazed cattle in pastures that were relatively distant from the fort (Atieno-Odhiambo and Cohen, 1989). The *Gundni Buche* at Gangu were occupied in a transitory, ephemeral and sequential manner by several Luo migratory groups, and some of these groups enhanced the fortifications during their occupation, reinforcing the surrounding ditches and increasing the heights of the perimeter banks. The period during which these fortified settlements were constructed was highly tumultuous in terms of wars and conquests- as mentioned previously- and this demanded "securing alliances across space with other [neighbouring] settlements".

***Architectural reconstruction of a typical Gunda Bur fort***

Since Luoland was occupied by Bantu speaking peoples prior to the arrival of the Luo, "archaeological remains in the region cannot be easily ascribed to a particular ethnic group". However, for the ongoing study, it does not matter whether *Thimlich Ohinga* and some of the *Gundni Buche* were built by the Luo or not. The fact that they are located within present day Luoland, and were occupied at some point, by the Luo, make them valid and appropriate for analysis and interpretation as constituent cultural architectural artefacts of the Luo. These *Gundni Buche* portrayed various geometric shapes at the plan level, including configurations that can be characterised as circular, semi-circular, elliptical or rectangular but with rounded (curved) edges (Odede, 2009), within precision limits that could be achieved by the prevalent rudimentary traditional construction technology that was available at the time. The area of each fort varied between 30,000 and 100,000 square metres, and each fort was most probably densely populated.

The interior organisation of a typical fort indicates that additional separation was achieved through the construction of internal ditches as partitions. It is postulated by this study that such interior partitions- coupled with makeshift but collapsible bridges as linkages- separated the warriors and men from the more vulnerable community members (the elderly, women and children) who required additional protection, and this defence strategy coupled with multiple exit gates (some of which were diametrically opposite), enabled the vulnerable individuals, as well as livestock, to escape while the warriors defended the fort, upon invasion by the enemy, who would typically approach the *Gunda Bur* from the main entrance.

In their current state, the *Gundni Buche* "enclosures are now poorly defined due to severe site destruction, due to multiple human activities, including cultivation of their interior by Luos, presently residing in neighbouring homesteads, and this is consistent with Luo customs that permit individuals to cultivate abandoned homesteads. The material from the walls of these forts has been recycled, being used for "both house and road construction". As mentioned previously, the banks of

these fortified settlements were typically 2.5 metres high and the ditches were 2 metres deep, indicating that territorial defence was the chief criterion in determining the extent and organisation of the fort. Frederick Odede observes that although *Gundni Buche* "enclosures vary in size", they are quite "similar in planning", and this justifies the sketches that are presented above, as well as providing additional confirmation for the validity of the method- adopted by the ongoing study- of drawing architectural generalisations and re-interpretations with regard to these settlements. Each *Gunda Bur* was sufficiently elevated relative to its surroundings and this enabled warriors and other occupants, as well as sentries who were atop trees within the fort to achieve adequate territorial surveillance, and warn all the fort's inhabitants adequately (with sufficient time for escape), prior to any impending attack by the enemy. The trees within the *Gunda Bur* were also good windbreakers, preventing high prevailing winds from lifting off the thatched roofs of traditional huts within the fort. The ditches surrounding the fort were filled with thorns and other sharp objects, including metal off-cuts from blacksmith activities (the pre-colonial Luo worked iron deposits), poisons and sometimes, live animals such as snakes, in order to provide additional defence for the fort's occupants. Dried grass was spread over these ditches to conceal their presence from the enemy. Typically, streams such as the Rawa Stream at Kipasi *Gunda Bur*, flowed on one of the lower sides of the fort, providing water for domestic use as well as providing further protection of the fort from invasion by the enemy, or even from wild animals such as leopards and hyenas.

The walls of these forts were "made up of a mixture of stone rubble and soil", which was "piled up after excavating the [surrounding] ditch". This indicates that the walls of *Gundni Buche* were not merely derived from earthen (mud) technology, but were actually stabilised by the presence of natural stone, enabling the attainment of greater heights. Grinding stones that have been vandalised from these forts, are currently in use by neighbouring communities, and these indicate that the forts and their contents were built to last, for a sufficiently long time, by their Luo creators. Additionally, the ready availability of marram cuirass soil enabled the Luo occupants of these forts to construct bank-and-ditch earthworks, rather than their stone-walled counterparts at *Thimlich Ohinga*, thus providing evidence for geographical determinism- in the provision of possibilities for human settlement in the physical landscape.

It is further surmised by this study, that in addition to the main gate and a concealed rear escape gate that was only known to the occupants of the *Gunda Bur*, there must have been other side gates that were ramped to enable easy escape of livestock. However, makeshift wooden bridges- as mentioned previously- were often used to enable the occupants of the forts to cross internal ditches as well as the portion of the perimeter ditch adjacent to the main entrance. These makeshift bridges could be destroyed by the Luo sub-tribe during war, in order to prevent the enemy from gaining entry into the fort as well as crossing over from the warrior section to the vulnerable section, if the enemy had gained access to the fort via the main entrance. It is also probable that the gates to these *Gundni Buche* were large wooden sliding or swinging makeshift structures that would be operated by strong young men (community warriors), who controlled and defended these entrances. The surface indentations and scratches that were made in the course of using these gates, have probably been eroded by the persistent disturbances from neighbouring communities who could even have dismantled the massive gates and recycled the wood as firewood or for building inferior structures such as cattle kraals. Unfortunately, no archaeological excavation will be able to provide confirmation of the existence of such gates, unless fragments from these gates are brought to the fore by further excavation at these sites.

So far, archaeological excavations that have been undertaken within these enclosures- such as those at *Oiko Gundni Buche* (*Oiko* A, *Oiko* B and *Oiko* C)- have yielded the "remains of broken pieces of mud walls", confirming the presence of traditional 'hut' type dwellings; scattered faunal remains and cattle bones, confirming the presence of domesticated livestock; and human bones, confirming human occupation; and ceramics, iron rings and bangles, confirming human activities such as body adornment, water storage and cooking.

The pertinent question remains whether the archaeological excavations of these fortified settlements, at present, are sufficiently reliable to anchor their architectural reconstruction by the ongoing study. Usually, more information is achieved through enactment of deeper excavations. Therefore, the architectural reconstruction and interpretation of *Gundni Buche* within this study will form the basis of future re-interpretations upon the availability of more artefacts as well as more interdisciplinary interpretations that will result from the undertaking of deeper archaeological excavations.

***Drivers of intangible Luo culture in Thimlich Ohinga and Gundni Buche settlements***

These are multiple and varied, being situated in the cultural ecology of the pre-colonial Luo peoples and their physical landscape. The most significant include the prevalent economic systems, religion, Luo philosophy of life and the underlying cosmological symbolism.

***Traditional economic systems***

From the onset of the great migration to their present existence, the economic life of the Kenyan Luo has been characterised by "agrico-pastoral-fishing" activities (Ocholla-Ayayo, 1976). The Luo placed great value upon their land due to its extensive role in their social, political and economic aspects of culture (Ndisi, 1974). This value was premised on Luo customs and economic ideology (Ocholla-Ayayo, 1976), which entrenched the functions of traditional community land as the provision for cattle and other livestock grazing; support for subsistence agriculture; construction of villages and homesteads; provision of large water bodies for fishing (rivers and lakes); and 'housing' the spirits of lineage ancestors who continuously exerted societal control in the daily lives of community members.

Huge surplus production was not possible due to "low development of technology", thus significant levels of accumulation was absent. The Luo society was therefore "largely static" despite contacts and exchanges with neighbouring tribes due to "similar technological level[s]". This indicates that the built forms of the Luo remained relatively static up to the period prior to colonisation of Luoland. Thus, extensive commonalities are discernible and expected between *Thimlich Ohinga* and *Gundni Buche* archaeological relics and other pre-colonial Luo existential systems. The economic means of production (land, including water bodies) ensured sustained deep and extensive socio-economic interactions within the community and these "enabled the Luo to accumulate and widen their normative and ideological beliefs". Religious rituals and rites also regulated economic activities within traditional Luo society, through medicine men (*Ajuoke*) who would dispense charms and chants for protecting homesteads and granaries from thieves (Ndisi, 1974), or rainmakers who would intercede with ancestors during times of erratic rains.

Architecturally, cattle kraals became indispensable within Luo homesteads that were embedded in agricultural and grazing lands, and the need for storage of 'minimal' surplus food crops led to the inclusion of granaries as 'support' components of built forms within individual homesteads. This ensured physical protection and security for their adopted lifestyles. Markets also emerged as a result of the informal barter trade between villages as well as along the boundaries of neighbouring tribes (Ndisi, 1974). Thus key traditional typologies of huts, homesteads, cattle kraals, granaries and markets were established.

***Religion: Luo objects of worship in the traditional community set-up***

Apart from ancestors, heroes and heroines, the Luo community worshipped the supreme omnipresent God, *Nyasaye* [also referred to as *Were*- a Bantu derivative, as evidence of cross-cultural borrowing from Luo neighbours- as well as *Nyakalaga*] (Ndisi, 1974). Celestial bodies- as abodes of *Nyasaye*- like the sun and the moon were also worshipped, but not the stars (which were believed to be fireplaces for cooking by the residents of the moon). The sun could bestow wealth and good fortune, while the moon bestowed love. Architecturally, the sun path, the cardinal points and the positions [path] of the moon in the night sky were significant determinants of orientation of large settlements and configuration of dwelling units within the Luo physical landscape to promote the practice of Luo astronomy.

The Luo also worshipped "extraordinary things" such as lakes [like Nam Lolwe (Lake Victoria); Lake Kanyaboli], rivers [like Ahero, Nzoia], huge snakes [like *omweri*], but the power within these objects was subordinate to that of *Nyasaye*, who created everything and could reveal himself in various forms and objects, as well as mete out punishment for disobedience of Luo customs and traditions. The extensiveness, directional nature and dominance of such objects of worship, respectively were therefore significantly manifested or expressed in Luo traditional architectural largesse, at the level of huge settlements like *Thimlich Ohinga* and *Gundni Buche*.

***Luo philosophy of life, ethos and world view***

With regard to culture, the anthropologist Clifford Geertz (2000 [1973]) presents a taxonomy that classifies moral and aesthetic evaluative aspects as ethos, while separating the "cognitive, existential aspects", and categorising them as "world view". For the traditional Kenyan Luo, moral issues were addressed through customs and prohibitions which were derived from the mental constructs of the community rather than those of the individual- as a practical philosophy- and therefore a strict delineation of these three cultural constituents would be impossible to achieve. The traditional Luo community had the overall "collective responsibility to ensure total adherence to customary laws" by all community members (Abonyo, 2005), in order to prevent *Nyasaye* (God) from withdrawing life sustenance, as this would lead to widespread calamities. Therefore, the philosophy, ethos and world view of the Kenyan Luo are discussed collectively in this study, in a holistic rather than fragmented manner.

The oral traditions of the Luo were vital to the propagation of the Luo philosophy of life, and this was anchored on the fact that community perception could "be learned through traditionally approved sources such as songs and chants" (Abiodun, 1990), as well as proverbs, which were the embodiment of "inherent philosophies and thoughts" which rationalised "basic questions about life" (Mburu, 2003). Thus the 'open to sky' spaces within *Thimlich Ohinga* and *Gundni Buche*

settlements were often appropriated for the propagation of these traditions. Luo normative beliefs were invariably "connected with supernatural [ancestral] spirits" that regulated the daily lives of Luo persons within these settlements (Ayot, 1973).

Generally, the Luo believed in living life vigorously and actively, to ensure individual longevity, due to the active force which resided within human existence, because human "existence itself was a force". Therefore, open spaces in these settlements were often appropriated for physical activities like musical performances and traditional dancing during festivities, as well as games such as *adhula* (land hockey), *mawi* (wrestling) and *ajua* (board games) (Ndisi, 1974). Luo cosmology was earth-centred, with the heavens and the earth portraying a husband-wife relationship in which "the heavens fertilize the earth in the form of rain and warmth" and the earth as a receptacle, "conceives, nourishes and bears the crop", thereby initiating, sustaining and promoting all living beings (humans, plants and animals) in it (Mburu, 2003). Thus, agricultural activities were undertaken within and without the confines of these archaeological relics.

Sacrificial rituals of the Luo community were referred to as *liswa* or *dolo*, and these involved slaughtering animals and inviting the forefathers- calling them initially by their individual names, then collectively- to feast on the offering, as the main way of strengthening and restoring the disrupted existential force, upon consultation of the *Ajuoga* (diviner) by the Luo elders. The *Ajuoga* was central to the Luo religious institutions as he "instituted an integral part of the philosophy of existence" through his ability to communicate with supernatural forces, which were perceived to be ancestral spirits, the sun, mountains, rivers, canoes or animals, thereby enabling settlement preservation.

Elderly members of the Luo community were not afraid of death, as it gave them the opportunity to unite with their ancestors and the living dead (relatives and friends who had died within their lifetime), and mourners- present during the funeral ceremony of any Luo individual- would beseech the departed to convey greetings to their ancestors too, as part of mourning. Thus, upon death, Kenyan Luo persons would go "into the unity of all things", as their 'afterlife'. This journey began from the *tero buru* funeral processions which commenced from the open spaces (courtyards) within the 'bereaved' homestead in these archaeological relics (settlements).

***Typologies of built forms in Thimlich Ohinga and Gundni Buche settlements***

The symbolisms, functionality and aesthetics of built forms within these archaeological Luo settlements are evident from the descriptions of the typologies that are provided below. Preference is given to typology that is derived from function rather than form, as all dwelling units of the Luo- in these settlements- were of the rondavel type (Anyamba, 2016), and were mostly indistinguishable on the basis of shape alone.

***Dala, as the traditional Luo homestead***

Within these settlements, typical Luo homesteads had distinct plan variations depending upon the number of wives and children within. The individual units (traditional huts) were configured in an organic manner around a central courtyard (Steyn and Roodt, 2003). In close proximity to the homestead entrance, the first unmarried male child constructed his hut (*simba*) on the right side of the homestead, and the second on the left side, the third on the right and so on in an alternating manner (Ayot, 1977). In situations where two wives within a homestead had four sons each, all the sons of the first wife (*Mikaye*) would construct their huts on the right side and all the sons of the second wife on the left side. Some Luo homesteads even accommodated outsiders- from distant clans- who were referred to as *Jadak* (Ndisi, 1974). Traditional Luo homesteads required protection, and this was achieved by inviting an *Ajuoga* (diviner), who would plant "a powerful plant" endowed with "supernatural force" that could counter any bad spell that was brought into the homestead by any other persons such as "threatened neighbours or jealous relatives" (Ayot, 1973). This plant- located prominently and visibly near the entrance- would divert such bad spells, thereby protecting the homestead dwellers from its "bad effects". However, bad omen and spells that were brought into the homestead by evil spirits could only be averted through dolo (sacrificial atonement).

The polygamous Luo homestead recognised the first wife- *Mikaye* (or *Mikayi*), whose hut was located at the "centre back" on the main axis, with the second wife *Nyachira* and her hut *Od Nyachira*, located to the right of the *Mikaye's* hut, and the third wife *Reru*, and her hut *Od Reru*, located to the left of the Mikaye's hut (Ocholla-Ayayo, 1976). The later wives were known as *Nyi-udi* and the location of their huts continued this juxtaposition and opposing alternating arrangement within the homestead. The Luo homestead was central to the formation of individual Luo identity by the community members as it represented "the place where their umbilical cord" (*biero*) was buried (Atieno-Odhiambo and Cohen, 1989), and this signified an eternal connection- between individuals and their homestead as the place of birth- that could not be severed. Within a typical homestead, the individual huts were "scattered around the perimeter" (Andersen, 1974), approximately three to five metres from the euphorbia fence, providing individual space around each hut that merged with the public *Lar* (homestead courtyard).

Ayot (1977) observes that sites for the construction of a new homestead were chosen after consulting the *Ajuoga* (the diviner)- even within these archaeological relics- who would intercede with ancestral spirits on the client's behalf, through performance of preliminary sacrifices as atonement (Ojoo, 2010). Such sacrifices could also be performed with regard to the construction of individual dwelling units within the homestead, both prior to and upon completion of construction (Ayot, 1977). The traditional Luo community was patrilineal, with male children being accorded greater significance than female children, within the homestead, as females were perceived to be transient because they would belong to other clans and sub-tribes upon marriage (Miruka, 2001), and this attitude can be discerned in the typical homestead layout which did not contain any huts for girls who were born within the homestead. Each wife's dwelling unit was surrounded by an undefined private space that was meant for individual expression as well as *biero* (umbilical cord) burial. The space could also be used for burial of the bodies of departed members of the homestead, with the homestead owner being buried at the "front of the first wife's" hut (Abonyo, 2005), and the rest of the members "to the left of their huts".

From the geometry and configuration of dwelling units (huts), within a typical Luo homestead, it "may [seem] at first sight" that extensive similarities exist, in comparison with the homesteads of other African communities. However, further investigations have established that the meanings that are associated with the various constituents of the Luo homestead, as well as the functions of the built forms and spaces within and without them, are "specific to the Luo", and this justifies the adopted typology of function within this study, as opposed to a typology of geometric shape and configuration. **Figure 7** illustrates the disposition of built forms and spaces within a typical homestead within *Thimlich Ohinga* and *Gundni Buche* archaeological relics.

The introverted nature of the Luo homestead was an indication of self-sufficiency with regard to its internal activities and functions. The thick euphorbia hedge further enforced the interior 'privacy' of the homestead by visually concealing the activities of the homestead from onlookers and passersby outside the enclosure. However, the porous nature of the hedge allowed sound transmission, which was vital for inter-homestead community communication, which guaranteed that the wailing of mourners would be conveyed to neighbouring homesteads, during any funeral ceremony, thereby leading to the convergence of relatives and neighbours at the homestead of the bereaved persons, in accordance with Luo customs.

***The individual dwelling units***

The traditional built forms of the Luo were simple buildings, but their character resonated "with the spirit of their people" (Fisher, 1996), expressing the genius loci of their cultural landscape. The typical geometric form of the dwelling units of the Luo was circular (cone on cylinder geometric typology). Various theories have been postulated by architects, as well as architectural historians, as to the reasons for the prevalence and dominance of this form over other possible alternatives (Andersen, 1974). The Luo individual, within the traditional environment, encountered a horizon, sun

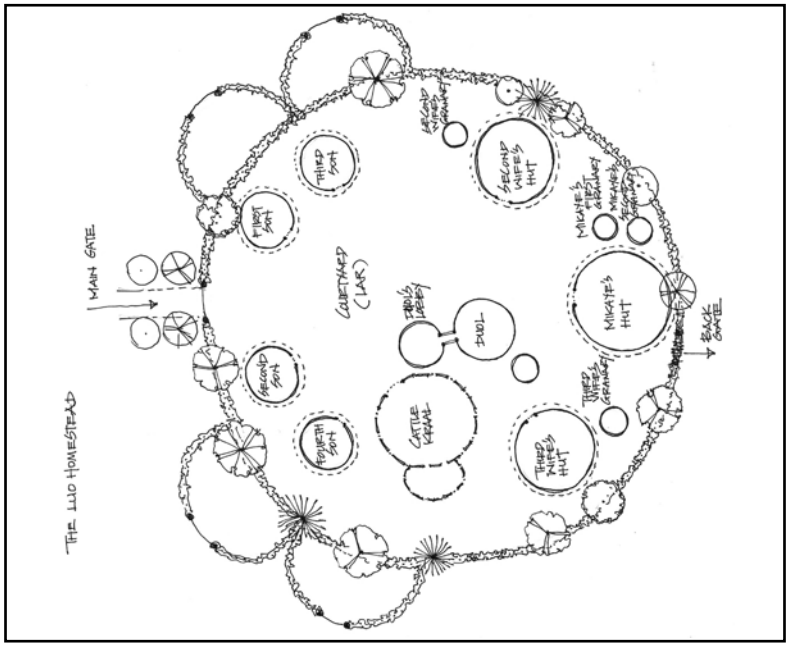


**FIGURE 7**
A typical traditional Luo homestead
**Source:** Adapted from Abonyo 2005

and moon that were all round, and the experience of these objects inspired the adoption of the circular form. The circular geometry was also adopted "for largely practical reasons", as it offered "the easiest way of setting out the plan of a house", through tying a given length of string to a post that marked the centre of the house and then moving around, with the string taut, to describe a circle whose perimeter would be demarcated with sticks- embedded in the ground, to sufficient depth- that defined the structural frame upon which the wall of the hut would be constructed.

The walls of these traditional Luo built forms were "made of wooden sticks" that were fastened with "horizontal ties", and plastered with mud, or a mud-dung mixture- and were structurally sound- while the roofs of these huts were "thatched with grass". The doors of these units were made out of "tied and woven reeds". The floor of each traditional hut was initially flooded with water during construction, and then a mixture of well compacted (manually beaten) tiny stones and gravels (Ochieng', 1979), was laid and permitted to dry, in order to provide an internal hard surface that would accommodate the various activities within the dwelling unit.

The interior furniture in each hut was simple and typically comprised of "sitting stools, sleeping mats, several pots", for cooking and water storage, and gourds that were suspended from the ceiling (Ndisi, 1974), for storage of herbal remedies and seeds that could be used during the next cultivation season. Fireplaces were also present and were often located proximal to the sleeping areas, to provide adequate warmth during the night. Some huts- belonging to the second and subsequent wives- also had an internal grinding stone near the fireplace, unlike its counterpart in the first wife's hut which was prominently located on the outdoor veranda.

***The Duol (the homestead owner's hut)***

The *Duol* was a focal point- a place of convergence within the homestead. This was where the young boys, aged between five and ten years old would gather during the night and eat with the older men, as they considered themselves too senior to eat with other younger children and girls in the *Mikaye's* hut (Ayot, 1977). The homestead owner could also summon some or all of the homestead dwellers into his *Duol* for special family meetings, which could involve ancestral thanksgiving prayers or dispensing of traditional medicines to everyone present, by the *Ajuoga*.

During consent-seeking visits by a prospective suitor of a daughter of the community and his entourage, the typical arrangement (interior layout or plan) of the *Duol* would change to accommodate the visitors. The girl's father (the owner of the *Duol*), and his 'committee' would sit on the bedside (sleeping zone) within the *Duol*- the most private area- while the visitors would sit exactly opposite them (in the most public zone) (Ayot, 1977). Inside the *Duol*, shields and spears- as community regalia that symbolised individual bravery- were "kept near the bedside or hanging from the ceiling" (Ndisi, 1974). In some cases, the *ng'angu* (an elevated bed made from solid earth benching) replaced the sleeping mat. The ng'angu was usually located at the extreme end of the *Duol*, at a position that was directly opposite the main entrance, and was the most private zone within the *Duol*.

Each *Duol* had a circular clearing, as an outdoor 'plaza' called *Alap*, in front of it and the two were linked by a narrow pathway that enabled the *Duol* to be accessed in single file (Ocholla-Ayayo, 1976). This 'plaza' was the place where the elderly male members of the homestead would converge, under the clear star-lit night sky, to make their plans, even with regard to conflicts with other Luo sub-tribes. Within the *Alap*, Luo astronomy was practised by both elderly men and women, who would look to the night sky in order to "determine the position of *yugni* constellation[s]", as well as *Ratego* (the morning star) and *Oluoro-Budho* (Jupiter), and then propagate this knowledge to the Luo youth who were gathered around them. The preference for the outdoors was a precaution to prevent the 'enemy' and other intruders, even from within the settlement- commonly referred to as *Jambetre*- from eavesdropping on the elders' private deliberations. The *Alap* was a transition space (a post-function and a pre-function space) that served as an entrance lobby for the *Duol*. Thus, the open *Alap* and the closed *Duol* exhibited a binary opposition of spaces that manifested itself as a mutually beneficial or symbiotic relationship.

The *Duol* was generally a male domain, a "forum" where elders, warriors and young boys who were too old to sleep in the *Pim's Siwandha*- elaborated below- would converge during the night, for supper and discussion thereafter, depending upon the occasion (Ocholla-Ayayo, 1976). The most private consultations would only involve the elders, while the warriors and young boys would be included during general conversation, with elders as the main speakers. The *Duol* was an indispensable community educational institution where "forbidden acts and behaviour were stressed" to male Luo youths, as well as "war tactics" and "theoretical fighting techniques", "bravery", "hunting expeditions, descriptions of animals and their behaviour, plants and grasses", and their multiple uses. Thus, the interior configuration of the *Duol* was dynamic and flexible in order to accommodate this spontaneity. A typical interior layout of the *Duol* exhibited bi-lateral symmetry, with in-situ radial circulation pathways that ensured easy movement of people within the hut. A large portion of the *Duol* was public space, and the homestead elders' seating

was hierarchically positioned at the centre of the hut, in recognition of their prominence, family status and elderly wisdom (**Figure 8**). The central food mat was the place where the food that was prepared by all the women in the homestead would be brought for inspection and tasting by the owner of the *Duol*, prior to onward distribution to, and sharing amongst, all those who were present within the *Duol*.

Thus, this communal form of eating ensured that no one starved because whatever food that was available was shared amongst the men in the homestead, thereby fostering "unity and solidarity" in the homestead (Ndisi, 1974), as well as "balancing the diet of the people". The elders often ate together, except when some of them were absent. On such occasions, the elderly warriors would then join the owner of the *Duol* to share the meal.

After the departure of most people who were congregated within the *Duol*, the interior arrangement would change, in order to enable the young boys- who were in between the *Pim's Siwandha* and the *Simba* institutions- to spread their sleeping mats for the night. The comfort of the people within the *Duol* was ensured by the presence of water in pots that were stored at one end. Firewood was also stored on the opposite end, and would be used by the owner of the *Duol* to make fire, for the young boys who would be sleeping within the hut, at the approach of dawn. At this time, the fire was necessary as only a few people were present within the *Duol*, and their body heat was now insufficient to guarantee adequate interior warmth, unlike when the *Duol* was in full session during the earlier part of the night. **Figure 9** is a vertical section through the *Duol* which displays the personal items of the homestead's owner as well as the inherent spatial appropriation.

***Od Mikaye (the first wife's hut)***

This traditional hut was typically constructed with its entrance facing the main gate of the homestead (Ayot, 1977), to indicate the hierarchy (prominence) that was accorded to the *Mikaye* in terms of the strategic position of her hut, as well as its exceptional size since her hut was the largest of all the wives, and was the only one with a veranda as well (Abonyo, 2005). If the women within the homestead co-existed harmoniously, then they would eat together inside the *Mikaye's* hut or outside the large veranda of this hut, jointly with all the little children in the homestead (Ayot, 1977), as a sign of respect for the seniority of the first wife.

The *Mikaye's* hut exhibited external bi-lateral symmetry of form, which was in opposition to the interior asymmetrical configuration of spatial adjacencies and functions (**Figure 10**). The outdoor plinth of the hut provided sufficient space for adequate sitting by both women and children of the homestead, as a place of resting after completion of their many domestic chores. This large plinth therefore encouraged other

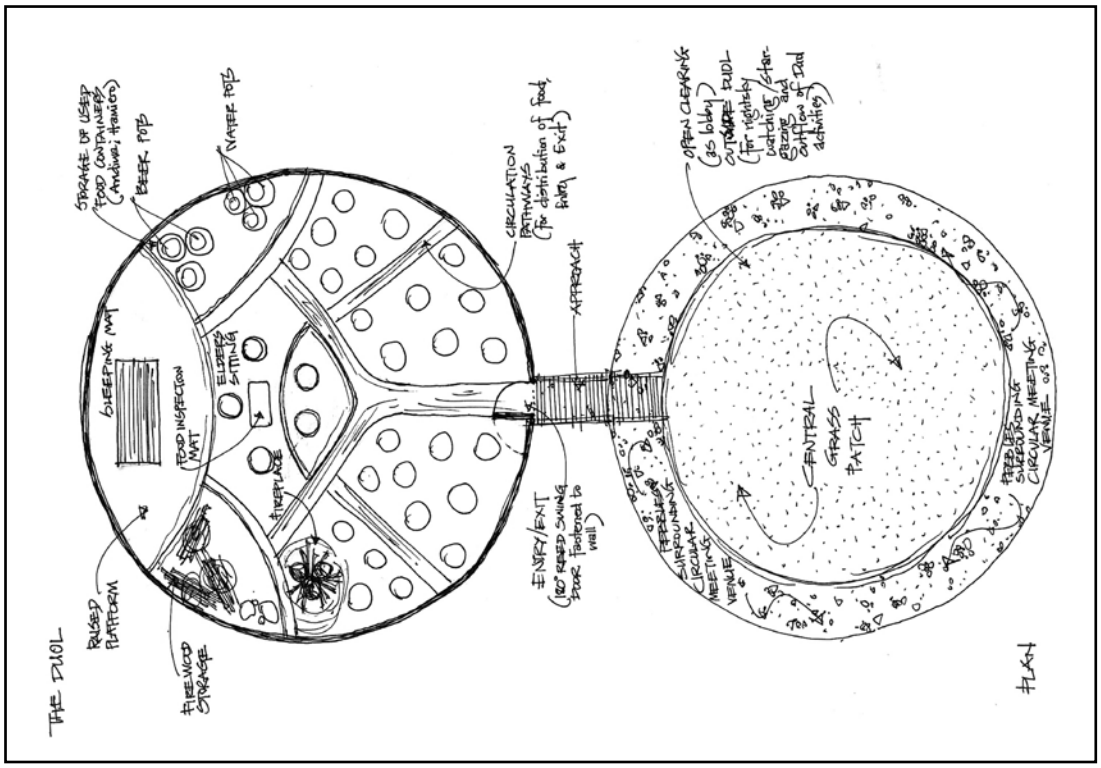


**FIGURE 8**
Reconstruction of spatial appropriation within the *Duol* and *Alap*
**Source:** Author 2016

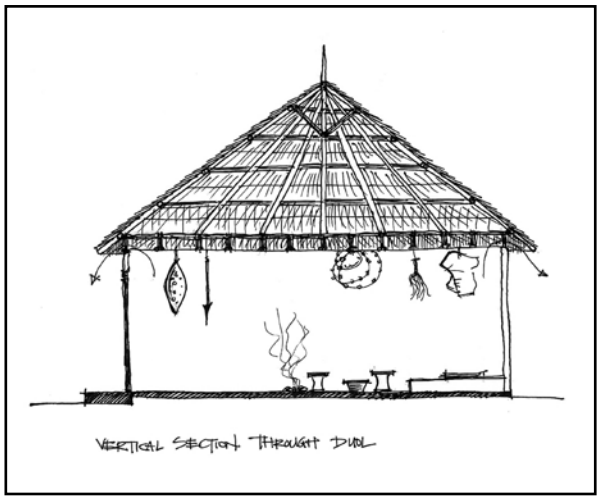


**FIGURE 9**
Vertical section through *Duol*
**Source:** Author 2016

wives to come and visit with the *Mikaye*, and engage her routinely in multiple conversations. As a partially enclosed and roofed outdoor existential space, the veranda 'appendage' was an extension of the *Mikaye's* hut, which served as both a pre-function and a post-function transition semi-public space that offered protection against weather extremities (Steyn and Roodt, 2003), in order to accommodate socialisation as well as domestic activities like grinding grain and bulk firewood storage. The location of the large grinding stone within the *Mikaye's* veranda was deliberate, as it enabled young Luo maidens of the homestead to be taught how to grind various cereals (Ndisi, 1974).

The interior of the *Mikaye's* hut was large, providing adequate space for 'moving things about' during the performance of her many duties within the homestead, including cleaning her own hut, "looking after [her] children", cooking and "cleaning utensils" (Ndisi, 1974). Generally, Luo girls ate with their biological mothers, in their specific huts, although the daughters of other wives would often accompany them as they went to eat with the *Mikaye* in her own hut. This communal eating took place in the central part of the *Mikaye's* hut, where all the females sat on the floor, circling around the food, with legs stretched out or in cross-legged fashion. **Figure 11** is a vertical section through the *Mikaye's* hut, indicating the veranda appendage and basic items therein.

The *Mikaye* slept on a mat that was positioned near the entrance of her hut, in order to protect and watch over her possessions. The *Mikaye* was also entrusted with providing 'motherly care' and protecting vulnerable young livestock, that were accommodated within her hut. The hearth (fire place) in the *Mikaye's* hut was located peripherally rather than centrally, furthest from the livestock to prevent them from falling into the fire, as well as attempting to ensure the safety of young children who would be running about and playing inside the hut. During drinking festivities, a large beer pot was positioned at the centre of the *Mikaye's* hut, and this allowed the women of the homestead to sit around the pot with their individual *oseke* (straws), and drink in private, thereby preserving their dignity.

The most precious possessions of the *Mikaye* were located at the furthest end of her hut. This area was large enough to cater for the storage of the rich variety of multiple pots that were routinely used for the preparation and storage of various traditional Luo dishes, as well as herbal medicines. Gourds and calabashes for serving gruel in the form of porridge (*nyuka*) or *kuon* were also stored here (Ndisi, 1974). Smaller pots and calabashes, exclusively for use in the training of young girls were also stored in this area. From "the age of six", these girls would "follow their mothers to the river to fetch water", as preparation for their future role as mothers. The supervision of this vital training- that ensured the propagation of Luo customs and traditions to ensure community continuity- was entrusted to the *Mikaye*.

***The Simba (unmarried son's hut)***
The *Simba* was the hut where 'grown-up' boys (unmarried men) of the homestead slept during the night, on animal skins that were spread out on the floor, as sleeping mats (Ayot, 1977; Abonyo, 2005). With time, the animal skins were replaced with straw mats known as *par*. These young men- as warriors (Ojoo, 2010), did not cover themselves up during the night (Ayot, 1977), and this could be due to the fact that many of them were present within the *Simba*, and their collective body heat would ensure warmth inside the *Simba*, even on cold nights. The young men (warriors) ate together inside the *Simba*. The *Simba*, as a traditional educational institution, was the place where the eldest unmarried brother taught his younger brothers the correct decorum, mannerisms and etiquette, in accordance with Luo customs and traditions, with regard to courtship, as well as duties within and beyond the homestead (Ndisi, 1974).

Prior to the marriage of the sister to a son of a particular homestead, the sister's suitors would converge at the brother's *Simba*, a hut that was meant for both young men and women in the homestead, although female members of the homestead slept in the *pim's Siwindhe* and not in the *Simba*. These suitors could then be entertained within the *Simba* by unmarried females (daughters) of the homestead. Once the suitors were sufficiently rested they would then proceed onwards to the girl's father's hut (the *Duol*).

Apart from acting as a boy's dormitory within the homestead, the *Simba* was also a military barrack,

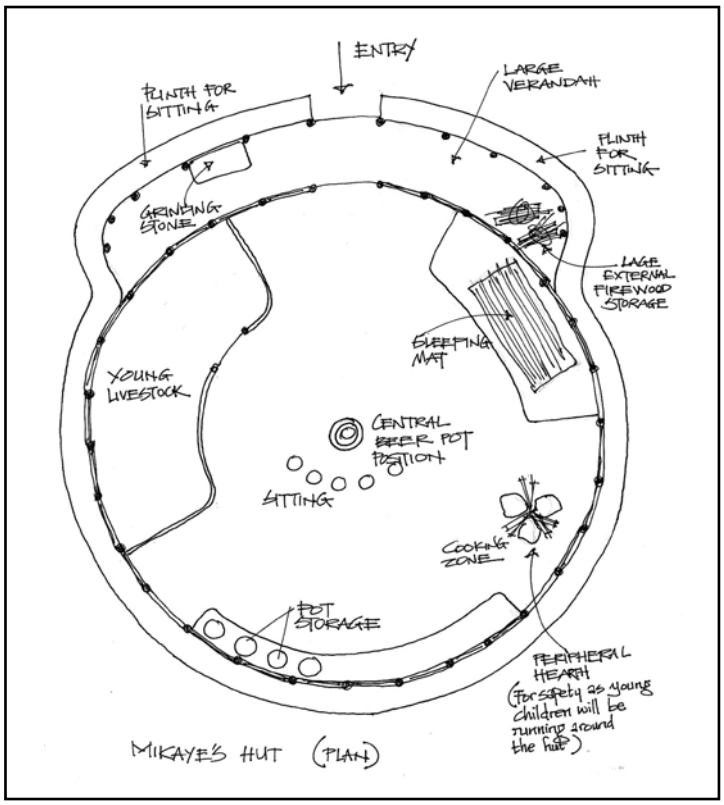


**FIGURE 10**
Reconstruction of *Od Mikaye*
**Source:** Adapted from Abonyo 2005

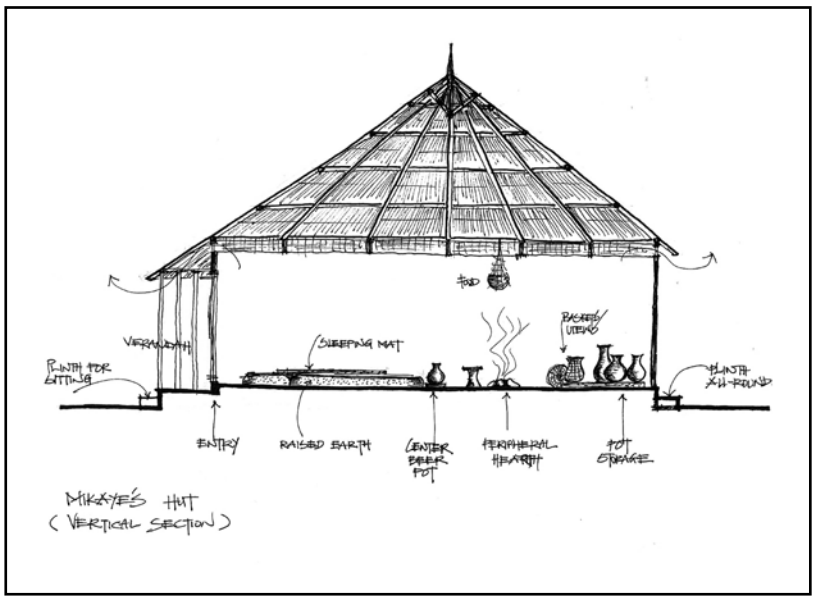


**FIGURE 11**
Section through *Od Mikaye*
**Source:** Author 2016

where warriors from other homesteads within the sub-tribe would be accommodated as they moved from one village to another during intra-community social exchanges (Ocholla-Ayayo, 1976). For the Luo, life began at the *Simba*, as the place where the marriage of the eldest warrior would be consummated, and this event signified the end of the role of that particular hut as a *Simba*, because the next son in lineage would then be required to construct his own *Simba*. Uncircumcised (uninitiated because of non-exposure to mandatory *Nak*, as the removal of the six lower teeth) Luo boys, "were not permitted to live in [the] *Simba*". Initiation

was performed to boys at the age of fourteen or fifteen, thereby facilitating their transition into warrior status. The *Simba*, as a traditional education institution, was the place where Luo warriors planned "hunting expeditions", as well as wrestling sports such as *mawi* or *olengo*, and this instilled "bravery and constant readiness" in Luo youth.

Like the *Mikaye's* hut, the *Simba* exhibited external bi-lateral symmetry of form, and interior asymmetry that arose from the positioning of water pots and firewood piles on opposite sides of the entrance. Inside the *Simba*, Luo warriors sat around facing the door of the hut, in a circular configuration that allowed them to listen to each other during their deliberations (**Figure 12**).

The warriors also slept while facing the entrance and this indicated their readiness to immediately wake up and counter any challenges posed by any intruders who entered the homestead with the intention of inflicting harm upon its occupants. Thus, this was the reason for the proximal location of the *Simba* to the main entrance of the homestead. The hearth (fire place) within the *Simba* would only be operational if the occupants of the *Simba* were too few in number.

The sleeping mats inside the *Simba* were arranged in a radial manner that signified egalitarianism or equality that manifested itself as the absence of rank amongst the warriors, even though the most senior of them all was the owner of the particular *Simba*. These mats were positioned at the periphery, furthest from the door of the *Simba*, in an attempt to achieve privacy, while ensuring that the most public conversations took place at the centre of the *Simba*. The sisters of the young warriors had the duty to fill the water pots inside the *Simba*, and replenish the stock of firewood on a daily basis, to cater for the comfort of the warriors during the night. The deliberate storage of pots and firewood near the entrance of the *Simba* was a sign of the expected bravery from these Luo warriors, and an indication of the fact that no intruder would dare to enter the *Simba* uninvited, with the intention of stealing the possessions of these Luo warriors. **Figure 13** is a vertical section

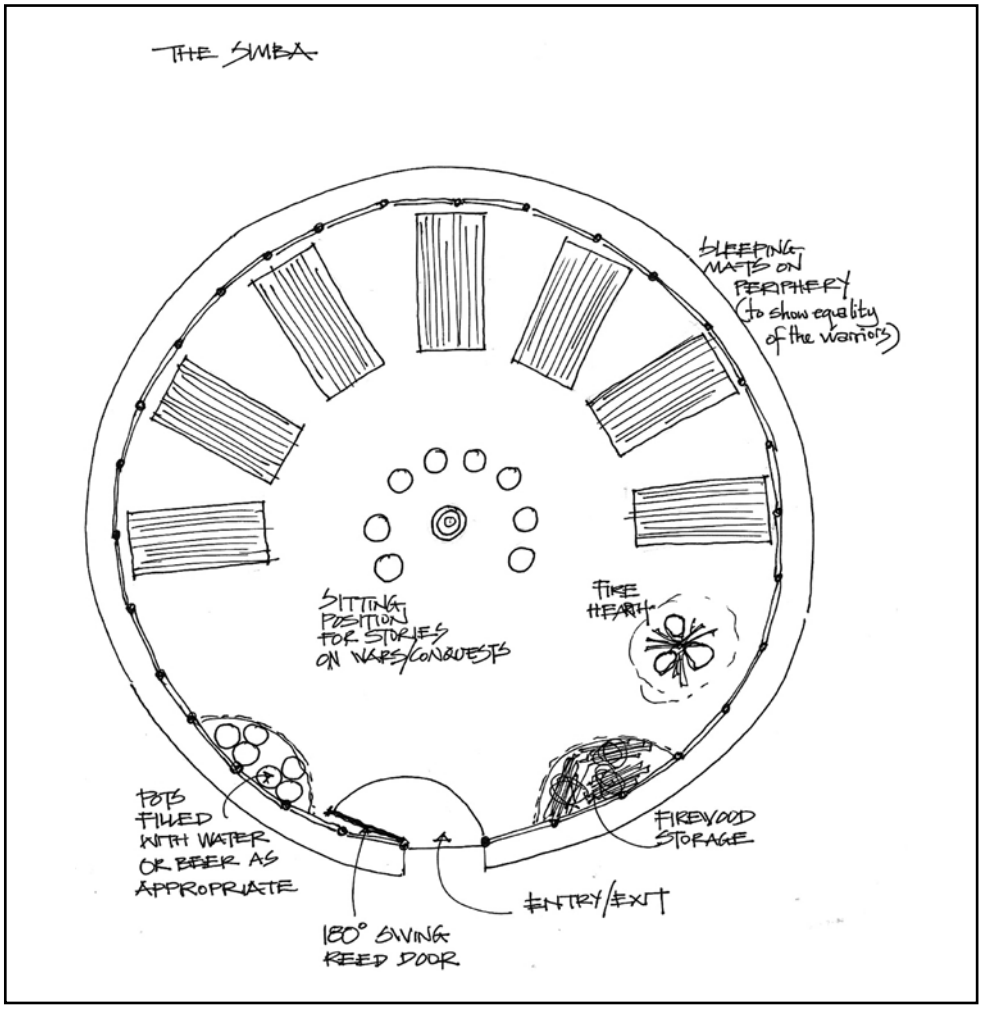


**FIGURE 12**
Reconstruction of spatial appropriation within the *Simba*
**Source:** Author 2016

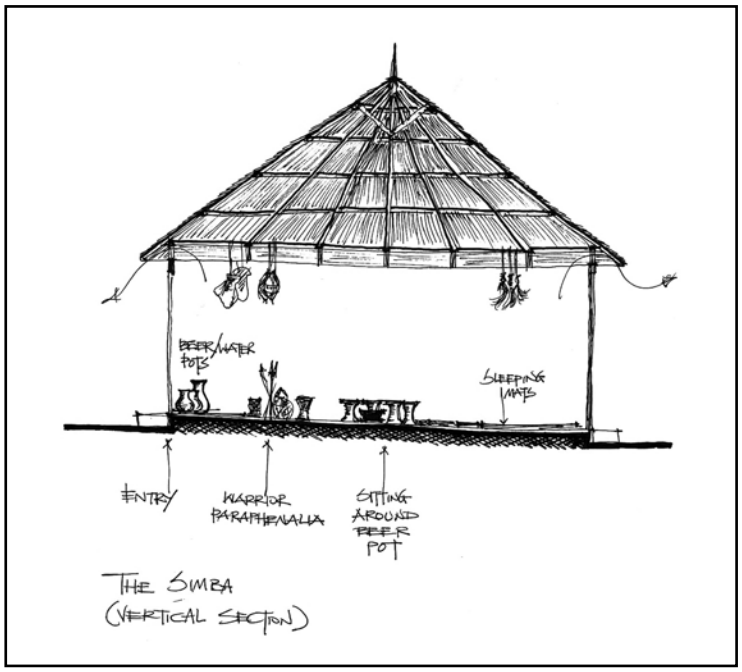


**FIGURE 13**
Section through the *Simba* typology
**Source:** Author 2016

through the Simba, which illustrates the typical items that would be found therein as well as their disposition.

***Pim and Siwindhe***

The *Pim* was an elderly woman (typically, a widowed grandmother) whose hut (*Siwindhi*, *Siwindhe* or *Siwandha*) within a homestead was the sleeping abode of girls and young boys- who could no longer sleep in their parent's huts- within the homestead (Ayot, 1977; Atieno-Odhiambo and Cohen, 1989; Ocholla-Ayayo, 1976). Usually, the *Pim* came from "a considerable social and geographical distance [in order] to enter a particular Luo household" (Atieno-Odhiambo and Cohen, 1989), typically from another (neighbouring) Luo sub-tribe. Through accepting the position of *Pim*, the elderly woman secured her future in order to prevent both social and actual death that would arise from her lack of both food and companionship. She, in turn, would ensure propagation and circulation of societal knowledge (mainly in the form of Luo oral traditions, such as riddles, proverbs, and poetry) that would be delivered as stories and instructions, during the night-time participatory proceedings within the *Siwindhe*, when the 'students' took turns in narrating Luo folklore (*sigendni*), indicating a rich symbiosis within the mutually reciprocal relationship between the *Pim* and the Luo homestead that welcomed her. Thus, "the *Pim* deepened the social and geographical knowledge of the younger Luo", especially the teenage girls who were taught about sexuality, marriage and childbirth.

Although the *Siwindhe* was "usually indistinguishable from other domiciles in the compound, at least from the outside" (Atieno-Odhiambo and Cohen, 1989), its interior portrayed a different spatial appropriation from the rest, due to its function as a 'broader' homestead educational institution, thereby validating it as a unique architectural typology within traditional Luo architecture. Inside the *Siwindhe*, a burning fire was maintained throughout the night to provide warmth to the occupants (Ayot, 1977). The young maidens and children of the homestead were entertained through stories that were narrated by the *Pim*, in the form of *sigana* and *ngeche* (proverbs), as vehicles through which Luo customs and traditional values were propagated, as Luo "philosophy of life" (Ocholla-Ayayo, 1976).

All persons within the *Siwindhe* slept on the floor, except for small children who slept with the *Pim* on her bed (Ayot, 1977), therefore the bed of the *Pim*, also called *Oriri*, was elevated, and made deliberately larger in order to accommodate these young children. The *Pim* was also an accomplished 'physician' within the homestead, who was capable of detecting and treating diseases using herbal medicines, although she did not have the rank or prominence of *Ajuoga* (the diviner). Thus, herbal gardens were typically located at the back of the *Siwindhe*. The *Pim* could also intercede with the ancestors on behalf of the homestead dwellers, and was therefore respected and revered within the homestead that took her in.

Every night, the *Pim* would "examine the dresses and ornaments" of all the girls in her charge (Ndisi, 1974), to ensure that they did not violate community customs

and prohibitions with regard to chastity; values that were cherished and propagated within this girls' dormitory (Ocholla-Ayayo, 1976), which served as a compulsory "institution for cultural tradition and social preparation". The *Pim* always ensured that the *Siwindhi* lessons would only commence after the interior of the *Siwandha* had been arranged as "a full preparation for retirement to bed". The *Pim's Siwandha* was divided into various sleeping zones, namely: teenage girls' area; the area for boys aged between 7 and 13; and the area for girls aged between 7 and 13.

The position and role of the central hearth inside the *Siwandha* was deliberate, with the aim of preventing the occupants of the different sleeping zones from trespassing into other 'forbidden' sleeping zones, thereby enforcing internal separation, in addition to providing the requisite warmth for occupants. The *Siwandha* occupants who deliberately absented themselves from the proceedings of this institution would be "punished by making them tend [to] the "perpetual fire" [within the *Siwandha*] that never got extinguished till the death of the old instructor, *Pim*". The deliberate positioning of the teenage girls sleeping abode near the entry of the *Siwandha*, allowed them to occasionally leave the hut, on some nights- upon being granted permission by the *Pim* (Ocholla-Ayayo, 1976) - in order to participate in *Chode* (courtship) activities with their boyfriends, within their *Simbni*, that were located in far flung homesteads. This positioning also ensured that there would be minimal disruption of the *Siwindhi* activities upon the return of these girls before dawn, without waking up the other occupants of the *Siwandha*.

As the eldest and most vulnerable person within the *Siwandha*, the *Pim's* sleeping area was positioned furthest from the door, in order to protect her from any harm or attack by 'unwanted' people, including thieves, enemies and *Jojuogi* (witchcraft practitioners), as well as wild animals. **Figure 14** illustrates the spatial appropriation and adjacencies within a typical *Pim's Siwandha*, while **Figure 15** is a vertical section indicating the items therein.

The story-tellers (narrators) were located centrally within the hut, nearest to the hearth. This encouraged other children and teenagers within the *Siwandha* to volunteer for story-telling activities, in order to gain favour by being accorded this privilege of momentary recognition, and personal comfort through proximity to the hearth's warmth. The water pot and firewood stock were positioned next to the *Pim's* bed because she was in charge of the *Siwandha*, and it was incumbent upon her to ensure- using her own judgement and experience- that the fire from the hearth was always under control (that is not too large to endanger the occupants, and not too small for the occupants to gain sufficient warmth).

The veranda of the *Pim's* hut was a necessary but optional addition to this typology. This veranda allowed the *Pim* to interact socially with other women within the homestead, who could not normally be allowed beyond this point, except under emergency situations, such as the *Pim* being taken ill or her eventual death. The *Pim's* veranda, as a transition space, thus allowed the *Pim* to converse routinely with these women whenever they brought her food or inquired about her health or sought her advice regarding any pertinent matters in the homestead.

***Lar, as the courtyard within the homestead***

The *Lar* was a multifarious community space within any given Luo homestead whose functions increased in magnitude depending upon the size of the homestead itself. Within the *Ruoth's Lar* (tribal Chief's courtyard) was an elder's court which adjudicated land disputes, and sometimes delivered verdicts regarding land conflicts between neighbouring clans, and these could often be based on the outcomes of bull fights within the courtyard, and the clan that owned the losing bull would be required to forfeit their land (Ayot, 1977), within these archaeological relics. During such an undertaking, the courtyard became a place of performance whose size had to be sufficiently large to allow for the presence of villagers (settlement dwellers),

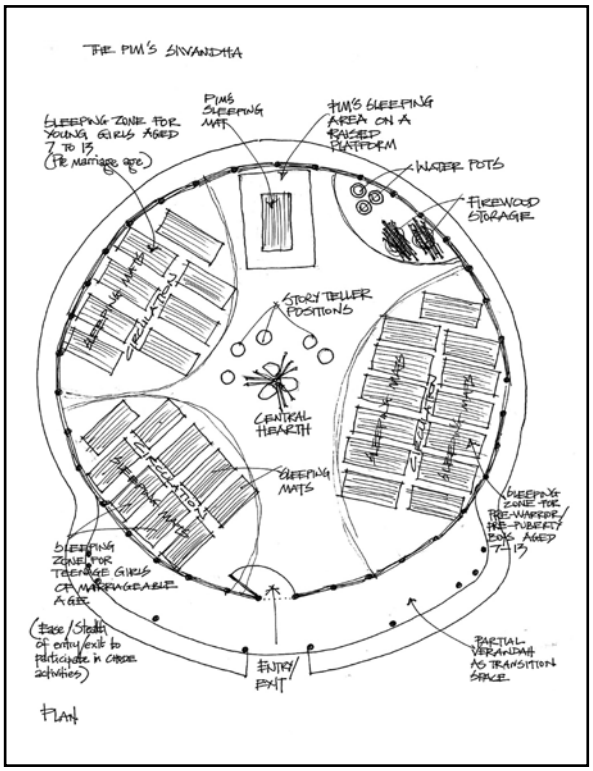


**FIGURE 14**
Reconstruction of spatial appropriation within the *Pim's Siwindhe*
**Source:** Author 2016

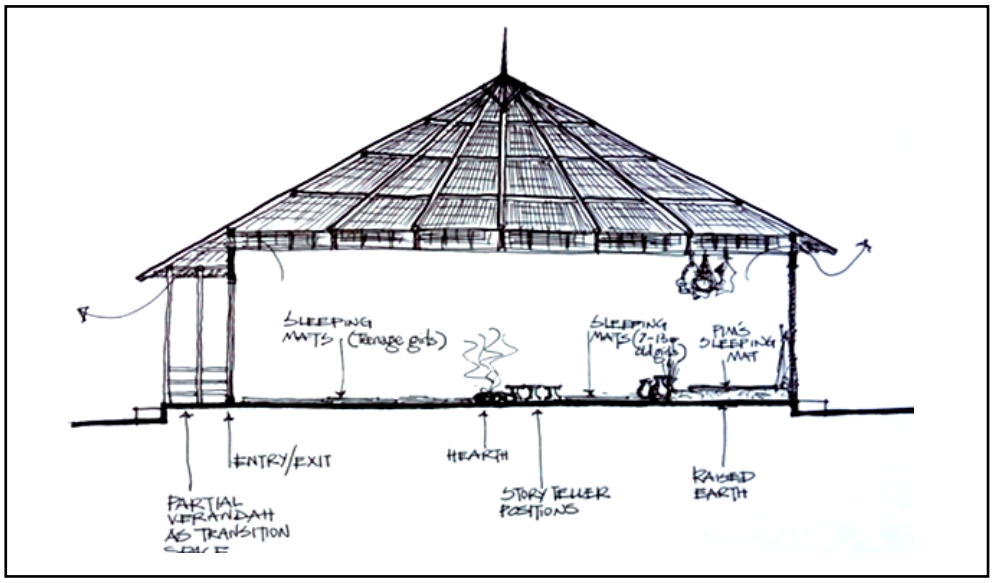


**FIGURE 15**
Section through *Pim's Siwandha*
**Source:** Author 2016

as participants, as well as other onlookers.

At the individual homestead level, the *Dipo Dhok* (cattle kraal) was a key feature within the courtyard, and it was typically located near the centre of the homestead, and the number of cattle (livestock) was taken as a measure of the homestead's wealth and power (Ojoo, 2010; Steyn and Roodt, 2003). Calves were separated from their mothers by keeping them in a separate enclosure within the kraal, or within the wives' huts, for additional care and safe keeping during the night (Ayot, 1977). Goats and sheep were enclosed within small huts that were known as *abila*. During extended periods of drought, members of the Luo community drew blood from these cattle, which would thereafter be mixed with milk and ghee from the same cattle to prepare a dish called *Remo* (clotted blood), which would be preserved for future cooking- in small amounts- by the community, and this was an effective method that ensured community survival through the drought. During extended periods of famine, the hides and skins of these cattle could also be cooked in the homestead *Lar* (courtyard), and eaten, by all the members of the homestead.

Many homesteads had single gates (for access), and had circular or oval shapes in plan, and their perimeters (boundaries) were secured by fencing. The courtyard, as a place of performance, was where the members of the community would be summoned by the *Ajuoga*, in situations where witchcraft was involved, and divination and atonement rituals were needed to counter or dispel its 'undesirable' effects. The 'good' climate facilitated the undertaking of outdoor activities within the *Lar* (courtyard), with adequate natural daylight, while also permitting natural airflow for cross ventilation of habitable spaces through aerodynamic wind action (from the door of the hut and out through the eaves as permanent gaps between the circular wooden 'ring beam' and the thatched roof).

The *Lar* was critical to the homestead as a place of music festivities and social gathering, during ceremonies such as significant rites of passage, including marriage, and *tero buru*, in death. Architecturally, the porous courtyard was the main organising principle of the homestead, providing both unity and adequate separation for the visual forms therein. Being an ambiguous space that portrayed a dual nature: being bounded by the euphorbia hedge, and yet porous through the multiple exit gaps (spaces), as well as entries into the dwelling unit. Thus, it underwent continuous transformations due to the dynamic and spontaneous nature of the activities that were always hosted within it.

## CONCLUSION

In this study, *Thimlich Ohinga* and *Gundni Buche* archaeological relics of the Luo cultural landscape- and the typical homesteads within them- were presented, analysed and re-interpreted through novel methods of architectural reconstruction that included speculation, conjecture, addition and insertion that was anchored in Luo cultural ecology and philosophy of life, thereby achieving the research intentions and objectives that were outlined in the introductory part of the study. The existing research gap between the great migration and eventual settlement of the Luo in their present location, as *lacuna*, was filled through explication of the architecture of the closely packed, dense and enclosed homesteads within these archaeological relics. Issues of identity and constancy rather than change were also addressed.

In recognition of the fact that interpretation is a continuous iterative process, deeper archaeological excavations and multidisciplinary collaborations are recommended in order to achieve even denser multi-vocal understanding of the architecture of these archaeological relics. The focus on interpretation rather than accurate documentation- which has been extensively undertaken by past researches- is timely, providing direction for future studies of Kenyan indigenous (tribal) architecture, as well as enabling the modern Luo populace to pursue architectural 'modernisation' that takes cognisance of their rich cultural traditions, in order to bring deeper meaning into the present and future architecture of the region.

This study also provides a basis that can be relied upon in future identification and exposure of new architectural typologies, functions, concepts and perceptions in the critique of built forms and settlements of other indigenous communities (tribes) in Kenya, which is long overdue, and this will provide a "reliable database" (Steyn, 2003), for Kenyan vernacular (traditional) architecture that can provide inspiration for future praxis and pedagogy. This will provide further direction for future analysis and comprehension of the 'vast' indigenous Kenyan architectural heritage, through holistic methods of cultural inquiry, including the provision of identity, legitimacy and purpose to Kenyan vernacular architecture.

***Opportunities for further research***

Although *Gundni Buche* and *Thimlich Ohinga* relics of traditional Luo settlement were presented and re-interpreted within this study, further multi-disciplinary collaborative investigations involving elaborate archaeological excavations are required (Steyn, 2011), in order to present more material that can yield an even denser re-interpretation of these artefacts, through the lens of critical research within the humanities disciplines (Eyo, 1990; Drewal, 1990; Odede, 2009).

An inquiry into conservation strategies of selected traditional Luo built forms is therefore pertinent- including preservation, where appropriate- of key cultural and architectural artefacts of the Luo (and this includes the knowledge that is embodied therein), such as *Thimlich Ohinga* and *Gundni Buche* - for future generations, in order to prevent loss, decline or extinction (Ayot, 1973; Odede, 2009).

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Africa HABITAT REVIEW

# Effects of Informal Land Development on the Urban Environment:

*A Case Study of Langas in Eldoret Municipality, Kenya*

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**Abstract**

*Majority of urban residents in sub-Saharan Africa live in slums often characterized by deplorable housing conditions. Informal settlements are not homogeneous and the dynamics which explain such informality vary from country to country. This paper attempts to unravel the origin of urban informality in Eldoret Municipality, western Kenya. Further, the paper discusses how the informality in land development affects the urban environment. The study used Langas, a low-income estate in Eldoret municipality as a case study. The assumption made is that Kenyan policies provide for planning and development control to guide urban development. Informality can therefore be occasioned by failure to adhere to such plans, or weak development control on the part of responsible authorities. This paper seeks answers to two questions: First, what explains the vacuum in development control? Secondly, how does the absence of development control affect the urban environment? The study relied on secondary data sourced from the review of literature and primary data obtained through observations, questionnaires administered on household respondents, key informants and focused group discussions. The analysis of the data shows that there is no policy provision for planning and development control in the rural areas including the urban fringe. When former rural areas are incorporated into the urban zones, the informality tends to persist because reorganizing such settlements requires reconstruction, and displacement, a move often viewed as costly and socially unacceptable. It is recommended that policy makers subject all areas of the country to planning and development control.*

Key Words: Effect, environment, informal, land development.

## INTRODUCTION

Informal settlements comprise of low quality houses that lack adequate infrastructure and social services. Although housing outside the planning process help individual households solve their shelter problems, evidence suggests that informal settlements exert tremendous public costs, particularly once they make up a large part of the city; and many of these costs are environmental. Informal settlements are, therefore, a reality confronting cities in developing countries, and efforts to formalize the informal sector have largely been unsuccessful.

Formalization processes have often destroyed livelihoods and shelter, and have exacerbated exclusion, marginalization and poverty in the cities of developing world. For urban planning in developing countries to be relevant and serve the greater good, it must identify innovative ways of dealing with informality, given that informal settlements are often the norm rather than the exception (Fekade, 2000; Njoh, 2008; Ayonga, 2012; Home, 2012). However, such innovative approaches would also be dependent on whether the causes of such informality are understood. The effect of such informal developments on the environment and people's lives should be documented as well if appropriate action has to be taken.

## RESEARCH METHODS

This paper interrogates the development processes that generate informal settlements in urban areas. In particular, the paper envisages to find out why the efficacy of zoning and development control processes in regulating urban development are wanting. In the same connection, the paper envisages identifying key environmental issues that are affecting informal settlements. This paper is based on a study carried out in Langas, an urban slum in Eldoret municipality, Kenya, less than 10 kilometres from Eldoret town. Eldoret town is located in the Rift Valley Province, about 330 kilometres North West of Nairobi. Eldoret,is the headquarter of Uasin Gishu County and it is one of the fastest growing urban areas in Kenya. Langas falls under high density, low-income areas of the Eldoret municipality.

In order to find out the historical genesis of informality in the Langas settlement, related literature was

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reviewed. Secondary data was particularly obtained from published literature related to the history of Langas area and the development process that created informality. In this connection, Musyoka (2004) was very useful. The various legislations in the form of Acts of parliament such as the Physical Planning Act Cap 286, the Government Lands Act Cap 280 (now repealed), and the Land Control Act Cap 302 (now repealed) that provided for planning and development control in the urban areas were also examined. The Environment management and Coordination Act of 1999 that provide for a clean and healthy environment was also assessed to ascertain why the environmental condition in Langas is wanting. An interview schedule was administered to a sample of key informants who included the chairperson in charge of Langas estate. These interviews were aimed to corroborate or cross check the validity of the data collected from secondary sources regarding the genesis of Langas informal settlement.

Random interview surveys were conducted among the residents of Langas to ascertain the overall view of informality and the environmental challenges that accompany such informalities. Observation and photographic techniques were employed to record information on housing structures, solid waste management, water supply, accessibility, congestion/ overcrowding of households and state of surface water sources. This source of information helped in determining the nature of environmental problems in Langas. Questionnaires were used to collect household data such as the nature of environmental problems affecting residents of Langas, the state of the environment over time, and their views on the amelioration of the deteriorating environmental condition.

Data collected from questionnaires and interviews was analyzed through discussion, explanation and description of the study findings, and presented through, bar graphs, pie charts, photographs and narrations.

**Informal settlements in developing countries and Kenya: a review of theory and practice**

Studies indicate that more than half of the population in the urban areas of less developed countries are living in congested shanty settlements, where sanitation, waste disposal, health and education services are scarce (UN Habitat, 2001). At least one third of those living in Nairobi, Dakar, Rio de Janeiro, Delhi, Dacca and Manilla are slum dwellers who lack access to even basic urban services. The World Bank estimates that the number of urban poor will almost treble to 1500 million by the year 2025. At least 600 million people, most of them poor, already live in health-and-life threatening situations in decaying urban environments. Yet, about 250 million urban residents have no ready access to safe piped water and 400 million do not have adequate sanitation (UN-Habitat, 2001).

The proportion of urban dwellers living in informal settlements is higher in Africa than any other part of the world. A staggering 62.2 per cent of the urban population in sub-Saharan Africa live in slums, while, in contrast, 14.5 per cent of North Africa's urban population reside in such settlements. The situation in Kenya is similar to what is happening in the rest of sub-Saharan Africa. The mushrooming of informal settlements in Kenya has overwhelmed the environmental health resources. Consequently, informal settlements are characterized by poor environmental conditions that predispose their inhabitants to poor health outcomes.

The spread of informal settlement has been described as an emaciation of normal urban growth processes under historically unprecedented conditions. It is observed that rapid rates of urbanization have increased the rates of rural-urban migration, most of who reside in slums and informal settlement. According to Musyoka (2004), most land for urban development, especially, that occupied by the poor, is supplied and developed outside state regulatory framework. As a result, most land for urban development has been supplied through alternative channels that evade planning in the development process. The physical planning Act Cap 286 of 1996 provides for planning in all land tenures, however, the Act came into force when development had already taken place. Musyoka (2004) explains that actors in the informal land delivery systems are of the view that the procedures for obtaining subdivision and development permission are inappropriate, obscure, costly and slow and bribing officials to turn blind eye to construction that do not meet the required standards.

***Origin of informal settlements in the study area: informal in rural and fringe land development inherited to urban areas through urban extensions***

Musyoka (2004) gives an account of informal land delivery and how it led to urban informality in Langas , Eldoret as below. After independence, the government encouraged Africans to pool their resources and collectively purchase former white settlers' farms. The result was the formation of numerous land-buying groups/companies or co-operatives. Langas area, measuring 1,050 acres or 425 hectares, was acquired in 1965 by a Kalenjin land-buying company from a white settler. The company secured a loan from the Agricultural Finance Corporation (AFC) using the title to the farm as security.

In 1974 the farm was informally subdivided amongst the shareholders in proportion to each member`s shares. Each member was issued with share certificates but, many opted to sell their plots and this became

the beginning of housing development. Owing to its proximity to Eldoret town, Langas area attracted low-income housing developers, leading to further subdivisions that continues to date. Estimates show that there are over 3,000 plots in Langas, and none of them are titled (Musyoka, 2004).

According to Musyoka (2004), initial land subdivision in Langas took place while the farms were outside the municipal boundary under the jurisdiction of the Land Control Board. During this time, the Town Planning Act (GOK, Cap134) provided for planning and control of land within municipalities and townships, and since Langas was then under freehold tenure located outside the municipal boundary of Eldoret it was excluded from planning provisions. The Municipal authorities had no powers to control development in the rural areas because they had no jurisdiction over such areas.

Rural areas were under the jurisdiction of Land Control Boards which was concerned in promoting agriculture in rural areas and not land use planning (Ayonga and Obiero, 2009; Ayonga, 2012). As a result, land in Langas was subdivided informally into smaller plots and development took place without control. The subsequent expansion of the municipal boundary over the years incorporated development hitherto situated outside the city into the city system including Langas. The incorporation of unplanned rural land into the urban can be seen as the genesis of informality in Langas. This state of affairs have been reported in other cities as well (Fekade, 2000; Home, 2012; Ayonga, 2012; Musyoka and Musoga, 2015).

***What then did planning do?***

Planning intervention in Langas came into place when the area had already been developed. Part V, section 29(a-d) of the physical planning Act Cap 286 of 1996 empowers local authorities to control the use and development of land and buildings in the interests of proper and orderly development of its area. Conflicts certainly occur during the processes of informal subdivision and development. Houses built on power line way leaves in Langas have been demolished and those affected by upgrading may have little choice but to move their walls and fences as directed by the road engineers. Many professionals regard the irregularity and/or non-conformance with planning standards of the layout of informal subdivision as unacceptable, seeking to re-plan them during upgrading or refusing to install services (Musyoka, 2004).

There has been a series of adaptations on the part of both sub dividers and the authorities which demonstrate on the part of the sub dividers a willingness to comply with the requirements, when they seem reasonable, and on the part of the local authorities, recognition that flexibility can lead to regularization, enabling a degree of control to be exercised over construction and revenue to be generated (Musyoka, 2004).

During upgrading, especially in the lower density area of Langas, it has been possible to negotiate with plot owners to move their boundary fences to improve access and even to agree on the release of sites for public facilities. Musyoka (2004) explains that to achieve infrastructural installation and titling, formal sector actors scaled down planning standards to accommodate existing development in Langas. Plot owners needed conventional services, while the Eldoret Municipal Council (EMC) and government departments needed the cooperation of plot owners to implement upgrading policies. Similar negotiations preceded the planning of phase 2 for upgrading Langas. Often, political relationships reinforce these processes of negotiation. Politicians and inhabitants of informal settlement need each other, the introduction of services in Langas is partly a result of local politicians, who have to protect their support base (Musyoka, 2004).

***The nature and origin of environmental challenges in informal settlements: towards a conceptual framework***

All informal settlements face a host of environmental health and sanitation problems. In most informal settlements, solid waste and refuse are disposed in open spaces available in these areas. The disposal of liquid waste is mainly through pit latrines and other on-site methods, which are shared by a number of families and are the source of considerable pollution. Uncontrolled development is causing physical disorder, uneconomical land utilization, and excessive encroachment of settlements into good agricultural land, environmental degradation and pollution risks.

It is observed that the majority of urban dwellers, especially those living in informal settlements have no access to basic services like sanitation, potable water, waste disposal, health and educational services. This is attributed to limited financial resources, poor management at local and central government level, rural-urban migration and high unemployment. It is observed also that governments find it difficult to send social and economic infrastructure/services to informal settlements due to lack of space and accessibility. This has contributed to inadequate infrastructural provision and environmental degradation.

Solid waste management is one of the fundamental problems faced by the residents of informal settlements. The problem is even more severe in the informal settlements that are too congested because there is no provision for adequate roads for the responsible local authority to collect garbage. Due to the lack of established collection points, piles of garbage are scattered in and around residential areas, which leads to environmental, and health problems. Most of the

informal settlements are characterized by high housing densities which make natural seepage of storm water more difficult due to a high share of sealed land. Flooding which results in the overflow of pit latrines and septic tanks is also a major cause for pollution of water sources. Due to the non-existence of drainage systems, storm water creates big puddles that become breeding places for mosquitoes, which is the cause of malaria.

Lack of access is one of the most common problems caused by and experienced by residents in the informal settlements. Because there are neither the layout plans nor the regulatory machinery, residents tend to build to almost 100 percent of their plot size. It has become impossible to provide access roads to these areas as there is no space for this. Likewise, no area is left open for social services like schools, hospitals, children's play grounds. Consequently, people and service movement in these areas is very restricted and residents have to walk long distance to obtain services like health, education, transport and the like. The problem is usually severe in cases of emergency such as fire where fire engines are unable to access the areas due to narrow roads or non-existence of roads.

## RESULTS

### Environmental problems prevalent in Langas: what the study established

Land delivered through informal channel that evades planning tends to be lower quality in terms of service provision (Musyoka, 2004). This is because there is no provision for services like way leaves, dumpsites and road reserves in which other services follow along such as water supply and drainage. Because of failure of planning, environmental problems associated with informality are bound to occur once the area is settled.

From the results obtained from the field, the problems that were identified according to the way households perceive their environment are poor solid waste management, poor liquid waste management, congestion and inadequate water supply (**Table 1**). For purpose of this study, solid waste refers to polythene bags, food remains from the households and liquid wastes are wastewater from washings and from houses.

The main environmental problems prevalent in the study area are:

***Lack of designated dumping sites result in poor solid waste management***

Polythene bags and food remains seem to be the main wastes in the study area. Polythene bags can be a breeding place for mosquitoes thus causing malaria while food remains also result in environmental related diseases. The Eldoret Municipal Council efficiency in the collection of wastes is not satisfactory, leading to heaps of uncollected solid wastes. UN-Habitat (1996) found out that the poorest area of any city are mostly the worst served by the garbage collection service or not served at all. This is because such areas have no areas set aside for dumping and the roads are too narrow to facilitate efficient connectivity within the settlements. This again is as a result of lack of planning and development control. **Table 2** gives a summary of how solid waste was disposed off in the study area.

The resulting problems are obvious, the smells, the disease vector and pests attracted by garbage and the overflowing drainage channels clogged with garbage. In addition, aesthetics of the area is compromised when solid wastes are scattered all over contradicting the goal of providing clean and healthy environment for all as contained in the Environment Management and Coordination Act (EMCA) of 1999.

**TABLE 1:** Environmental problems as perceived by residents of Langas

| Environmental problems | Frequency |
|---|---|
| Poor solid waste management | 20 |
| Poor liquid waste management | 3 |
| Congestion/overcrowding | 16 |
| Inaccessibility | 12 |
| Inadequate water supply | 15 |
| Flooding | 19 |

**Source:** Field survey 2012

**TABLE 2:** Modes of solid waste disposal in the study area

| Types of waste | Frequency |
|---|---|
| Burning | 15 |
| Dumping | 2 |
| Throwing any how | 3 |
| Composting | - |
| Total households | 20 |

**Source:** Field survey 2012

***Congestion/overcrowding***

Congestion in the study area was evident, and can be attributed to the fact that the area developed initially without a formal plan. Houses are very close together, though the study did not look at the number of occupants per unit. Most of the houses are attached to each other in a line, the reason being entirely maximization of space by house owners for more profits. Given that, waste disposal methods and sanitation are inadequate, such dwellings and their occupants are vulnerable to infections.

This is attributed to the fact that these houses came up

informally and were not subjected to building standards. Congestion increases the incidences of infectious diseases, mainly through a greater opportunity for the spread of infection. It further says that social stress due to overcrowding produce psychological disturbances that in turn increases susceptibility to diseases. Apart from that, overcrowding also results in lack of privacy among household members.

***Inadequate water supply***

Although water supply is not a major problem in Eldoret, tap water is not accessible to most of the households in Langas; water is made available by water vendors in various water kiosks and wells. The boreholes in Langas are sunk in unhealthy environments such as, between households or near collapsed buildings. This often results in contamination of water sources thus leading to diseases such as typhoid, cholera and diarrhea.

In Langas residents pay between Ksh 10-50 per 20 litre jerican. It appears therefore that low-income groups pay more for water as they resort to other sources of water that are unsafe for drinking (**Table 3**).

***Inaccessibility***

Lack of access is one of the most common problems caused by and experienced by residents in the informal settlements. Because there are neither the layout plans nor the regulatory machinery, residents tend to build to almost 100 percent of their plot size. It has become impossible to provide access roads to these areas, as there is no space for this. While many of the subdivision in Langas are orderly, some are not and the resultant subplots and circulatory systems are irregular, with some plots lacking access (Musyoka, 2004).

**TABLE 3:** Sources of water for household use in Langas

| Types of waste | Number of households |
|---|---|
| Tap water | 5 |
| From river | - |
| From well | 13 |
| Water vendors | 2 |
| **Total households** | **20** |

**Source:** Field survey 2012

## DISCUSSION

This paper set out to identify the development approach that resulted in creating informality in Langas. The study established that much of development took place when Langas was outside Eldoret municipal boundary. During this time the Town planning Act Cap 134 provided for planning and control of land use within municipalities and townships and planning and control of land use in all government land outside municipalities. This means that development in Langas which was by then a freehold land tenure outside the municipal boundaries took place without planning. Consequently, the subsequent expansion of the municipal boundary incorporated development in Langas which then was outside the city but was not planned. This was the genesis of informality in Langas.

The paper also sought to find out why development control is ineffective in the area. The study established that despite the enactment of Physical planning Act, Cap 286 of 1996 that provides for planning and control in all land tenures including Langas, development control in Langas has been ineffective because the areas developed without initial planning. Although planning was done, after it was absorbed into the municipality, planning at this stage is reactive rather than proactive, since much of the existing development is accommodated or formalized in the end (Musyoka, 2004; Home, 2012; Ayonga, 2012). What has been done is negotiation for formalization because of conflicts, political negotiations between the developers, the county authorities and the politicians who want votes from the developers. Formal actors scale down the standards in order to accommodate existing development and to raise revenues in order to meet its obligation of providing services.

## CONCLUSION AND RECOMMENDATIONS

Urban development in transitional countries is characterized by massive informality and some of these informalities are as a result of policy inertia where some land tenure systems are not subjected to planning and development control. For example rural areas are not subjected to planning and development control in Kenya. When such areas are incorporated into the urban proper, the informality tends to persist. Residents of the informal settlements, however, live in deplorable conditions which subject them to health hazards. It is recommended that policy makers subject all areas of the country, including rural areas to planning and development control. Secondly, governments should take bold steps to reorganize informal settlements through urban renewal and reconstruction and provide essential services to such settlements.

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Africa HABITAT REVIEW

# Establishing Evolution in Connectivity of Public Open Space in Nairobi CBD (1963-2015)

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**Abstract**

*Public open spaces play a significant role in the life, form, and experience of cities. Urban growth means increased numbers of people require access to public open spaces. Multiple public open spaces in Nairobi's Central Business District (CBD) are under-utilized, not fully performing their role as areas for commerce, transportation, and recreation. There is therefore a dichotomy comprising the need for adequate public open spaces on one hand, and the non-optimized use of existing public open spaces on the other. The overall research from which the paper is derived investigated fifteen public open spaces in Nairobi CBD. This paper is focused on connectivity, which is a variable of the built physical environment. Connectivity is the capacity of connections to carry people or vehicles to and from a particular destination. It influences the number of people that can access a space through designated linear spatial connectors. Good connectivity provides easy access to public open spaces for pedestrians and vehicles thereby increasing the potential number of users of the space. An observation checklist, interview schedules, aerial photographs, digital photographs, and city maps were used for data collection. It emerged that the number of services in ground floors surrounding the space, the number of connectors to the space, and the number of users of surrounding sidewalks influence the number of users arriving at the space and thus its social sustainability.*

Key Words: Connectivity, public open space, social sustainability.

## INTRODUCTION

In 2008, for the first time in history over half of the world's population lived in urban areas. This is expected to rise to 70% by 2050. Almost all of this growth will take place in developing regions, including Kenya (UN-Habitat, 2009). As cities in developing countries grow they will need to provide services and public amenities for their increased populations including public open spaces such as parks, gardens, and streets. In most cities of the developing world, there are not enough streets, and those that exist are either not well designed or well-maintained (UN-Habitat, 2013). Streets are about connectivity. Streets, highways, roads, and lanes are connectors and providers of access to different parts of the city. This research recognized the need to establish the role of these connectors in access of public open spaces in the CBD. Good access is a contributing factor to increased utilization of public open spaces. Establishing the relationship between connectivity and public open space use helps to determine how public open spaces in the CBD can be made more sustainable.

## THEORY

The theory of evolution and the concept of sustainability have provided the theoretical framework that guided this research. The purpose of studying evolution, however, is to see if an evolutionary perspective can help understand urban change and hence inform future planning and design (Haas, 2012). Several theories related to evolution exist such as the Theory of Inheritance of Acquired Characteristics (or Lamarkism), the Mutation Theory, and Neo-Darwinism (or the Synthetic Theory of Evolution). It is however the Darwinian Theory of Evolution that forms an integral part of the framework for this research.

Darwin's Theory of Evolution was inspired by observation of plant and animal biological life. It is therefore important to establish the links between biological life and cities. An organism can be described as a whole with interdependent parts, likened to a living being. A city can be likened to an organism due to its many diverse, dynamic, harmonious and conflicting parts. These parts are numerous and include spatial, social, economic, environmental, administrative, and political aspects. In order for a city to function there must be a measure of interdependence and compatibility amongst its moving parts. Related to the dynamic nature of cities and their component parts it has been argued that the city can be considered to

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be organic as it seems to have a life of its own (Haas, 2012). In terms of wholeness, a city is both a singular entity and a collection of diverse entities. It is defined administratively as one urban centre that is managed and governed by a county, municipal, or other form of local government. In order for development and services to be delivered to the urban centre, there is need to prioritize, decision make, co-ordinate, and implement guided by the effect that these have on city as a whole. Fragmentation in city development and management often results in inequitable spatial and socio-economic development, non-optimal use of resources, and citizen dissatisfaction.

Similar to living beings, cities are birthed and grow. They can also exhibit illness and die. Since the Mesolithic Era (less than 10,000 years ago) numerous factors have influenced the genesis and endurance of human settlements. These include topography, proximity to water sources, trade and commerce, ease of access, ease of defence, and spiritual, cultural, or philosophical beliefs. From small beginnings, settlements have grown into civilizations that have influenced the politics, economies, and cultures of entire regions. An example is the ancient Egyptian Civilization (c. 6,000BC-400BC) that depended on the Nile as an important natural resource. Its ancient cities included Thebes, Memphis, On/Heliopolis, and Luxor.

Another example is the ancient Greek Civilization (900BC-c.100AD) that pioneered political and administrative systems through democracy and creation of city-states. It also exploited topography to advantage in terms of settlement design and functions. This is demonstrated in the location of the Acropolis in Athens and creation of amphitheatres as civic facilities in each city state. Neither ancient civilization exists today as in the past. Previously important city-states such as Corinth and Argos in ancient Greece have been eclipsed over time in terms of size and significance by cities such as Thessaloniki. Over time, some cities in other ancient civilizations such as Egypt, have degraded and died e.g. On/Heliopolis, while others have persisted and grown e.g. Luxor. These examples illustrate the organism-like nature of cities as creations that constantly undergo spatial, social, and economic birth, growth, decline, and death over time.

Darwin (1859) argued that evolutionary change comes through the production of variation in each generation. Individuals with characteristics which increase their probability of survival will have more opportunities to reproduce. Their offspring will also benefit from the advantageous character, so over time these variants will spread through the population.

It is worthwhile here to establish the link between variation in species to the urban context. This can be achieved through identifying causes of beneficial changes in cities or city neighbourhoods that then get replicated or reproduced in other cities or neighbourhoods. Biological variation and urban changes (variations) can be likened because, as in the case of species, it is often adverse or challenging environmental and contextual circumstances that compel cities to develop systems, structures, plans, modus operandi that benefit the city and make it function better. This is particularly well captured in the realm of governance where administrative, planning, and management systems typically become more advantageous, whether in terms of efficiency or accountability, over periods of time.

In support of the Darwinian principle of variation and selection, public open spaces in many cities including Nairobi are regarded as being beneficial, advantageous and profitable to the city and its citizens as at 2015. Had this not been the case, open spaces would have been fully encroached and built up by now. They would not have been retained and protected by national legislation and local by-laws. There would also be no appreciation for the spaces as demonstrated by their use by citizens. The fact that the spaces have persisted means that they have been 'selected' because of the environmental, social, economic, and spatial benefits that they provide.

Natural selection acts solely through the preservation of variations that are in some way advantageous, which consequently endure. As each selected and favoured form increases in number, so will the less favoured forms decrease and become rare. According to Darwin rarity is the precursor to extinction (Darwin, 1859). It can however be argued that rarity is a precursor to preservation. It is agreed that rare species will be less quickly modified within any given period. However, it is not agreed as suggested by Darwin that these rare species will consequently be beaten in the race for life by commoner species or spaces. On the contrary, because of their rarity and uniqueness, it is expected that greater value will be attached to such species and effort made to preserve them from extinction. This can be likened to practice and attitudes concerning spaces in cities and neighbourhoods for instance. If a neighbourhood has only one large tree in its public park, it is probable that citizens of the neighbourhood will treasure the tree, seek to use it responsibly, and protect it if necessary. The tree is rare and therefore highly valued, making it a feature that is worthy of preservation rather than extinction.

Associations can be made between the theory of evolution and the design, form, and function of public open spaces. Vibrant and well-used public open spaces such as the Piazza San Marco in Venice, Italy (completed in 1100) or Central Park in New York, USA (completed in 1857) have a combination of spatial, social, economic,

and environmental characteristics that contribute to their vitality and good use. Public open spaces such as the aforementioned have persisted and performed as recreational and socially interactive spaces over extended periods of time. According to the theory it would be due to their advantageous characteristics that they have remained relevant, responsive, and attractive to users and therefore survived or in Darwinian terms 'been naturally selected'. The favourable or advantageous spatial characteristics (variations) that enhance performance of public open spaces and indeed their likelihood to survive are retained while unfavourable or injurious characteristics are rejected. Some fundamental spatial elements have therefore remained generally consistent in public open spaces and have contributed to the sustained appeal and vitality of the spaces. Characteristics of such public open spaces are retained or in other words become reproduced or inherited, carrying on those characterstics that increase their chances of enduring as good public open spaces.

According to Darwin (1859), those species that displayed the most traits that were most useful had the greatest capacity for survival through inheritance with the consequent destruction or abandonment of those less fit traits. Unlike Darwin's variation however, not only the advantageous but also the disadvantageous characteristics are passed on in public open spaces over time. Less fit traits are not always destroyed or abandoned; they in fact in some cases get replicated elsewhere. The profitable and the unprofitable are therefore retained in the spaces. Negative characteristics are not 'naturally' or automatically rejected by designers, managers, and users of the space, which is why cities have public spaces that can be improved.

There is similarity in the view of Darwin and urbanist Kevin Lynch (1972) with regards to his observation that the passage of time in the urban environment is experienced through progressive and irreversible change. According to another urbanist, Stephen Marshall (2009), a city is evolutionary in the sense that urban change is gradual, incremental, adaptive, and ultimately transformative. Both urbanists concur on the progressive and transformative nature of urban evolution.

**Sustainability**

Sustainable cities of the 21st Century would have good public spaces, compact urban form, be lively, safe, and healthy cities (Danish Architecture Centre, 2008). Worpole and Greenhalgh (as cited in Shaftoe, 2008) have argued that public space is of central political importance to questions of sustainable, equitable and enriching urban life.

What therefore is sustainability? Indeed, there has been much debate on what exactly sustainability is. Coined in the 1980s, the most widely quoted definition of sustainability is as a part of the concept of sustainable development as defined by the Brundtland Commission of the United Nations. Therein, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (United Nations General Assembly (UN), 1987). The United Nations has defined as economic development, social development and environmental protection as sustainable development goals (UN, 2005).

Cross-disciplinary concepts that are central to any discussion of sustainability include adaptability, evolve-ability, robustness, resilience, regulation, and conflict (West, 2009). What is emerging is that sustainability is about time. Sustainability is a dynamic reality related to the life of a building, town, or community, and change and decay are parts of that reality. It has been posited that sustainability is not something that can be delivered but rather a condition which must be evaluated over time and that which is to be sustained will always be open to question and reinterpretation (Haas, 2012).

No overarching, integrated conceptual framework has yet been developed that can provide a long-term big picture uniting the many highly inter-related themes underlying sustainability. Indeed Fowke & Prasad (as cited in Dimitrov, 2010) observed that not only is there no agreed and accepted definition for sustainability, there also seems to be a resistance to any attempt to determine one. Existing approaches have, to a large degree, failed to come to grips with the essence of the long-term sustainability challenge namely, the pervasive interconnectedness and interdependency of energy, resources, environmental, ecological, economic, social, and political systems (West, 2009).

Many kinds of sustainability exist including environmental, cultural, economic, social sustainability, and business sustainability. By the time of the 1992 United Nations Conference on Environment and Development there was a growing consensus that the concept of sustainability should encompass interrelated ideas drawn from economic, social, and environmental realms. The interrelated nature of these three domains has been referred to as the "three pillars of sustainability." Based on this understanding, the goal of sustainability therefore relates to the interconnectedness of economic, social, institutional, and environmental aspects of society and ecology (Curran, 2009). With regard to the design and form of cities, good urban design is essential for delivering places that are sustainable on all counts: places that create social, environmental, and economic value (Haas, 2012).

As pillars of sustainability and sustainable development, economic sustainability is concerned with the underlying concept of optimality and economic efficiency applied to the use of scarce resources. It involves renewable energy development, minimization of resource depletion and degradation. Environmental sustainability focuses on the stability of biological and physical systems (United Nations Economic Commission for Africa, 2012).

Social sustainability, which is most relevant to this paper, is people-oriented, and seeks to maintain the stability of social and cultural systems, including the reduction of destructive conflicts (UNECA, 2012). It involves access to socio-economic infrastructure and social services and concerns women and youth engagement.

In this research, sustainability is defined as the ability to enhance the vitality, functionality, and/or attractiveness of a public open space while employing resources in a diligent manner. A public open space is deemed sustainable if it enhances its vitality, functionality, or attractiveness while employing resources in a diligent manner. It has four major aspects namely social, economic, environmental, and governance aspects. Functionality is described as the quality of being suited to serve a purpose well. Diligent refers to having or showing care and conscientiousness.

**Public Open Space**

This research defined public open space as space that is under the jurisdiction of a public agency, generally exposed to the natural elements and accessible to all members of the public. Public open spaces may be governed by public agency regulations that dictate terms of operation and rules of use. In this research the units of observation also called the subjects are the individual public open spaces.

**Connectivity**

Connectivity is the capacity of connections to carry people or vehicles to and from a particular destination (Marshall, 2005). This connectivity or number of connections to and from a particular place influences the volume and frequency with which people can arrive at the space. Connectivity is also referred to as permeability. It deals with designated paths of movement in the urban space such as streets, roads, alleys, and lanes. Connectivity influences the number of people that have access to public open spaces through designated linear spatial connectors. These link to the public open space itself or a perimeter roadway enclosing the space. Poorly connected spaces mean that fewer people and vehicles are able to arrive at and therefore utilize the space. Arrival at the public open spaces of the city is influenced by the connectivity of the space as related to the level of penetration of pedestrian and vehicular paths of movement that lead to the space. Jacob (1961) has noted that the problematic parks as public open spaces are those located where people do not pass by and likely never will. She further notes that for good connectivity within a neighbourhood, majority of blocks must be short and streets must be frequent. According to Moughtin, Cuesta, Sarris & Signoretta (2003) finely meshed grids offer different ways to get from place to place within the grid. This is an aspect of good urban form. Coarser and less permeable grids offer fewer ways for movement that is characterized as a less favourable spatial configuration. According to Conzen (as cited in Tisdell, Carmona, Oc, & Heath, 2003), of the elements of urban form that change over time, street patterns tend to be the most enduring. As emphasized subsequently, the number of connector spaces as part of the street pattern, is a significant predictor of the social sustainability of public open space in Nairobi. This is discussed in detail later in the paper.

## RESEARCH METHODS

The research employed was both qualitative and quantitative. It engaged a combination of research methods in order to appropriately respond to its research objectives. Palinkas et al. (as cited in Njuguna, 2010) have argued that mixed research methods are preferable as they provide better understanding of research issues than either qualitative or quantitative approaches alone. Using multi-stage maximum variation sampling, fifteen spaces were the subjects of the main study. The subjects for this research comprised parks and gardens: Central Park, Jeevanjee Gardens, John Michuki Park (also weekday open-air market), and Hilton Hotel Circle; pedestrian accessible roundabouts: Globe Cinema Roundabout and Khoja Mosque Roundabout; car-parks: Sunken Car-park (also weekend open-air market), Supreme Courts Car-park (also weekend open-air market), Kenyatta International Convention Centre Public Car-park, and Railway Go-downs Parking; bus terminus: Kenya Bus Services Terminus and Railways Bus Terminus; promenades: Aga Khan Walk and National Housing Corporation Walk and markets: Wakulima Market.

This research used a qualitative approach in order to establish the spatial evolution of public open spaces in Nairobi CBD from1963-2015 (research objective 1). The qualitative approach relied on description of spatial characteristics. Data was collected using an observation checklist and through review of city maps, digital photographs, and aerial photographs. In order to establish the factors that contribute to making spaces sustainable for 2015 however (research objective 2), a quantitative approach was employed.

The qualitative aspect of this research involved creation and analysis of a series of variable-specific maps. In order to investigate the evolution of each space from

1963-2015 six variables were identified, one of which was connectivity. It was fundamental that these variables could be observed, measured, and compared among the spaces and over the stated period. The variables therefore are all concerned with the built physical environment and natural physical environment. Base maps, figure-ground maps, density maps, land use maps, and 3D models were generated for each space based on aerial photographs, electronic maps, digital photographs, desktop research, and interview responses. Historical written and photographic documentation was also referenced for information on spatial characteristics of the study spaces. This was in response to the first research objective focused on establishment of spatial evolution of public open spaces in Nairobi CBD from 1963-2015.

On the quantitative aspect, research variables were primarily generated by the literature review and used to develop the observation checklist and interview schedules. Using these two research instruments fieldwork data was collected. It was subsequently processed and analysed using Statistical Package for Social Sciences (SPSS). This was in response to the second research objective focused on establishment of the social, economic, environmental, and governance factors that contribute to making public open spaces in Nairobi CBD sustainable.

Through SPSS analysis, four multiple regression models for sustainability were generated, one for each aspect. This paper is focused on social sustainability because this is the dependent (or outcome) variable whose regression model comprises connectivity (number of connector spaces) as one of its independent (or predictor) variables. This indicates that there is a clear relationship between connectivity and social sustainability and a significant link between the findings of the two research objectives.

## RESULTS

Regarding the evolution of spaces from 1963-2015 aerial photographs, hard and soft maps for select years provided the main sources of reference. The average for the variables of connectivity was calculated for the six years. Connectivity of the spaces was measured by the number of streets per metre of space perimetre. Based on the average connectivity of all spaces per year, **Table 1** indicates that the connectivity of the spaces studied increased by 30.8% from 1963-2015. This increased connectivity was observed as having been primarily due to increased construction and resultant higher densities in the areas surrounding the study spaces. Property development according to plot pattern and provision of access paths between buildings surrounding the spaces increased levels of connectivity to the spaces.

**Figure 1** illustrates average connectivity changes for the six years. It indicates an increase from 1971-1998 and a slight decline thereafter between1998-2015.

For further analysis, **Table 2** was generated showing connectivity changes for each of the study spaces. It

**TABLE 1:** Average of all spaces for connectivity (1963-2015)

| YEAR | AV CONNECTIVITY |
|---|---|
| 1963 | 0.013330667 |
| 1971 | 0.016650667 |
| 1978 | 0.017050667 |
| 1998 | 0.017621333 |
| 2003 | 0.017374667 |
| 2015 | 0.017374667 |
| DELTA | 0.0041 |
| % DELTA | 30.80% |

**Source:** Authors 2017

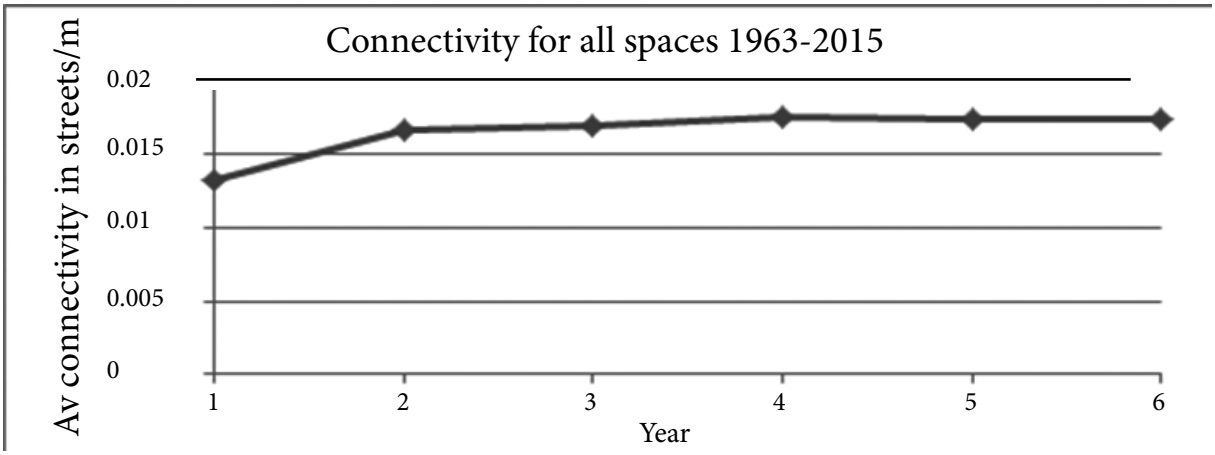


**FIGURE 1**
Graph showing connectivity for all spaces (1963-2015)
**Source:** Authors 2017

**TABLE 2:** Connectivity for individual spaces (1963-2015)

| Study / Space / Variables | 1963 | 1971 | 1978 | 1998 | 2003 | 2015 | 1963-2015 % change |
|---|---|---|---|---|---|---|---|
| **Connectivity (No. streets / m)** | | | | | | | |
| Central Park | 0.00526 | 0.00526 | 0.00526 | 0.00702 | 0.00702 | 0.00702 | 33.5 |
| Jevanjee Gardens | 0.0213 | 0.0213 | 0.0256 | 0.0256 | 0.0256 | 0.0256 | 20.2 |
| John Michuki Park | 0.0111 | 0.0083 | 0.0083 | 0.0083 | 0.0083 | 0.0083 | -25.2 |
| Hilton Hotel Circle | 0.0138 | 0.0426 | 0.0426 | 0.0426 | 0.0426 | 0.0426 | 208.7 |
| Globe Cinema Roundabout | 0.007 | 0.0233 | 0.0233 | 0.0256 | 0.0256 | 0.0256 | 265.7 |
| Fire Station Roundabout | 0.0638 | 0.0638 | 0.0638 | 0.0638 | 0.0638 | 0.0638 | - |
| Supreme Courts Parking | 0.0032 | 0.0032 | 0.0032 | 0.0064 | 0.0064 | 0.0064 | 100.0 |
| NCC Sunken Parking | 0.0059 | 0.0088 | 0.0088 | 0.0088 | 0.0088 | 0.0088 | 35.6 |
| Railways Godowns Parking | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | - |
| KICC Parking | 0.0053 | 0.0053 | 0.0053 | 0.0053 | 0.0053 | 0.0053 | - |
| Railways Bus Terminus | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | - |
| KBS Bus Terminus | 0.0148 | 0.0148 | 0.0148 | 0.0148 | 0.0111 | 0.0111 | -25.0 |
| Aga Khan Walk | 0.0046 | 0.0091 | 0.0148 | 0.0161 | 0.0161 | 0.0161 | 250.0 |
| National Housing Corporation Walk | 0.018 | 0.018 | 0.014 | 0.014 | 0.014 | 0.014 | -22.2 |
| Wakulima Market | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | - |

**Source:** Authors 2017

indicates that most of the spaces experienced increased connectivity from 1963-2015. Percentage increased change ranged from 265.7% for Globe Cinema Roundabout to 20.2% for Jeevanjee Gardens, the oldest of all the spaces. Connectivity for approx. 27% of the spaces remained the same over the period. However, John Michuki Park, Kenya Bus Terminus, and the National Housing Corporation Walk experienced decrease in connectivity of 25.2%, 25% and 22.2% respectively.

The changes in connectivity of each space have been graphically represented in **Figure 2** for the period 1963-2015.

The connectivity maps that follow illustrate the changes in connectivity indicated in the previous tables and figures. Reference is made to pedestrian and vehicular connections to the spaces. The changes in connectivity have been categorized as comparative high increase, mid-level increase, and low increase.

Comparative high increased connectivity (267.7-208.7%) comprising Globe Cinema Roundabout, Aga Khan Walk, and Hilton Hotel Circle.

As shown in **Figure 3**, connectivity increased from 1971-2015 for Globe Cinema Roundabout. This means that the ability of users to arrive at the space increased. The function of the roundabout as a public recreational amenity and its enclosure by a major road with heavy vehicular traffic resulted in creation of underground walkways for safe pedestrian crossing (**Figure 4**). Neglect and poor maintenance have made these walkways redundant due to vulnerability of users to crime and victimization (**Figure 5**). The radial street pattern means that the space is accessible from multiple directions that can influence its appeal to users. It also means that access to the space can be impeded in the event of heavy and fast-moving vehicular traffic.

As illustrated in **Figure 6**, from 1963-1971 Aga Khan Walk (AKW) was a shorter, unpaved path. As at 1978 the path had been paved and extended in length to span from City Hall Way to the north and Haile Selassie Avenue to the south. Due to increase in area of the promenade and number of buildings, connectivity to the space increased from 1963-2015. Increased

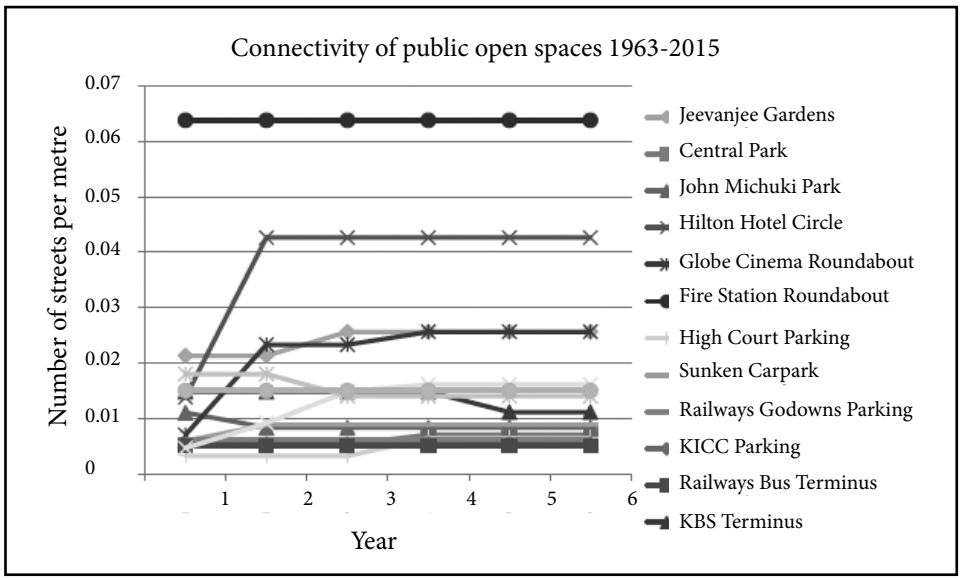


**FIGURE 2**
Graph showing connectivity of individual spaces (1963-2015)
**Source:** Authors 2017

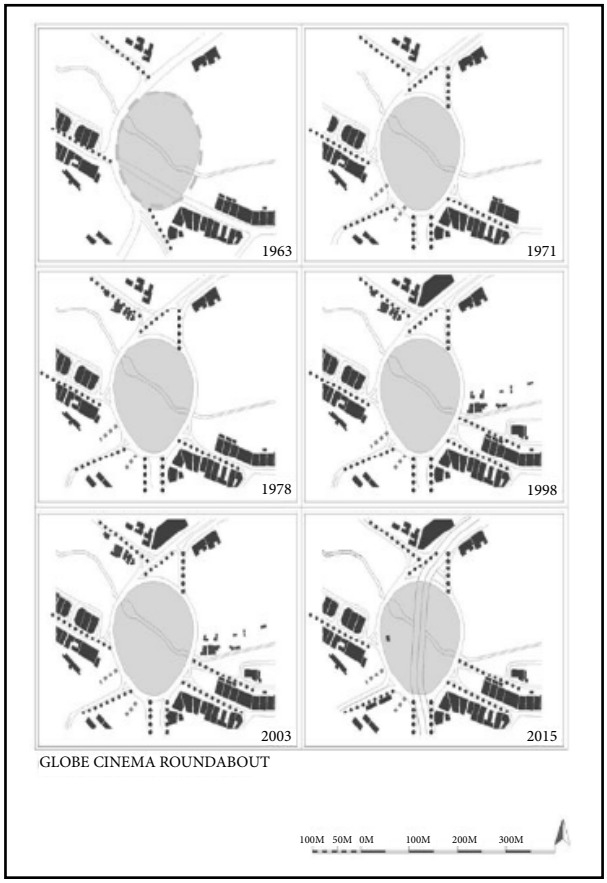


**FIGURE 3**
Changes in connectivity for Globe Cinema Roundabout (1963-2015)
**Source:** Authors 2017

**FIGURE 4**
Traffic on major highway enclosing Globe Cinema Roundabout
**Source:** Authors 2017

**FIGURE 5**
Dark and unkempt underground walkways
**Source:** Authors 2017

connectivity meant an increased carrying capacity of connections and greater number of users arriving at the promenade. Since 1963 there has been increased social and economic vitality in AKW enabled by the increase in connectivity. The space has therefore become more sustainable. **Figures 7** and **8** indicate public amenities and retail businesses that have contributed to this heightened vitality.

As illustrated in **Figure 9**, connectivity of Hilton Hotel Circle increased from1963-1971 but remained the same from 1971 -2015. This consistency over a 44 year period confirms morphologist Conzen's (as cited in Tisdell et al., 2003) observation that out of the basic elements that comprise the form and layout of the city, street patterns are the least likely to change. Most connectors link onto Moi Avenue, a major road enclosing the space to the east (**Figure 10**). Majority of the alleys and secondary streets connecting to the space are in between multi-storied buildings along Moi Avenue (**Figure 11**). Increased building density surrounding the space tends to result in increased connectivity to the public open space.

Comparative mid increased connectivity (100.0%) comprising Supreme Courts Parking.

**Figure 12** indicates that from 1963-2015 the number of connectors to the Supreme Courts Parking carrying vehicles and pedestrians doubled. The construction of Reinsurance Plaza opposite the car park in 1982 led to increase in connector streets (**Figure 13**). This street also links Taifa Road to Aga Khan Walk, accessible by pedestrians only. Connectors and connectivity deal with the carrying capacity of roads, streets, lanes and alleys to a space. An increase in the number of connectors therefore means a greater capacity to bring potential users to the space. More users in the space influence the social and economic vitality and resultant sustainability of the space. This is particularly significant for this public space that is used as a cultural market on Saturdays and Sundays.

Comparative low increased connectivity change (35.6-20.2%) comprising Sunken Parking, Central Park, and Jeevanjee Gardens.

From 1963-1971 the connectivity to the NCC Sunken Car park increased but thereafter remained unchanged until 2015 (**Figure 14**). Increased connectivity meant an increased carrying capacity of connections and greater number of potential users arriving at the car park. These users are pedestrians and vehicles. In terms of numbers of connectors per linear distance, the number of pedestrian-only connectors to the space is higher than that for vehicles.

As captured in **Figure 15**, connectivity for Central Park

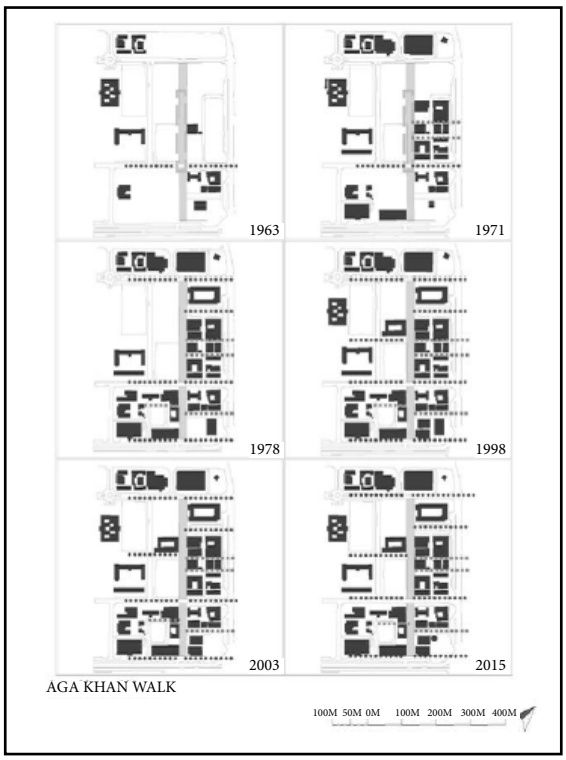


**FIGURE 6**
Changes in connectivity for Aga Khan Walk (1963-2015)
**Source:** Authors 2017

**FIGURE 7**
Hybrid City County of Nairobi public toilet and retail kiosk block model on Aga Khan Walk
**Source:** Authors 2017

**FIGURE 8**
Retail business along Aga Khan Walk lined with benches for recreation and socializing
**Source:** Authors 2017

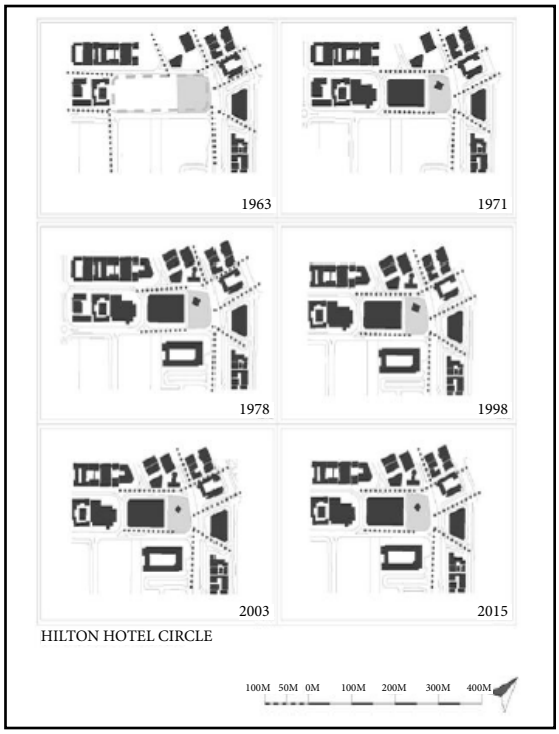


**FIGURE 9**
Changes in connectivity for Hilton Hotel Circle (1963-2015)
**Source:** Authors 2017

**FIGURE 10**
Dual carriageway Moi Avenue bordering Hilton Hotel Circle
**Source:** Authors 2017

**FIGURE 11**
Buildings along Moi Avenue whose densities increase connectivity of Hilton Hotel Circle
**Source:** Authors 2017

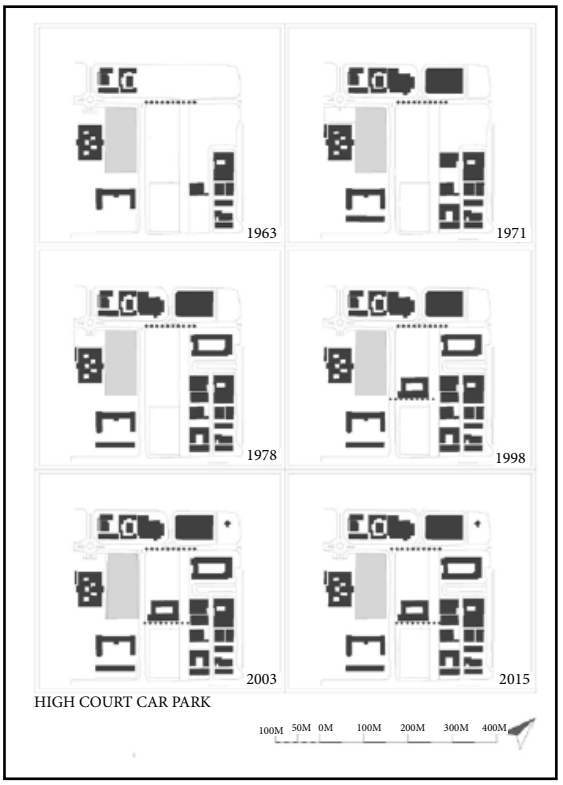


**FIGURE 12**
Changes in connectivity for Supreme Court Parking (1963-2015)
**Source:** Authors 2017

**FIGURE 13**
Taifa Road with Reinsurance Plaza to the left, across from Supreme Court Parking
**Source:** Authors 2017

increased from 1963-2015. Majority of connectors to the park carry both pedestrian and vehicular traffic. Central Park is bordered by Kenyatta Avenue and Uhuru Highway, which are high-traffic dual carriageways. This means that cars cannot stop, drop off or collect people due to the volume and speed of vehicles using the highways. West of the park plots have a back-to-back arrangement meaning access to these plots at the park edge is from Nyerere Road. This plot pattern coupled with the adjacency of plots eliminates the usefulness of connectors being located in-between individual plots. In this instance therefore, the plot pattern influences the presence of connector lanes, alleys, footpaths that would bring potential pedestrian users

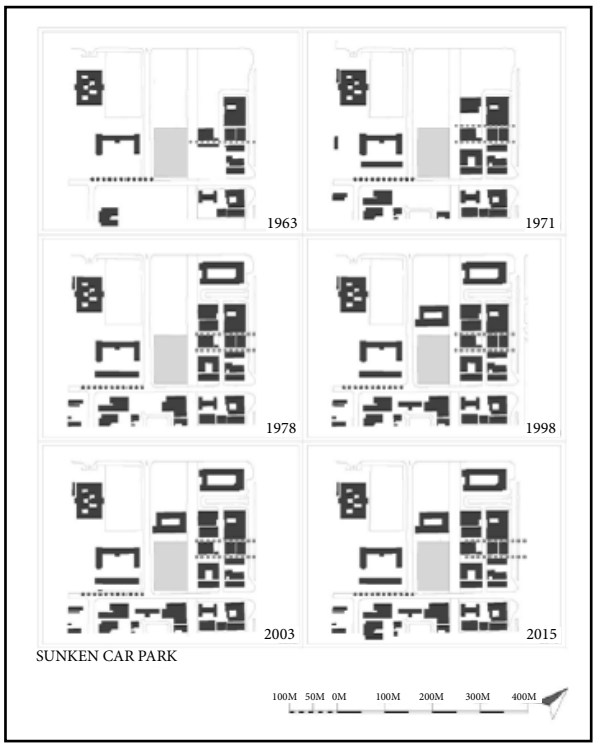


**FIGURE 14**
Changes in connectivity for Sunken Car Park (1963-2015)
**Source:** Authors 2017

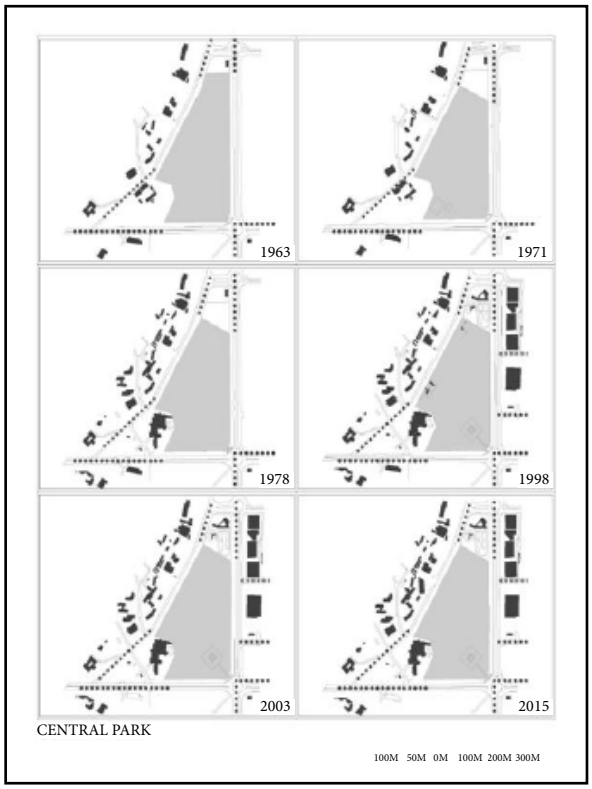


**FIGURE 15**
Changes in connectivity for Central Park (1963-2015)
**Source:** Authors 2017

to the edge of the park. The influence of plot pattern and access also influences the possibility of connectors developing between buildings opposite the park on Uhuru Highway. Without exception, all the buildings surrounding the park have their main entrances and access roads away from the highway on Loita Street that runs parallel to the highway. Connectivity is further hindered by a fence that separates most of these buildings from the highway, installed for security and surveillance purposes.

As indicated in **Figure 16**, there was a slight increase in connectivity for Jeevanjee Gardens from 1963-2015. The park was allocated in 1906 and its boundaries, enclosing, and connecting streets were established early in the growth and layout of the city (**Figure 17**). The number of pedestrian connector spaces however increased from 1963 – 1978. This was due to an increase in the number of buildings facing the park that enabled the creation of lanes and alleys connecting onto Monrovia St and Muindi Mbingu Rd (**Figure 18**). From 1998-2015 however, the number of alleys connecting onto Moktar Daddah St decreased due to development of buildings on previously vacant land. This indicates that increase in number of buildings does not consistently result in an increase in alleys, lanes, and walkways in-between the buildings.

Comparative decreased connectivity (-22.2—(-)25-2%) comprising National Housing Corporation Walk, John Michuki Park, and KBS Bus Terminus.

**Figure 19** indicates that there was a slight decrease in connectivity of National Housing Corporation Walk from 1971- 2015. This was due to the blocking of a pedestrian connector following the construction of National Housing Corporation building along the Walk. As of 1971, NHC Walk was a paved pedestrian only walkway (**Figure 20**). Moi Avenue slip road lined with commercial buildings and on-street parking acts as a connector to NHC Walk (**Figure 21**).

For John Michuki Park, from 1963-1971 there was a decline in the connectivity to the space due to closure of pedestrian access route resulting from construction of a building (**Figure 22**). Combined pedestrian and vehicular access routes however remained the same from 1971-2015. The space is bordered by Muranga Road to the east but there is no direct access from the road to the space because of a change in ground level (**Figure 23**). The block patterns created by buildings adjacent to the park have been retained from 1971, most of which have functioned as warehouses and as the backside of buildings (**Figure 24**). This use as warehouses has been retained since the early 1960 which explains the consistency in connectivity from 1963-2015.

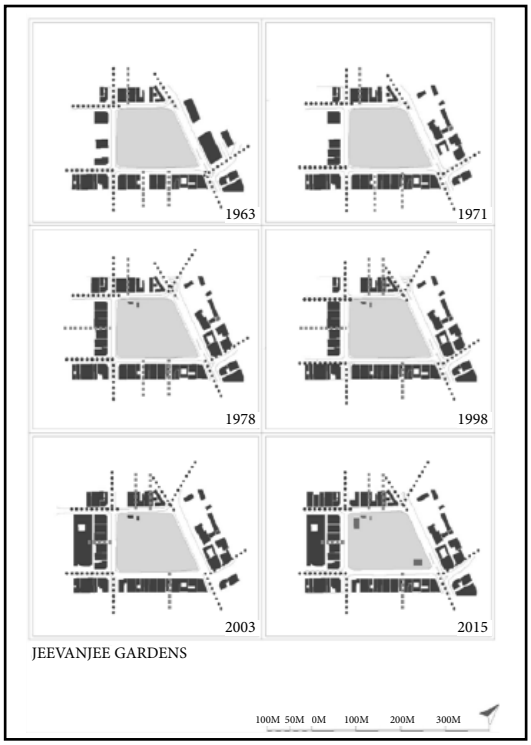


**FIGURE 16**
Changes in connectivity for Jeevanjee Gardens (1963-2015)
**Source:** Authors 2017

**FIGURE 17**
Moi Avenue enclosing Jeevanjee Gardens on the east
**Source:** Authors 2017

**FIGURE 18**
Buildings along Monrovia St to the north of Jeevanjee Gardens
**Source:** Authors 2017

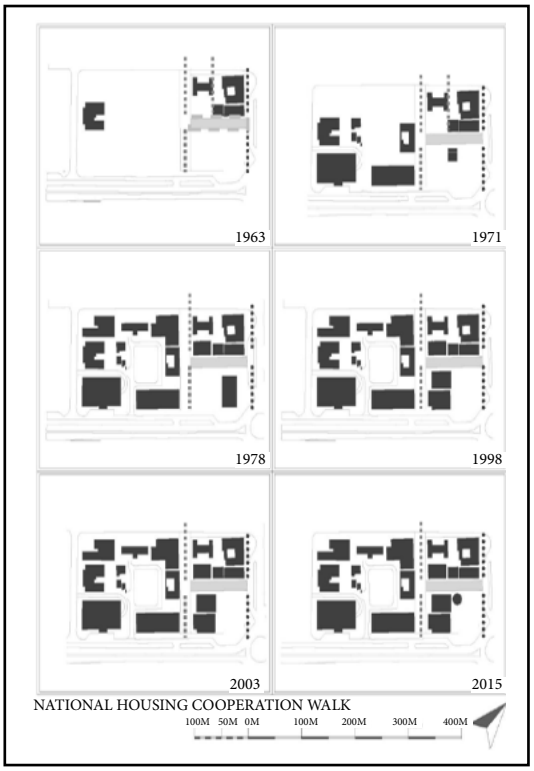


**FIGURE 19**
Changes in connectivity for National Housing Corporation Walk (1963-2015)
**Source:** Authors 2017

**FIGURE 20**
National Housing Corporation paved double walkway separated by vegetation
**Source:** Authors 2017

**FIGURE 21**
Moi Avenue Slip Rd that connects to NHC Walk
**Source:** Authors 2017

For the KBS Bus Terminus, from 1963-2015 the number of connectors to the space decreased as indicated in **Figure 25**. The terminus has two main roads through which public vehicles access the space. By 1998 provision for vendors and small scale commercial activities was introduced in between Khalsa Centre, a school and temple complex, and the bus terminus that restricted access to the space and thus reduced the number of connectivity. By 1998 a public toilet block that is today managed by NCC, had been constructed to the south of Khalsa Centre (**Figure 26**). This added to the number of lanes connecting into the space that in turn increased its connectivity. By 2015 the connections to the space decreased because the building of commercial structures that blocked off connectors to the space along its eastern and western edges. Decreased connectivity means that the ability of roads, lanes, and alleys to enable pedestrians and vehicles to arrive at the space decreased (**Figure 27**).

Using SPSS, the factors that contribute to social sustainability of public open spaces as indicated by the multiple regression models are as follows:

Taking Y to be the dependent variable (Number of Users Space), $X_1$ to be the Number of Services in Facing Ground Floors, $X_2$ to be the Number of Connector to Space and $X_3$ to be the Number of Users of Sidewalks, then the predicted regression model given as follows:

$$(Y \text{ predicted} = \beta 0 + \beta 1X_1 + \beta 2X_2 + \beta 3X_3).$$

This is the predicted model also called the expected model of the original model ($Y = \beta 0 + \beta 1X_1 + \beta 2X_2 + \beta 3X_3 + \varepsilon$). The error term becomes zero since the expected value of the error term is zero.

The model of social sustainability was deduced as $Y_1 = -0.017+11.942X_1+0.\ 228X_2+0.\ 059X_3$.

Where $Y_1$= Number of Users of Space; $x_1$= number of services in ground floors of buildings facing the space; $x_2$= the number of connectors to the space; $x_3$=the number of users of the sidewalks surrounding the space.

In this model, the Number of user of space was taken to be the dependent variable and Number of services in facing Ground floors, Number of connectors to space, No of Users of Sidewalks as our independent variables.

R-square is the Coefficient of determination that explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable. Adjusted R-square is used in place of R-square as it predicts a model better since it controls for over-estimates of the population R-square resulting from small samples and high collinearity.

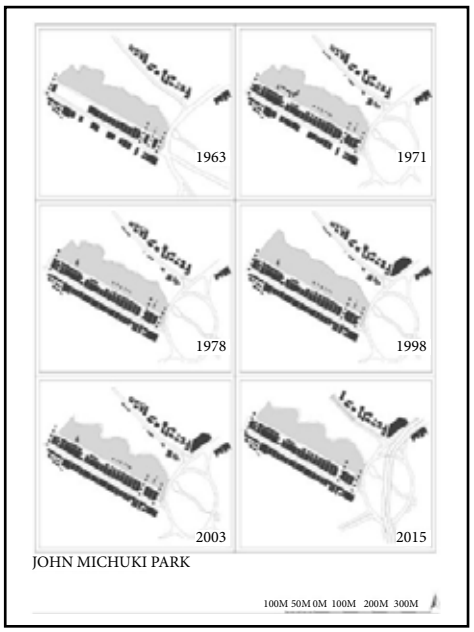


**FIGURE 22**
Changes in connectivity of John Michuki Park (1963-2015)
**Source:** Authors 2017

**FIGURE 23**
Murang'a Road bordering John Michuki Park at a lower ground level to the left
**Source:** Authors 2017

**FIGURE 24**
Warehouses and back side of buildings facing the park to the south
**Source:** Authors 2017

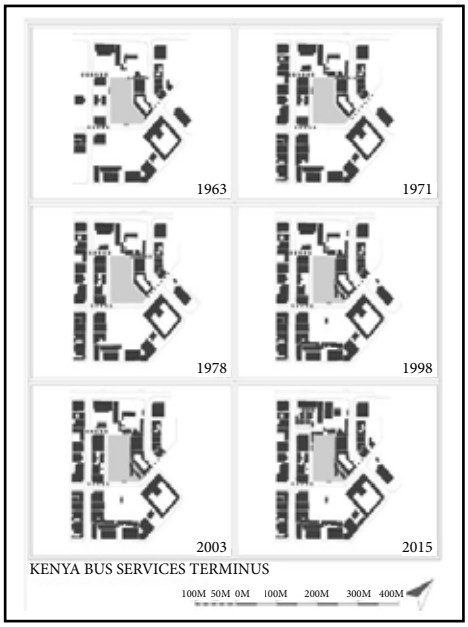


**FIGURE 25**
Changes in connectivity for Kenya Bus Terminus (1963-2015)
**Source:** Authors 2017

**FIGURE 26**
Commercial activities and public toilet near Khalsa Centre
**Source:** Authors 2017

**FIGURE 27**
Pedestrian connector to the south of KBS Terminus
**Source:** Authors 2017

According to the research findings in **Table 3**, the value of Adjusted R-Square is 0.857. This implies that, 85.7% of variation of Number of User of Space was explained by the Number of Services in Facing Ground Floors, the Number of Connectors to Space and the Number of Users of Sidewalks.

According to the research findings in **Table 4**, the Analysis of Variance (ANOVA) test was used to determine whether the model was significant in predicting the Number of users of space. At 0.05 level of significance the ANOVA test indicated that in this model the independent variables are significant in predicting the dependent variable as indicated by significance value=0.0001 which is less than 0.05 level of significance ($p=0.0001<0.05$). Therefore there is significant relationship between the dependent variable and the independent variables.

From the findings in **Table 5**, at 5% level of significance, Number of services in Facing Ground floors was found to be a significant predictor of Number of User Space as indicated by the p-value 0.005 ($p=0.005<0.05$). Number of Connector to Space was also found to be a significant predictor of Number of User Space as indicated by the p-value 0.007 ($p=0.007<0.05$).

## DISCUSSION

### Connectivity and Spatial Evolution:

46.7% of the public open spaces studied indicated an overall increase in connectivity from 1963-2015 while 20.0% of the spaces indicated an overall decrease over the same period. Increased connectivity in turn results in an increase in number of users in the space, which is a measure of social sustainability. The more people arriving at the space, the more socially sustainable it becomes because more users enhance the vitality, functionality and attractiveness/appeal of the space. In 33.3% there was no change in connectivity from 1963-2015. As indicated previous, connectivity influences the number of people that have access to the public open space through designated linear spatial connectors that link to the public open space itself or a perimeter road enclosing the space. Good connectivity provides easy access to public open spaces for pedestrians and vehicles thereby increasing the potential number of users of the space.

Regarding this research therefore, increased connectivity from 1963-2015 would be an indicator that more people had opportunity to arrive at the public open spaces. This would mean an increase in number of users in the space, which is a measure of social sustainability. The more people arriving at the space, the more it tends towards social sustainability because more users enhance the vitality, functionality, and attractiveness of the space.

**TABLE 3:** Social sustainability model summary

| Model | R | R Square | Adjusted R Square | Std Error of the Estimate |
|---|---|---|---|---|
| 1 | .942[a] | .888 | .857 | .2077299 |

**Source:** Authors 2017

**TABLE 4:** ANOVA for social sustainability model

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 3.754 | 3 | 1.251 | 28.996 | .001 |
| | Residual | .475 | 11 | .043 | | |
| | Total | 4.228 | 14 | | | |

**Source:** Authors 2017

**TABLE 5:** Coefficient of multiple determinations of variables for social sustainability

| Model | Unstandardised coefficients | | Unstandardised coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std error | Beta | | |
| (Constant) | -.017 | .079 | | -.216 | .833 |
| No of services in facing ground floors | 11.942 | 3.462 | .498 | 3.449 | .005 |
| No of connector to space | .288 | .068 | .429 | 3.340 | .007 |
| No of users of sidewalks | .059 | .029 | .242 | 2.063 | .064 |

**Source:** Authors 2017

Small block sizes, and thus greater connectivity, promote urban vitality, connectivity, and legibility (Jacobs, 1961). The presence of people in a space contributes to the vitality of the space. According to Jacobs (1961) people confer use on parks and make them successes or else withhold use and doom parks to rejection and failure. Shaftoe (2008) observes that people are the ones that play the most important role in animating public open spaces. He further notes that the idea that public spaces must be functional and used underscores the relationship between the vitality of a space and its sustainability.

The layout and type of streets or roads therefore also influence how sustainable a public open space is. If streets connect directly to the public open space or connect to a pedestrian-friendly street that does not make access to the space difficult, then the number of users arriving at the space will increase. From 1963-2015 Nairobi experienced growth and public significant infrastructure development. This emergence of major highways and bridges that constitute the street/road pattern of the CBD has reduced the access and appeal/attractiveness of the space for pedestrians that have to cross six-eight lane highways, with their high-speed traffic, in order to get to their destination space. This is particularly the case where roadways/highways encircle the public open space or act as a boundary on one or more sides of the space.

**Factors Contributing to Social Sustainability**

The spatial and non-spatial drivers (or predictors) that influence social sustainability have been established. These driver variables indicate the interconnectedness of the various aspects of sustainability. This knowledge of drivers of sustainability can be used to enhance the vitality, functionality, and attractiveness of existing public open spaces in city centres. In addition, it can inform urban planners, urban designers, and other built environment practitioners in their creation of new public open spaces that are intended to be sustainable.

The social sustainability model indicates that it is influenced by a combination of spatial, economic, and social factors. The drivers of social sustainability in public open spaces in Nairobi CBD have been established as the number of services in ground floors of buildings facing the space, the number of connectors to the space, and the number of users of the sidewalks surrounding the space.

The number of services businesses (i.e. barbers, photo studios, photocopying services, mobile money services etc.) in ground floors of buildings facing the

space and the number of connector spaces were found to be significant predictors of the number of users of the space. The number of services businesses in ground floors of buildings facing the space, influences pedestrian traffic on surrounding sidewalks. This pedestrian presence in turn increases the vitality of the environment around the space. The more people using the space, the more vitality it has and the more attractive it becomes for other users. The importance of people in spaces has been captured by Jacobs's (1961) argument that when people use public open spaces they make them successful. The importance of this measure of social sustainability is underscored by Shaftoe (2008) who states that in order for public space to be real they must be functional and used.

## CONCLUSION AND RECOMMENDATIONS

From 1963-2015, Nairobi's public open spaces have become more sustainable (able to uphold their vitality, functionality, and appeal) in terms of connectivity, densities, enclosure, and space use. The first three characteristics increased while the last characteristic became more diversified over time. The spaces have however become less sustainable in terms of their grass cover and space of size, both of which have decreased over the period. In the case of Nairobi over the same period, there has been spatial evolution with regards to connectivity, densities, enclosure, and space/ land use diversity. The term evolutionary applies to the aforementioned four because their good spatial characteristics have been enhanced over time, for instance the connectivity to them as public open spaces has increased. The more connectivity to a space, the more the number of users arriving at the space, and in turn, the better the space fulfills its function and exhibits greater vitality. Spatial evolution can also be described as having taken place because changes have occurred over a 52-year period of time, indicating that the process has been gradual.

All cities can be described as having a degree or measure of sustainability because they all possess the ability to enhance their vitality, appeal, and functionality. Cities experiencing extreme conditions such as war and natural disasters can be described as unsustainable at that particular period of time, being able to recover and be restored in terms of their functionality, appeal, and vitality. Cities and their spaces can also be more sustainable in one aspect (e.g. environmental) and less sustainable in another aspect e.g. economic. In reality of cities, spaces as captured by public open spaces exhibit movement in two directions whereby in some ways they are becoming more sustainable while in others they are becoming less so. In the case of Nairobi for instance, its public open spaces since 1963 have become more sustainable in terms of connectivity, enclosure, and density but less sustainable in terms of space size and grass cover.

Urban spaces are ultimately made by human beings for human beings. Achieving spaces that are able to uphold their vitality, functionality, and attractiveness from the social perspective has proved to be the most complex and comprehensive of the four aspects of sustainability. This conclusion is informed by the comparative analysis of dependant and independent variables for each aspect of sustainability.

Since the number of users is a measure of social sustainability, introduction of more services in ground floors of buildings facing the space and increased connectivity to the space will enhance its social sustainability. Therefore, when designing interventions on how to make public open spaces more sustainable therefore, introduction of more services businesses (i.e. barbers, photo studios, photocopying services, mobile money services etc.) should be prioritized. It is important that such businesses should be located in buildings whose entrances face the public open space and located on the ground floor of the buildings. This creates a functional and visual connection between the building, its services, and the space. The service businesses typically support short-term interaction with customers, meaning that they experience high volumes of pedestrian traffic. It is critical that entrances to the business be easily accessible and not separated from the public open space by fencing or other spatial obstacles. To take it a step further, an increase in the number of service businesses should be accompanied by an improvement in the quality of environment such as installation of garbage bins. Encouragement of greater diversity in the types of services should accompany the increase in numbers as both will enhance the attractiveness and vitality of the adjacent public open space.

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Africa HABITAT REVIEW

Africa HABITAT REVIEW

# The Use of Urban Public Space in the Rapidly Urbanizing East African Communities:

*A Case Study of Kigali, Rwanda*

*** Josephine Malonza and Robert W. Rukwaro**

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**Abstract**

*Public spaces are considered as a vital elements in urban environment hence a place of encounter where public life unfolds. Recognizing the importance of the role and function of urban public spaces and resonating to the concept of the street as urban public space, this paper shall describe the dialectic relation between the physical and social aspects of urban public space. Focusing on Kigali city, the research explores the relationship between the physical and social dimensions of urban public space; here understood as the space for our everyday action in the city catalyzing social cohesion. Reflecting on Rwanda's past history heavily characterised by a series of atrocities culminating in the 1994 genocide, it is hoped that Rwanda's urban formation can be considerate enough on the creation of sufficient public spaces towards a people-oriented city. The evident rapid urbanization of postcolonial Kigali city has resulted in the haphazard development of a city with significant consequences such as the absence of urban public space. There also seems to be a mismatch between the economic and social pillars of development in Kigali city. Whereas the economic aspect of the city is actively and rapidly growing, there seems to be poor provision for key elements that support the social pillar such as pubic urban space. The research underpinning is conducted on a continuing fieldwork exercise on Kigali city, with an empirical focus of the recently created 'Car Free Zone' (CFZ) within Kigali's Central Business District (CBD); a pedestrianization exercise aimed at formally introducing urban public space into the city. The core research methodology shall be use of site observation, activity mapping and in-depth interviews on randomly selected spots along Kigali's car free zone. Additionally the research shall document institutional responses from city council officials on the maintenance and evolution of urban public space in Kigali. Data collected thus far has shown that public space is a primary scene of social interaction in the city.*

Key Words: Car free zone, Kigali, streets, urban public space.

## INTRODUCTION

On 15th August 2015, a segment of KN4 Street in Kigali city, Rwanda was declared a car free zone (CFZ) (Malonza, 2015). This was an attempt by the government of Rwanda to create a vehicular free space in the city for exclusive use by pedestrians. Kigali city is without public space and this is effort is seen as a possibility towards the creation of the first formally recognized urban public open space for Kigali. The success of the CFZ as an urban public space will depend on a wide range of issues but this paper attempts to frame it on recent and crosscutting qualities as concluded by the public spaces around the world, Project for Public Space (PPS), after evaluating thousands of urban public spaces through out the world.

PPS argies that four fundamental qualities are important; First, they are accessible. Secondly, people are engaged in activities there. Thirdly, the place is comfortable and has a good image and fourthly, it is a sociable place; one where people meet each other and take people when they come to visit (PPS, 2011).

### Research problem

Public space is a primary ingredient in the creation of quality of urban space hence plays a critical role in the betterment of cities in this error of rapid urbanisation. Pedestrianisation is a new concept in Kigali city Rwanda, wherby the CFZ is the first case effective August 2015. There seems to be no current research examining the combined social-spatial integrative framework on urban public space. It is this research gap that this papers aims to fill in; in view of discovering what better success would be achieved on the use of urban public space by integrating both its social and spatial dimensions. As to whether the focus on CFZ just like any other pedestrian street is on the use or the users of public space, it is rather difficult to process each of the though lines without interweaving together both the social and spatial elements; seeking a deeper

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understanding of how the spatial, social, economic, cultural, legal and planning aspects interrelate. This paper therefore aims to fill this gap in research by examining the current uses and challenges of CFZ, using the various components of urban public space in a single project.

**Aims of the study**

This research aims to conduct an in-depth study of the car free zone in Kigali's CBD in order to gain a better understanding of how the space is used currently, the challenges faced considering that it was not initially designed as an urban public space. Next the paper attempts to investigate what design options can be applied to improve the current use into a more successful urban public open space. To improve the relationship between the use and users of CFZ as an urban public space, the paper puts together the two camps of literature on the design of public space as well as the activities on public space, to discover how the spatial and social dimensions could interrelate better.

The research questions that the study sought to answer were:

*How is the CFZ used currently?*
*What are the challenges of uses and users?*
*How do the social aspects of users influence its use?*

**Research structure**

The paper begins with a literature review that explores attributes of good urban public space as well as the existing themes in the current research of public space. The notion of street as public space is looked into as well as the users of space and specific attrobutes of Igali streets. This is achieved through design-based research, demographically rooted research, and an exploration into current arguments on use and users of urban public space. It next outlines the research methodology for the study as has been used by other researchers. The various research methods the paper adopts and their limitations are also explained. After the methodological section, the data is collected and analysed. The results of the research are therefore discussed in relation to the research objectives. The final section discusses the findings of the research in the context of the literature and present opportunities and pointers for further research on this topic.

**Research limitations**

The CFZ is a small fragment of the KN4 Street, and is also relatively new as it was closed from vehicular traffic in August 2015. There are no other pedestrianized streets in Kigali. Therefore, other segments of the KN4 street or other streets in Kigali have not been considered in this paper. There are of course other variables not incorporated in this paper, that play a role in determining why different people perceive urban spaces the way they do.

The research did not reach out to those not using the CFZ at the time of fieldwork. It is recognized that such people either use the CFZ or hold narratives of their dislike to using the space that remain undiscovered.

Due to time limitations, the research did not do a comparative analysis of CFZ verses other pedestrian streets in the region, which would have obviously offered more complexity and richness to this study.

## THEORY

There exists two bodies of contemporary research on public space; Whereas some researchers look into the social dimension of public spaces; ethical and demographic research (Habermas, 1989; Mitchell, 2003); others focus on the spatial dimensions; design-based research (Whyte, 1980; Gehl, 1987; Carr, Francis, & Rivillin, 1992).

This section first outlines the ingredients of good public space. It further highlights the concept of street as public space, incorporating both its physical and social dimension. This section further examines the various users of space to explore how the spatial and social dimensions of public space interrelate. It then looks into streets in Kigali city, introducing the CFZ as a case of study. This flow is hoped to help the research to discover which of each aspects enhance or hinder the use of CFZ and which aspects would easily combine together for better functioning of CFZ as a public space.

**Good Urban Public Space**

The qualities and ideals of good urban public space are increasingly becoming a topic of concern for urban designers and planners (Lang, 2005; Moughtin, 2003; Tibbalds, 2001; Worpole, 2007; CABE, 2011). Urban design is "primarily concerned with the quality of the public realm-both physical and sociocultural-and the making of places for people to enjoy and use" (Carmona, Health, OC, & Tesdell, 2003). Since the 1960s, researchers have focused on both guidelines for the development of public space and post-occupancy evaluation of existing public spaces. In order to better design public plazas, planners must understand why good design matters, what elements "good" design includes, and a means of evaluating design after building. The socio- spatial body of thought holds that social problems (and solutions) can indeed be found in spatial form. Research has long focused on using a set of best practices and design guidelines in order to both design and evaluate public spaces that are well used by a diversity of people.

If a public space is well designed, it is more likely to be well used. Gehl (1987) recognised that a "high quality

physical environment" will attract more people. He devised a framework for understanding the relationship between the sociability of public spaces and their design. By dividing activities into three categories—necessary, optional, and social— and researching their presence in different space, Gehl created rubric to evaluate what makes a space usable and desirable. Necessary activities, such as walking to work or school, remain at the same level in low quality and high quality physical environments. However, high quality environments induce additional optional activities, which, in turn, invite social activities (Gehl, 1987). Thus, a "high quality physical environment" will help to deliver on the first ideal of public space: high use (**Figure 1**).

While Gehl (1987) concisely explains the importance of creating "life between buildings" through good design, it is also critical to note the different elements that compose a public space. In The Image of the City, Lynch assessed five elements of the city that shape the view of users. They are: paths, edges, districts, nodes, and landmarks (Lynch, 1960). While these five elements are important, Lynch further made an assessment that different users experience the city differently and form disparate narratives on space. To accommodate a variety of users, public space must be designed to accommodate a wide diversity of users in order to catalyse a lively public realm.

The design elements of public space can be divided into two categories: macro-design (beyond-the-place) and micro-design (within-the-place) (Varna & Tiesdell, 2010). Regarding macro-design, Gehl posits that the key feature of a public space is the presence of people, a characteristic that can be encouraged through physical planning. He believes that by creating spaces in areas with low, closely spaced buildings and a high level of foot traffic, the "physical framework" for a public space can encourage the development of an "open-minded" place (Gehl, 1987; Madanipour, 2003). This is further echoed by Whyte (1980) who established that the largest attractor of people was, in fact, other people. Micro-level design refers more to the individual elements of a public space that contribute to attracting users initially.

| Type of activity | Quality of physical environment | |
|---|---|---|
| | Poor | Good |
| Necessary activities |  |  |
| Optional activities |  |  |
| Social activities |  |  |

**FIGURE 1**
The relationship between environmental quality and human activity
**Source:** Gehl 2011

Numerous guides have been created in order to explain principles of good public space designing, with an emphasis on the human element (Gehl, 2011; Krier, 1979) (**Figure 2**).

Jacobs (1961) insists on high quality, interactive and pedestrian-friendly environments in cities and neighbourhoods. She argues that enhanced connections between members of a community further increase joy and safety in the city highlighted in her 'eyes on the street' concept.

Whyte (1980), through his seminal research on parks and plazas in New York city, discovered that voids in the city- places without people- continue not having people and consequently attract 'deviant bahaviour' and concluded that the biggest attractor of people and therefore safety is other people.

Indeed, looking at successful urban public spaces from both design and management perspectives, one can extrapolate various recommendations and principles that are contextual hence easy to implement. University of Michigan (2007) originally in 'How to turn a place around, 2000' highlights design and management recommendations for public open spaces (**Table 1**).

**Street as Urban Public Space**
The street in any city is undeniably a multifunctional space; be it a physical space in terms of it being a channel of movement or a connection between points A-Z, or a social space in terms of it being a public realm or place in itself.

Jacobs (1961) believes that streets and their sidewalks are the main public spaces of a city, and hence its most vital organs. She further insists that interesting streets imply an interesting city and on the contrast if the streets are dull the city will also be dull.

***The streets as a physical space***
Krier (1979) has described the street as the space found between built elements within a city and it includes public spaces such as pedestrian walkways, roads, sitting areas and public amenities. Simply put, streets serve the function of accommodating human activities. Streets therefore are a very important component of the public realm and cannot be left behind in the discussion

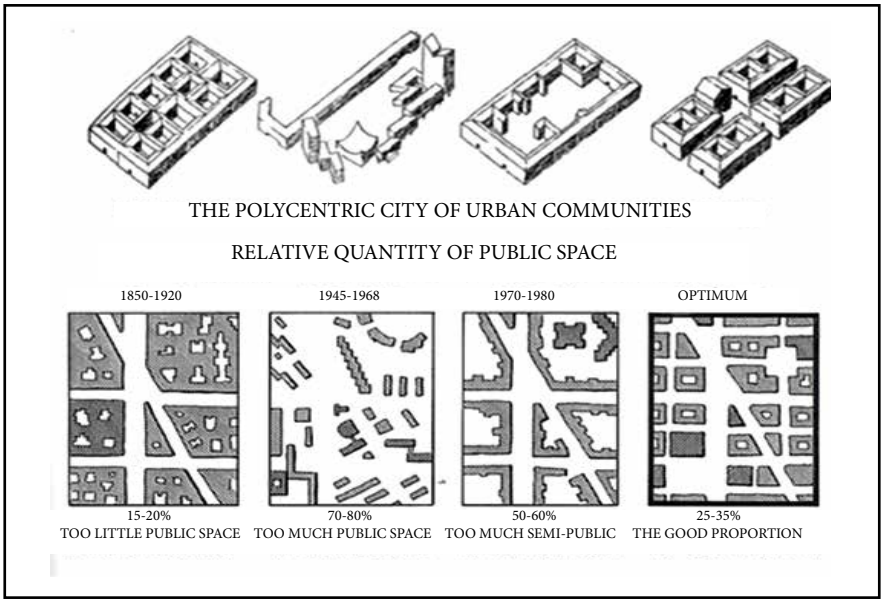


**FIGURE 2**
Leon Krier's definition of good public space
**Source:** Krier 1979

**TABLE 1:** Design and management recommendations for public open space

| **Uses and Activities** |
|---|
| • Provide amenities that will support desired activities.<br>• Create focal points where people gather.<br>• Develop a series of community-oriented programs with local talent from institutions (churches, schools, libraries, farmers markets, and so forth) to attract people in the short term and to demonstrate that someone is in charge.<br>• Change the type of events that are held or modify the space, if necessary, to better accommodate events.<br>• Work with adjacent property owners and retailers to develop strategies to lease ground floors of empty buildings and help revitalize the area. |
| ***Comfort and Image***<br>• Add practical amenities- seating, telephones, waste receptacles, information booths, food vendors, community-oriented public art, flowers, and fountains- in carefully considered locations.<br>• Create a management presence through vendors or food and information kiosks by creating an entrance or adding a view onto the place from windows in an adjacent building.<br>• Increase in security by providing more uses for activities at the place, which will increase the number of people present, or by appointing an individual to be in charge of security.<br>• Upgrade maintenance, including daily cleaning, and preventive maintenance of physical facilities.<br>• Establish a community policing program. |
| ***Access and Linkages***<br>• Widen sidewalks or provide sidewalk extensions at crosswalks, better balancing pedestrian uses with other uses (vehicles, bicycles, deliveries, and so forth).<br>• Construct clearly marked and/or conveniently located crosswalks.<br>• Make accommodations for bicycle users (bike lanes, lockers, storage racks, etc.).<br>• Infill vacant lots with structures and uses to create continuity of pedestrian experience.<br>• Balance on-street parking with other uses.<br>• Change traffic signal timing to improve pedestrian access.<br>• Improve use of parking through changes in enforcement or regulation. |
| ***Sociability***<br>• Develop focal points- public gathering places that accommodate a variety of activities.<br>• Arrange amenities to encourage social interaction, such as grouped benches and movable seating.<br>• Stage special events and activities to draw people.<br>• Encourage community volunteers to assist with improvements or maintenance of a place.<br>• Provide a variety of uses in adjacent building to attract a variety of people. |

**Source:** University of Michigan 2007

of urban public space. This significant role of streets in the city has increasingly attracted scholarly attention especially the relationship between the physical characteristics of a street and the human behaviour. Alfonzo et al. (2008), with a study focusing on California City, discover that high population density, mixed land uses, sidewalk continuity and good pedestrian infrastructure are the various physical characteristics of a neighbourhood that are associated with walking and non-motorized transportation in the city. Recently, Moirongo (2011) focuses on Nairobi City investigating the urban space characteristics that influence human distribution in the CBD's (Central Business District) streets and discovers that constitutedness and scale of urban space, traffic circulation patterns and land use mix are important aspects.

It is also recognised that the primary purpose of a street is a thoroughfare for both vehicular and pedestrian movement. This implies that accessibility and circulation within a street become important parameters in the investigation of this paper.

***The streets as a social space***

According to Carmona (2010), public realm combines both the physical space and the social activity dimensions by facilitating public life and social interaction.

Mongomery (1998) stated that, "streets are undoubtedly the most important elements in the city's public realm. The network of spaces and corners where the public are free to go, to meet, gather and simply to watch one and other".

Indeed, beyond the physical attributes, streets also provide the opportunity for social interaction and cultural exchange for instance through window shopping, meting and talking with a friend during pedestrian movement, which is otherwise difficult to achieve with vehicular movement unless the car is parked (Carmona, 2010; Jacobs, 1961).

Streets in Swahili cities such as old town Mombasa and Zanzibar compose a rich case for studies of the 'street as social space'. The senses of enclosure on these streets make the creation of spaces and sub-spaces that catalyse social cohesion. These streets have therefore become the lining rooms for the Swahili people, the third place that is both their homes, shops and offices. The environmental condition comes in handy; considering the harsh humid climate in these city due to the close proximity with the Indian ocean, these streets, owing to their narrowness receive cool breezes that render them cooler than the indoor spaces therefore encouraging more outdoor living and activities.

Furthermore, Tiesdell & OC (1998) also identified qualities that make up a public realm: (i) universal access (open to all); (ii) inclusive and pluralist (it accommodate people from different background); (iii) symbolic and representative of the collective and of sociability (a reflection of cultural identity of the city rather than individual agenda); and (iv) neutral territory (free from impartiality).

This social perspective of streets qualify them to it be a Place, which has been understood as the totality of the physical characteristic of the place, the activities in them and the meaning they hold to people (Mongomery, 1998; Relph, 1976).

**The Users of Urban Public Space**

Not all parks are well used (Jacobs, 1961). According to Jacobs (1961), parks that are near heavy pedestrian traffic and offer multiple "demand" uses (basketball courts or concerts) will be the most successful. Yet, there is still more than creating a desired amenity. Outside factors, such as socioeconomic status, race, or gender, may influence the degree of use in certain public spaces (Dai, 2001).

***Age***

The needs of public space users vary greatly by age group. Like women, children are sensitive to the design of public spaces (PPS, 2011). Children are a large user group in public space; however, they are frequently disenfranchised during the planning process (Hart, 1978). Play and fitness are crucial for healthy children, so public spaces should accommodate those needs—both on playgrounds and in the regular public realm (CABE, 2011).

Despite these aspirations and normative desires for play space, children and teens often feel excluded from public spaces, particularly in highly commercialized areas (Heywood and Crane, 1998; Watson, 2006). While to city centres, there is a perception that many public spaces are for white-collar workers only (Wooley, 2005). While the design of public spaces may not be inherently exclusive, teenagers may feel unwelcome in certain areas due to fear, programming, or a set of amenities catering to a different group.

Similarly, the elderly also require special consideration in the design of public space. While the use of public space by the elderly adds extensive value to the population by promoting interaction, the elderly are the least likely population to use public space (Fini, 2010). Much like the disabled, poorly equipped public spaces lacking in accessibility are underused by older populations. Yet, by creating handicap accessible places, emphasizing seating options, including shade, creating active and passive participation options, public space designers can encourage equity of use across age ranges.

***Gender***

Despite extensive literature, there are two bodies of thought regarding women in public space. Some believe that public space allows more women freedom from male dominance (Wilson, 1995). Others believe women see public spaces through the lens of fear due to potential harassment and crime (Valentine, 1990). Women's fear of public space, mostly due to the perception of danger or high levels of crime, can be deterrent to use (Skogan and Maxfield, 1996). While the fear of crime in public space also affects men, "studies have shown that women's fear of public space limits their freedom and enjoyment of public life" (Yavuz and Welch, 2010). For men, other groups of men in public space are the most worrisome.

Despite higher levels of fear, research shows that women actually use public space at higher rates than men (Paravicini, 2002). Women are also more sensitive about the design of public spaces (PPS, 2011). Thus, it is important to consider both women and men as key user groups when designing public space. This includes planning for a variety of amenities and designing with safety in mind. The recommendations for designing for women include improving lighting, creating clear sight lines, adding clear signage, and reducing signs of neglect (Service, Women's Design, 2007).

***Household income***

There is an evident relationship between household income and use of public space. Where as in some areas public space is only accessed by the rich, in other areas public space is seen an urban living rooms for the poor and homeless. Poverty is not a one-dimensional issue. The role that poverty plays in public space use is visible in the income brackets of the users. In the global north for example, it is believed that the number of blacks and Hispanics in space are nearly twice as high as those for non-Hispanic and whites and that the poverty rates for blacks and Hispanics in the use of public space is further stratified by both race and income (Gradin, 2011). While most of the current quantitative research reflects the importance of public space access and use for those on the lower end of the socioeconomic scale, it is still important to integrate spaces across race, gender and ethnic groups as well (Loukaitou-Sideris, 2008).

One factor limiting the use of public space by certain groups may be poverty level. Merz and Rathjen (2009) suggest that the working poor have less leisure time at their discretion. They recognise the repercussions of this effect; people in poverty have less time to spend on leisure activities (a proxy for public space use) and, thus, have less capacity to develop social capital bonds (Merz and Rathjen, 2009). If Merz and Rathjen's theory is correct, there are also racial implications for the use of public space. Cohen et al. (2012) sampled 50 neighbourhood parks in Southern California to investigate the link between poverty and park use. Their research sampled parks with diverse populations and included a consideration for poverty level. Using the System for Observing Play and Recreation in Communities (SOPARC), the researchers observed each of the parks for 7 days, 4 times/day over the course of two years (Cohen et al., 2012). SOPARC includes information on each individual, including race, age, gender, and physical activity. They also surveyed 75 park users in each location. The researchers found that there were more park users in higher poverty neighbourhoods than in lower poverty neighbourhoods, and the use of the parks is much denser in high poverty neighbourhoods.

Similarly, users in high poverty areas report using the park more frequently than users in low poverty areas (Cohen et al., 2012). However, previous research has shown a lack of leisure time in poorer households.

As compared to the residents living near the parks, park users were more likely to be Latino and young (Cohen et al., 2012). These broad findings on park use demographics provide a sounds methodological basis for future park research and further explore the relationship between poverty and leisure time/park use.

In addition, low-income residents perceive higher levels of crime and rates of disrepair in their neighbourhoods than their richer peers. It has been argued that each of these factors also decreases park use for those with low socioeconomic statuses.

The commercialisation of public space may also serve as a deterrent to use as "comfort, safety, and profit" replace political activity (Mitchell, 1995). This is particularly marked in low-income populations. Deliberately planned spaces, particularly near shopping places, may divide spaces along socioeconomic lines.

**Good Public Space**

**Streets of Kigali**

Streets in Kigali, just like in any other city play a significant role in the spatial organization of the city. However, in this case, the 'absence' of public plazas and parks in Kigali CBD brings in need for an emphasis on looking as the street beyond just a channel of moving from point A to B (Malonza, 2015). In this perspective, streets become very important symbols of the public realm since they constitute a significant part of open public space; they contain human activities, when streets are able to cater for the functional, social, and recreational needs of people, they are increasingly and positively associated with economic growth, physical health of people, and a sense of community.

Aside from the primary key function of streets to offer

a spatial orientation in a city, it is seemingly obvious that they can be a perfect balance/inter-weave between urban form and social space, drawing upon its multi-textured nature, vibrancy, diversity, flexibility etc. that could improve the dialogue between the city and the people. Specifically, the naming of streets in Kigali is also fundamentally for commemorative purposes. As streets play a significant role in the spatial organization of the city, their names can also be seen to play an equally or more significant role in the socio-cultural order. In this sense, the author argues that commemorative street names can be a powerful tool considering their ability to highlight Rwanda's present and past narratives of national importance; further to this opinion, in fact the fragmentation of city streets can also be seen to correctly represent the relativity of these narratives; national unity, republic, peace, revolution, army, youth, among others.

The car free zone highlighted in **Figure 3** shown in images in **Figures 4 (a)** and (**b)** forms part of the *avenue de la paix* (Peace Avenue), which is currently referred to as the KN4 street. It is also seen as the main spine of the city connection the city gateway (downtown roundabout) to the city referral and teaching hospital known as *Centre Hospitaire Universitaire Kigali* (CHUK).

**Conceptual framework**

The research uses a conceptual framework that interweaves two different bodies of thoughts on urban public space together; the social dimension and the physical dimension. **Figure 5** explains the conceptual framework used in this paper to explore the relationships between the social and spatial dimensions of public space. Following Gehl's criteria for key elements of successful public space, protection, enjoyment and comfort are used. For the social dimension, the age, gender and household income of the users are used.

The aim of the proposed conceptual framework in **Figure 5** is to contribute to the field of urban design research, considering the particular value of potential relationship between people activity and physical settings of space. Defining the conceptual framework in terms of investigating relationship between the social and physical dimensions of public space through a conceptualization of users and activities and how they relate to the spatial configuration and the resulting environmental quality within the space. This framework is established based on Gehl's (1987) and Carmona's (2010) types of activity as well as required place principles and characteristics that bring people together.

Since the meanings the users and non-users give to public space play a significant role in the production and use of public space, the relations between the physical and social dimensions of public space cannot be ignored in the planning process. Through their interpretation, deeper meanings emerge, perspectives and concepts of users are incorporated and the link between use and users gets better enhanced (Mehta, 2014).

This research will take on an interpretavist orientation; it is "interested in the subjective meaning, namely the way in which people make sense of their world, and in which they assign meanings to it" (Sarantakos, 2005). As noted by Varna and Tiesdell (2010), the interpretations of policy makers, users, and nonusers, and their rootedness in interactions and contexts, are critical to understanding and answering research questions about the role of socioeconomics, race, and culture in the use and design of public space.

## RESEARCH METHODS

This chapter outlines the research design used to evaluate the previously outlined research questions.

**Research Strategy**

Generally most research on public space tends to lean to qualitative approaches, a mixed methods (combining qualitative and quantitative) would be useful to develop a much more complete synthesis.

In this research, questions one and two lend themselves to qualitative approaches but questions three would require to be quantifies with numerical data. Therefore the approach will be inductive; it will utilize the data collected through a variety of methods to develop theories (Denscombe, 2007).

**FIGURE 4 (a) & (b)**
The Kigali CFZ before and after August 2015
**Source:** Malonza 2015


**FIGURE 3**
The commemorative streets of Kigali and CFZ highlighted
**Source:** Authors 2016

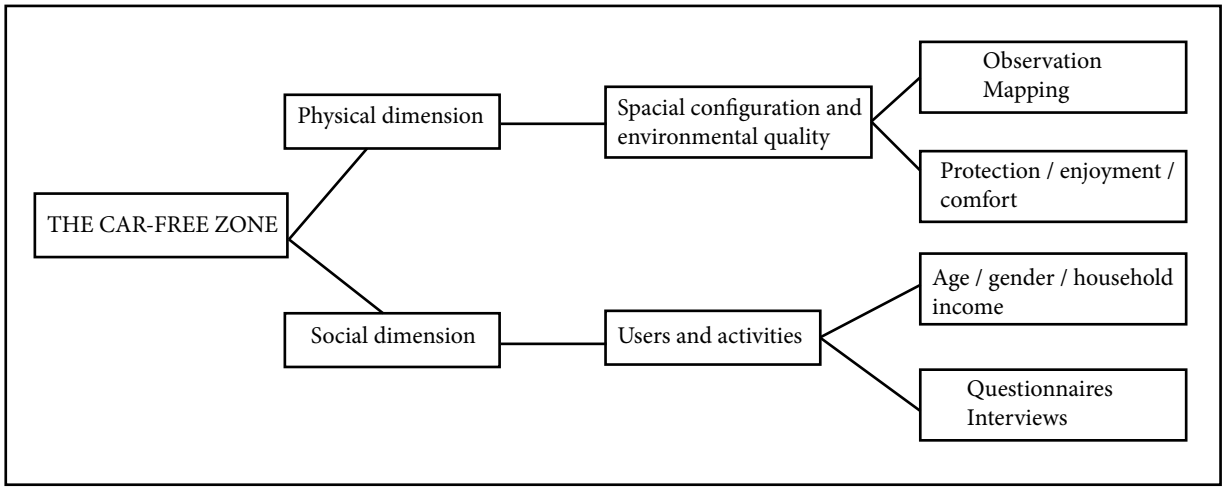


**FIGURE 5**
Conceptual framework
**Source:** Authors 2016

**Research Design**
This research utilizes a mixed-methods approach by including both qualitative and quantitative data (**Table 2**). Using both methods of data collection rounds out the research by allowing for deeper exploration of the reasoning behind certain thoughts and decisions (Denscombe, 2007). The case study approach is prime for the utilisation of multiple methods. This research project will use triangulation to further substantiate findings and to offer a more thorough look at the case studies. Triangulation is useful for providing a "fuller and more complete picture" while improving accuracy (Denscombe, 2007). It also serves to complement the research so that "different aspects of an investigation can be dovetailed" (Bryman, 2008). Quantitative methods of structured observation and surveys will be undertaken. Qualitative methods of content analysis and interviews will be used to triangulate and complement the qualitative findings.

**Case study approach**
Case studies frequently utilize the inductive approach to expansively explore specific cases and to develop theory out of in-depth explanations (Yin, 1994). Yin (1994) describes the case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". The complex contexts surrounding the creation and use of public spaces, as well as the interpretavist approach, befit the case study approach for its recognition that the space itself does not exist in a vacuum. Case studies are particularly ripe for the use of multiple methods of data collection (May, 2011).

The case study approach can feature one in-depth study, or it may choose to focus on multiple cases for the sake of comparison (Yin, 1994). If multiple cases are chosen, "every case should serve a specific purpose within the overall scope of inquiry" (Yin, 1994). The research aims to "produce contrasting results for predictable reasons;" this may allow for future theoretical replications (Yin, 1994).

In addition, in the method of Whyte and his predecessors- most public space research is done with case studies.

**Case study selection**
For this research the car free zone in Kigali's CBD was chosen as a representation of the first ever formally recognised public space in Kigali, which reflects the governments gesture towards filling in a gap in the urban development of Kigali.

***Structured observation***
Structured observation, or "a technique in which the researcher employs explicitly formulated rules for the observation and recording of behaviour," will be used to answer question three (Bryman, 2008). Observing behaviour allowed the researcher to eliminate survey bias and to record the spatial distribution of behaviour. Using an observation schedule based on the use table outlined by Cooper & Francis (1998) and revised during a preliminary unstructured observation time, the researcher focused on behaviour and its location within the space at a variety of different times and days and at some programmatic events (Denscombe, 2007). The prior use of this strategy as a portion of an ethnographic research project the spatialisation of Costa Rican plazas confirms its usefulness of this type project (Low, 1996).

***Semi-structured interview***
Semi-structured interviews were used to supplement the transportation narrative. By speaking to the city managers in each location, a more comprehensive view of the design process and the stakeholders emerged.

A semi-structured interview was chosen because it allowed the researcher to address specific questions and expound on content analysis while allowing the interviewee freedom to expound on other concepts (Bryman, 2004, 2008). Semi-structured interviews also allowed for cross-case comparison. The interviews allowed for further probing into "opinions, feelings, emotions and experiences" that reflect the constructionist ontology and should be explored in

**TABLE 2:** Research methods triangulation

| Research question | Method | Data type |
|---|---|---|
| I | Structured Observation/Interviews | Quantitative/Qualitative |
| II | Content Analysis/Interviews/ Structured Observation | Quantitative/Qualitative |
| III | Interviews/Content Analysis/Survey | Quantitative/Qualitative |

**Source:** Authors 2016

depth (Denscombe, 2007).

The interview schedule reflected the semi-structured style by outlining key phrases and concepts previously identified in content analysis (Bryman, 2004). The interviewees were purposively identified in the content analysis stage.

***Field survey design***

Quantitative surveys were used to evaluate the demographics of the users and to evaluate the feelings of safety and welcomeness of the users.

For questions three and four, a survey was useful because it was "a rapid and relatively inexpensive way of discovering the characteristics and beliefs of a population at large" (May, 2011). The surveys collected both nominal and ordinal data. The survey addressed questions such as income range, age, gender, distance from place of residence to park, and feelings of welcomeness and safety using a Likert scale. Using surveys facilitated testing of the dependency of variables and enabled statistical analysis of the results.

The answers were categorically coded. The demographic data was compared to the Census data available for the city at large. The surveys were used to run a chi-square test for association in SPSS. A similar method of users was used successfully by Gobster (1995) to discover user demographics and preferences in greenways.

## RESULTS AND DISCUSSION

The research found out that whereas the uses of the car free zone are similar, the users vary greatly owing to age, gender and household income. The perceptions of safety and comfort also depend on the age and gender. This section first discusses the accessibility of the car free zone, whose formation was more legislative that normative design-based intervention. **Figure 6** shows the location of the car zone.

**The CFZ as a physical space**

The CFZ is about 200 metres long and 6 metres wide, within Kigali's CBD. On either side of the street are commercial buildings (including 4 banks), mixed use buildings, the Kigali city hall building, and 2 construction sites for equity and Cogebank office blocks, as illustrated in **Figure 7**.

In the middle of the street is a grass lawn and palm trees form its central spine, on the western part of the street are mature grevillea trees that were cut off in March 2016 reducing on a tree cover necessary to shade the CFZ area for better comfort.

The tarmac surface earlier used by vehicles is still in place and even in the absence of vehicles, many pedestrians still keep to the side walkways leaving empty road in between.

Since the formation of the CFZ was mainly legislative, the street is still lacking the appropriate facilities that could support public space such as; benches, picnic tables, fountains, play areas, multi textured surfaces.

Following this research's conceptual framework, three spatial elements and their influence the use of the space are discussed below; protection, comfort and enjoyment.

***Protection***

The CFZ is fully pedestrianized. No vehicle is allowed in hence there is no chance for traffic accidents. The zone is also free from noise pollution. For protection against crime and violence, the CFZ does not yet have a lively public realm but Kigali is overall a safe city. There will be need for adequate lighting as a way to attract more social activities to the street, during both day and night. Protection against unpleasant sensory experiences, is largely lacking. The lack of shelters against the hot sun and rain renders a bigger par of the CFZ uncomfortable. The few mature grevillea trees were cut down. There is no furniture for seating and minimum protection from wind pollution.

***Comfort***

Gehl identified the importance of creating places to walk, places to stand, and opportunities to sit. The first two have been met in the CFZ but there is still lack of places to seat and relax. An addition of benches, tables, softscapes, among others, would be useful towards enhancing a quality public space to attract lively public realm. The junctions and nodes offer great views and vistas especially to the lower part of Kigali's CBD- to the northwest. There are minimum opportunities of places to idle, jog, run, play. The several banking halls, restaurant and shops directly open into the street (as was the case when the street was vehicular), which in turn hinder the chance for transition space that would otherwise offer a better scene for interaction.

Quite often silent discos and selected musicians have offered entertainment for adults, mainly in the evenings and night but for children, the CFZ does not offer any entertainment events.

***Enjoyment***

The human scale factor is still missing at the CFZ. Heights of building entrances have remained same, as was the case when the street was vehicular. Sun shading trees or umbrellas are still few. The MTN/Tigo vendors with logo printed umbrellas for advertisement often attract more customers who stand around longer; due to the shade and human scale. The node at BK attracts lots of people due the shade provided by the trees present. It is still difficult to have a positive sensory experience on

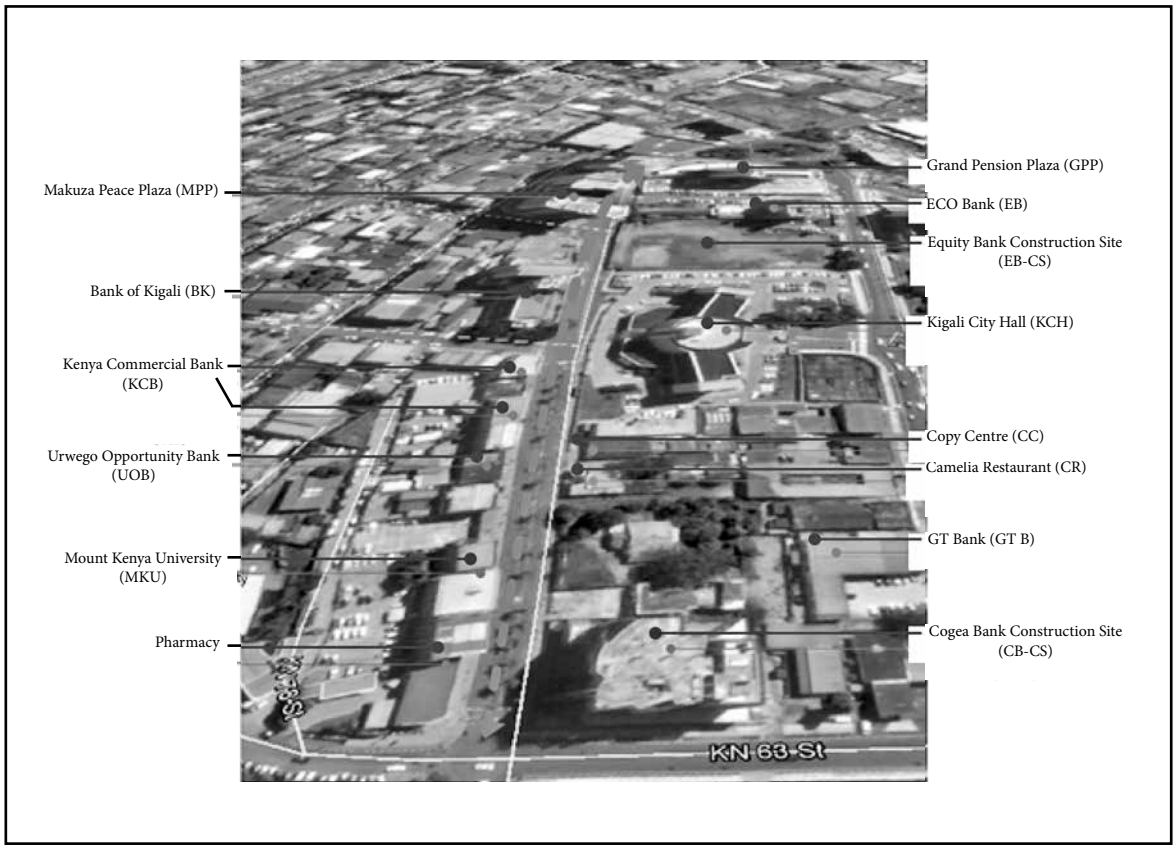


**FIGURE 6**
The location of the car free zone and adjacent buildings
**Source:** Authors 2016 (Modified from Google Earth)

the CFZ. Sculptures, fountains, furniture, frontages and pavements would add value.

**Land use and adjacent areas**
The CFZ was not initially designed to be a public space. Therefore the landuse illustrated in **Figure 7** remains same, as was when the street was vehicular circulation. The heights of adjacent buildings vary from 4 metres (one floor camellia restaurant) to 40 metres (10 floor grand pension plaza). The equity bank office block is expected to be the tallest in Kigali upon completion, about 88 metres (22 floors). The facades on either side of the street have a variety of textures, colours, elements that bring diversity and interesting and engaging facades.

The MKU University and Camellia restaurant attract lots of people who stand and chat at the entrance; for MKU, students tend to gather in small groups mainly before and after class and for Camellia at meal times, mainly lunch. The entrance to the two supermarkets on the street; Sharma and Simba also has an active public realm. There are no other social joints on the street.

The newly inaugurated M-peace building provides upscale fast food restaurants; children play area and boutiques, which attract people of mainly the middle and high income. A newer upscale Camellia restaurant is also housed here. Most facilities in M-peace building serve the upscale clientele, which consequently influences the uses and users of the building.

**The CFZ as a social space**
***Patterns of use***
As illustrated on **Figure 8,** the users of this space are typically walking across the space using the side walkways, in as much as the streets in between are also fully pedestrianized. In the mornings and evenings of workdays, the flow of pedestrians is much faster and evenly distributed. However on the warmer hours of the day (also working hours), the numbers decrease. In the weekends the streets are more empty. A considerably smaller number of students attend classes at MKU. The tarmac surface is also very warm by mid day, which discourages use. Often more groups linger around Camellia restaurant waiting for space to sit.

The uses of the CFZ observed by the researcher largely match the information provided in **Table 3**. There were a couple of other unscheduled activities that also pulled in a significant number of people to the CFZ such as genocide commemoration meetings- the weeks of April 2016. Businesses are required to close down at noon and businessmen and shoppers required to join in these

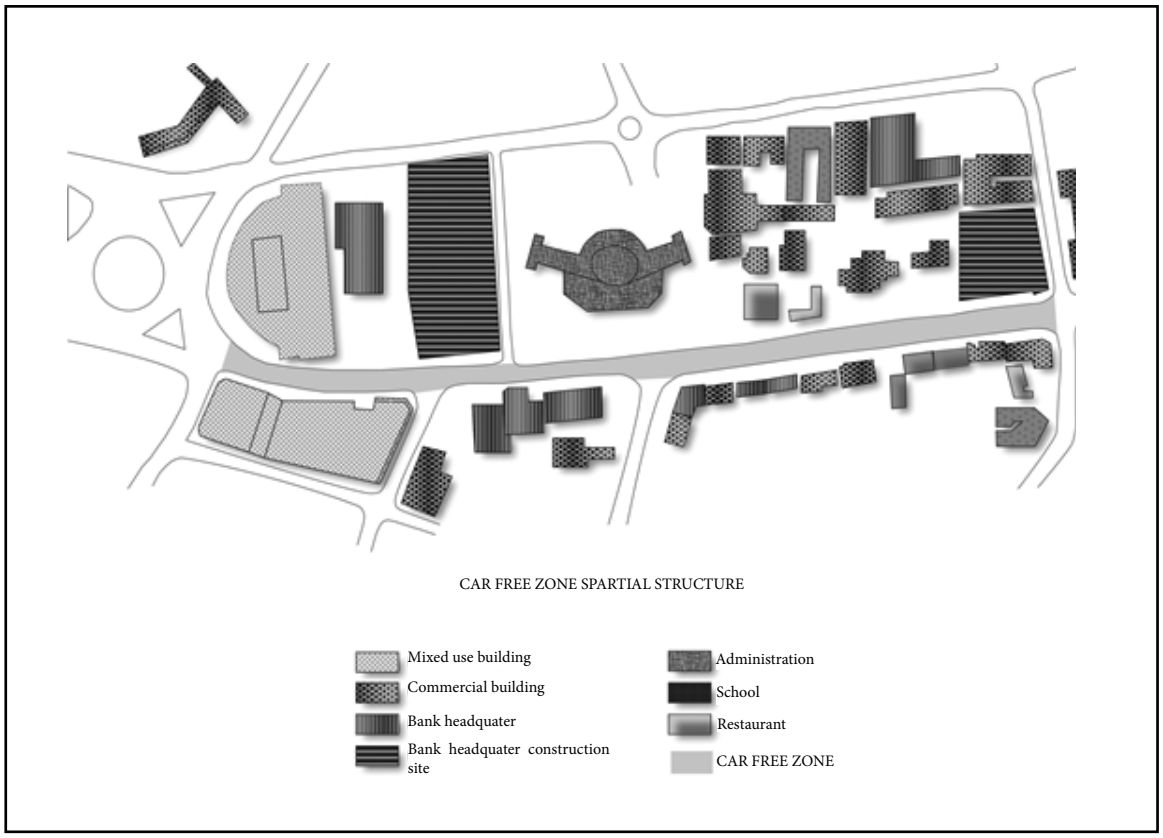


**FIGURE 7**
The spatial structure of CFZ
**Source:** Authors 2016 (Modified from Google Earth)

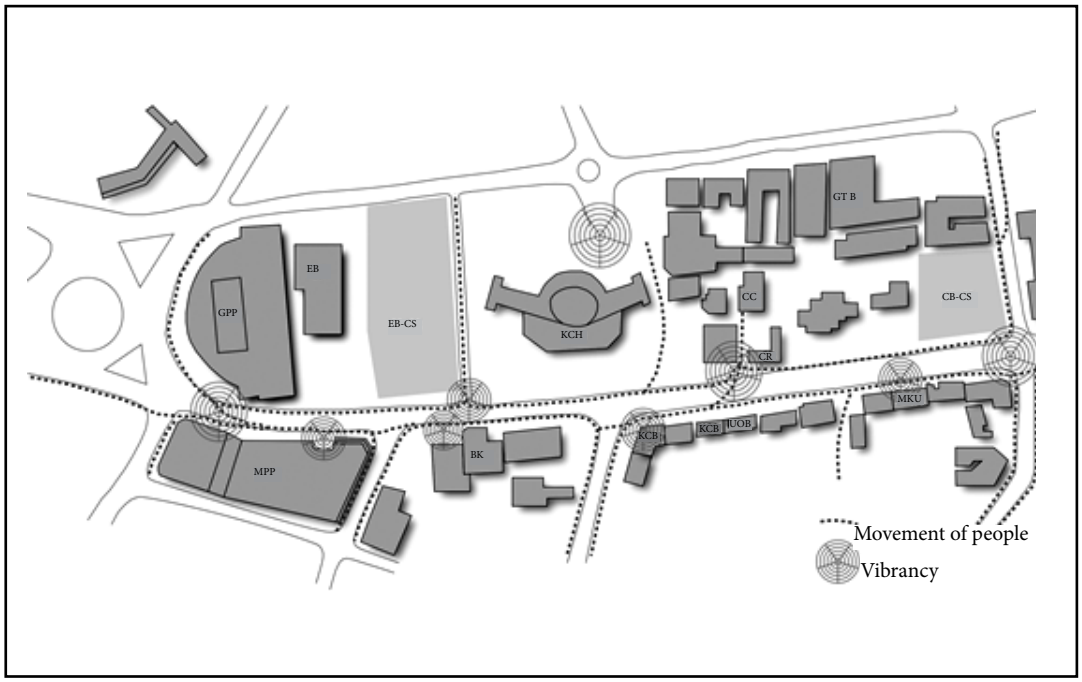


**FIGURE 8**
The patterns of use and vibrancy of CFZ
**Source:** Authors 2016

meetings as a matter of national policy. Occasionally, students on school trips took a walk across the street. Musicians, journalists, artists, and photographers frequent the space. Following this research's conceptual framework, the criteria for analysing the users are categorized in 3; age, gender, and household income.

***Age***

Rwanda's population is mainly comprised of youth. This was also evident in the research data collected. Children were not interviewed, just counted and their behaviour and movement patterns observed. The 18-34 age group was the most popular on the CFZ as illustrated in **Table 4**.

***Gender***

The overall Rwanda's population has more women than men (**Figure 9**). Coincidentally there are more women than men at the CFZ; 60% female and 40%.

***Household income***

The household income of users of the CFZ fell on a wide range, with the majority falling within 100-499$ (equivalent to 400,000-800,000 RFW) per month (**Table 5**). Although the middle class total population is still lagging behind compared to other EAC countries as shown in **Figure 10**, this means that the CFZ is equitable across the various income brackets.

## CONCLUSION

With the above data analysis, the research has been able to draw conclusions on the dialectical relationship between the spatial and social dimensions of the CFZ- taken as a case for an urban public space as outlined below.

**What are the current uses and challenges of CFZ?**

The study found out the urban design of the CFZ is still similar to what was when the street was vehicular. The heights of buildings range form one floor to 10 floors, with a construction site of a new office tower with 22 floors. The right node of the CFZ with the grand pension plaza and M-peace building mainly house upscale facilities such as restaurants and boutiques, which in turn attract middle and high-income users. Commercialized spaces have the potential to lend an aura of privatization, which in turn exclude either implicitly or explicitly some groups of people. However, the middle part is equitably balanced as it mainly composed of banks that open door to a wider bracket of clientele. The left node has camellia restaurant, Sharma supermarket, MKU University all of which attract a wide ranger of users into the CFZ. However there are not appropriate amenities and public services; benches, shelters, art, fountains that would be attraction nodes within the CFZ.

**TABLE 4:** Age of users in the CFZ

| | Age | Percentage |
|---|---|---|
| 1 | U17 | 15 |
| 2 | 18-34 | 45 |
| 3 | 35-54 | 24 |
| 4 | 55-75 | 15 |
| 5 | Over 75 | 1 |

**Source:** Authors 2016

**TABLE 5:** Household income $

| | Age | Percentage |
|---|---|---|
| 1 | 0-99 | 15 |
| 2 | 100-499 | 45 |
| 3 | 500-999 | 24 |
| 4 | 1,000-1,499 | 15 |
| 5 | 1,500 + | 1 |

**Source:** Authors 2016

**TABLE 3:** Activity patterns along CFZ on weekdays and weekends

| | Activity | Percentage | Total count per weekday | Percentage | Total count per weekend |
|---|---|---|---|---|---|
| 1 | Passing through | 35 | 300 | 28 | 150 |
| 2 | Shopping | 5 | 40 | 11 | 60 |
| 3 | Coming to the bank | 9 | 80 | 7 | 40 |
| 4 | Going to restaurant | 6 | 50 | 9 | 50 |
| 5 | Attending school | 29 | 250 | 15 | 80 |
| 6 | Sitting and relaxing | 2 | 15 | 4 | 20 |
| 7 | Buying airtime MTN/Tigo vendors | 12 | 100 | 22 | 120 |
| 8 | Other | 2 | 20 | 4 | 20 |

**Source:** Authors 2016

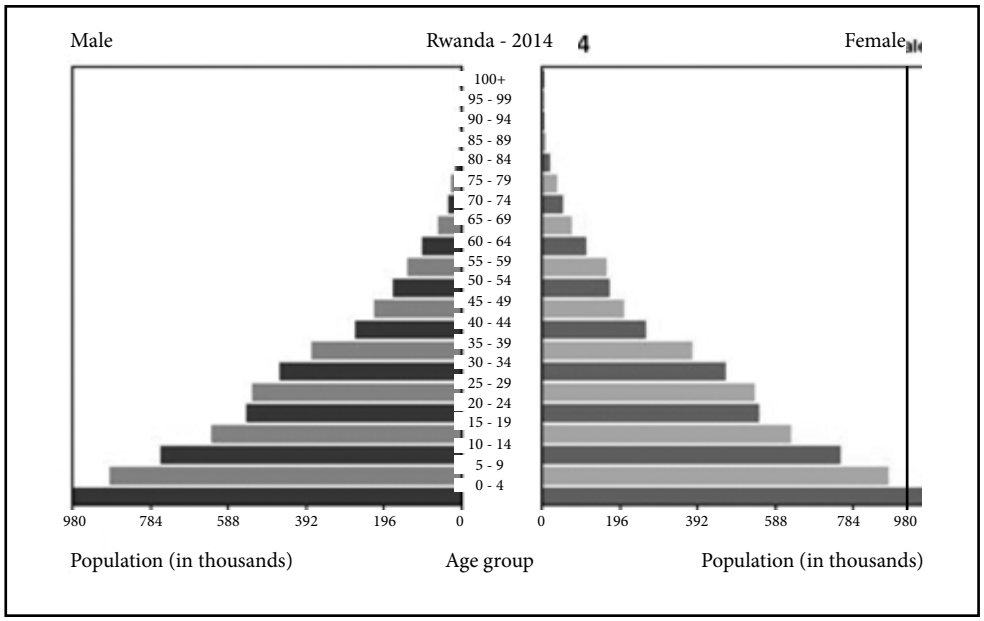


**FIGURE 9**
Rwandan population pyramid 2014
**Source:** NISR 2015

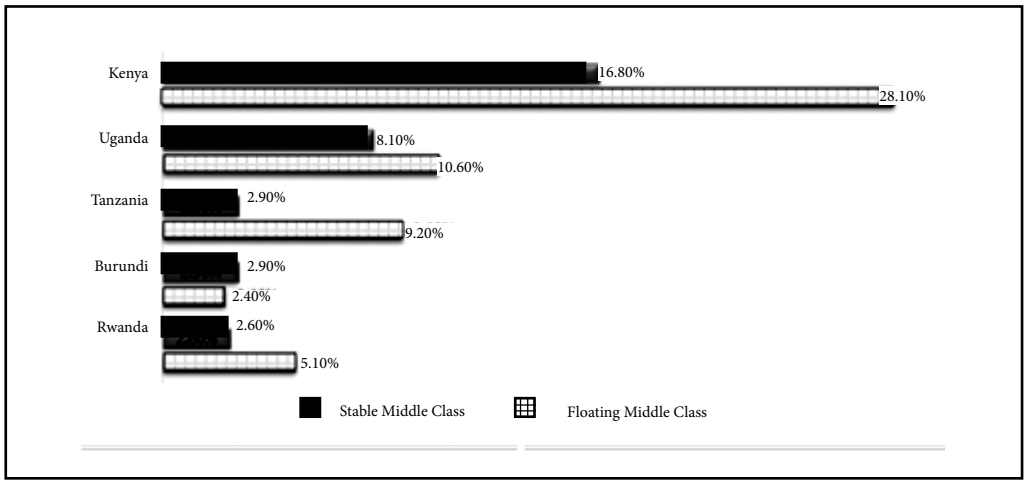


**FIGURE 10**
The patterns of use and vibrancy of CFZ
**Source:** Authors 2016

***Land use***
The commercial programme on the street seems to be suffering from the lack of a vibrant public realm and most businesses have not welcomed the idea of CFZ. The level of commercialization therefore seems to be decreasing. Some businesses closed down already.

***Active frontages***
Except for the restaurants and supermarkets, the rest of the frontages are not active enough to support vibrancy. Indeed the vendors MTN/Tigo seem to attract more people than huge buildings on the streets. A big proportion of buildings along the CFZ are banks whose security requirements may not allow for active frontages. Authors reviewed have overly agreed that active frontages are an important ingredient in the boosting of vibrancy and safety of public spaces.

***Access and circulation***
Being a car free zone, the space pedestrian oriented; it is easily walkable and safe. The absence of cars renders the space protected form traffic accidents, and noise and pollution. The two nodes of the CFZ act as gates to enter and exit the space. Two minor veins feed into the CFZ from the adjacent traffic routes, which make easy to bring people in and out of the CFZ.

**How do the current physical attributes of CFZ relate with the users' activities?**

***Use***

The CFZ is as a result of a legislative action not design-based from its formation. However, this research has found that the relationship between the physical elements on the streets and the activities of the users have a strong relationship. Due to absence of amenities and social nodes, a lot of the activities are active leaving little space for passive activities such as seating, watching urban life, relaxing on the street.

MKU with specific use- university campus- is an example of mandatory activities as Gehl puts it. Whether rain or shine, students must attend classes. The street has minimum facilities for supporting necessary activities, which in turn boost social activities.

The overall lack of shaded areas and the hot tarmac surface further impact on the number of uses on the CFZ. Groups of youth hang out at the former bus stop since it provided shade and sense of enclosure. The research has confirmed that patterns of activity have long been linked to design aspects (Whyte, 1980; Carmona, 2010). Lots of uses cluster around the spots depending on where people chose according to their convenience.

Whyte (1980) has presented examples of passive engagement as sitting and relaxing. However, since the CFZ is largely without benches, playgrounds, fountains and public art, the level of passive engagement remain minimum. As Whyte (1980) has argued—"what attracts people is other people". Therefore if the numbers are still low, the attraction remains low.

**Users**

The findings have been categorized in three; age, gender and household income.

***Age***

The campus and working age bracket 18-34 years dominate the CFZ with 45 percent. They use the space more since campus students have to attend class; working class people have to connect through the CFZ to their workstations, bus stations and restaurants. Rwanda's elderly population is very small as illustrated in **Figure 9**. The research finding of a very low turnout of those above 75 years of age confirms this phenomenon.

***Gender***

At the CFZ, women are the dominant users of space. This phenomenon is also supported by academic theories that assert that women frequently spend more time in public spaces due to their "close relationship with their immediate urban environment" due to tasks related to children and domestic work (Garcia-Ramon et al., 2004). This is complemented by the fact that the Rwandan population has more women than men, to arrive at the findings that 60 percent of the users of the CFZ were women.

***Household income***

There is a household income hierarchy on the CFZ due to the type of facilities present. Whereas around the right node, upscale services dominate the space, to the left node, facilities for middle and low-income users exist.

Studies have shown that only people on the middle and high end of the socio economic spectrum find the time and meaning of leisure hence dominate public space. However, the data analysed in this research does not support this finding. The majority of people on the CFZ belong to the low-middle income bracket of 100-499$ (equivalent to 400,000-800,000 RFW) per month, making 45 percent of the users in CFZ.

**How do the social aspects of users of CFZ influence its use?**

Since there seems to be no sufficient amenities and resources on the CFZ to attract all age groups, what is available seems to be favoring the 18-34 year age bracket that mainly go to the MKU University or work in the banks and commercial building on the CFZ or adjacent streets.

The research also found out that the CFZ has more women than men. Generally, it is agreed that women are likely to feel more unsafe and uncomfortable in public space than men. The dominance of women in CFZ therefore confirms it as a very safe area. This is supported by the general remark that Kigali is globally considered a very safe city.

The research finding statistically differs from literature findings. Low and middle-income earners dominated the CFZ unlike the expected middle and high-income who are believed to have a sense of leisure and meaning for public space. Literature on commercialization of public space also asserts that those with lower incomes may feel unwelcome in highly commercialized spaces, yet this was not evident at the CFZ.

## RECOMMENDATIONS

The study found that there was a need to:

Have appropriate and varied amenities and public services in order to attract urban users of different age groups, genders and income incorporated into the design of public space.

Give priority in urban design to land use activities that enhance urban users' interaction.

Boost the vibrancy and safety of public spaces through creating active frontages of urban developments being designed.

Pedestrianize public space by making it car

free, accessible, safe and easily maneuverable and accommodative to social group activities.

Create social node with appropriate amenities in order to enhance urban activities such as seating, watching urban life, playing, water drinking and relaxation.

Create shaded areas with a sense of enclosure for people to hang around.

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Africa HABITAT REVIEW

# Micro-Temperature Change in Relation to Urban Built Form:

## *Use of the Predictive and Remedial Building Nomogram Diagrams for Sustainable Development in a Temperature Changing Environment*

*** Yusuf H. Ebrahim and Robert W. Rukwaro**

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**Abstract**

*This study aims to explore the use of predictive and remedial building nomogram diagrams in approximating the micro-temperature change of two or three urban built form (building) variables in interrelated scales and trends, with the objective to establish the influence of these urban built forms on the micro-temperature change. Methods include the use of predictive nomogram scales in the first instance in the planning and design of buildings to predict the nominal value of the micro-temperature change for a combination of urban built form (building) variables. Remedial nomogram scales were thereafter used to remedy and treat against sick building syndrome by use of qualified attributes of urban built form on building proposals, retrofitting and transformations of existing buildings over the micro-temperature change. Findings of the study conducted on 30 plots in a structured neighborhood of Komarock Infill B Estate (Nairobi) between 8th June 2013 and 19th September 2015, identified and determined of significance that seven building variables (building type, plot size, building orientation, building classification, road proximity, ground coverage and plot ratio) of the urban built form had an impact on the dependent micro-temperature change. In the multivariate analysis, the scatterplots indicate that the lower the building orientation, plot coverage, plot ratio and the larger the plot size and distance from the road, the lower the temperature change. Architects are recommended to use the approximated micro-temperature change data using the building nomograms instead of temperature data from predominantly open ground meteorological stations in the design of sustainable buildings in a temperature changing environment.*

Key Words: Building science, sustainable development and urban climate change.

## INTRODUCTION

Bioclimatic analysis in tropical countries is undertaken by architects as part of the design and planning strategies in the development of sustainable urban built forms in a temperature changing environment. Architects are taught to address issues of society, technology and environment. Climate is a subset of the broader environment whose consideration provides the basis of adequate shelter which Olgyay and Olgyay (1963) have called mature architecture. Bio in the sense of biological or of living things or of life and as such related to societal and technological concerns (Allen, 1985). Climatic, environmental and more specifically external air temperatures, affect through the process of thermal dynamics, the internal comfort conditions (Hough, 1989). Urban temperatures are increasing through the phenomenon of climate change and the establishment of heat islands (Littlefield, 2008; Szokolay, 2011).

In a way as the urban temperature have been generally increasing and as such the built form by necessity needs to adapt to these changes by the process of retrofitting whereby the existing structures are modified and transformation of the already built structures and neighbourhoods to adapt to the changing environment. This change by the users themselves through change of user applications and renovations has been gradually done over the years since the initial handover of projects such as Komarock Estate by the practitioners. However, it is not planned and by nature, not structured to take care of the temperature change. By using temperature data from the predominantly open ground meteorological stations in climatic design, the built form in urban areas has failed to respond to the temperature changing environment (Environment & Urbanization, 2015).

Casual observations of the built form have indicated that the building variables lack expressed ideas or concepts that link temperature change to structured neighbourhoods. For example, the non-structured neighbourhoods and structures have lacked meaningful and sustainable built form which would express design and planning strategies in a temperature changing environment. A pilot study established that two houses of the same building style (villa) placed on different

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orientations, gave rise to different temperatures being recorded in the open space adjoining the test cell which was the living rooms. The question raised then is what does one need to do in order to bring about that which would explain the cause and effect of temperature on sustainable built form. This study is an attempt to answer this question and attempts to explore the urban climate change.

Moreover it focusses on the temperature changes close to the ground – i.e. at the spatial micro-level. The essence of the study is to identify the variables at play and to link them to sustainable development. A house designed for a warm, dry area cannot be expected to function at greatest efficiency in a different climate. There is an obvious gap between house form and house function over wide areas (Oliver, 1973). Anyamba (2011) has asked the question, "Since architecture is always site specific can it be continent specific?" The study poses a similar question "since the built form for an estate and its manifestation on the micro-temperature change is site specific, can it be climatic region specific?"

A study on the use of the predictive and remedial building nomogram diagrams for sustainable development in a temperature changing environment and that of micro-temperature change in relation to urban built form crosses the boundaries of established disciplines and that the modern environmental scientist needs a broad background in quite diverse disciplines. The aim of such a study is to facilitate comprehension of the relationships that exist and to promote a rational interpretation of climatic concepts as they relate to both natural and man-modified environments (Oliver, 1973).

## THEORY

Micro-temperature or the air temperature near the ground and was calculated at approximately one and a half metres above the floor level to reflect and compare well with data given by meteorological stations (Koenigsberger et al., 1973). Benchmarking data was done by use of meteorological data from the Jomo Kenyatta International Airport (Kenya Meteorological Department, 1984).

Air temperature provides a measure of thermal comfort and the other variables related to thermal radiation, air flow and relative humidity which relate to thermal comfort were dealt with in a subjective way by use of the Bioclimatic Chart as generally advocated by Koenigsberger et al. (1973), in the application of the lake climate of Kenya by Ebrahim (2010) and by use of the Hygrothermal Comfort Scale as used by Meffert (1980) in the study of Lamu. Design standards used in the study included Kenya Bureau of Standards (KBoS: 2007) and International Organization of Standards (ISO: 1995, 1996 and 2001) necessary to maintain thermal comfort of a space (Koenigsberger et al., 1973).

Theoretical delimitation for the study included the heat balance equation (Koenigsberger et al., 1973), radiative excess temperature (Meffert, 1981) and sol-air temperature concept (Koenigsberger et al., 1973). Universal climate change agreement used in the study was the United Nations Climate Change Secretariat (UNCCS: 2015a) rated to the Paris Climate Agreement.

Now as part of the overall climatic design for sustainable development, architects need to make a decision on the environmental design strategy involving the type of energy system of the site and the level of application of these systems earlier on in the design process. **Figure 1** shows a diagrammatic representation of the potential for climatic controls on building sites which is available to architects. **Figure 1** represents a typical plot of air temperature data for a normal day and it is based on the work of Koenigsberger et al. (1973) and modified by Meffert (1980). In the case of Koenigsberger (1973), he was concerned with the varying climatic factors. He placed these on the Y-axis. Their surrogate was the micro-temperature change in degree Celsius ($^0$C), while the abscissa the time in unit hours.

The United Nations Climate Change Secretariat (UNCCS, 2015; 2015a) recommends a figure of two degree Celsius as the upper limit for climate change. If this is the starting point for the design process, the architect would consider macroclimatic, meso-climatic, microclimatic and artificial climatic controls for regulating the internal and external environment of the built forms. Macroclimatic controls are used in the large scale level of planning and settlement design of the built forms and offer minimum intervention to the external environment.

Meso-climatic controls are intermediate level related to the building design, while microclimatic controls offer small scale at the elemental and structural scale interventions to build form design. Precisely controlled indoor climate can only be achieved by mechanical (active) controls, but this may not be the aim of this study, and even if it is, with adequate structural controls, the task of mechanical controls is radically reduced to make the system more economical (Koenigsberger et al., 1973).

Operationalizing the concepts is done through classifying the concepts into several clearly defined dimensions and identifying the various indicators (surrogates) for each. Dimensions are specific groups of concepts. The review of theories helps you to establish the structural dimension and surrogates (empirical indicators) of the studied phenomena (Rukwaro, 2016).

In the study micro-temperature change was the

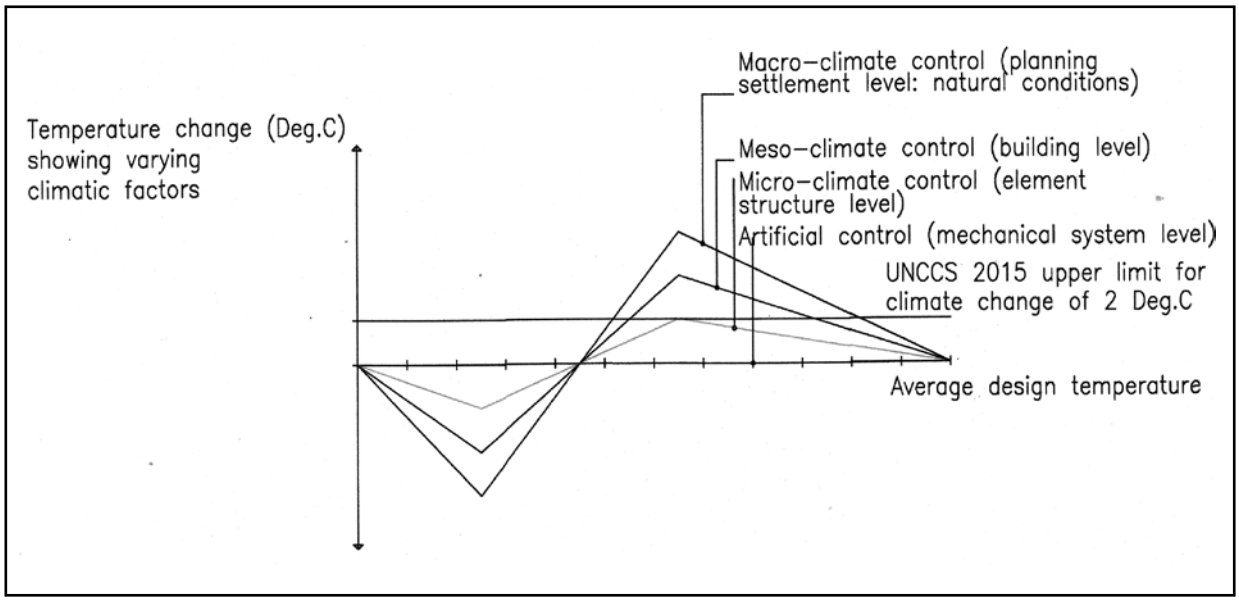


**FIGURE 1**
Potential for climatic controls
**Source:** Modified from Koenigsberger et al. 1973; Meffert 1980

dependent variable and urban built form being the independent variable. Micro-temperature change was operationally defined and to be measured in degree Celsius.

Urban built form (building) were operationally defined and to be measured using surrogates. Building surrogates related to the urban built form variables were operationally defined and to be measured as building type and building heights in metres, plot size in square metres, orientation in degrees from the north, building classification and row of building widths in metres, road proximity in metres, ground coverage and plot ratio as percentages of the plot size.

## RESEARCH METHODS

A case study was undertaken of a structured neighbourhood comprising two hundred and forty plots within the Komarock area of Nairobi, mainly concentrated in an area called the Infill B Phase. Nairobi is approximately on the 1½ degree south of the Equator, 37 degree longitude and exhibits generally a highland climate (Hooper, 1975).

Nairobi City County has three main districts made up of the Central Business District, Core Nairobi and the Nairobi Metropolitan Region. Most of the structured neighbourhoods such as Komarock were mainly built towards the east of the city (Nairobi Metropolitan Region) and is reported to have an area of thirty two thousand square kilometers by the UNEP Global Resource Information Database (Commission for the Implementation of the Constitution, 2010).

Now it is not easy to understand the nature of a particular climate by merely looking at the vast amount of data published in the records of the nearest meteorological station and other data collected by the study. It was necessary to sort, summarize and simplify collected data with reference to the objectives and requirements of the study. This was accomplished best by adopting a standardized method of data collection, processing, analysis and graphic presentation techniques (Koenigsberger et al., 1973).

Digital and analogue tools used in the study included the design and development of Temperature Template for bioclimatic analysis in tropical countries (Ebrahim, 2010d), digital tool development in Kenya (Ebrahim, 2010c), Ebenergy Software (Ebrahim, 2010), design and development of Ebstats Software (Ebrahim, 2015), Stata Software (Kiel, 2015), Excel (Gottfried, 2002) and the data loggers (Onset HOBO Data Loggers, 2007).

Longitudinal research design was used in the study, whereby temperature data was collected using the observation method and the research tools of observation sheets, checklists and tabulations from 30 sampled plots and 16 sampled open spaces, roads or paths during the period of 8th June 2013 to 19th September 2015.

Organization refers to the process of rearranging, reducing and summarizing of the data so that it can be easily understood and utilized. It was necessary to organize the data before attempting to analyze it. The study used methods that were visually easy to interpret (Kabiru and Njenga, 2009).

Data presentation used building nomograms,

photograph, frequency distribution table, bar chart, scattergram, frequency polygon, hyperspace diagram, polar curve, isotherm distribution map and diagrammatic summary table.

Nomogram as a graphic option of the study had purpose of information as to show three or more variables in interrelated scales and trends. A nomogram is a combination of different scales displaying variables which are interlinked through relationship. One draws a line between the two scales and reads the resultant on a third one (Koenigsberger et al., 1973; Szokolay, 2011).

Urban built form (building) variables include building orientation (Degrees), road proximity (M), plot size ($M^2$), ground coverage (%), plot ratio (%), building height (M) and building width (M), and related to the micro-temperature change ($^0$C).

**Research Methodological Framework**

The study used two types of nomogram to explore multivariate analysis. Predictive nomogram was used as a nominal scale while remedial nomogram was used as a qualified scale. **Figure 2** shows a predictive (nominal scale) nomogram for building variables, while **Figure 3** shows a remedial (qualified scale) nomogram for building variables showing average micro-temperature change. It is important to note that these nomogram diagrams are for structured neighbourhoods in tropical upland climates.

Predictive nomogram are used in the first instance to predict, foretell or prophesy the micro-temperature change for a combination of urban built form (building) variables, while nominal in the sense of virtually nothing or nominal or face value or much below actual value and scale as relates to rule determining intervals between variables or relative dimensions or graded system (Allen, 1985). Steps to be taken in using **Figure 2** (Predictive Nomogram) are as follows:

Find the value of one of the seven building variables and locate this value on the respective scale,

Find the value of another of the building variables and locate this value on the respective scale,

Lay a straight-edge from these two points across to Scale C1 to approximate the value of the micro-temperature change value in degree Celsius of the multivariate prediction of the setting,

Take readings of the other five building variables as limiting values, and

Undertake the steps above again for any other two building variables to achieve the resultant micro-temperature change values in degree Celsius.

Remedial nomogram are used as a remedy or treat against sick building syndrome (Ebrahim 2011, 2011a) or as a means of counteracting or removing anything undesirable or rectify, make good (Allen, 1985), while qualified as to qualify or make competent or fit for position or purpose, make legally entitled, satisfy conditions or requirements, modify or make less absolute, moderate, mitigate, make less extreme, attribute a quality (Allen, 1985) of the building variables over the micro-temperature change. Steps to be taken in using **Figure 3** (Remedial Nomogram) are as follows:

Identify the thermal source (building orientation: degrees) on Scale A1 and Scale A2,

Identify the requite thermal barrier or buffer on respective scale as follows:

*Scale B1 (road proximity: M) ranges from near, average and further from the main road,*

*Scale B2 (plot size: $M^2$) ranges from small plot, standard sized plot and large plot near major road,*

*Scale C1 (building height: M) ranges from Villa, Maisonette or change of user plot,*

*Scale C2 (building width: M) ranges from row housing, semi-detached house or detached house,*

*Scale D1 (ground coverage: %), and*

*Scale D2 (plot ratio: %),*

Lay a straight-edge from these two points across to the activity or situation (micro-temperature change: $^0$C) on Scale E1 and Scale E2, which ranges from baseline climate control, active system climate control, microclimatic (rural) controls, meso-climatic (peri-urban) control and macroclimatic (urban) controls.

## RESULTS AND DISCUSSION

Identified and determined of significance independent building variables of the urban built form having an impact on the dependent variable micro-temperature change using building nomograms were building orientation, building classification, building road proximity, building type, plot size, ground coverage and plot ratio.

Average building orientation was 171.2 degrees and correlated to an average temperature change of 3.4 degree Celsius ($^0$C), while the minimum building orientation was 46 degrees correlating to 1.4$^0$C, maximum building orientation was 316 degrees and 7.2$^0$C temperature change, and a positive and ascending line of regression relation between the building orientation and the temperature change.

The data seems to suggest that the lower the building orientation in degrees from the north, the lower the temperature change values. However, as the orientation was measured in degrees in a clockwise motion from the north, the data was plotted in the form of a polar curve relationship between micro-temperature change and building orientation variable distribution pattern in concentric circles. Plot 211 had temperature reading of 1.5$^0$C (June), while Plot 225 had temperature reading of 6.7$^0$C (September). Building orientation and building

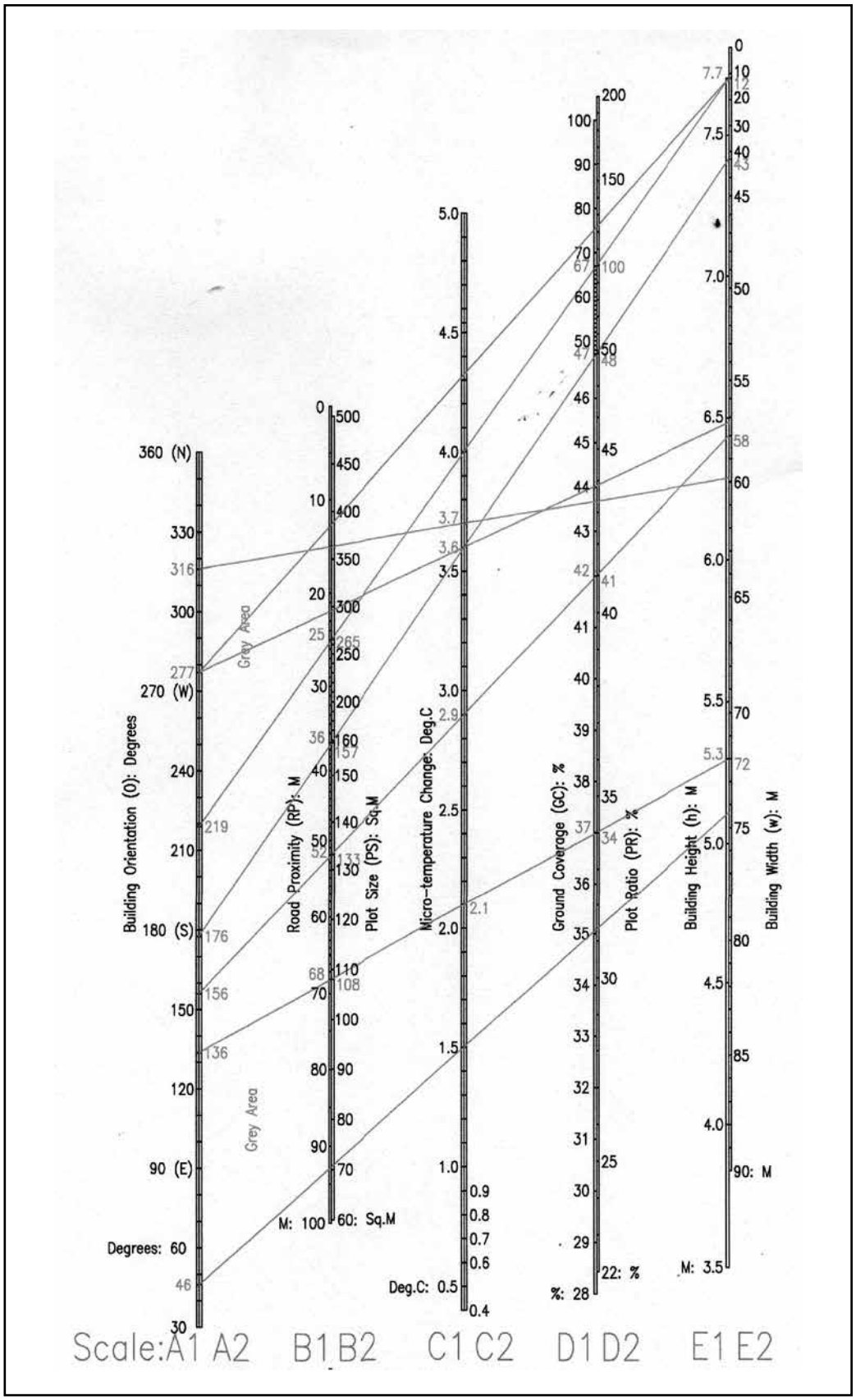


**FIGURE 2**
Predictive nomograms for the average micro-temperature change for building variables for structured neighbourhoods in tropical upland climates
**Source:** Field work results 2015

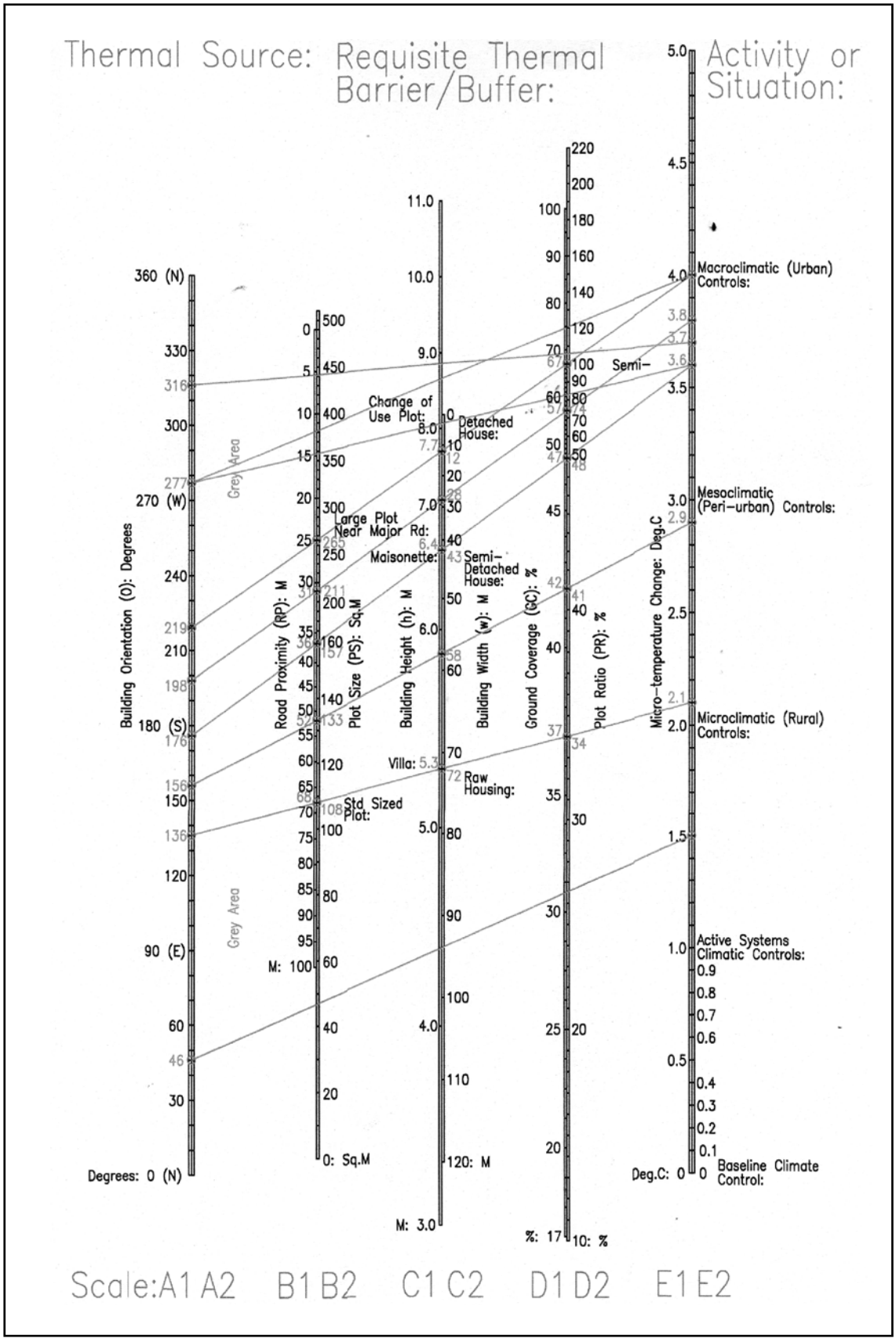


**FIGURE 3**
Remedial nomograms for the average micro-temperature change for building variables for structured neighbourhoods in tropical upland climates
**Source:** Field work results 2015

road proximity being the dominant factors.

This study findings on the building orientation were consistent with Singh and Singh (2010), whose observations established the orientation of the building as a significant variable, related to the temperature change, by noting that planning related to the site, its surrounding, local climate, traditions of the people and the natural elements such as the sun, rain, wind and orientation of the structures.

Average width of row of buildings (building classification) was 40.1 metres (semi-detached house) scoring a 3.4 degree Celsius temperature change, minimum width of row of buildings of 6 metres (detached house) scoring 1.4 degree Celsius, maximum width of row of buildings of 153 metres (row housing) with 7.2 degree Celsius, and a negative and descending line of regression relation between the building classification and the temperature change.

The data seems to suggest that the lower the width of the row of the building, the higher the temperature change figures. This study identified four categories of building as detached, semi-detached, row and change of user, and building classification with the width of the row of building as a significant variable in the determination of temperature change. Findings of study were consistent with Singh and Singh (2010), who recommended the classification of buildings into six categories based on use and tenement basis.

Average building road proximity was 51.9 metres and correlated to an average temperature change of 3.4 degree Celsius ($^0$C), while the minimum road proximity was 11.4 metres correlating to 7.2$^0$C, maximum road proximity was 98.2 metres with 1.4$^0$C temperature change, and a negative and descending line of regression relation between the distance of the building to the main road and the temperature change.

The data seems to suggest that the shorter the distance from the main road, the higher the temperature change values. However, location and distribution of the dependent variable frequency was best represented on isotherm distribution map. Building road proximity finding was consistent with Singh and Singh (2010) which identified building as planning and design attitude to urban built forms.

Average height of buildings (building type) was 6.4 metres (Maisonette) scoring a 3.4 degree Celsius temperature change, minimum height of 5.3 metres (villa) scoring 1.4 degree Celsius, maximum height of 7.7 (change of user and transformed plots: **Figures 4** and **5**) with 7.2 degree Celsius, and a positive and ascending line of regression relation between the height of the building and the temperature change. The data seems to suggest that the lower the height of the building, the lower the temperature change value.

Plot 68 (Transformed Plot) had temperature reading of 3$^0$C (February), while Plot 71 (Transformed Plot) had temperature reading of 3.7$^0$C (February). Width of rows of buildings, building road proximity, ground coverage and plot ratio, seem to be the dominant factors.

Plot 99 (Basic Maisonette) had temperature reading of 1.4$^0$C (May), while Plot 142 (Basic Villa) had temperature reading of 7.2$^0$C (September). Width of rows of buildings, building road proximity, height of building, ground coverage and plot ratio, seem to be the dominant factors. Heat is transmitted through the roof of low buildings (Basic Villa) compared to the taller building (Basic Maisonette). Month of data collection seems to also affect the results. September is traditionally warmer than May in the tropical climate.

**FIGURE 4**
The transformed Plot 71
**Source:** Field survey 2015

**FIGURE 5**
The transformed Plot 68
**Source:** Field survey 2015

Building type findings of this study was consistent with Singh and Singh (2010), who noted that planning and designing of buildings does not only involve the building. Singh and Singh (2010) also related form and function to the building type choice as planning and design attitude to urban built form, and compare well with Firth and Wright (2008), who came up with recommendation based on building type for the temperate climate.

Average plot size was 140 square metres ($m^2$) and correlated to an average temperature change of 3.4 degree Celsius ($^0C$), while the minimum plot size was 101 $m^2$ correlating to 1.4$^0C$, maximum plot size was 422.3 $m^2$ and 7.2$^0C$ temperature change, and a negative and descending line of regression relation between the size of plot and the temperature change.

Plot size findings of the study are in conformity with Singh and Singh (2010), who noted that setting of a minimum plot size is one aspect of density zoning. However, given the nature of the planning at Komarock Infill B Estate of placing the larger plots near the road and the small ones on the inside, the building road proximity seems to override the plot size in this regard by having an inverse relationship between the plot size and the temperature change variable.

Average building ground coverage was 47.6 percent and correlated to an average temperature change of 3.4 degree Celsius, minimum ground coverage of 23 percent correlated to 1.4 degree Celsius, maximum ground coverage of 86 percent with 7.2 degree Celsius, and a positive and ascending line of regression relation between the ground cover of the building and the temperature change.

The data seems to suggest that the lower the ground coverage, the lower the temperature change value. Findings of the study were related to the temperature change, and suggest that both the ground coverage (urban built-up area) and light angle (height to width ratio) were significant building and open space variables. Other studies by Rose, Horrison and Venkatachalam (2011) of six urban built forms (dense compact mid-rise urban form and dispersed low-rise urban form) in relation to urban geometry (the density of building height to width ratio), sky view factor and green cover (vegetation), in Chennai Metropolitan Area (India) using a computer model, concluded that the height to width ratio influenced comfort conditions significantly when compared to the percentage of urban built-up area.

Average building plot ratio was 65.9 percent and correlated to an average temperature change of 3.4 degree Celsius, minimum plot ratio of 29 percent correlated to 1.4 degree Celsius, maximum plot ratio of 162 percent with 7.2 degree Celsius, and a negative and descending line of regression relation between the ground cover of the building and the temperature change.

The data seems to suggest that the lower the plot ratio, the higher the temperature change figures. Findings from this study suggests that with ground coverage (GC) of approximately 47.6 percent and plot ratio (PR) of 65.9 percent, on average 3.4 degree Celsius temperature change would be realized. Plot ratio findings are in agreement with Mumina and Mundia (2014), who recommended the use of development controls, green building technology, establishment of Nairobi green corridors and space to ameliorate against urban micro-climate change.

## CONCLUSION AND RECOMMENDATIONS

Since the built form in urban areas has failed to respond to the temperature changing environment by use of temperature data from predominantly open ground meteorological stations in bioclimatic design, architects should instead use micro-temperature change data using nomogram diagrams. In a region plagued with dwindling resources and the vagaries of climate change, designers and planners need to seek ways of optimizing resource use and methods for sustainable living. Appropriate linkage should be created by practitioners, researchers and the trainers of architects.

Secondly, since non-structured neighbourhoods and structures lacked meaningful and sustainable built form which express design and planning strategies in a temperature changing environment by way of an explanation of cause and effect of temperature on sustainable built form, study results and findings to be used by architects which provide possible reasons and the measurement of micro-temperature change of urban areas compared to rural areas and the part that built form contributes to the temperature change. Digital and analogue technology must be harnessed in the training and practice of architecture.

Thirdly, since earlier studies on micro-temperature change had indicated that the built form lacked manifestations related to the temperature changing environment, study results and findings to be used to bridge the knowledge divide. Digital and analogue technology should be used to update teaching and practice materials for architects through the development of digital and analogue technology, databanks and libraries, support of research and development in educational and allied institutions, facilitation for the attendance and presentation of research results and findings in relevant local and international seminars.

Fourthly, since the study into the use of predictive and remedial nomogram diagrams for sustainable development in a temperature changing environment and that of micro-temperature change in relation to urban built form crosses the boundaries of established disciplines, the training of architects and environmental scientists needs to incorporate a broad background in quite diverse disciplines to facilitate comprehension of the relationships that exist and to promote a rational interpretation of microclimatic concepts as they relate to both natural and man-modified environments.

Further for the structured neighbourhoods to meet the global accepted temperature change of 2 degree Celsius agreed in the Paris 2015 Convention by the use of both the predictive and remedial building nomogram, the scatterplot indicate the threshold for each of these variables were minimum plot size of 108 square metres, building orientation of between 46 to 136 degrees of the North (i.e. N-E direction), plots should have a minimum distance to the nearest main road of 70 metres, maximum height of 5.3 metres, minimum width of the rows for housing of 72 metres, maximum ground coverage of the plot of 37 percent and maximum plot ratio of 34 percent.

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Africa HABITAT REVIEW

# Inadequate 'Police Power' over Land Tenure as a Factor in Ineffective Urban Development Control:

*Evidence from Nairobi Metropolitan*

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**Abstract**

*'Police power' is the authority held by all sovereign states to enable them plan and control the use of land for the sake of promoting public interest. Policy must, however, have such powers embedded in the statutes in order to facilitate effective state control over individual land tenure rights. On the basis of the land tenure-urban development control nexus, the UK government had to nationalize all development rights in 1947 in order to facilitate effective urban planning and control. Studies show that urban planning in Kenya is ineffective, and, consequently, this paper posits that part of the failure of the western-borrowed planning instruments to facilitate proper urban planning in Kenya is due to land tenure regimes that have no/or inadequate provision for state control. To this end, this paper seeks answers to the following questions: (i) How does land tenure affect urban planning and development control? (ii) In what way did the nationalization of development rights in the UK facilitate effective 'policing' of urban development? (iii) To what extent can ineffective urban planning and development control in Kenya be attributable to inappropriate land tenure rights? Based on the findings of questions i-iii, (iv) what policy options are available for effective urban planning in Kenya? Out of the five land tenure case studies reviewed, it was only in government land where planning and control is provided for. This means that four out of five land tenure regimes occupying 80% of the urban space in Nairobi proceeds without state control. This then can explain why urban planning in Kenya is ineffective, and Nairobi, in particular.*

Key Words: Constrained, ineffective, Kenya, planning and control, police power.

## INTRODUCTION

Urban land use planning in less developed countries is ineffective due to the use of inappropriate western planning model (Olima and Obala, 1998; Fekade, 2000; Ayonga, 2012; Home, 2012; Musyoka and Musoga, 2015). Whereas this position is indisputable, there is need to explain why the western models that have worked very well in the planning of cities in Europe and North America tend to fail when applied in the cities of the less developed countries, Kenya, in particular. There has been increased interest in Kenya to plan urban development following the realization that urban population is likely to rise to between 50 and 60% by the year 2025 (ROK, 2007; ROK, 2010). Yet, the expected urban population upsurge in Kenya is occurring within the backdrop of constrained knowledge in the theory and practice of planning (Fekade, 2000; Ayonga, 2012; Home, 2012). In this paper, it is argued that western countries have over the years reorganized their legal and institutional frameworks to make them facilitate effective urban planning and development control (Clarke, 1948; Thomlinson, 1963; Taylor, 1998). Yet, the rest of the countries in transition, Kenya included have taken over such instruments without making the requisite legal and institutional framework meant to make such instruments effective (Ayonga, 2012; Home, 2012).

The argument in this paper is that urban planning and development control in Kenya is ineffective, partly, because policy and legal framework have not empowered the state to fully exercise its 'police power'. Such power shall emanate from the amount of expropriated development rights that are taken from individual land tenure rights and bestowed on the state. If the state had such powers, it shall enable them regulate urban development. Development occurs on land, hence, the study used a land tenure approach in carrying out the investigation on land tenure. The question raised regarding development-land tenure nexus is: does the law give power to the state to plan and control development in all land tenure regimes?

## RESEARCH METHODS

Literature review was carried out using desk research in order to understand and conceptualize the role of land tenure towards effective urban planning and development control. To this end, the 1947

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nationalization of development rights model in the UK was reviewed and found useful. If the review finds a correlation between land tenure and development control this then would set the premise on which the Kenyan land tenure-development control relationship would be interrogated. The investigation culminated in the conceptualization of an ideal land tenure system that results in steering desirable urban development pathways. It is the ideal urban development pathway that would also lead to desirable urban spatial patterns.

Following the review, it is conceptualized in this paper also that development control takes place in three stages; the 'contextualizing', the 'prescriptive' and, and finally, institutional capacity' stages. The first level of development control referred to here as 'contextualizing' stage cannot take place if land tenure does not have provisions to facilitate state control and the second level of control referred to here as 'prescriptive' cannot take place also if the development process bypasses the 'contextualizing' stage of control (**Figure 1**). The absence of the ideal land tenure in the development process is assumed to have a 'destabilizing effect' throughout the land development system. The inability of the development system to generate the two levels of control, and in particular, the absence of the appropriate tenure system is attributed to lack of policy and legislative framework (Clarke, 1948; Litchifield and Darin-Drabkin, 1980; Kivelli, 1993; Taylor, 1998; Fekade, 2000; Home, 2012).

If planning aims to regulate urban development, it would be prudent to define the term 'development' at this juncture. The concept 'development' is defined as the 'making of any material change in the use or density of any building or land or the subdivision of any land and the erection of such buildings or works and the carrying out of such building operations (ROK, 1996, CAP 286). Viewed from the context of the definition that development specifically involves land subdivision or the erection of physical artifacts, then development in our conceptualized model shall take place in the 'contextualizing' and in the 'prescriptive' stages and therefore, regulative control should be carried out at this level (**Figure 1**). If for one reason or another the development process evades the two stages, then such development shall never be the subject of control in the future, unless through reconstruction.

The third approach taken in this paper was to use the various land tenure categories within Nairobi metropolitan to investigate whether policy and legislative frameworks really empower the state to regulate all developments in the city. Land tenure in Kenya is categorized as communal, private and public (ROK, 2010; ROK, 2012; Home, 2012; Musyoka and Musoga, 2015). When communal land is alienated for allocation to individuals, the resulting land tenure becomes private freehold while alienation and allocation of public land to individuals gives rise to private leasehold tenure (ROK, 2012; Musyoka and Musoga, 2015). Nairobi metropolitan has all the land tenure categories found in Kenya and, therefore, the discussions and conclusions carried out in this paper, though based on Nairobi Metropolitan, can be viewed to apply to the whole country.

**Literature review and conceptual framework: is there a correlation between land tenure and urban spatial patterns?**

The question asked here is: how did land tenure become an issue of concern in the urban development process and what particular role does land tenure play in the whole urban development trajectory? Others have observed that all human activities take place on land, and land is also a unique factor of production compared with others because it is immovable and incapable of expansion of supply (Litchfield, 1980). "Because of this special place in society, it is difficult to grant an individual absolute ownership of any portions of land as against the rest of society as might have with a motor car, television set, and so on" ( Litchfield and Darin-Drabkin, 1980).

The importance of land tenure can also be viewed in the context of events occurring in Europe during the 19th and 20th centuries. First, the British were worried by the woeful impact of the industrial revolution throughout the 19th century where developers, guided by the speculative motive, undertook massive urban development without the guidance of planning (Gallion and Einsner, 1963; Taylor, 1998). Besides the disturbing events of the industrial era, England had suffered heavy damage to its cities during the two world wars and it is reported that one third of its 13,000,000 dwellings were damaged (Gallion and Einsner, 1963; Taylor, 1998).

To address some of the challenges relating to the era of industrial revolution and the destruction of property occasioned by the war, the Housing and Town Planning Act of 1909 was enacted to facilitate improvements of the housing conditions (Clarke, 1948; Gallion and Eisener, 1963; Hobbs and Doling, 1981; Taylor, 1998). The 1909 Housing and Town Planning Act also granted powers to local authorities to prepare plans in their respective jurisdictions. As a result, there was need for urban reconstruction and later, there was need to deal with urban congestion as well. The planning and reconstruction of London, was followed by the need to reduce population density within the inner core of the metropolitan area. This was carried out through the dispersal of people and industry from the center to the new towns (Gallion and Einsner, 1963; Hobbs and Doling, 1981; Kivelli, 1993; Taylor, 1998).

In order to initiate informed policy options regarding

future urban development, several committees were set-up to study and review some of the past urban development policies (Clarke, 1948; Gallion and Einsner, 1963; Hobbs and Doling, 1981; Cullingworth, 1988; Taylor, 1998). These committees were the Barlow committee, the Uthwatt Committee and, the Scott committee and their studies were meant to suggest on how the urban problematic could be resolved. Based upon the Uthwatt report, the 1947 Act introduced a comprehensive modification in land policy with the provision that the state shall reserve all rights to the development of land (Clarke, 1948; Gallion and Einsner, 1963; Hobbs and Doling, 1981; Taylor, 1998). In particular, the government was empowered to expropriate all 'development rights" in land and land owners had a right of compensation for loss of this right and such compensation was based on 1947 land values. A central land board was appointed to administer these negotiations and a fund of 300 million pounds was set aside by the national government for this purpose (Gallion and Einsner, 1963).

As permission was subsequently granted by local planning authorities to develop property, the land owners were required to pay a "development charge" to the government. This charge was in the amount of the difference between the value for the existing use and the land value for the new development approved by the planning authority. A permitted use which resulted in the lesser value for the owner required that the owner be compensated the difference and the permitted use which led to higher value required that the land owner pay the difference to the government"(Gallion and Eisner, 1963). The recommendations from the Uthwatt committee and the subsequent nationalization of development rights, succeeded in embedding in the 1947 Town and Country Planning Act a development process that could be viewed as a system (**Figure 1**).

***The culmination of development process as a system and the central role of land tenure***

It can be deduced from **Figure 1** that the evolving development process forms a coherent system where components feed inputs into the system that in turn produce essential outputs that optimize the urban spatial patterns as seen in the following context: When the state took away some of the development rights of the private land owners, it means that no individual could undertake development without obtaining a development permission. This requirement then enabled the state to undertake planning on a plain surface and it further enabled the planning authorities to articulate a land use framework that took care of all land use categories including those often ignored by the free market system. Planning on a plain surface facilitates freedom to plan and control without any encumbrances or resistance from land owners and this then contextualizes current development and forms a framework for future control as well.

When planning on a plain surface, it becomes possible to allocate space to all land uses, set standards for minimum and maximum land sizes, predetermine type of houses to be constructed and articulate a road network that connects all the land uses. The stage and level when planning is facilitated can be viewed as providing a form of indirect control for all land uses. For example is only after planning when the location of land use is determined, development standards are set, minimum lot sizes are set and the type of future buildings are predetermined and such development control can be viewed as 'contextualizing' control.

The certificate of land ownership given to individuals had conditions ingrained in it to the effect that all development taking place either now or in the future including land subdivision shall require development permission. Land tenure that gives the state freedom of control and which further conditions developers to seek for development permission not only allows the state to undertake planning before control but it also ensures that all developers are and shall be brought under the snare of development control when they seek for development permits. This type of land tenure also facilitates effective servicing of the urban land before such land is released to the market for development.

In this paper, the stage when developers are required to obtain development permission before undertaking development is referred to as 'prescriptive' control stage. It is at the level of issuing development permit when the expected development conditions are spelt out to the developer. The premeditated standards in land subdivision, building standards, road network, various land use zoning shall come into fruition during the 'prescriptive' stage. The use of state 'Police power' to regulate urban development begins in the contextualizing stage when planning takes place and during prescriptive stage when developers follow conditions prescribed by the authorities in the development permit.

It is considered that all the stages of development from the contextualizing stage to the prescriptive stage shall require an authority to bring them into effect. The third stage of control, is referred to in this paper as 'institutional' capacity control. Theory and practice has shown that institutions have to be integrated and coordinated in order to effectuate development control. The planning institutions should also have power to implement the plans and punish those who fail to follow the plan. Such institutions should also have budgetary provisions, and enough manpower to undertake development control and all these require policy and legislative guidance. In the UK system, for example, the government had to undertake several legislations

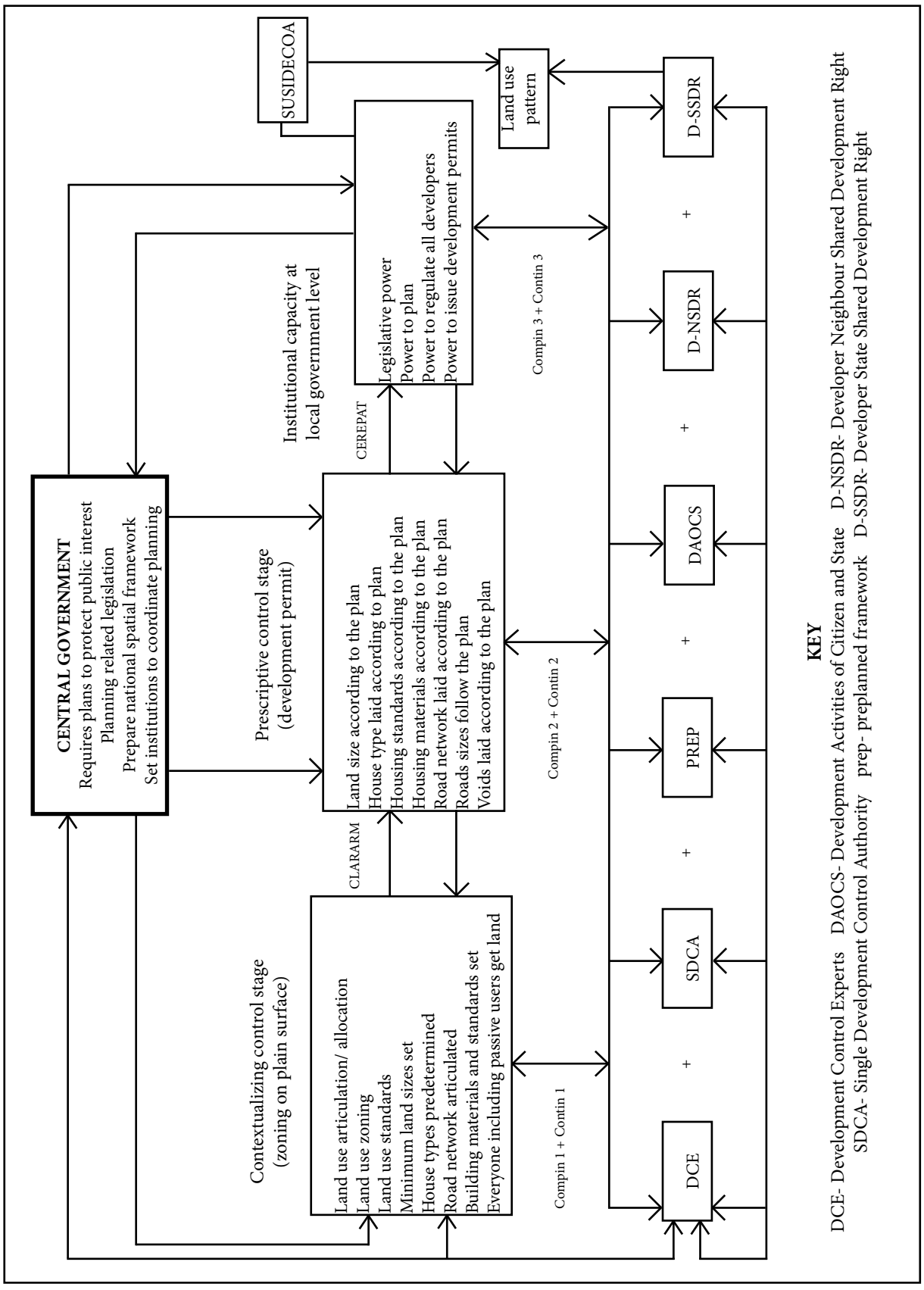


**FIGURE 1**
Land development and control system
**Source:** Author' s construct 2017

to enable it build institutional capacity to undertake planning and development control and to coordinate all the activities of the actors in the development system (Clarke, 1948; Gallion and Einsner, 1963; Cullingworth, 1988; Taylor, 1998).

In order to strengthen their institutional framework, the 1947 Town and Country planning Act in the UK put in place a central authority in charge of planning and development control (Clarke, 1948; Gallion and Ensner, 1963; Cullingworth, 1988; Taylor, 1998). The Act also created the office of the minister of planning or the secretary of state in charge of planning. The same law provided for a hierarchical relationship where the minster and the secretary in charge of planning were at a higher level, followed by central Land Board and finally, local authorities at the local level. The Minister approved plans and gave policy guidance while the land boards undertook land valuations, compensation and compulsory acquisitions and the local authorities undertook development control. Local authorities had provisions for research sections, development control, and forward planning sections, and all these were premised on Faludi's theory of organizing planning departments (Faludi, 1973).

If the development process takes the form of the foregoing conceptualized trajectory, combined with the various inputs from the experts, and neighbor's input, the summation shall lead to the optimum spatial pattern or desirable urban land use (**Figure 1**). This model emphasizes a trajectory premised on a preplanned development scenario which begins with plan, service, build, and occupy (PSBO). However such development pathway requires that land tenure facilitates planning on a plain surface and that the state holds power to regulate and police such development (Clarke, 1948; Gallion and Einsner, 1963; Kivelli, 1993; Taylor, 1998).

In the following sections, it is demonstrated that the UK model of preplanned development, and appropriate land tenure system was exported to Kenya during colonial rule.

***The western model of Plan-Service-build-occupy development pathway was imported to Kenya during colonial rule: 1896-1963: but was applied in European and Asian settlements***

The 1947 UK model of development which begins with planning, followed by servicing, then building and then occupation of the building (PSBO) was brought to Kenya during colonial rule. The provisions of PSBO were contained in the Town Planning Ordinance and the Crown Lands Ordinance (ROK, 1931 TPO, CAP 134; ROK, 1948 CLO) and the emphasis was that planning be carried out on a plain surface. Consequently, developers were issued with land leases that had conditions to the effect that all developments required permission (ROK 1948, CAP 133; CAP 134). This resulted into a duality of land use patterns; the formal PSBO in the European settlements and the informal-led Build-Occupy (BO) in the African settlements.

During colonial era therefore, all European and Asian settlements, both in the urban and rural areas were subjected to planning using the Town Planning Ordinance and the Crown Lands Ordinance (ROK, 1948, CAP 134; CLO, TPO). The areas occupied by Africans both in the urban areas and rural areas were not the subject of planning (Ayonga and Obiero, 2009; Ayonga, 2012; Home, 2012). This approach in land use management created a dichotomy in which the European and Asian areas had favorable spatial patterns while the African settlements developed informally (Njoh, 2008; Ayonga and Obiero, 2009; Ayonga, 2012; Home, 2012).

In the following sections, it is demonstrated that even in the period of post-colonial era up-to 1996, land policy allowed the colonial planning approach to continue up to 1998. The only difference from the colonial era practice and that of the post-colonial era practice in land management was that there was no discrimination along the races.

**Three development pathways applied in post-colonial era 1963-1998**

During post-colonial rule, the government changed the laws that saw the Crown Lands ordinance become the government Lands Act and the Town Planning Ordinance become the Town Planning Act (ROK, CAP 280; ROK, CAP 134; Home, 2012). However, the provisions of the two Acts did not vary from those of the colonial era in terms of substance and coverage (Home, 2012). Three development pathways were provisioned under various statutes to regulate urban land development in Kenya during the era of post-colonial rule up to 1998.

The PSBO development pathway covered government land both in towns and in the rural areas under the provisions of the Town Planning Act and under the Government Lands Act (ROK, TPA, CAP 134; GLA, CAP 280) as was the case during colonial rule. The second PSBO-development pathway supposedly covered three miles strip of the limits of urban boundaries and four hundred feet from the center of trunk roads under the provisions of the Land Planning Act (ROK, LPA, CAP 303). The third development path way was the informal BO which covered rural areas under the provisions of the land control Act and the registered land Act (ROK, CAP 300; CAP 302). The existing statutes then divided Kenya into three zones, the urban proper under the Town planning Act, the peri-urban and 400 feet from the center of trunk roads that was under the land planning Act, and the rural

areas that were under the land control Act.

It is observed that the regime of the Land Planning Act was not effective in the areas that it was meant to control (Shibira, 1978; Ayonga and Obiero, 2009; Ayonga, 2012). This means that both the peri-urban where land planning Act applied (ROK, CAP 303) and the rural areas where land control Act applied (ROK, CAP 302) suffered from the tragedy of informal development both in the era of colonial and post-colonial rule. This then condensed the three zones into two, the formal urban development pathway and the informal rural development pathway. The emergence of dual spatial patterns; the formal in the former European and Asian settlements and the informal in the former African settlements can then be viewed in the foregoing context and is a factor observed even to-date.

***Physical Planning Act (CAP 286) 1998-2010 introduced formal PSBO-pathway: but what happens to areas of BO-led spatial patterns?***

In 1996, the Physical Planning Act (PPA) (ROK, 1996, CAP 286) was enacted and came into operation in 1998. The provisions of this Act were applicable throughout the country and in all land tenure systems (ROK, 1996, CAP 286). It should be noted that the PPA was the replica of the Town Planning Act (TPA) (ROK, CAP 134) and the TPA was also based on the 1947 Town and Country planning Act of the UK and the Two Acts envisaged planning taking place on a plain surface. However, development in the African towns and African rural areas were not subjected to planning during colonial rule. The same practice was continued in post-colonial era up-to 1998 when the PPA came into operation. This means that the areas occupied by Africans had suffered informal development for a period of 100 years beginning from 1896 to 1998. How then can PPA be effective in areas already developed?

The fact that PPA assumed planning to take place on a plain surface is corroborated by the following excerpts from the PPA; in section 24(3) of the Physical Planning Act (PPA) a statement is made as follows: "the director may prepare a local physical development plan for the general purpose of guiding and coordinating development of infrastructural facilities and services for an area referred to in subsection (i)(government land, trustland or private land) within the area of authority of a city, municipal, town or urban council or trading or marketing center, and for the specific control of the use and development of land or for the provision of any land in such area for public purposes (ROK, 1996, CAP 286). This section clearly assumes that the director would have freedom to guide land use development on a plain surface and this was exactly the spirit on which the Town Planning Act (TPA) was based. Whereas this assumption was true in government land tenure, such an assumption did not apply in rural freehold tenure areas where massive development had taken place without planning.

On the basis of the plan prepared by the director referred to above, the local authorities were also empowered under section 29(a-d) of the Act to:

prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area.

control or prohibit the subdivision of land or existing plots into smaller areas.

consider and approve all development applications and grant all development permissions.

ensure the proper execution and implementation of approved physical development plans (ROK, 1996, CAP 286).

Again, this section assumes that planning was carried out on a plain surface and that development control shall be according to such plan and development is taking place for the first time. This position is not correct considering that development scenario that currently exists in both the African urban and rural areas had taken place before the provision for planning contained in the Physical Planning Act came into force.

It is argued that the ability of the director of physical planning to prepare plans under section 24(3) shall depend on whether land tenure facilitates for planning on plain surface. The implementation of such plans through the use of development permits by local authorities or county governments as provided for in the Act shall also depend on whether the land tenure allows for such control as was the case during the era of TPA and in the UK. However, development has been going on in the rural areas which are occupied by Africans without land use planning both during colonial and post-colonial rule up-to 1998. The assumption made in the Physical Planning Act is then oblivious of the fact that development has taken place in some areas of Kenya for a period of 100 years without the benefit of planning and that land tenure does not facilitate planning. To what extent can the Physical Planning Act be able to regulate development in such tenure systems?

***Did the state have control over urban development in Kenya as envisaged in PPA?: Evidence from land tenure-based case studies***

In this section, the question asked is: How much leeway did land policy provide in the law to enable the state regulate urban development?

***Application of PPA in government land tenure: did government have control?***

Within government land the land developer was issued with a lease certificate which contained conditions specified, inert-alia, that such land could not be

transferred, subdivided, or developed without the consent of the commissioner of lands (ROK, CAP 280; ROK, CAP 134; ROK, CAP 265). The Land Act therefore made it mandatory for all developers to seek for development permission before subdividing their land or before building any house whether such a house was for purposes of residential, commercial, industrial or even a church. This requirement in the law and in the land lease then promoted consultation between the state who were the planning and development control authority and the developer who undertook development through the creation of subdivisions and physical artifacts.

The Government Land Act further specified that the commissioner of lands could only issue leases to land owners if such land was surveyed and when the Director of Surveys had issued and certified a deed plan prepared by a registered surveyor (ROK, CAP 280). The requirement that such land be surveyed ensured that every use to land occupied the rightful location as earlier 'contextualized' during planning and such survey also reduced conflict and litigation, first between one land use and another and secondly, between the landowner and the state. Government land tenure can then be viewed to have incorporated the system components envisaged in the 1947 Town and Country Planning Act in the UK that facilitated preplanned development.

***PPA introduced PSBO on rural freehold land, but BO-pathway also retained under LCA: can PPA be used to regulate BO in rural areas?***

Freehold land tenure is a privately owned land derived from the alienation of former communal land that existed in the rural areas during the colonial era. The process of land conversion from the communal tenure to the freehold tenure begins by an adjudication committee identifying land rights over the once communal land. Once the rights are adjudicated and confirmed by the committee, the boundaries are fixed by the survey department and the survey plan approved by the director of surveys. The land ownership register is authenticated and approved by the land adjudication officer. The land adjudication officer hands over the register to the land registrar who issues freehold titles to the allotees under the registered land Act (ROK, CAP 300). It is clear that the process of land conversion and registration is devoid of the input of land use planning and developers have been issued with titles also before planning. It is also noted that land use is dominantly for agriculture use but areas for community facilities including recreational areas are not articulated during this stage. This means that the first stage of 'contextualizing' control has not taken place as conceptualized in this paper.

Subsequent land subdivision simply involves a mutation plan by the land surveyor, which is approved by the land control boards. The approved mutation is taken to the district surveyor as required under the Land Control Act (ROK, CAP 302) who amends the map and registers the mutation which he/she later hands over to the land registrar for issuance of titles. Land use planning is and was not part of the requirements by the land control boards when approving land subdivision. The erection of physical artifacts in the form of homes in the rural areas did not require approval under the registered land Act and the land control Act (ROK, CAP 300; ROK, CAP 302). Consequently, housing, commercial, and industrial development have proceeded in the rural areas from colonial to post-colonial era up-to 1998 without prior planning and approval. The Physical Planning Act envisages to regulate land use planning in the rural areas in 1998 and beyond.

Seen in the context of section 24(3) of the Physical Planning Act that gives the director of physical planning power to prepare a local physical development plan for the general purpose of---guiding and coordinating development… To what extent can the director of physical planning be able to actuate this section of the law in an area of freehold land like Kawangware and Kangemi developed outside Nairobi without planning during colonial era? How about several sections of Ngong area, Kitengela area, Kinoo areas, Kiambu, Kikuyu and all those surrounding the city, but which have developed organically over the years when the areas were lying outside the town boundaries. How can local authorities issue development permission to developers whose physical artifacts were constructed in the past unless such permits are issued in retrospect? In the rural areas where land tenure is freehold, the state has no power to plan the land and the land certificates held by land owners have no conditions to allow for that intervention (ROK, CAP 300; ROK, CAP 302; Ayonga and Obiero, 2009; Ayonga, 2012; Home, 2012).

***The development process in trust-land Tenure: does the state have the right to plan and control development?***

During the time of adjudicating communal lands in post-colonial era, the land adjudication committee often set aside land for urban development and for the use of other utilities such as schools, hospitals and livestock holding grounds. Survey departments were established within the local authorities and junior survey assistants were employed to keep records of such lands. While setting aside land for urban development, land adjudication officers mainly chose locations that were swampy, hilly, or rocky since good land had to be allocated to individuals, who were the main focus of the land adjudication process. The areas set aside for urban development were allocated to developers by the relevant local authorities.

When subdividing and allocating land for urban development, the local authorities often convened

meetings of the full council, where they passed and adopted a resolution to the effect that land be identified, demarcated and allocated to the identified individuals (ROK, CAP 165). In the resolution, the town clerk was authorized to issue letters of allotments to the identified land beneficiaries. It can be realized from the onset, that the motive for the land subdivision was mainly to find plots for the councilors and their henchmen who were elected to represent various council wards and not planning *per se*. Most of the plots were, therefore, either for residential use, commercial or industrial. The implication is that land for community facilities were excluded in the land allocation process since the voices of such users were passive. The development pathway in towns categorized as trustland where local authorities had power of land allocation and development control took the informal option of build and occupy (BO) since the process was devoid of planning.

The junior surveyors, for lack of training and experience often created very in-appropriate layouts, consisting of narrow and poorly articulated street networks. The resulting urban patterns in these towns therefore were undesirable. The towns where data were collected for the purpose of this study were Ongata Rongai, Kitengela and Mulolongo. Interestingly, all these towns exhibited the same characteristics in urban patterns where land allocations are skewed towards few users while excluding community facilities. Secondly, road networks in these towns are very narrow and the towns lack drainage systems. During colonial era, these towns were categorized as African trading centers and planning was excluded in such centers. This means that such towns suffered from the tragedy of planning exclusion both in the colonial and post-colonial eras.

Although planning in the context of the Physical Planning Act (ROK 1996, CAP 286) is assumed to take place on a plain surface, the reality is that development in such towns had proceeded without the benefit of planning and the Physical Planning Act does not provide a solution on how the planning shall proceed in such circumstances. What then can PPA do to ameliorate the negative aspects of unplanned areas where development had already taken place? Unless the law has provision for urban reconstruction, such towns shall remain informal forever.

***Land use development process in the cooperative land tenure clusters: is there provision for planning?***

Immediately before and after independence, indigenous Africans were encouraged to buy land from European settlers in what was referred to as the one million acre scheme. Some of the people who were then working bought the land either as individuals or as cooperative societies. Those who bought land in the former government land areas, including the land buying cooperative societies, individuals and land buying companies used the services of the land surveyors to subdivide land, place beacons, and prepare deed plans that were approved by the Director of Survey. This means that there was no land use planning *per se* and there was no plan at regional level to guide such land subdivisions.

The subdivisions scheme in Government land were also approved by the commissioner of lands after circulating the plan to various authorities for comments. The greatest part of eastern part of Nairobi currently known as Eastland and occupied mainly by African civil servants are lands that were bought and transferred to Africans from Europeans who occupied the rural "scheduled" land. Such land were either under coffee, livestock production or sisal plantations. It must be noted however, that although land subdivisions were carried out by land surveyors, and the plan circulated to the director of physical planning amongst other authorities for comments, the lack of a regional planning framework to guide the subdivisions meant that such subdivisions were informal.

It is noted however that most of the comments and requirements from the director of physical planning were that land be set aside for community facilities and adequate road network be articulated. The director further required that water supply be provisioned by the sub-divider of the land and that land be set aside for community facilities or be surrendered to the government for custody free of charge. This requirement, though often respected was not based on any existing law and, therefore, it was taken as advisory. This created room where the director of physical planning could collude with the commissioner of lands to defeat certain requirements of the law for the sake of rent seeking, or where land were left for public use but such land was later subdivided and allocated to individuals. However, some of the cooperative societies bought land in areas of freehold title and the subdivision of such land was undertaken by land surveyors who did not incorporate community facilities.

It can be concluded therefore that the cooperative land tenure did not incorporate land use planning in the development process, first because there was no plan on the basis of which such control could be undertaken and two, because the land tenure system did not have provisions for planning. Land subdivision, and the erection of the physical artifacts proceeded on a build-occupy basis without land use planning and control. The Physical Planning Act (CAP 286) cannot regulate development that occurred in the years gone by.

## DISCUSSION

This paper set out to find answers to various questions posed earlier regarding the likely correlation between land tenure policies and ineffective urban planning

and development control. From the discussions, the following are emerging:

***In the UK, urban reconstruction was required but land tenure became an impediment***

In the UK, urban patterns inherited from the industrial and pre-industrial eras were problematic and undesirable because the development process followed the informal build-occupy pathway that did not incorporate land use planning. The reconstruction of the cities after the war was being undertaken by necessity and it was while undertaking such reconstruction when authorities also realized that the urban layouts also required to be reworked in order to remove the old order that evolved through organic development.

It was realized, however, that properties were privately owned and reconstruction required that people be transferred to other places and it was necessary to offer them huge compensations for loss of their property. It was on this basis that several committees were appointed to advise the government on future policy options to facilitate efficient urban planning without huge expenditure from the exchequer.

In order to avoid future compensations, the Uthwatt committee in particular recommended that the state nationalizes all development rights in order to facilitate planning on a plain surface in line with the doctrine of 'preplanned development'. All developers were required to obtain development permission which then enabled authorizing authorities to ensure that such development proposals were in conformity with the urban planning framework. It can then be deduced that the land tenure-development control connection and how it affected urban planning was established through the Uthwatt study.

***The 1947 Town and Country Act provided for plan-service-build-occupy pathway (PSBO) which operated on plain surface***

The second question that was relevant in this inquiry is: how did land tenure facilitate efficient urban planning and development control? The Plan, Service, Build, Occupy (PSBO) development process which was put in place in the UK after the 1947 Act is based on the concept of 'preplanned development' and such development took place on a plain surface. The planned area is then serviced: the roads are constructed, the drainage channels are opened and paved, areas for essential community facilities are constructed such as police posts, hospitals, schools, markets, recreational areas, sewerage works, water works, and administration centers.

In order to implement the plan, those who approve development proposals ensure that developers follow the provisions of the plan before permits are issued to such developers. Developers can only seek for development permits if there is such requirement in the law and if the land titles they possess have this requirement. The completion of development is followed by occupation certificates and those who issue such licenses certify themselves that all the requirements of the plan and the building code are followed.

The UK government through studies carried out by the Uthwatt committee realized that such development pathway required that the state retained development rights although such development would be undertaken by individuals. This pathway created the appropriate land tenure that facilitated the use of state 'police power' to regulate urban development.

***The PSBO-development pathway inherited to Kenya during colonial era and applied in European and Asian settlements, but excluded the African areas***

During colonial rule, the UK planning model was imported to Kenya and applied in European and Asian settlements only and not areas covered by Africans. This means that whereas European settlements followed the PSBO development pathway that was based on preplanned development, areas occupied by Africans developed organically outside planning. This then created a dual development pathway in Kenya that were continued to post-colonial era.

Land policy created two development pathways: the PSBO in the former European settlements and the organic-led BO in the former African settlements. The dual development scenario was continued in Kenya up-to 1998 when PPA was enacted.

***The Physical Planning Act envisages preplanned-led PSBO scenario, but organic-led BO also exists***

The Physical Planning Act was enacted in 1996 and operationalized in 1998. The PPA was, however, based on the model of the Town Planning Act which also borrowed from the 1947 Town and Country planning Act of the UK. The Physical Planning Act therefore assumes that planning shall take place on a plain surface which begins with planning, followed by servicing, then build and finally occupation of the finished product (PSBO).

Whereas the PSBO model could be relevant in the former colonial settlements, now government land zone, African rural areas have undergone a century of development without planning, making the use of PPA irrelevant. The Physical Planning Act shall remain ineffective in the former African settlements unless amendments are undertaken to take care of the development realities.

## CONCLUSION

In 4 out of 5 land tenure systems studied, development had taken place organically without planning and this was because policy had not provided for the need for such control. This means that the state had no power

to 'police development through land use planning in most parts of the country constituting 80%. Land use planning and development control in retrospect in such areas cannot be effective unless the instruments of control are varied and this requires a paradigm shift.

## RECOMMENDATIONS

***The call for paradigm shift: in order to redesign, reconstruct and re-engineer urban patterns***

The approach to urban planning and development control in Kenya requires a new approach where things are done differently not based on business-as usual-approach. The old urban pattern created through centuries of urban neglect and organic development must be replaced with a consciously designed new order based on preplanned development. The following are some of the suggestions for the envisaged order.

Reconstruction shall require a bold move similar to what happened in Europe, and in the UK in particular after the industrial revolution and the post-war era. This approach would, however, be very expensive as it involves movement of people and compensation for properties lost. However, whereas there were conditions that favored urban reconstruction in Europe such as fire outbreaks, damages resulting from war bombings, the great depression that called for social welfare state, coincidence with the period of renaissance and the ideals of environmental determinism and a determined government, such scenarios are lacking in Kenya. For example, majority of the people in Kenya reside in rural areas and rural-based programs usually take precedence to those of the urban. This policy approach shall require a visionary and benevolent dictator to bring about the desired change, otherwise, the status quo may persist to the foreseeable future.

***Subsequent development after reconstruction to follow: PSBO-pathway***

If urban reconstruction is favored in Kenya, it is recommended that subsequent future developments be preplanned. Preplanned development is based on the PSBO model that follows the process of planning, followed by the servicing of the planned areas, then developers obtain development permits and finally developers occupy the finished artifacts by obtaining an occupation certificate. This shall ensure that future urban patterns result from planning intervention.

***Reorganize the planning and development control institutions***

There will be need to have authorities in charge of planning and development control at both the national and local levels. The UK system for example had to nationalize development rights and this shall be relevant in Kenya in order to make planning and development control effective. The county governments or local authorities shall be in charge of planning and development control at the local level while there shall be need for an authority at the high hierarchy to coordinate the county planning activities.

Policy must put in place a new dispensation that shall demolish the old order and provide the impetus and tempo for the sustenance of the new futuristic urban arrangement.

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Africa HABITAT REVIEW

# A Need for New Housing Policies in an Entrenched Neoliberal Economic Environment in Sub-Sahara Africa

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**Abstract**

*In a decidedly neoliberal environment, the urban poor in countries of Sub-Sahara Africa (SSA), cannot afford to live in adequate housing, as such, they will continue to be accommodated in the ever-expanding informal settlements in urban areas. Over the past 60 years, there has been a consistent search for a housing solution for the urban poor and its strategies are ever changing due to demographics, politics and socioeconomic forces. Despite frequent shifts of strategy in housing policy over the years, housing challenges have persisted and it is getting worse for the low-income population in a liberalized economic context. This paper is a contextual evaluation of housing policy within a neoliberal environment in Sub-Saharan African (SSA) countries and Kenya in particular. It is a desk study based on literature review from varied sources that includes the World Bank and UN-Habitat. Many housing policies formulated after 2000 in these countries, indicate a significant shift in the role of government in housing delivery from that of main actor to facilitator. This has tremendously changed housing delivery through increased participation of the private sector, both in formal and informal housing, the latter having experienced greater impact. Embracing neoliberalism in seeking a housing solution for the urban poor has faced challenges as a result of shifts in economic paradigms, unfulfilled policies, poor economic performance, limited and inaccurate information, regulatory constraints and tenure challenges. This paper has argued for a review of housing policies in view of the challenges and suggests that this can be redressed in ways such as; developing capacity for information gathering, social support for the urban poor, incentivising formal housing, formulating enabling regulations and secondary policies, changing social perceptions about poverty and institutional reforms.*

Key Words: Housing, housing policy, neoliberal environment, Sub-Sahara Africa.

## INTRODUCTION

Housing policy in developing countries has greatly been influenced by the World Bank and the United Nations. A review of housing policies of Kenya (Republic of Kenya, 2004) and a number of countries of SSA, which were formulated after 2000 (Ondieki, 2016b), replicates much of the policy position of these institutions (World Bank, 1993; UN-Habitat, 2003; UN-Habitat, 2011). Housing policy has substantially been successful within the framework of formal housing, however, the informal housing sector; a dominant form of accommodation in cities faces a myriad of shortcomings. Thus far, there are no overarching strategies that are tangible and actionable to achieve comprehensive and adequate housing for the urban poor (Arnott, 2008; Hamdi, 1991; Huchzermeyer, 2003).

Demographic indicators reveal that the Sub- Saharan Africa is the continent's least- urbanized region at 40 percent in 2013 (UN- Habitat, 2014), however, its cities are expanding rapidly and by 2025, they will be the most rapidly urbanizing in the world (ditto). On an Africa wide scale, urbanization in 2050 will stand at 58 percent (ditto). According to the World Bank reports, a majority of urban dwellers, who are estimated at between 60 and 70 percent, live in informal settlements (World Bank, 2013), which are emerging spontaneously as a "dominant and distinct type of settlement" in the 21st century (UN- Habitat, 2016). This growth in urbanization is posing challenges to housing policy formulation and implementation mainly in developing countries. The UN's Habitat III rallying call- "New Urban Agenda" is timely and could renew governments' commitments to action on this subject matter.

The discourse on housing policies in SSA countries reveals that various strategies such as social housing and housing markets, have been used in seeking a sustainable urban housing solution. These, unfortunately, have had little success in meeting the housing need of the urban poor. The most dominant is the blend of social and market-oriented approach with a greater bias

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to the latter. It mainly embraced neoliberal economic principles that led to failure in offering appropriate housing solutions. It can be argued that economic approaches cannot be a panacea for housing problems in contexts of weak economies, which pose the question as to whether such an understanding could make a case for other approaches that push the limits beyond economics (Ondieki, 2016a). The challenge, of course, is how it can be executed within an entrenched neoliberal economic environment. There are certainly no easy solutions and housing research would not provide these without experimentation. Probably, the solution lies in the proposition that every state and city endeavours, in their own ways, to seek homemade solutions to their unique housing challenges because there cannot be a generic one to urban housing challenges (Hamdi, 1991).

This paper argues that there is a need to review housing policies to reflect the realities of the urban poor. It discusses housing policy challenges in a neoliberal environment and under the context of urban poverty and informal housing markets in SSA countries and Kenya in particular. The paper concludes by suggesting new policies that encompass factors beyond the economics of the free-market.

## RESEARCH METHODS

### Challenges of Implementing Housing Policy in a Neoliberal Environment

### Shifts in global economic paradigms

The chronology of interventions on urban housing in post independent SSA countries shows that successive administrations experienced challenges in implementing housing policies necessitating continuous review mainly in response to global political and economic paradigm shifts and realities of urban poverty. A summary of these policy reviews is illustrated in **Table 1**.

The government's support of low-income households to access housing in the 1960s and 1970s through a number of housing strategies including state housing and site-and-service schemes, were abandoned in the 1980s instead of being reformed to comply with socioeconomic conditions of the rapidly changing urban context. These changes were influenced by global economic changes that introduced Structural Adjustment Programmes (SAPs) in developing countries by the Bretton Wood institutions. This socioeconomic policy shift meant that the governments lessened their social responsibility to the public in favour of market forces. This brought about profound implications for housing and other government services in the low-income sector and exacerbated the growth of informal settlements.

### Unfulfilled policies

The fundamental focus of housing policy is twofold. One, to enable demand and supply of housing to operate in the free-market and two, to secure the welfare of the poor and vulnerable population (Clapham, 2010). However, housing policy in SSA has worked more in favour of the middle and upper income groups who operate within the free-market context. It is not surprising that housing policy targeted homeowners and renters in this category; a minority as demographics suggest. Comparatively though, the poor and vulnerable, who are the majority and whose household formation is ever greater, have increased the demand for affordable housing, thus, leading to the proliferation of informal settlements where such housing is supplied. For example in Luanda, the largest city in Angola, about 80% of residents live in informal settlements (**Figure 1**).

**TABLE 1:** Summary of global paradigm shift

| Period | Dominant Orthodoxy | Strategy for Urban Housing |
|---|---|---|
| 1960s | Modernization Theory with a Western bias. | Import substitution strategy.<br>Mass housing |
| 1970s | Growth and Redistribution Theory.<br>Basic Needs Theory. | Focus on site and service schemes and self-help projects. |
| 1980s | Emergence of the Neo-liberal Theory.<br>Imposition of Structural Adjustment programmes (SAPs). | Problems of affordability at the fore.<br>Tacit acceptance of informal settlements.<br>Upgrading of informal settlements. |
| 1990s | Neo-liberal Theory.<br>Emphasis on Enablement and Good Governance. | Cities increasingly seen as engines of economic growth.<br>Restrictive building and land-use standards increasingly ignored. |
| 2000s | Sustainable Livelihoods Theory.<br>Focus on poverty eradication. | Privatisation.<br>Focus on private/public sector partnerships. |

**Source:** Anyamba 2006

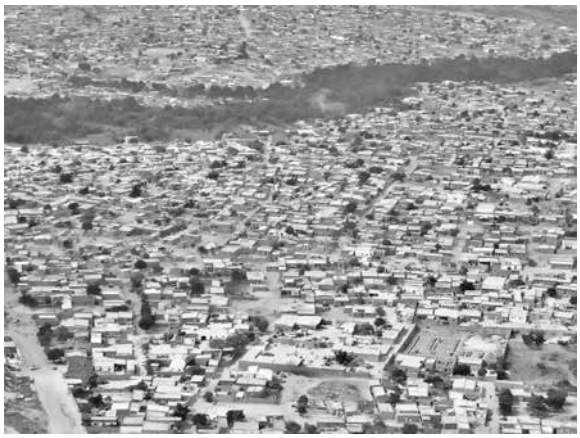

**FIGURE 1**
Informal suburb in Luanda
**Source:** Hammelkar 2007

Although the government has embarked on an ambitious housing development programme as exemplified in Kilamba, shown in **Figure 2**, observers postulate that it is not in sync with the demands of the poor residents who would have benefited more from a different development approach (Jenkins, 2011; Buire, 2015).

The challenges of implementing housing policies that were meant to expand and or improve the physical character of settlements such as site-and-service schemes experimented on in Kenya, Tanzania, Nigeria, Zambia and Senegal were abandoned for the reason that they did not benefit the targeted low-income population. Site-and-service schemes failed to provide sufficient housing for the low income populations in urban areas because a majority lacked the financial capacity to develop their plots, which they gradually commodified and moved back to informal settlements thus defeating the purpose of the housing strategy that envisioned better housing. For example in Nairobi, all site-and-service schemes that were established in the 1960s through to 1980s were sold off to rich entrepreneurs, who converted them to high-rise housing blocks for rental purposes.

Upgrading of informal settlement as an intervention strategy has been a controversial subject where wealthy individuals own substantial stakes in informal housing. In such situations, it has been challenging to make a plausible argument for this policy. In Nairobi, housing in informal settlements is mainly owned by 'slumlords' and upgrading such settlements may raise the house value and disfranchise existing tenants at the benefit of slumlords. For instance, efforts at slum upgrading in Mathare in the 1990s sponsored by GTZ, the Catholic Archdiocese of Nairobi and the government of Kenya, became a cropper due to slumlord activism and tenants' unease over the uncertainty of housing affordability. It was felt that would benefit 'outsiders' and the landlords feared it would deny them long-term income despite being promised a payoff. Consequently, slum-upgrading strategies in many cities in SSA never really took off as envisioned in policy. It can thus be surmised that housing strategies fronted by the World Bank and the UN have had limited success because they never yielded the desired outcomes for the targeted beneficiaries.

**FIGURE 2**
Kilamba; a new housing suburb at the outskirts of Luanda - Luanda
**Source:** LongIslandPerson 2012

**Limited and inaccurate information**

Though the pace of research on housing in African countries has increased rapidly in recent years, there is still very little empirical work analysing housing policies in African countries that is intellectually persuasive (Arnott, 2008). The data are either unreliable or insufficient, possibly because of the multiplicity of issues that cut across many disciplines. Research has been through case studies, which is mainly inconclusive. Governments have limited information about informal housing such as demographic of households, housing adequacy and needs. Additionally, the unpredictable growth of informal housing makes it more difficult to gather information whose validity period will make it meaningful for urban planning. With such limited information, documenting housing problems and predicting which policies will be effective is difficult thus reduces the target efficiency of policy.

**Poor economic performance**

Inadequate funds to conduct housing programmes at a national scale is of great challenge in many countries. Thus, the greater difficulty they have in mounting national housing programs can be attributed to the difficulty of raising revenue, relative to the size of their economies (Arnott, 2008). Arnott (2008) ascribes this to evasion of income and property taxes in the informal economy, which erodes their tax bases. Most of these countries have a large informal sector as well as a high proportion of housing that is informal and since housing policies are premised on a formal economy, it becomes an ineffective tool for intervention in a poorly performing economy.

This scenario is exemplified in Kenya where between 60-70% of the urban population live in informal settlements (KNBS, 2009). According to the United Nations Economic Commission for Africa (UNECA), Kenya has one of the highest informal sector employment in Africa. Employment in the informal sector excluding agriculture stands at 77.9 (UNECA, 2016). Further, the report notes that three out of four workers are employed in the informal sector, a proportion that increases to over 80 percent among women. The study attributes the high level of informal sector workers to inability of the formal sector to absorb the huge number of job seekers. It is therefore not surprising that a majority of this urban population live in informal settlements. The report further observes that in SSA, informal employment drives job creation in most countries and estimates that over 70 percent of jobs have been in that sector over the past 10 years. As economists explain, this is one of the reasons governments cannot collect sufficient taxes to fund social welfare activities that include the provision of adequate and affordable housing.

Further, a majority of the poor and a substantial number of wealthy entrepreneurs work in the informal sector and governments cannot accurately measure their incomes. This severely compromises the effectiveness of broad income-related transfer programs and more generally limits the scope for redistribution. Economists indicate that a large informal sector relative to the formal one, lowers the fiscal capacity of an economy. Hence, to meet the demand for public services in such a context, governments impose high tax rates on formal sector income and turn to other revenue sources that are inherently inefficient, resulting in highly distortionary fiscal systems, which encourage the use of regulation, both to direct the economy and to collect fee revenue (Arnott, 2008). In Kenya for example, increased rates for development approvals by local authorities and other statutory bodies such as the National Environment and Management Authority (NEMA) and the National Construction Authority (NCA) are some of the ways the government collects revenue in the building sector, which developers aver impedes its growth.

In most SSA countries, poor economic performance has made mortgages unattractive to a large population. As a consequence, those left out opt to develop housing through informal means (World Bank, 2015). Hence making informal housing not just a characteristic of the poor but also of higher income groups. Furthermore, poor economic performance has made it difficult to acquire land, it has increased the cost of construction and minimized infrastructure provision. These factors constrain the ability of poor households to consume "decent" housing and this makes informal housing the lowest cost option (World Bank, 2015). On average, a formal "affordable" house in most SSA countries costs about 17 times the mean annual household income against an acceptable standard affordability measure of between three and five times (CAHF, 2013).

**Urban poverty and population growth**

A major characteristic of cities in developing countries is urban poverty expressed by the nature of settlement where they live among other indicators. The urban poor live in unauthorized housing in informal settlements (UN-Habitat, 2003). They mainly derive their income from informal economic activities that are mostly undocumented and income is mostly low and irregular (Arnott, 2008). In discussions of housing policy, there is little if any mention of income-related housing assistance programs and whatever redistribution occurs via housing policy, is done without reference to household income. Since governments are reluctant to subsidize unauthorized housing, their housing programs are biased towards authorized housing and therefore against the neediest households (UN-Habitat, 2003). Rarely do the urban poor get direct assistance in rent.

The World Bank forecasts that poor economic performance in most SSA countries compounded with population growth would increasingly witness expansion of informal settlements (World Bank, 2015). This is in contrast with other regions of the world where informal settlements will decline as illustrated in **Figure 3**. It is further estimated that population of settlements is growing at 4.5 percent annually, a rate, which will double in 15 years (World Bank, 2015). After this period, the majority of the world's slum dwellers will live in African cities thus necessitating the urgency for a new housing policy to redress the situation in the countries of Sub-Sahara Africa.

**Regulatory constraints**

Overregulation in the housing sector is one of the greatest impediment to achieving affordable housing (World Bank, 1993; De Soto, 2000; UN-Habitat, 2003). There are vast studies on this subject matter and solutions have been presented on how to overcome regulatory constraints. In many SSA countries, these have been vastly ignored exacerbating the housing challenge. De Soto (2000) argued that informal housing is a product of regulatory violations, which is a response, mainly to its non-responsiveness to the housing reality of the urban poor in the prevailing socioeconomic context. He asserts that when laws are in conflict with the basics of human survival, they are, out of necessity, violated. The violations are a consequence of their need for affordable housing, which is unmet within the legal framework. This argument explains the frequency of informal settlements in developing countries.

Housing regulations and secondary policies are not meant to enable the smooth operation of the market. Governments at all levels set up numerous impediments to housing development, primarily excessive

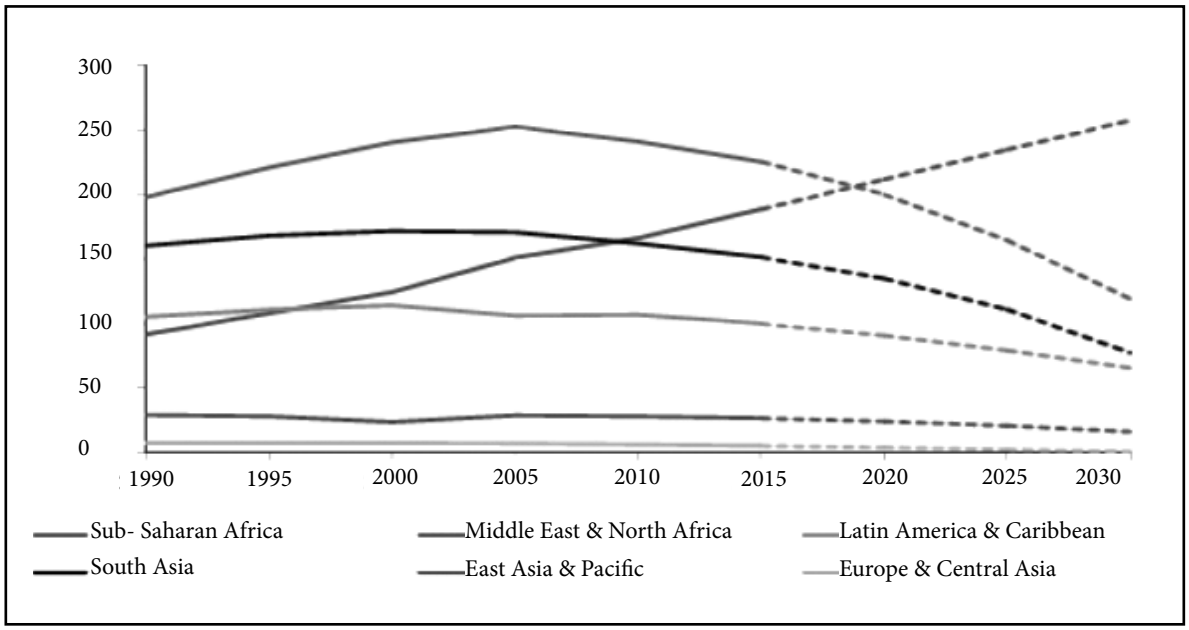


**FIGURE 3**
Estimated urban population living in informal settlements by region 1990-2030
**Source:** UN 2014

and burdensome housing and land use regulation and excessive permit fees (World Bank, 2015). One reason is that cash-strapped local governments use permitting to generate revenue and another is by urban planners who are intent on enforcing their vision of the city against the power of market forces (Arnott, 2008). This behaviour encourages the construction of non-compliant housing, which reduces the power of planners to influence the spatial development of the city.

The literature on housing policy emphasizes the importance of removing impediments to the smooth operation of housing markets but contains little discussion of housing policy as a redistributive tool (Arnott, 2008). Large-scale housing programmes that were highly regarded as a solution to the neediest household in the 1960s have since been abandoned. It seems that these countries have resigned to the inability to provide "decent and affordable housing for all", and instead focus on small-scale, local programmes that are having little effect in increasing housing stock for the burgeoning urban poor and vulnerable populations. An example is the Kenya Slum Upgrading Programme (KENSUP) that is being undertaken in Kibera slums of Nairobi through an initiative of the UN-HABITAT and the government of Kenya (Republic of Kenya, 2005). It is a high-rise housing scheme that is supposed to gradually replace the low-rise slum, whose purpose is to afford poor slum household's secure tenure and affordable housing (**Figures 4** and **5**). This programme has been criticized not only for slow implementation but also for lack of a sustainable and equitable strategy of supplying sufficient housing units to the slum dwellers.

**Tenure challenges**
Land ownership in cities of SSA countries differs greatly and this has had much influence to the pattern of informal settlements. Urban land in Nigeria, DR Congo and Kenya is to a great extent owned by private sector and it is mainly in the riparian that most informal housing is built (Ondieki, 2016b). In contrast, informal housing patterns in cities where land is under state control, this is mainly in countries that experimented on socialist political ideologies at independence or later such as Angola, Mozambique and Ethiopia. In these countries, there is much more control in the formation of informal settlements. In both cases however, tenure is a challenge.

**FIGURE 4**
Site of Phase I KENSUP housing scheme in Kibera, Nairobi (highlighted section)
**Source:** Google maps 2016

**FIGURE 5**
KENSUP housing flats
**Source:** Author 2016

Tenure in informal settlement is a thorny subject because reconciling interests of various stakeholders has proven difficult in situations where it has been tried. Moreover, once poor households are given tenure, they quickly exchange it for short-term monetary gain and revert to their normal way of living (Syagga, 2012). Therefore, tenure may not be a solution to housing for the urban poor.

Literature on informal housing in Kenyan settlements highlights these challenges (Syagga, 2012). In Korogocho for example, there are three groups that claim public land; tenants, resident structure owners and non-resident structure owners. In such a scenario is it difficult to decide who will get the title. For instance, tenants have demanded the right to titles on the grounds that landlords have benefited from the rents at their expense when they do not own the land and the standoff still persists. It is also not conceivable that there is enough land in any given settlement to be parcelled out individually to all residents.

**Towards a New Housing Policy**
The challenges of implementing housing policies in SSA countries highlighted in the first section of this paper suggest that there is a need to re-examine a number of areas within these policies that significantly impede the realization of their objectives. Consequently, this section postulates on possible areas of policy review that could improve on its implementation.

**Developing capacity for information gathering**
A new housing policy needs to be underpinned by accurate data, which can be achieved through incorporation of mechanisms for resourcing and capacity building for information gathering. It is incumbent upon policy makers to encourage periodical review of data gathering methodologies, which should be incorporated in periodic national census. It could also be significant to advance housing research as a strategic national policy through funding studies in local research and tertiary institutions. Such a strategy would ensure frequent surveys on housing because of the rapid changes taking place in the sector.

The Kenyan case, where a number of studies are conducted, can offer lessons on this: The Kenya Integrated Household Budget Survey (KIHBS) and Kenya Demographic and Health Survey (KDHS) are regular studies carried by the Kenya National Bureau of Statistics (KNBS). While this constitute a positive direction in the search for information to facilitate policy implementation, it is not enough in terms of specificity, detail and depth.

**Social support to low-income households**
Research has shown that a majority of the low-income urban population earn wages that cannot afford them adequate housing (Owino, 2014; UN-Habitat, 2003). The portion they earmark for rent is not sufficient earning to the landlords to supply 'adequate housing' and remain in business. Hence, to achieve access to adequate housing some form of housing subsidy may need to be considered. Research has shown that housing is the single-most expensive component to households, consuming between 25% and 50% of household income (UN-Habitat, 2003). In the low-income sector, that is a significant proportion and yet it may not be enough to invest in adequate housing. Such is the understanding that makes progressive countries provide subsidies to low-income households to access housing that they could otherwise not afford in a free market context.

Further, to boost empowerment of the urban poor, housing policy may require to incorporate urban planning interventions to achieve inclusivity and balance in urban growth. Such a policy will ensure households work and undertake business in places that have close proximity to work and markets. Whenever housing is located at the periphery of the city like most informal settlements, and industry and business are located elsewhere, such as the city centre and distant industrial parks, costs of transportation and infrastructure development are increased.

**Incentivizing formal housing**
The decision to participate in the formal or informal economy by both firms and individuals is based on perceived self-interest. It is therefore in the governments' interest to make formal participation in economic activities more attractive. This may entail some sacrifice of short-term efficiency. For example, in the short-term

the government could regularize informal housing that meets set criteria in building standards not only to collect more in tax revenue but also to extend its control over the economy. Some informal settlements may be declared special planned areas where revised building standards can be accepted for a specified duration. In Kenya for example, the Physical Planning Act-Part IV-B gives the Director of Physical Planning authority to prepare both long and short-term development plans through consultation with stakeholders. Scenarios such as the one envisaged for special planned areas may be implemented within the provisions of the law (Republic of Kenya, 2010).

Tenure: Elsewhere in this paper, there is an argument against tenure for the urban poor but on the contrary, it offers an opportunity for formalization of activities and could grant homeownership to the urban poor if well managed. Accordingly, a new housing policy may need to incorporate a framework that reduces the opportunity for commodification of title in informal settlements such as the Community Land Trust (Syagga, 2012). In principle, such a legalization strategy would ensure that land is owned by a registered Trust that leases it out to the families who live there and that the house and other structures erected on the land are owned by the individual families. Further, each family can sell its house but at a regulated price by the Trust whose governance is shared between the Trust representatives and other stakeholders such as the local government (Syagga, 2012). Such a formal strategy will enable the local authorities and government to effect control over the development of informal settlements.

**Formulating enabling regulations and secondary policies**

Planning and building regulations: An overregulated formal housing market is a phenomenon that is observed in many developing countries. The construction permitting process is mostly expensive and may take several years. Building and zoning standards are unrealistically stringent. Overregulation makes formal housing unaffordable for the poor and much of the middle class and encourages the construction of non-compliant housing. This state of affairs is widely acknowledged (World Bank, 1993; De Soto, 2000; UN-Habitat, 2003). The dilemma of enforcing planning and building regulation in the context of poor economic performance presents serious challenges. If governments ignore violation of regulations and provide the same level of services to informal as to formal housing, they fail to discourage the future construction of informal housing. If they regularize unauthorized housing, developers would have little incentive to conform to regulations. If however they discourage informal housing, they may impede the operation of the informal housing market and harm the needy (Arnott, 2008). An effective housing policy should be dynamic and progressively seek to increase the proportion of formal housing through enforcement of regulations while reflecting upon contextual housing realities. It will need to address the minimum irreducible spatial and technological provision for housing.

Land market: The urban land market in a number of SSA countries is distorted and consequently hurts the housing market for the low-income population. A progressive housing policy requires to address land speculation in urban areas to curb unreasonable increases in land values, which further alienates the urban poor. In support of such restructuring, the legal system may require to shift from primarily protecting individual rights, to increasingly ensuring the collective social function of property such as making more land available for housing development in the low-income sector (Fernandes, 2003).

Fiscal policy interventions: There are a number of fiscal policy initiatives that government can deploy to make housing accessible to low-income urban populations. It can offer tax incentives that target groups such as community based housing cooperatives to promote home ownership or to the private sector to participate in rental housing development for the low-income sector. The former strategy would avoid the kind of biases that would be encountered if individuals were targets of tax incentive strategies. Tax incentives must be realistic to the prevailing economic situation otherwise the Kenyan example that was tried out in 2008 through legal notice number 115 (Laws-of-Kenya, 2008) failed to attract investors because it was poorly formulated and could not accrue profit to investors. Further, through other secondary policies and legislations, local governments may require to be facilitated to collaborate with the private sector to launch housing programmes and finance urban redevelopment using land value capture instruments. Public Private Partnerships (PPP) are some of the strategies that could be used to increase access to housing.

Liberalization of the housing market may seem to favour the middle and upper income populations, nonetheless, it requires to be potentially regulated to make it more accessible to decongest demand in the low-income housing sector. This may be achieved through fiscal policy reviews of mortgage interest.

**Changing social perception about the people that live in informal settlements**

Support for urban poor populations in informal settlements may require to be viewed not as a reward rather as necessary assistance for purposes of equity. To achieve this, a decentralized redistribution strategy requires to be incorporated in the housing policy to facilitate local governments and community organizations, which are better placed to identify the truly needy for

support.

The perception that informal settlements are sources of crime must be redressed. Housing policy may need to incorporate strategies that can secure and improve people's livelihoods to reduce incidences of reliance on criminal means of making a living (Huchzermeyer, 2003). The policy should have mechanisms that promote community participation in neighbourhood matters through democratic leadership. They must be enabled through a people-driven intervention process to take on the long-term responsibilities for maintenance and ongoing neighbourhood improvement.

**Institutional reform**

The experience gained by the World Bank through their housing support programme across the developing countries between the 1960s and 1980s has demonstrated that emphasis in housing policy should shift from projects to institutional reform (World Bank, 2015). This is because despite investing in numerous housing projects across developing countries, their impact to the overall wellbeing of the urban poor has had very little success. Consequently, an effective housing policy should be structured in a manner that will improve coordination and co-operation of all housing stakeholders, with clearly defined structures of engagement to avoid inconsistencies, fragmentation and overlapping of roles.

## CONCLUSION

In order to redress the housing challenge facing the urban poor it is recommended that housing policy makers require to first, critically focus on and address factors that increase the cost of housing and second, seek and implement strategies of improving the conditions of existing housing stock both within the formal and informal sectors. Policy makers, as agents of governments, have at their disposal a number of enabling instruments that they can utilize to address housing challenges on the demand, supply and management sides.

On the demand side, the government can, through legislation and public policy, enhance achievement of sufficient housing, mainly for the urban poor in a number of ways: one, there should be tangible efforts in administering programmes of land and house registration and regularization of insecure tenure. This is achievable through contextual pro-poor legislation of property rights. Two, fostering innovative arrangements for providing greater access to housing finance by the poor through fiscal policy instruments such as mortgage finance and, three, introducing and rationalizing subsidies by ensuring that subsidy programs are of an appropriate and affordable scale, well-targeted, measurable, and transparent, and avoid distorting housing markets.

On the supply side, the government can, among other strategies, provide incentives for housing development by providing infrastructure and services for residential land development. Withdrawing regulations, which unnecessarily hinder housing supply and lastly, reorganizing the building industry through creation of greater competition and removing constraints to the development and use of building materials and technologies.

The success of these measures will of necessity require support of an institutional framework that is information rich on matters of the housing sector. Accordingly, institutions that support the housing sector should be strengthened to have the requisite capacity to oversee and manage the performance of the sector.

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Africa HABITAT REVIEW

# Phenomenological Epistemology as an Indispensable Component in the Resolution of Challenges Encountered in the Architectural Production of Urban Space

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**Abstract**

*Three decades have elapsed since Christian Norberg-Schulz—inspired by Heideggerian phenomenology—appropriated the Genius Loci concept (spirit of place) into mainstream architectural discourse, in his seminal publication Genius Loci: Towards a phenomenology of architecture (1980). In this text, Norberg-Schulz presents the compelling place-postulate model, arguing that man can only dwell [comfortably] on earth if he/ she seeks and achieves an Existential foothold, through effective orientation within the Existential space, which though cosmologically derived, may even be considered to be exemplified by any harmonious urban space in the Kenyan context. Can the phenomenology of architecture still provide a relevant approach through which Kenyan architects can re-examine the modes and processes of space production within our cities today, in order to realise the elusive Existential foothold for metropolitan dwellers? This paper is an outline synopsis of phenomenological epistemology as an initial step to providing an alternative yet valid method of comprehending the architectural production of urban space. It raises timely questions regarding the tensions that emanate from entrenched power relations within Kenyan urban spaces. These tensions originate during the application of development control instruments that determine urban densities; zoning; circulation and transition; disposition of urban functions; and renewal or regeneration to revive urban sectors that were previously thriving. Initially, the adopted methodology is discussed, embedded in the justification of the philosophical approach within the paper. Phenomenology is presented as a constituent of mainstream philosophy. The contributions of the classical phenomenologists are outlined in a synoptic manner. Norberg-Schulz's architectural Existential phenomenology is discussed, together with the criticisms that have been levelled against it. The case for a broadened and more inclusive phenomenology is presented on the basis of ontological dimensions; levels of intentionality; and aspects of phenomenological consciousness. The production of urban space is discussed from the perspectives of cognition; truth and reality; understanding and memory. Finally, aspects of phenomenology within urban space are exposed within the Kenyatta International Convention Centre (KICC), a seminal Kenyan architectural artefact.*

Key Words: Architectural artefact, epistemology, ontology, phenomenology, place-postulate, urban space.

## INTRODUCTION

This study counters purist positions, which over-emphasise contextual incongruence between Africa and the West, claiming that Eurocentric 'schools of thought' are inapplicable to Africa. These positions do not acknowledge the contributions and achievements of philosophical approaches such as phenomenology, as well as their inherent potential for application to understanding pertinent architectural and urban issues in Africa.

Thus, this study provides philosophical explication of architectural production of urban space in Kenya, with practical implications. It presents an alternative and novel approach that initiates critical and reflexive attitudes in Kenyan architects, to augment prevalent practices in urban design. Appropriation of phenomenological philosophy into mainstream architectural discourse in Kenya—with a broadened epistemology and mandate beyond the initial postulate by Christian Norberg-Schulz—is relevant for anthropocentric design sensitivity and production of architectural knowledge. This will ensure effective response to pertinent challenges within urban spaces. The approach is antithetical to widespread Modernist dehumanization, evident in the adoption of Western models of urban space production, without a critical analysis of their appropriateness to the Kenyan context.

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Kenyan architectural academia is assumed to be ready to engage with Phenomenology as Philosophy, which is often perceived to be 'complex' and 'difficult'. Kenyan architects should be encouraged by Martin Heidegger, who adopts Edmund Husserl's approach of ignoring restrictive dogmas and presuppositions to argue that phenomenology can only be comprehended by "seizing upon it as a possibility" (2002a [1962]; 2002b [1962]; 2002c [1962]). The versatility of Phenomenology is attributed to its dual nature as a first order theory—that describes and explains structures, processes and phenomena, offering procedural and methodological guidelines—and a second order theory which provides a unitary framework to integrate multiple first order theories (Roche, 1973).

Apart from initiating dialogue on expanding boundaries of architectural theory in Kenya, the study reclaims the central position of human experience, to theory, research and praxis. Roche (1973) describes the human mind as an individual's "beliefs and knowledge", which acts as repository for an array of meanings, revealed by personal experience, securing the world as a reality. Experience is vital for knowledge acquisition, the prerequisite to cognitive empowerment. Due to its sensitivity, the proposed anthropocentric focus yields a sustainable fit between the urban space and its users.

The study is delimited to tangible urban space—perceived as social, communal and interactive—where architectural meanings are embodied, within physical artefacts and urban forms. Urban spaces may also be individual, mental and spiritual, due to their multiple characteristics. However, in this study an embryonic expanded Phenomenology will be discussed, and other aspects of urban space, in Kenya, are proposed for further investigation.

## RESEARCH METHODS

### Justification of the adopted philosophical approach

Lansana Keita (1991) declares that "philosophy in an African context should seek an African orientation". This implies contextualisation rather than pursuit of purity as proposed by Frantz Fanon who "committed himself to the course of human freedom" (Hansen, 1978). In one of his most significant works The Wretched of the Earth (1966 [1963]), Fanon presents the case against Eurocentricity through vital questions:

*How is it that we [Africans] do not understand that we have better things to do than to follow that same Europe?". "We today can do everything as long as we do not imitate Europe, so long as we are not obsessed by the desire to catch up with Europe…European techniques and the European style ought no longer to tempt us and to throw us off our balance…When I search for Man in the technique and style of Europe, I see only a succession of negations of man…Let us combine our muscles and our brains in a new direction…No, we do not want to catch up with anyone. What we want to do is to go forward all the time".*

However, Fanon's quest, of an Africa existing independently of Europe and its technology, is questionable for architecture, which relies heavily on Western construction technology.

Heinz Kimmerle argues that: "the selection" of academic philosophical material from Western academies "and the way in which it is used in teaching and research is already an Africanisation of Western philosophies" (1997), validating the 'Africanisation' of phenomenological discourse herein. Kimmerle (2011) seeks to "set up dialogues between Western and African philosophies" to enrich Western philosophy. This indicates a trend, in its formative stages, where Afrocentric and Eurocentric epistemologies co-exist as equal partners. Kenyan architectural discourse requires a harmonious balance of Afrocentric and Eurocentric approaches as complementary alternative viewpoints. Recourse to Philosophy, to justify the inclusion of Afrocentric and Eurocentric epistemology is necessary in order to propose solutions to challenges that are encountered in architecture and the production of urban spaces. For Norberg-Schulz (1980b [1975]) architecture is the transcendence by man, of his specific environmental situation through abstraction of meaningful forms and principles of organisation, to facilitate problem-solving and general planning. The main purpose of architecture is to make human existence meaningful. Architecture is "any people's spatial response, comprising the patterns of its appropriation and use" (Osman, 2004). These definitions of architecture are relevant when discussing the production of urban space from a phenomenological epistemology.

Henry Odera Oruka (1991a) argues for the balance between Afrocentric and Eurocentric discourse, when he proclaims that "the ethnophilosophers started with the strong assumption that African philosophy and Western philosophy must and can only be different. But the assumption was a fallacy". This cautions African architects who pursue an approach of total disparagement of Eurocentricity. A synthesis of progressive aspects from both epistemologies is a better option. Peter Bodunrin (1991) insists that one "must not be charged for being unoriginal or being irrelevant as an African philosopher [or architectural researcher] simply because he is discussing in the African context, issues that have also received attention elsewhere". Bodunrin (1991) continues to argue that "the philosophy of a country or region of the world is not definable in terms of the thought-content of the tradition nor in terms of the national origins of its thinkers", suggesting that appropriation of critically selected progressive Eurocentric ideas is a valid undertaking. In this paper, a critical analysis of selected publications by Christian Norberg-Schulz is undertak-

en in order to provide a synopsis of the place-postulate model that describes 'Existential' space, in order to reveal its characteristics and constituents. This model has the potential to test the efficacy of Kenyan urban spaces as 'Existential' spaces. A critical review of identified philosophical texts on Phenomenology and its epistemology is also undertaken, to broaden the 'Existential' Phenomenology that was co-opted into architecture by Norberg-Schulz.

Kwasi Wiredu agrees with Oruka and Bodunrin, declaring that "for a set of ideas to be a genuine possession of a people, they need not have originated them, they need only appropriate them, make use of them, develop them…and thrive on them". This validates the utilisation of phenomenological philosophy in the explication of urban space production. "It is now time to begin self-criticism in Africa", proclaims Bodunrin (1991), which calls for critical assessment and "reconciliation" of compatible approaches that are "more beneficial and productive than an attempt to consider these approaches as mutually exclusive and antagonistic" (Kaphagawani, 1991). Thus, a critical hermeneutics is employed in this paper. This is an interpretive approach that is both subjective and speculative. It enables comprehension of architectural artefacts within urban spaces through semiological explication of their constitution. This approach is validated in linguistics (by Derrida and Foucault schools), and in hermeneutical philosophy (Oruka, 1991a). Gestalt Psychology, an approach where built forms and urban spaces are discussed as a whole and not as fragments or individual parts (Osman, 2004), is adopted in this study.

Keekok Lee (2000) asserts that architecture and buildings are prime examples of human artefacts, as they are "material embodiment" and "sub-class" of human intentionality. The physical landscape is also an architectural artefact (Ralwala, 2013). An artefact may also be defined as "any cultural agent within the socio-cultural realm", including intangible "values, ideas, emotions, rituals, social practices and linguistic agents that are explored eco-systematically, within their contextual settings" (Osman, 2004). Thus, urban spaces are architectural artefacts. This understanding will be evident in this study.

**Phenomenology as philosophy**

The core fields of philosophy are ontology, epistemology, logic and ethics, focusing on studying beings, knowledge, valid reasoning, 'right' and 'wrong' respectively. Epistemology is an anchor branch of philosophy that queries existing knowledge, acquisition of future knowledge and its validation (Smith, 2009). For Smith (2009), phenomenology is the fifth core field that focuses on studying experience. This indicates the significant position of phenomenology within philosophy. Smith (2009) argues that phenomenology has been practiced unconsciously in and out of philosophy. It is both ancient and contemporary. Phenomenology is tasked with provision of models that offer explanations for meanings related to the experience of various phenomena. Thus, phenomenology portrays a typological-historical dialectic. Upon reading Martin Heidegger, Norberg-Schulz states that phenomenology is "the study of essences, and according to it, all problems amount to the finding of essences" (Abel, 2000). The objective of phenomenology is to "surmount or put aside preconceptions, especially scientific abstractions, and to try and understand the nature of 'the things in themselves'"

In the Stanford encyclopedia of philosophy, David Woodruff Smith (2009) outlines the philosophy of phenomenology, its origins and historical development (see the full document at http://plato.stanford.edu/archives/sum2009/entries/phenomenology). Phenomenology studies structures of consciousness as experienced by the first-person. At the core of experiential structures is intentionality. Experiences of or about objects are directed towards the objects themselves, and arise from an object's contents or meanings. Experience is extended to include thought, perception, emotion, imagination, volition and action. The first-person may be an individual, a group of people, a community, an institution or even an academic discipline. Phenomenology extends beyond the limits of sensory perception to focus on intentions, with their attendant inherent and related meanings.

**The contributions of classical phenomenologists**

The development of phenomenology as philosophy is attributed, sequentially, to the four classical phenomenologists: Edmund Husserl, Martin Heidegger, Jean Paul Sartre and Maurice Merleau-Ponty. Husserl defined phenomenology as a science whose essence was the consciousness of the first-person's experience, manifested as intentionality. Heidegger emphasised the centrality of the context (world) to phenomenological experience and the revelation of exhibited meanings in different human activities. Jean Paul Sartre recognised consciousness as a phenomenon. By interpreting different experiences in significant situations, Sartre broadened phenomenology, using it as foundation for Existential philosophy. For Merleau-Ponty, body and mind were inseparable in the contemplative perception of things (Smith, 2009). Thereafter, multiple approaches, with significant variations, have been employed by philosophers while developing phenomenological analytical constructs of meaning, even in architecture.

**'Existential' phenomenology: the contributions of Norberg-Schulz**

Norberg-Schulz anchored his phenomenology of architecture thesis on Heideggerian Phenomenology, relating architecture to natural and man-made environments (1980a, 1980b [1975] and 1996 [1983]), de-

scribing it as a concretisation of existential meanings within the man-environment totality, whose purpose is the exposition of truth (1980a). Dwelling is the achievement of an Existential foothold, and is realised when multiple forces within a place are resolved to achieve a harmonious synthesis- Genius Loci, the 'Spirit of Place' (1980b [1975]: 225; 1980a). Genius Loci is that 'Spirit of place' which is the "opposite" that man has to counter, to reside peacefully in any location (Norberg-Schulz, 1980a). This 'spirit' should be comprehended to enhance or complement nature. Components of Norberg-Schulz's construct include:

**Architectural Truth**: A thing (building, ornament, work of art or landscape) gathers world to reveal the truth and set it into work. Gathering enables the thing to operate and fulfill its purpose, permitting dwelling. The gathered "fourfold" (world) consists of earth, sky, mortals and divinities, opening up the world, keeping what is gathered and revealed. 'Setting the truth into work' is the main purpose of architecture, exposing any underlying meanings.

**Place postulate**- Enclosure: a distinct area divided by a physical, implied or natural boundary. A domain is a basic enclosure; Boundary: a threshold at which something commences its 'presencing', achieving separation and unity of outside and inside, providing enclosure and spatial direction. It invites contemplation, discovery; Space: a three dimensional organisation of elements in a place, exhibiting extension and enclosure. Place: tangible totality of material, geometric and texturally distinct character, irreducible to its constituent properties. Path: a directional element dividing the environment into domains. Existential place: an embodiment of experienced meanings as framework for man's actions, determined by experiences and relations. Dwelling: an Existential foothold, achieved through orientation and identification, a synthesis of the total man-place relationship. Landscape: lived or inhabited space between earth and sky, manifesting the fourfold, indicating places where development is favourable. Identification: familiarity of a man with surrounding landscape, recognising its potentials and limitations. Orientation: position of man in relation to the environment, providing emotional security through centres, paths and domains that give direction, enabling dwelling and meaningful experience. House: "the central place of human existence", a point of departure and return, the origin of man's co-ordinate system. Articulation: making precise a particular character, achieving distinction, identity. Disentanglement of webs and labyrinths in urban spaces reveals architectural character and scale.

**Dimensions of natural understanding of place**: Modes of understanding the environment, urban space, including cosmic symbolism. Rain and sun path symbolise creation and, birth or death respectively. Natural order is directional, exemplified by gravity, sun path and flow of rivers. Characterising places through anthropomorphic relationships, natural associations. Appreciation of light, recognising its divine nature as a varying, natural phenomenon. Time, expressed in rhythms of seasons, exhibits constancy and change. Dimensions are thing, order, character, light and time.

**Character**: General atmosphere of a place or space, its most comprehensive aspect, linking particular actions to specific places through materiality and form. Spatial character is Natural, relating attributes of physical objects within a space to cardinal points and the sun for orientation; Human, personified by social objects, gender or personality type; and Spiritual, anchored in cultural objects, beliefs and values.

**Archetypes of place** as romantic, cosmic, classical or complex. Romantic architecture and landscapes exhibit inclusivism, multiplicity of phenomena, dynamism, continuous change, spontaneity, variety, complexity, contradiction of individuals in the urban space. Cosmic architecture and landscapes indicate monotony, permanence of structure in a static, geometric, universal order, lacking variety. Cosmic space is regular, grid-like or labyrinthine, abhoring sculpture. Classical landscapes and architecture represent a perfect marriage between man and nature, unity of topology and geometry, lack of variety, monotony, stasis or dynamism. Complex, hybrid architecture and landscapes synthesise these archetypes, selecting qualities from each, to achieve unity of expression.

**Critique of Norberg-Schulz's architectural Existential Phenomenology**

In this section, the case for the relevance of Norberg-Schulz's existential phenomenology and its application to architecture and production of urban space, is presented, despite various contestations and disputations that have been directed against it.

Criticisms, prejudices and accolades have been directed at Norberg-Schulz's architectural Existential phenomenology, indicating its potency in describing experience of architecture and urban space. Norberg-Schulz's phenomenology is a "'weak theory" since it does not give "an indication of the desired result" except for "a bundle of untested principles without a formal outcome", proclaims Ignazi de Sola Morales (Vidler, 2011). Determination of architectural forms of expression prior to design eliminates creativity and originality in solutions, promoting uniformity rather than variety. Norberg-Schulz's phenomenology was pioneering, situating architecture in a cultural context in order to promote effective communication of intended meanings within built form. This is the position from which it should be evaluated, consistent with Beata Sirowy's (2010) proclamation that "the mediating, anti-dualist character" inherent in phenomenology "makes it a relevant framework in the search for a more inclusive conceptual basis for sustainable architecture".

For Kenneth Frampton (2007 [1987]), phenomenology promotes sensorial experience of architecture, rather than shallow visual scenographic images. However, for Jorge Otero-Pailos (2002), phenomenology seeks to train architects in the technique of 'vision', reducing their "over fascination" with technology in order to unite architectural theory and praxis in the quest for "cultural and social relevance". Critics describe Norberg-Schulz as a "vulgar interpreter of Heidegger" (Otero-Pailos, 2007), and this indicates academic intolerance because philosophical hermeneutic interpretations and linguistic semiotic devices are subjective. Other critics claim that "Norberg-Schulz used Heidegger as a theoretical mask to add philosophical credibility to the visual project of modernism, at the precise moment modernism seemed destined to die". In *Genius Loci*, Norberg-Schulz (1980a) discusses cosmic, classical, romantic and complex architectural expressions in ancient Rome, Prague, Khartoum and Chicago. His discourse is descriptive; not prescriptive, centred on meaningful places and not architectural paradigms.

Heideggerian truth was misread by Norberg-Schulz as a "purely visual phenomenon" from the position that vision was "the ontological first principle of understanding and communication". In fact, a deeper vision, beyond literality enables a more thoughtful comprehension of architectural artefacts. In this regard, Norberg-Schulz was justified in emphasising holistic rather than literal vision. Otero-Pailos (2007) alleges that for Norberg-Schulz, "truth was revealed in images". In architecture, the image remains a tangible artefact. Norberg-Schulz's phenomenology of architecture is not superficial as it concentrates on architectural content inspired by and derived from culture to create meaningful existence within urban space.

Elie Haddad (2010) observes that Norberg-Schulz's structuralist framework and background was an impediment to his phenomenology, which should have indicated ways for overcoming mind-body duality. Such phenomenology has limited applications, implying "a return to vernacular architecture" or "espousal of a "figurative" postmodern architecture". Haddad does not recognise the multiple types of phenomenology and their variants. Why does he focus on Merleau Ponty's interpretation in Phenomenology of perception, while ignoring other classical phenomenologists? Norberg-Schulz's description of visual appearance is insignificant compared to manifold architectural possibilities, beyond vernacular and postmodern associations, within phenomenology.

Haddad (2010) alleges further that the success of architectural phenomenology is limited, as it does not address socio-political dimensions of architectural production and focuses on "formal manipulation of parameters such as tactility or vision" instead. Norberg-Schulz explored links between natural landscapes and architecture, without describing cultural aspects like politics or colonialism, hence the need to broaden the scope of Phenomenology. However, can meaningful architecture be realised when sensorial experience of architectural artefacts is absent in built forms and urban spaces?

**The case for a broadened Phenomenology**

The meaning and scope of Phenomenology have been reviewed, even in architecture. Its philosophical offshoots "include structuralism and deconstruction" (Moran, 2002). For Merleau-Ponty, phenomenology is consciousness embedded in "social and material things" (Roche, 1973). Phenomenology operates as ontological cognition based on consciousness, governing intentional human action, generating comportments that link an object and its referent, revealing the experiential perception of a Being's conscious activity (Roche, 1973; see also Husserl's noesis and noema 2002[1983], in Moran 2002; Heidegger, 2002b [1962]).

Bernard Curtis (1978) argues that "any such essential structure of consciousness would play a fundamental part in a theory of education" as consciousness has a "common structure" despite variations in cultural beliefs, practices and linguistic concepts. Significant differences exist in the approaches adopted by phenomenologists, who insist "on the primacy of consciousness as a meaning-bestowing agent", accessible via phenomenological epistemology, uniting different approaches and practices that inform architectural ontological descriptions. Human attributes, including temporality, intentionality and social interaction are implied within this ontology. Expression of these attributes architecturally and their experience, generated from the utilitarian domain of built form, are valid concerns of architectural phenomenology, which focuses on appearance of cultural artefacts.

For Heidegger (2002c, [1962]), appearance is distinct from mere exposition, an "announcing itself by something which does not show itself", including "all indications, presentations, symptoms and symbols". Architectural appearance is a revelation that may be discerned through intuition and contemplation. Though a complete reduction of all human existentiality to appearance is a claim beyond architectural phenomenology, significant cultural phenomena, manifesting themselves as appearances within urban spaces, should be analysed (Moran 2002), including urban renewal in downtown Nairobi (Kirinyaga and River Roads) and the tensions that originate from its application. This will create harmony between old and new developments, taking cognisance of existing morphologies.

Heidegger (2002c, [1962]) states that "space and time" present themselves as appearance. This spatio-tempo-

ral aspect provides architectural co-ordinates, locating cultural artefacts contextually. The revelation of an artefact extends from the building facade, into internal content, focusing on other sensorial perceptions, in addition to the visual. This is evident in Critical Regionalist trans-optical architecture (Frampton, 1996 [1983]), and urban spaces. Zoning of Nairobi City, inherited from Colonial urban planning should now be evaluated, a century later, to assess the impact of encroachment, vehicular circulation, and transition between incompatible urban functions like housing and industry. The assessment should also be extended to include persistent traffic congestion that extends from major motorways to residential estates.

Heidegger (2002c [1962]) declares that phenomenology "is the science of Being of entities—ontology". Phenomenology is the means of accessing the "phenomenon" with the aim of revealing truth through "demonstrative precision" by analysing its "meanings" [semiology, hermeneutics]; "modifications" [metabletic changes] and "derivatives" [off-shoots: deconstruction]. Ontology may be defined as the nature of Being and its structure, possessed by an existential (human) entity (Roche, 1973). Within phenomenology, epistemology and ontology portray a symbiotic relationship, in which ontology confirms and validates epistemological assertions. Hermeneutics refers to "a general theory of interpretation" (Ricoeur, 2002), linked to semiology because, through interpretation, the meaning of an artefact is deduced and recorded. Though written texts are read literally in order to interpret them, social and cultural texts require phenomenological reading, due to congruence with unfolding reality. The scope and boundaries of semiology are undefined (Guiraud, 1975). The lack of consensus is due to overlap with linguistics and hermeneutics. Perceived as "the science of signs, semiology encompasses all knowledge and all experience, for everything is a sign: everything is signified and everything is a signifier".

Architectural movements, paradigms and styles are imbued with humanistic content that enables ontological analysis, to reveal concealed phenomena in built form. Heidegger (2002c, [1962]) categorises concealed phenomena as "undiscovered", "buried-over" or "disguised". Contextual de-sedimentation is required to expose constituent essences of these phenomena, including entrenched power relations in urban spaces. Political coercion from privileged persons within statecraft during the Moi era resulted in the abuse of development control instruments by the political establishment. This is exemplified by the introduction of the concept of Nyayo-era spot zoning. Thus, buildings such as Yaya Centre benefited from such *ad hoc* planning regulations by the Nairobi City Council and were consequently awarded higher plot ratios.

**Phenomenological ontology in the production of urban space**

Being and its structure transcend all qualities of an existential entity. Architects should comprehend the nature of Being, prior to design of built forms and production of urban spaces, based on Sartre's categories of ontological dimensions (Roche, 1973; Moran, 2002). **Table 1** shows a synopsis of these dimensions and their architectural implications.

Architectural creations are inanimate, encompassing ontological dimensions because their inhabitants personify them, extending their comportments into them. Architectural intentions are located within ontological dimensions of human existence, being expressed as 'intentionality'. Franz von Brentano defines intentionality as "the structure which constitutes the true nature of a psychic phenomenon" enabling their categorisation and separation from physical phenomena (Heidegger, 2002b [1962]). For Heidegger (2002b [1962]), intentionality is the "structure of lived experiences", while for Roche (1973), intentionality links thought to action, sustaining individual freedom in architectural artefacts and urban spaces.

**Phenomenological intentionality and its implications for the urban space**

Architectural intentions depart from intangible concepts at a cognitive level to focus on tangible human experience of built form, expressing thoughts and actions of society that are imbued within architectural artefacts. This expression acknowledges that prevalent individual freedom is a rich source of architectural variation with regard to aesthetic choices and taste cultures. Organisation and disposition of functions within physical urban spaces, aesthetic formulation and architectural attitude to context are examples of ontological architectural intentions.

Brentano categorises intentionality based on subject to object attitudes, consistent with Heidegger's approach of directing intentionality at an object or action (Roche, 1973). **Table 2** reveals the levels and types of intentionality in architectural artefacts and urban spaces, together with their architectural implications.

Within architecture, passions generated by built forms signify success of architectural intentions. The level of success may be used to gauge the relevance of architectural solutions despite conformity to, or difference with, contemporary thought and practice. For Heidegger (2002b [1962]), ontological passions are life comportments, exemplified by "perception, judgement, love, hate ... and these are "acts" or "intentional relation[s]"". Focusing on identification, description and documentation of such acts fosters a better understanding of architecture and urban space production. This demands prior distinction between any comport-

ment and its target object, which for Heidegger (2002b [1962]), recalls Husserlian 'noesis' and 'noema' respectively, with regard to 'Intentio' [intention] and 'Intentum' [the intended]. Architectural 'noesis' focuses on human experience of, and attitude towards built form, including its cultural motivation and interpretation. On the other hand, architectural 'noema' is an explicit description of the built form itself.

**Phenomenological consciousness and its implications for the urban space**

For Brentano, consciousness as activity focuses on symbiotic relations between an "active subject" and its conscious object (Roche, 1973). Architectural consciousness is "a referential activity", distinct from other cognitive acts, and its "correct description" is central to phenomenology. Brentano, Sarte and Merleau-Ponty directed ontological analysis at consciousness and action, to attain comprehensive understanding of existentiality. Within architecture, consciousness is directed towards space within built forms, urban space, and its utilitarian experience, functionality, and cultural expressions of built form, exhibiting various aspects. These aspects and their architectural implications, as well as origins are summarised in **Table 3**.

**TABLE 1:** Architectural implications of the Dimensions of Being

| Dimension | Nature | Architectural Implications |
|---|---|---|
| Being-in-itself | Antithetical to consciousness. | Creates contextually 'irresponsive' architecture, providing functional solutions that are not informed by cultural ecology. |
| Being-for-itself | Anchored in the existential world. Though seemingly bounded, it offers "unlimited abilities and choices". | Grants architectural freedom, creating structures which express the complexities of experiential reality. |
| Being-for-others | Awareness of scrutiny by other Beings, generating "experiences of timidity, shyness and anxiety" promoting conformity . | Adopts an extroverted approach through manipulating proxemic relations, including positive recognition of street lines, promoting architectural kinesics within built form to enhance the context. |
| Being-against-other-people | Creates anti-establishment characteristics within a phenomenon. | Adopts an introverted attitude, protesting against contextual reality. |

**Source:** Author 2017 (Adapted from Roche 1973)

**TABLE 2:** Architectural implications of levels and types of intentionality

| Intentionality Level | Intentionality Type | Description | Architectural Implications |
|---|---|---|---|
| Primary | Representation | "primitive awareness of something by the subject" | Describes only the visual, pictorial, tangible or sensory architectural aspects, focusing on literal cognition. |
| Secondary | Judgement | The subject decides to "accept the object as true or reject it as false" | Evaluates the architectural creation based on its functional and aesthetic appeal. A cognitive level of decision emanating from experience of built form, signifying the onset of architectural phenomenology. |
| Tertiary | Affectivity | Focuses on the exclusions of the first two tiers including comportments such as "love, hate' | The most successful level of architectural creation regarding anthropomorphic sensitivity, evoking deep emotional attachment or response, as evidence of architectural ontological cognition. |

**Source:** Author 2017 (Adapted from Roche 1973)

For Sartre, consciousness is "a certain and absolute structure of existence" that is equivalent to "nothingness" and is therefore an "impersonal stream of creativity in which all human beings participate" (Roche, 1973). Architectural creativity and production of urban space can be traced to both individual and communal consciousness.

**Phenomenology and architectural knowledge in the production of urban space**

The role of philosophy in analysis of [architectural] knowledge is to pose internal or disciplinary questions regarding "coherence, consistency and implications" of knowledge claims taken at "face value' (Roche, 1973). Philosophical validation is crucial to ensure that all appropriated and emergent knowledge is devoid of "illogical deductions" and contradictions. Knowledge presuppositions are categorised as methodological or procedural, epistemological and ontological. Methodology is disciplinary specific and focuses on "how knowledge is actually acquired", by questioning "how man knows what he claims to know" in order to procedurally offer an accurate description of meanings that are evident and utilised ontologically. Therefore cogni-

**TABLE 3:** Architectural implications of the constituents of phenomenological consciousness

| Aspect of Consciousness | Description of Origin | Architectural Implications |
|---|---|---|
| Choice | For Sartre, choice is equated with consciousness as "one must choose in order to be conscious" (Roche, 1973). Architectural choice may be intuitively directed at a set of alternative paradigms or phenomena. | Choices are exemplified by recourse to typology, history, contextualism and cultural responsiveness of expression within built form. Choices must be tempered with rationalism. |
| Internal conflict | Consciousness is perpetually engaged in the impossible desire to be "thing-like", thereby escaping from its natural confinement (Moran 2002). | The desire for 'thingness' in architecture is exemplified by the expression of intangible culture within tangible built form. Though a challenging task, it indicates ontological sensitivity to human intentionality. |
| Identity | Consciousness is the datum for 'personal identity" and temporal "self knowledge", expressing individual similarities and differences (Roche, 1973). Individual consciousness precedes and compliments societal consciousness (Curtis 1978). | The task of culturally expressing the Kenyan identity, including the creation of acceptable national attire, has been unsuccessful. Without recourse to 'Fascist' tendencies, Critical Regionalist Kenyan architecture may succeed in this quest through multivalent inclusion of multiple cultural parameters. |
| Multiple facets | Growth of individual consciousness is a temporal function that utilises history to accumulate knowledge and direct action (Curtis, 1978). | These sustain the multivalence of architectural approaches and concepts thereby enriching the emergent meanings. |
| Variation | Jean Piaget recognises individual variations of consciousness though he considers its "common structure" with the inherent logical, spatio-temporal and causal aspects as of greater significance (Mays, 1978). | Sustains variety rather than promoting architectural conformity or homogeneity resulting from totalitarian or dominating establishment architecture, thereby ensuring prevalence of individual creativity. |
| History | Piaget proclaims the historical nature of consciousness, identifying it as a means of questioning the possibilities of action and knowledge within the present reality (Bolton, 1978). | The past is a rich source of architectural exemplars which can be critically interpreted to respond to contemporary challenges. The successes within the Kenyan architectural heritage should be documented and interpreted. |

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|---|---|---|
| Emotion | For Sarte "emotional consciousness" is the existential means of "being-in-the-world" and is therefore a vital means of perceiving reality (Roche, 1973). | These signify ontological synthesis of built form through judgement of architectural solutions. However its input is delivered when further architectural action is impossible, apart from documentation and inclusion within future projects. |
| Relationship with society | Curtis (1978) observes that consciousness is anchored in societal "beliefs and action", confirming the deterministic and regulatory role of society. Consciousness portrays a mutual symbiotic reciprocity with its target object as it is synonymous with the "external world'. | The community is the Husserlian 'Lebenswelt', a rich source of phenomenological experiences that demand architectural expression (Roche, 1973: 36). The cultural ecology of the Kenyan context is the means to developing an appropriate Critical Regionalist Kenyan architecture. |
| Semiology | Meanings emanating from consciousness are anchored in the "meaning – structure" possessed by an entity and are expressed through a "related set" of signs | Architectural semiology is an ontological quest that incorporates phenomenological hermeneutics to rationalise meanings within cultural ecology, indicating the need to establish ontological structures of meaning in Kenyan architecture. |

**Source:** Author 2017 (Adapted from Roche 1973)

tion, thought, memory, experience, truth, perception and freedom of choice are all valid concerns of phenomenological epistemology as they focus on knowledge acquisition within its philosophy. By portraying "a positive theory of knowledge", phenomenology offers description and explication of man's actions in their specific contexts.

Johannes Climacus distinguishes between essential knowledge and accidental knowledge (Pojman, 1978). Essential knowledge is ontological, derived from a person's existential world, while accidental knowledge concentrates on the intellect only. Relevant architectural knowledge is existential, embracing practical aspects. Since phenomenology directs personal intellectual faculties towards existential comportments, it is essential, and not accidental.

Bernard Curtis (1978) emphasises that all experience is "structured by thought" and is reflective, validated by Husserl's proclamation that "no natural laws can be known a *priori*" and must be "established and rationalised by experience". The experience that yields knowledge acquisition in architectural phenomenology is linked to one's intellect, involving observation, perception and intellectual assessment of built forms in urban space. This is based on analytical judgements emanating from a Being's encounter with any artefact in its existential sphere.

Architectural concepts are included within intangible experience, although they are directed at tangible objects (Roche, 1973). Experienced reality is categorised as physical or social, and are encountered in urban space, where physical structures are situated in their social, cultural and historical contexts. Phenomenology describes "that which is given in experience". Conceptual description targets individual and collective experience, enabling knowledge acquisition, as pertains to architectural production of urban space.

Immanuel Kant identifies key components of knowledge as intuitive, based on sensibility or conceptual, based on understanding (Moran, 2002). Kant further refers to objective knowledge as "justifiable" and "tested and understood by anybody" regardless of "anyone's whim [sic]" (Mays, 1978). For Husserl, the scope of intuition should be broadened to include conflict, unity or synthesis (Moran, 2002). Only then may intuition be used by phenomenology, as a second order theory, to integrate the epistemology within architecture, complementing objectivity with subjectivity, tempering scientific explanations with historical justification as history is equally objective and rigorous (Moran, 2002; Carr, 1993).

Phenomenological epistemology prohibits communication of concepts through assertions, as they degenerate knowledge, encouraging rote learning that implies being "understood in an empty way", resulting in the loss of "indigenous character" by promoting "empty intending" through direct recall (Heidegger, 2002c [1962]; 2002b [1962]; Heaton, 1978). This prohibition is consistent with Louis Pojman's (1978) claim that "only what is learned through experience" and then "personally appropriated is truly known".

Phenomenological epistemology shuns anti-humanistic versions of knowledge which are perceived as "dubious theoretical maneuvres [sic]" (Murphy, 1993). This includes separation of "praxis from knowledge" or reference to subjective knowledge as "contaminated by interpretation". Phenomenology perceives the existential world as key to its discourse. This is antithetical to such 'biased' positions, due to anchor in human reality. Architectural reality—described by Husserl as '*Lebenswelt*' or "natural attitude"—embraces the world with all its dichotomies, complexities and contradictions (Roche, 1973).

**Phenomenological cognition and urban space production**

"Phenomenology must study and bring to clarification the nature of the essence of subjective acts of cognition" (Moran, 2002). Knowledge acquisition through cognitive acts like experience, perception and understanding, enable the achievement of intellectual freedom, leading to recognition of truth. Heidegger (2002b [1962]) describes perception as natural, emphatic or deceptive. Natural perception is concrete, tangible and tactile, and practical; emphatic perception is a "detached observation" portrayed as a lack of interest in the perceived thing; while deceptive perception is directed at an illusory object. Deceptive perception cannot lead to truth, a *priori*, and is of little use to architects. Natural perception generates ontological meanings that are incorporated as new knowledge. Emphatic perception is an ontological failure in the object of perception as it is unable to evoke sensibilities in the perceiver. Emphatic perception is directed at 'boring' architecture.

Cognitive adequacy of phenomenological determinations is verified by recourse to the social realm of the natural life world (Pilotta, 1993). This verification is an epistemological quest for truth. Heidegger (2002b, [1962]) highlights three categories of truth. The first is Husserlian 'noema' of "being–identical to the presumed" and is truth established on the basis of identity to the object in question. It is the undisputable truth. Secondly, true knowledge is characterised by intentionality. Such knowledge is derived from lived experience and is directly related to human comportments. What one experiences is nothing but the truth itself. Thirdly, truth is "being-real", referring to what gives demonstrative identification or legitimacy to knowledge. Such truth is based on tangible or intangible evidence, including technological instrumentation that measures sensorial perceptions like comfort, heat, texture or strength. However, truth based on cultural norms is tempered with caution, as cultural variations result in different perceptions of reality within urban spaces.

**Truth and reality in urban space production**

Yoshikuni Yattani (1993) argues that "all truth is subject to question". This is disputable, regarding truth based on Heideggerian being-identical to an object. Truth claims are always provisional, implying that truth can never be certain; it is ephemeral until a finer truth is postulated (Murphy, 1993). Existing truths are continuously revisited through persistent questioning (Heaton, 1978). Jean Gebser proclaims that "the centre is everywhere" (Murphy, 1993). Such a centre portrays truths. Thus, various versions of the same truth may co-exist in an urban space. This justifies subjective interpretations of built forms and urban spaces. Absence of a single centre requires an epistemological shift from monocentric to polycentric concepts.

Within Alfred Schutz's multiple realities, overlap, rank and inter-relationships still persist. In this regard, Pojman (1978) discusses Soren Kierkegaard's claim that "subjectivity is truth", which he disputes, arguing that Kierkegaard implied that "'subjectivity' alone is 'untruth'". Pojman insists that subjectivity cannot exist alone from objectivity, hence truth must be "conformable to a standard". This is consistent with Heidegger's third meaning of truth. Truth should synthesises objectivity with subjectivity. When this synthesis is achieved, phenomenological epistemology will be the standard for such truth.

**Understanding and memory in concretisation of urban space**

Architectural truth is discerned through understanding. Postmodernism, gender and environmental issues, in relation to the production of urban space, are co-opted into phenomenology to "understand the nature of living in the age of global technology and interculturalism" (Moran, 2002). Acculturation, technological appropriateness and human-environment conflict in architecture are best understood through phenomenological probes. The phenomenologist should comprehend the "reflexive production of knowledge" (Pilotta, 1993). Such knowledge, according to Pojman (1978), generates facts, evoking emotional sensibilities, promoting understanding. Such understanding depends on ontological emotional responses, and is inevitably subjective. This echoes Kierkegaard's claim that "subjectivity is truth". The past, as the genesis of meanings, is vital to understanding (Smith, 1993). Language coupled with intentionality yields understanding. Understanding is a hermeneutical task, perfected through iterative interpretation and invention of roles, which are performed collectively to enable "a similar reading of a social text" (Murphy, 1993). This results in a unitary presentation of an architectural artefact within urban space.

Understanding depends upon memory. Heaton distinguishes between memory that produces understanding and memorising as a result of assertions (Curtis, 1978). Memory is ontological, in continuity with a Being's existential world; or dependent, propagated

by reliance on external reminders (Heaton, 1978). Play is indispensable to development of cognition. What is 'play' within the context of production of urban space, and how can it be nurtured? Ludwig Wittgenstein states that meaning—as manifestation of knowledge—is "socially situated in the communicative games that people play" (Roche, 1972). Architectural games and 'play' are intellectual and communicative, being geared to knowledge acquisition (exemplified by Metabolists, Frei Otto structures or Fullerene domes) (Jencks, 1985 [1973]).

Knowledge acquisition is regulated, based on freedom of choice. History only provides some answers to pertinent questions in urban space, as several architectural epistemological problems remain insoluble due to multiple truths. Choice confirms or rejects "a particular interpretation of reality" (Murphy, 1993). Such choices are completely irrational acts regarding personal "tastes, desires and judgements" (Guiraud, 1975).

**Phenomenology within the design of the KICC**

The Kenyatta International Convention Centre (KICC) in Nairobi, is imbued with characteristics that pertain to the objectives of the phenomenology of architecture. These characteristics are articulated both directly and indirectly within its architecture and are revealed upon a critical subjective probe of its internal and external content (the building itself and its multivalent courtyard as an urban space). **Figure 1** shows an image of a night view of the KICC and its neighbourhood context as an urban space. The centrality of KICC to the *Genius Loci* of Nairobi City is evident. The artificial lighting creates a visual unity of composition that captures the elements constituting this cultural artefact, namely the courtyard, the podium, the tower with helipad and amphitheatre.

**Table 4** is a brief description of phenomenological aspects within the KICC composition. Interior and exterior spaces within this composition are regarded as urban spaces. Due to the hermeneutic (subjective) nature of the explication, the author appreciates that other possible interpretations may also be valid. The discussion herein is an initial means to achieving consensus on these phenomenological aspects and observations.

**Figures 2-12** further illustrate the phenomenological apects within KICC both as an architectural artefact and a seminal urban space in Nairobi, Kenya. The strong use of colour in the Tsavo Ballroom portrays phenomenological inclusivity (**Figure 2**). Note the concealed ceiling artificial lighting, which creates spatial transformation for greater effect. The KICC courtyard, as an urban space, is a place of pluralistic cultural inclusivity. **Figure 3** indicates that all citizens of Kenya are welcome to this national cultural artefact, despite differences that emanate from their ethnic, economic or social backgrounds.

In **Figure 4**, the graphics on the huge screen at the KICC galleries visually enrich the KICC as an architectural artefact, conveying messages to the large crowd in attendance at the KICC courtyard as an urban space. The brutal exposed concrete finish of the beams and metal balustrades above the gallery are visible, indicating that architecture of tactility creates memory within urban spaces through enhancement of sensorial perception.

The stepped interior seating; the timber table layout; the carpeted floor; the roof lighting which admits natural daylight selectively; and the brutal concrete finish of the beams and columns indicate an architecture that is anthropocentrically sensitive, promoting complementary tactility rather than focusing on aspects of visual scenography alone (**Figure 5**). This use of space in the KICC Amphithearte indicates how spatial quality and experience within an artefact can be enhanced to promote phenomenological experience, manifested in the consciousness and intentionality of users of urban spaces.

The Karl H. Nostvik Amphitheatre is named after the architect who designed the KICC. A mural depicting the arrest of the first Kenyan President, Jomo Kenyatta, is visible indicating the centrality of political *Zeitgeist* and African Nationalism in the conception of the KICC artefact (**Figure 6**). This indicates that urban space production can be enhanced through incorporation of historical aspects within artefacts.

The spaced row seating; the collage of brutal concrete and timber with the concrete floor tiles and artificial lighting creates yet another different ambience suited to conference and symposia activities as evident in the Shimba Hills Room (**Figure 7**). Variety, strong use of colour and inclusivism are vital to the creation of vibrancy which is required for phenomenological experience of both internal and external urban spaces.

The VIP Lounge is a tastefully furnished room, with timber wall panelling as finish, that accommodates dignitaries, enabling them to cater for spontaneous meetings and preparation prior to conference proceedings within the KICC (**Figure 8**). It also caters for hosting other guests as they lobby for resolutions, as well as impromptu 'get-togethers' after conclusion of conference activities. The KICC therefore attends to specific details pertaining to all categories of its users, showing its inspiration from the everyday world (Husserlian *Lebenswelt*, in classical phenomenology).

The former Prime Minister and Vice President's Lounge reveals tasteful finishes and meticulous attention to detail in accommodating and catering for the political class (**Figure 9**). The leather wall panelling contrasts the use of timber in other spaces, in an attempt to avoid

**TABLE 4:** Phenomenological aspects within the KICC

| Phenomenological Aspect | Description or Architectural Explication |
|---|---|
| ***Genius loci*** | KICC is central to the *Genius Loci* of Nairobi city as it is the most identifiable public architectural artefact to the entire populace irrespective of socio-economic status. This was achieved through the significant importance attached to 'our own' building over a period of time by politicians and the ruling elite as well as the citizenry (Reflexive Regionalism). For 25 years (1969-1994), KICC was the tallest building in the entire country and was perceived as a symbol of great technological accomplishment by Kenyans on Kenyan soil thereby generating great pride in the current and future potential of the nation. It is the most prominent yet accessible cultural artefact to the populace as it has no restricted access unlike other artefacts such as Parliament Buildings. |
| Cultural response | The composition captures and expresses Nationalism through the statue of the nation's founding father, Jomo Kenyatta and the flag of Kenya on the ground level plaza. Internationalism is emphasised by the multiple flags of various countries and organisations that are also hoisted at the ground plaza. Traditionalism is recalled through this large plaza that is open to sky and accommodates large public gatherings. However, the colours of the Kenyan flag were never used as a major theme within the composition, perhaps in an attempt to prevent the domination of the artefact by a single nation's culture. |
| Place postulate including orientation and identification | The entire populace recognises the KICC as the most prime cultural artefact. The site boundaries provide enclosure. The paths and streets are the entry walkways as well as the grafted ramps. The separation of various domains is through compartmentalisation and hierarchy ranging from the largest ground plaza to the smallest meeting room. Each spatial unit within the whole is articulated differently to create and sustain variety. The KICC, for the majority of Nairobi's residents, is a major landmark and obelisk which acts as a referential origin. Various other artefacts are located relative to the KICC, thereby indicating its vitality for orientation and identification. Temporary identities described as "promotional identities" are also supported through extensive "hosting of banners and promotional material" during conferences and events (http://www.kicc.co.ke), indicating an architecture of persuasion through commercial and ideological allusions. |
| Experiential architecture | The grey colour of the KICC facades recalls local Kenyan earthen clays. This creates a subdued non-domineering and inviting exterior in contrast to the brown earthen colour of Parliament Buildings. The exposed rough and fair faced concrete offers tactility. The extensive grounds support ambulatory pedestrian circulation that enables multiple viewing of the KICC artefact from various angles. The level changes and terraced seating within the multivolume amphitheatre indicate layering characteristic of the Postmodern space whose experience results in architecture of memory. The vertical juxtaposition of meeting spaces within the tower creates additional vibrancy of spatial experience especially when delegates shuttle from one meeting or entertainment space to another. |
| Poetic dwelling | The imagery of KICC and its symbolism, though subjective, can be discerned upon probe by any party. The conical pyramidal amphitheatre recalls both a traditional hut and a large mountain such as Mount Kenya. The vertical tower is a phallic symbol and its verticality evokes memories of a Maasai spear directed towards the sky which they believe to be their point of origin. The tower also seeks to unite the ground and the sky as an act of cosmic symbolism. |
| Flexibility | The available spaces are easily adapted to suit different functions and the needs of clientele by offering spaces in close proximity supported by ancillary functions as well as flexibility of amalgamation of units such as Lenana Room and Aberdares Room upon demand. |
| Variety | Different sized facilities for exhibitions, conferences and symposia are available to suit the requirements of different clientele. |

| | |
|---|---|
| Architectural truth | The 'thing' (KICC building and the entire site) 'gathers world' (poetically perceived as the cultural ecology of the nation and literally as Internationalism of its functions), 'making presencing' (through activities and functions that it hosts as a convergence point as well as its symbolism and imagery, to reveal grandeur that is evident right from the entrance), thereby 'setting the truth into work' (perceived as an expression of prevailing reality with regard to Zeitgeist, resolutions achieved at conference proceedings, finalised business deals, results of rallies, elections and contests which are all significant because they are realised within KICC as the truth). This 'truth' is architectural and also cultural. |
| Dimensions of natural understanding | The 'thing' is the KICC itself. The progress of 'time' is monitored at the Helipad which offers stunning views of the entire city from sunrise to sunset and even throughout the night. Adequate 'light' is available throughout the building for different tasks by supplementing natural daylight with artificial light as appropriate. The composition exemplifies various aspects of 'order'; visual (holistic unity of composition), fluid (circulation), structural (construction technique), axial (access), geometric (form genesis and synthesis) and organic (curvilinear amphitheatre roof and cylindrical tower). The 'character' beholds a dynamic interplay of contrasts in which the obliquely grafted ramps at the podium complement the horizontal alternating motifs of the tower. |
| Architectural character | The KICC is monumental and grandiose in scale, bold in its Modernistic construction, vibrant and full of complementary functions and activities and unpredictability (as seminar, exhibition and plaza spaces are available for commercial hire by differing clientele and this determines the day to day functions) as well as spontaneity resulting from continuous cultural confluence and fusion. |
| Inclusivism | The KICC is inclusive as it caters for individual and particular spatial needs of numerous clients. The enclosed amphitheatre supports internal conferences while the plaza recalls the traditional multivalent rural agora that is suited for external crowd pulling performances. |
| Historicism | Evidenced by reference to traditional architectural forms for genesis and synthesis (mountain, traditional hut, granary, and phallic symbol). |
| Sustainability | The KICC building and grounds are largely sustainable with comparatively minimal maintenance costs. |
| Archetypes of place | The Cosmic archetype and its 'regimental order' are absent. There is no acknowledgement of the neo-classicism in the neighbourhood context. The rhythmic facades are Romantic. The composition is a Hybrid collage through reference to vernacular architecture for form genesis as well as Modernist technology and typology. |

**Source:** Author 2013

**FIGURE 1**
A night view of KICC and its neighbourhood context
**Source:** Wakofula 2013

**FIGURE 2**
The KICC Tsavo Ballroom during an exhibition
**Source:** Wakofula 2013

**FIGURE 3**
The KICC courtyard as a place of pluralistic cultural inclusivity
**Source:** Wakofula 2013


**FIGURE 4**
The KICC galleries at the podium
**Source:** Wakofula 2013

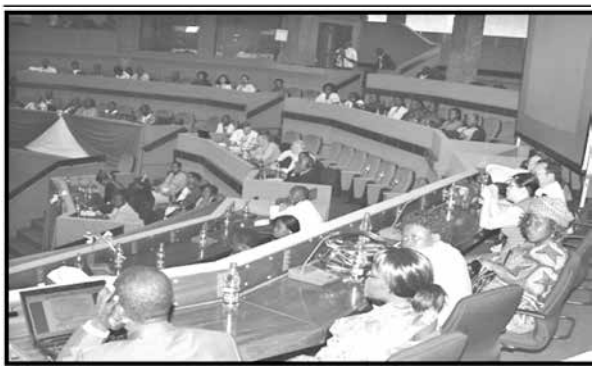

**FIGURE 5**
An interior image of KICC amphitheatre during a conference
**Source:** Wakofula 2013


**FIGURE 6**
A display of a mural at the Nostvik Amphitheatre within the KICC
**Source:** Wakofula 2013

monotony with regard to material use. This concept can be extended to external Kenyan urban spaces to avoid monotony and enhance spontaneity of activities within them, thereby enriching their architectural qualities.

The Presidential suite in **Figure 10** shows the centrality of the KICC to the entire nation as it caters for the president's comfort and interests and by extension, the interests of the entire nation. Note the greater spatial size as an indication of political hierarchy and supremacy. Persistent use of timber, brutal concrete (durability), colour, carpets and leather results in a collage unity of composition and user comfort. This is consistent with the creation of urban spaces with specific functions that do not cater for spontaneity due to imposed restrictions that promote exclusion. The character of this space may be justified by phenomenological considerations limited to the first person, as an individual user

**FIGURE 7**
The Shimba Hills Room, KICC
**Source:** Wakofula 2013

**FIGURE 8**
The VIP Lounge at the KICC
**Source:** Wakofula 2013

**FIGURE 9**
The former Prime Minister and Vice President Lounge KICC
**Source:** Wakofula 2013

of urban space.

The Tsavo Ballroom as an urban space has been prepared for a dinner party (**Figure 11**). The image indicates flexibility of use and spatial transformation that ensures multivocality of its users and multivalence of its architecture. This prevents architectural obsolescence and redundancy and promotes architectural sustainability, a key leitmotif of Existential phenomenology, described by Norberg-Schulz as an Existential foothold.

The Turkana Room in **Figure 12** exemplifies an urban space as a place where Norberg-Schulz's 'dimensions of natural understanding', within Existential Phenom-

**FIGURE 10**
The Presidential suite at the KICC
**Source:** Wakofula 2013

**FIGURE 11**
The Tsavo Ball Room in KICC, arranged for a dinner party
**Source:** Wakofula 2013

**FIGURE 12**
The Turkana Room in the KICC
**Source:** Wakofula 2013

enology, find physical articulation. The sky lighting admits natural light within this conference space to create an ambience that matches or even exceeds the effects of artificial lighting. This indicates the manifold possibilities of using light as a structural device and ordering element in architecture, and this can be extended to external Kenyan urban spaces.

## CONCLUSION AND RECOMMENDATIONS

Phenomenological epistemology provides the means to resolve some of the architectural challenges that are routinely encountered during the production of tangible and intangible urban spaces. Christian Norberg-Schulz provided the initial direction towards this effort when he introduced the concept of Existential phenomenology into architecture as a discipline. However, a broader understanding of phenomenology is required to sufficiently engage with pertinent contemporary issues in urban space production. This is enabled by inclusion of ontological dimensions of existence; different levels of intentionality; and aspects of phenomenological consciousness to describe and analyse human experience of built forms, both as architectural artefacts and constituents of urban spaces. The comprehension of individual and collective cognition and perspectives of architectural truth and reality are vital in this regard. This will promote understanding and memory within Kenyan urban spaces, as architectural places, in the long term.

Although phenomenological aspects were discussed within the KICC, a seminal Kenyan artefact, the author proposes the extension of this method to other urban spaces in Kenya, including pedestrian walkways such as Aga Khan Walk in Nairobi CBD; public 'squares' exemplified by the urban space between the Kenya National Archives and Stanbank House in Nairobi CBD; public parks such as Uhuru Park; and markets such as Gikomba and Muthurwa, in Nairobi, to mention but a few examples. It is only through such undertakings that Eurocentric academies like architectural phenomenology may eventually find holistic acceptance and inclusion in Kenyan architectural academia. This may then provide a relevant alternative discourse that may counter purist scholarly positions which focus only on Afrocentric content, devoid of vital input from external sources.

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Africa HABITAT REVIEW

# Economics of Urban Space:

## *Are the Street Vendors in Nairobi City Spared?*

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**Abstract**

*Street vending in Nairobi city is not a new phenomenon. City governments have changed overtime but perception of street vendors as a city menace has persisted through all regimes of the capital city. Various attempts of both legal and spatial approaches to resolve the menace have been made by successive city governments with little success. There are those that criminalize hawking in city streets by canceling their licenses while others issue licenses indicating hawking is a legitimate business. Spatial strategies adopted in the past are diverse some aimed at settling the hawkers in markets, allowing them to operate within Central Business District (CBD) in selected spaces at specific times in addition to allocating them the back lanes of the cities' blocks. However, none of the strategies has contained hawkers from the temptation of spilling over to the CBD streets and walkways. It is therefore important for urban managers to study the street vending as a unique business venture that requires specific conditions to thrive in addition to a comprehensive study of the city dwellers' behavior in relation to urban space in order to understand what sustains street vending. The paper is structured in a way that it started by; first, presenting the history of street vending in Nairobi city. Second, an analysis of the current situation and characteristics of street vending in Nairobi. Third, classify various types of hawkers that operate within Nairobi CBD. Fourth, an evaluation of the past and existing state interventions and policy developments on street vendors space allocation. Fifth, an account of the existing strategies for street vendors space allocation by Nairobi county government. Sixth, field results and interpretation. Seventh, an evaluation of the underpinning urban economic principles to be considered in allocation of space for street vendors. Eighth, review of urban management challenges that hinder space allocation for street vendors in Nairobi. Lastly, the paper has given policy recommendations on how economics of urban space principles can be used as a guide for the space allocation of street vendors in the City of Nairobi. The study was carried out through, review of relevant literature in both published and unpublished media, field observation and key informants interviews. The study analyzed the successes and failures of past and existing spatial strategies carried with assumptions that hawkers just need space to operate without considering the fact that the location characteristics of the space provided is of extreme importance if hawkers' needs have to be met without a sting to the city economy. The paper aimed at reviewing the economics of urban space principles in entrenching right to the city by all business classes. It assessed the viability of offering urban space for free in favor of informal traders in a capitalist city in ensuring fair competition and equity in the business platform. In conclusion the paper made recommendations drawn from analysis of the study findings.*

Key Words: Hawkers, space allocation, spatial strategies, urban space.

## INTRODUCTION

### History of Street Vending in Nairobi City

At the onset of colonialism, African women initiated hawking of foodstuffs in Nairobi. At the time, the British colonial masters restricted entry to urban space through a requirement of permission passes mostly issued to only men who were permitted as wage workers and therefore for women it was a tough struggle to gain access (Robertson, 1997). With time the number of hawkers increased exponentially leading to the administrator's move to return the traders back to their home districts disguising them as prostitutes in the city although the motive was to control the number of Africans accessing the city then, a reserve of the colonial settlers (White, 1990). After independence the denial of hawker's right to the city has continued to date; more than fifty years after independence. In the post-independent period, urban space is highly political and involves many interested parties. As a result political leaders perceived hawkers as a political constituency and therefore used the access to urban space as a tool for patronage favoring their royals with access to the most lucrative spaces while the non-royals were faced with harassment, violence and ruthless demotion of their open air markets. During the struggle for multiparty democracy in 1990s, small scale traders started

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to develop associations that would negotiate for their right to urban space (Robertson, 1997).

**The Current Situation of Street Vending in Nairobi**

Unlike in the past when street vending suffered the perception as an illegal tbusiness, currently it is recognized as a form of trade with a specific license issued by the Nairobi county government. Another aspect of proof of its recognition is seen in the acceptance of vendors' associations like Nairobi Informal Sector Consultative Forum/Confederation (NISCOB) and Kenya Hawkers Association (KEHAWA) as members of established legal business associations specifically Kenya Private Sector Alliance (KEPSA) and Nairobi Central Business District Association (NCBDA). Noting that hawkers are represented in all these associations indicates they are a part of decision making process in the city development agenda. However, despite all the gains in the recognition of their presence and representation in urban governance, the relationship between street vendors and Nairobi City County Government (NCCG) is still sour. Manifestation of the unpleasant relationship is visible in running battles between the *askaris* and the hawkers. The city *askaris* mistreat the hawkers by extorting bribes; confiscate their goods and physical assault that in some cases beatings have led to death of hawkers. Hawkers on the other hand have developed survival tactics to spy the *askaris*. The spies engaged by the vendors to warn and protect them from arrests, later metamorphosed into cartels that exploit the hawkers in guise of a protection force and demand protection fees. Egan (2014) observed that the cartels lead the hawkers in fighting back the *askaris* by throwing bottles and stones during the raids (**Figure 1**).

Hawkers are viewed as a menace as they have taken over major streets and open spaces in the city. By 10 am, the streets are overflowing with street vendors selling all sorts of wares on Accra Road, Moi Avenue, Kenyatta Avenue, Tom Mboya street, Aga Khan Walk and Ronald Ngala street (Mutavi, 2017). The main contention here is that the city by-laws on hawking requires hawkers to operate in designated areas of the city. The term 'designated areas' is not well curved out, well defined and of space qualities that guarantee a thriving hawkers market. So far many attempts have been done to create hawkers trading space but with little or no success. Several hawkers' space allocation projects of the past failed to deliver intended results of moving hawkers from the CBD streets. As a result of failure by the urban managers to develop adequate, quality urban space hawkers keep coming back to the CBD streets where they suffer constant harassment, arrests, confiscation and damage of their goods, extortion through bribes and physical assaults by the NCC *askaris* who accuse them of occupation and disturbance of order in public spaces.

**FIGURE 1**
Hawkers engaging the Nairobi City County *askaris* in running battles during a raid
**Source:** Kiarie 2014

## THEORY

**Types of Hawkers**

Street vending is of various forms and the space requirements are diverse. Some are mobile vendors roaming around the city carrying their wares by hand move from place to place selling to customers inside the buses, through the bus windows, in the offices and at the parks and gardens. The other categories lay their wares on the pavements at the shop fronts and along the walkways around the city blocks. Others have built temporary structures along the city streets. Hussein (2014) discovered that 46% of hawkers sell by moving between vehicles in traffic, 40% lay their wares on the street pavements and 14% sell at the bus station. Further, state that selling between moving vehicles enjoy high patronage than the other spaces.

Hawkers can also be classified by the types of the commodities they sell such as; second clothes and shoes commonly known as *mitumbas*, new clothes and shoes from China, jewelries both locally made and imported from China, old and new books, agricultural products like vegetables, fruits, potatoes, green maize, onions, sugar cane among others. The hawkers largely acquire their wares from China and Dubai as the imported goods are cheaper than those sourced locally (Mutavi, 2017).

**State interventions and policy on space allocation for street vending**

The principle means of public sector support to SMEs is through formation of appropriate policies. The government has mentioned time to time of its commitment to promote development of the sector by providing policy framework. Sessional Paper No.2 of 1992, Small Enterprise and Juakali Development in Kenya, the paper sort to establish the requisite enabling environment for the development of the sector. Other policy documents declare the government intention to create an enabling legal and regulatory environment. The Development Plan for 1989 -1993 declared that; the government

would speed the already initiated review of the local authorities' by-laws and regulations that proved restrictive to the development of the SMEs. This would include the suspension of certain categories of licenses, appropriate revision of building codes and ease allocation of land to SMEs'. Despite these commitments, the government has not detailed out the method of implementation of these policies. The procedure for land allocation and administration of urban space is not clear and as such it marginalizes the SMEs. Consequently, most players in this sector operates under conditions of insecure tenure with permanent fear of relocation and therefore unable to invest in suitable facilities, infrastructure, plant or machinery (Oyugi, 2002).

Failure to allocate land for informal sector has led its operations very temporary. Majority of the street vendors operate on shop pavements, road sides and under developed urban spaces. As a result they are classified as illegitimate which fail to raise any revenue for the state. Illegitimacy gives the sector a negative image thus ignoring some positive attributes which are peculiar to the sector and highlights only on the shortcomings of the sector. The constant harassment due to land related issue has curtailed its growth and its contribution to the economic growth. A closer look at the situation in Nairobi reveals that the sites that are illegal according to NCCG are the same that are considered lucrative by the street vendors because of their proximity to the potential customers.

Another challenge on street vending policy in Nairobi is that they keep changing regularly. For example Business Daily on 29th May, 2015 announces that the Nairobi County Government has revoked the street vendors' licenses abruptly (**Figure 2**). So far there is no concrete direction on hawking. Sometimes NCCG *askaris* are lenient for some days only to later catch the hawkers off guard by arrests and harassment.

**FIGURE 2**
Hawker packing the ware after revocation of hawker license
**Source:** Kiarie 2015

**Existing strategies for street vendors space allocation in Nairobi**

The solution to the hawker's space allocation will start by the urban management and planning practitioners appreciating the fact that street traders and hawkers are an integral part of urban environment. They should not come up with ways to exclude them but to include them in urban space by carefully planning and placing them in the best locations that would establish their businesses. Kusakabe (2006) notes that for street vendors to secure their right to the urban space the approach must take urban planning perspective. How spaces are defined and planned are critical to street vendors who are often accused of disturbing order and occupying public spaces. The management challenge is to translate the SMEs policies that recognize hawking as a business into a functional urban space management system. The stakeholders should be involved in process of developing workable solutions that would make the street vending a lawful trade. On the other hand the solution should consider balancing the interest of the city at large especially those of the formal business players who should not be disadvantaged as well. Some of the solutions proposed are as follows;

The recent introduction of night markets and rehabilitation of existing markets on 25th March, 2016, NCCG launched a legitimate hawkers' night market along Mama Ngina Street between 4pm to midnight. The market will be opened on selected weekends every month. Traders will not pay any license to operate. The NCC will provide fire, lighting, security, ambulance and garbage collection to make the market safe and secure. In addition, NCC has rehabilitated its markets in Ngara, Dandora, Kariokor, Landies Road, Burma and Wakulima in addition to constructing new phases in Karen and City Park.

Development of markets is not a new approach to resolve the hawkers menace. It has been done earlier in Nairobi and elsewhere in the world but the hawkers keep coming back to the street. It is important to understand that hawking business thrives by providing convince to the customers. The customers make impulse buying due to perceived low prices, convenience and availability. When hawkers are moved to vacant car park, playground and designated streets, the customers who make impulse purchase will not walk there simply because they don't have a pressing need for the item on sale. In addition, a free market that allows traders to operate without any charges is likely to be congested and insecure thus discouraging some sensitive clients from accessing the market. As a result hawkers will register reduced sales and will therefore not be contained in the market. More over a market that is free for all is usually not fair for the physically weak like the women, youth and disabled. It's likely that the stronger men will take up the most lucrative location in the market and the weak are squeezed at unfavorable locations registering reduced sales. This happened in Muthurwa market and that is quoted as the reason why the small scale women hawkers were the first to abandon the market and got back to CBD streets (Kamunyori, 2007). In the

year 2005 the hawkers were moved to New Ngara market and the strategy failed miserably. This study reveals that when hawkers register reduced sales, they cannot be contained in the designated areas as they strive to follow the customers towards the bus terminus and shop pavements.

The proposal of introducing open air market that operates on given days would adversely affect hawkers that deal with perishable goods. The hawkers have no coolers and storage facilities and customers' needs the goods daily. The hawker on the other hand earns from hand to mouth and therefore needs daily income to survive. They cannot rely on a market that operates a few selected days which will mean they will be underemployed.

Hawkers are of different categories, there are those that can fit in designed areas in suitable locations. This category is the one whose goods are specified like; clothes, curios, electronics. However, the NCC will be unfair to the formal business in the city that pay high tax, licenses and leases and perceive presence of hawkers as nuisance to their registered businesses.

Street vendors lay their goods outside shop fronts (**Figure 3**). They illegally operate in front of businesses that have paid licenses. For example, when the a former minister for Local Government Hon. Musikari Kombo proposed to allow hawkers operate from Koinange Street, he was faced with a lot of resistance from the formal business community until the strategy was dropped.


**FIGURE 3**
Invasion formal business shop fronts by hawkers in Nairobi City
**Source:** Mbatiah 2016

More so, the idea of the NCCG of offering urban space and service for free to a section of city business community (hawkers) while charging other business licenses and taxes to operate in the same space is unfair and does not entrench the canon of fairness and equity in taxation Laws of Kenya. The hawkers are selling their wares to make profit and one wonders why the government should use the revenue generated by other Kenyans to finance their services in security, ambulance, lighting and solid waste management. In realization of this loop hole some formal business owners are likely to withdraw from formal businesses and hire hawking agents to sell their wares in the serviced tax-free night market. If this happens the NCC will suffer reduced revenue and therefore will not sustain the urban service delivery. In addition, a free of charge market will boost the ease of entry to the hawking multiplying the number of hawkers beyond the carrying capacity of the space provided and the problem will escalate. It is wrong for the NCC to assume that hawkers cannot afford license fees, the recent media highlight at KTN news shows (Namu, 2016) that the hawkers bribe the *askaris* with more than two hundred shilling a day on average indicating that they can afford to pay Kshs. 6,000 a month on rent for premises and renew a license annually if they are well managed and placed in a formal sector. This agrees with Kusakabe (2006) study noting that in Bangkok the local authority privatized the hawkers market where the private company organized and offered services to the hawkers in return for rent. The market models were success stories as the company renovated the infrastructure including restrooms and car park. They attracted more customers and vendors who made good sales. They were satisfied and were ready to pay higher rents in return. The key to success in this case study revealed that, it is the way the market managers listen to the vendors and how they are able to accommodate their needs that lead to the high vendors' satisfaction and retention.

## RESEARCH METHODS

The study is primarily exploratory research aimed at gaining an understanding of underlying reasons, opinions, and motivations on the street vending in Nairobi city. The qualitative research provided insights into the problem and helped in developing ideas for recommendation.

The primary data collection for this study involved interviews with key informants from NCCG as the researcher tried to understand the effort by the government towards resolving the hawkers menace in addition to identifying the key challenges surrounding the issue. The second category for key informants' interviews was the street vendors' associations' representatives. This included; Nairobi hawkers association (NHA), Micro and Small Enterprise Leaders (MSEL), Kenya National Alliance of Street Vendors and Informal Traders (KENASVIT) and Persons with Disability Street Traders Association (PDSTA). The aim was to capture their perceptions with regards to how the city governance treat their use of city space, the challenges they face, as well as their recommendations on resolving the issue. During the interviews, the data was re-

corded in a note book real-time. The interviews were rich with information that gave good insights to the study findings. The street vendors' behavior was closely observed and relevant photographs were taken to record the information. The secondary data collection was used to review literature from previous surveys on the topics, unpublished thesis, publications, Acts of Parliament and local newspapers.

Qualitative analysis was worked where responses were paraphrased and in some instances reported verbatim. Narrative and performance analysis was applied in order to discover and reveal repeated similarities in the perception of hawkers' representatives. These perceptions were drawn from key informants and the observations that the researcher had noted on the checklist.

## RESULTS AND DISCUSSION

### City Governance

An interview with the City Planning department official attempted to define the term 'informality' in street vending trade with Nairobi CBD. It was clarified that, despite the fact that hawking has been regularized by the Micro and Small Enterprise Act of 2012, it is considered informal due to the fact that it is carried out on spaces meant for other uses. Regularization happens only when the trading activities take place in designated areas thus not suffocating other uses or causing any conflict of the use of urban spaces. This gives street vending a strong spatial-economic connotation that must be addressed in order to preserve the city's role as an economic engine for the nation.

The City Government has in the effort to accommodate the street vendors within the City rolled out several projects. For instance, annexing the shoe shiners with the public toilets, allocation of candy shops and shoe shining near the bus stops, marking out spaces for newspapers and book sellers (**Figures 4** - **6**). These allocations include provision of ample walking spaces. NCCG a while ago erected modern formal kiosks next to Nairobi Hospital to cater for small scale street trader but the strategy failed to serve the purpose as they were all taken up by high income traders kicking out the intended venerable groups of traders.

The city government laments that despite efforts to settle down the hawkers in designated markets, for example Muthurwa hawkers market which is not fully occupied to date, the street hawkers menace still persists within CBD (**Figures 7(a)** and **(b)**). The NCCG is faced with a challenge it trying to understand why the street vendors keep abandoning the spaces allocated to them and getting back to the streets (**Figure 8**). In some cases, the hawkers even sold out the premises to the high income traders.

An NCCG official in an interview on 15th September,

**FIGURE 4**
Shoe shiner's spot along Loita Street in Nairobi
**Source:** Survey 2016

**FIGURE 5**
Newspaper vending along Kenyatta Avenue in Nairobi CBD
**Source:** Survey 2016

**FIGURE 6**
Books and newspapers' sellers along Loita Street in Nairobi CBD
**Source:** Survey 2016

2016, stated that street vending challenge is manifested in a chain of conflicts. First, there is a class dispute between the middle income and low income earners. The middle income complains a lot to the City government about the hawking nuisance in the CBD. In contrast, the middle income encourage hawking by offering market for their wares. Second, there exist conflicts between the street vendors and the large scale traders in formal premises as they complain of facing unfair competition from the street vending while they pay huge taxes and rates to the city and national governments.

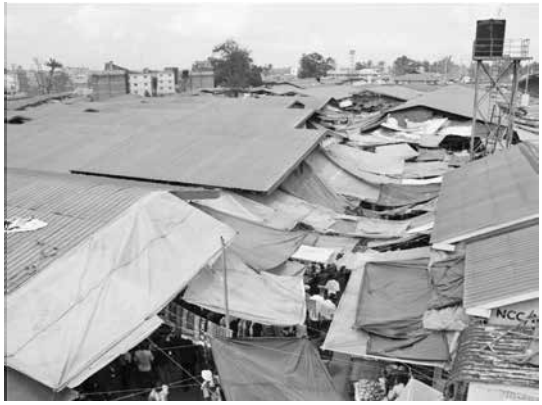

**FIGURE 7 (a)**
Aerial view of Muthurwa market
**Source:** Survey 2016

**FIGURE 7 (b)**
Inside view of Muthurwa market
**Source:** Survey 2016

**FIGURE 8**
Street vending in a busy street in Nairobi
**Source:** Survey 2016

Third, control of city vending is also faced with spatial political hurdles that are informed by ethnic conflicts. The study was informed that, attempt to control hawking within CBD is interpreted as mistreating certain communities aligned to a certain political wing. Forth, an attempt by the city government to resolve the menace by allocating street vendors along the back lanes of the city blocks was disputed by the large scale business owners who claim that they need the back lanes as loading and off-loading zones. Fifth, there is conflict in definition of who is formal and who is informal. Sixth, the national government security agencies argue that some of the street vendors are not genuine traders but criminals who hide guns under their wares disguising as street vendors. Seventh, property owners of the adjacent premises invaded by hawkers complain to the city government that their presence devalue their properties. Eighth, there also exists a conflict between the physically strong street traders and the physically weak street traders. This has introduced unfair competition against youth and women vendors a disadvantage to the marginalized groups in the recently launched the Nairobi free night market along Mama Ngina Street. As a result, the strategy has once again failed to meet the intended objective. Nairobi City County Government identifies the social-economic issues as the main stabling block to the resolution of the above outlined conflicts. The recent influx of the motorcyclists in the already congested CBD streets has intensified the street vending problem (**Figure 9**).


**FIGURE 9**
Motorbikes have invaded the city streets at Moi Avenue and Kenyatta Avenue junction
**Source:** Survey 2016

**Street vendors' perceptions on their right to the Nairobi city space**

An interview with the chairman of the Micro and Small enterprise reveals that despite the existence of the MSE Act of 2012 that was envisaged to regularize the sector, their right to the city space is still curtailed as the Act has not been implemented. They perceive street

vending as an important player in the city economy outlining the following strengths; the sector generates 20% of the country's GDP, is a source of employment, creates business opportunities to women and youth as envisioned in Kenya Vision 2030, generate substantial revenue for the county government through the daily tax of Kshs.100 per day amounting to Kshs.36, 500 per trader per year. The MSEs are organized into registered SACCOs and associations. The major weakness in the sector is the lack of credible financial structure to enable them by the market spaces.

There are special groups within the sector that needs special attention in addressing the spatial allocation of the street vendors in Nairobi. An interview with a representative of Persons with Disability Street Traders Association (PDSTA) revealed the following concerns on their inclusion into the city space: they feel cut off from decision making process on the planning and management of the city noting that the MSE Act 2012 is currently being amended without representation of Persons with Disability (PWD) thus stating that, 'nothing for us without us', Mr. Maingi 15th September, 2016 11.00 am along Loita Street, Nairobi. There exists multiple issue of the hawkers' licenses that are not harmonized, as a result some sections of the NCCG issue licenses only to be rejected by another section of the same government. Explained the reason for Muthurwa desertion by Persons with Disability (PWD) as lack of appropriate toilets and sanitation facilities that caters for their special needs. While asked to suggest the best way to settle the hawkers within CBD without conflict with the other land uses the interviewee suggested a development of a muilt-storey hawkers market that has public transport bus terminus and hawkers stalls in the upper floors.

An interview with a hawker reveals the following challenges; high fines charged by the NCCG, the designated area authorized for hawking not well defined, constant harassment by the city *askaris* through physical assault and bribe extortions, suffer from stigma as hawking is perceived by the general public as an illegal business, operate with minimal capital as little as Kshs. 3,000 coupled with lack of credit facilities a situation that exposes them to exploitation by *shylock* credit lenders that charge higher interest rates than the banks. They explain that most of their hard earned gains are lost to the *askaris* as bribes. They justify their preference for acts of bribery by stating that the fines charged by the NCCG are too high coupled with time wasting procedures that makes bribery the better option. Sometimes women use their young children as human shields to resist arrests.

Hawkers complained that the formal tents offered by the NCCG at Kshs. 3,500 per day and Kshs. 70,000 per month are too expensive for an ordinary hawker to afford and sustain. Hawkers express fear that the current disorganization and congestion in the CBD streets poses a high risk of terrorism attack as a terrorist can easily hide among them.

Hawkers had the following suggestions with regard to use of city space; hawkers should be allowed to operate at night from 6pm to 6am and to be made responsible of sweeping the streets before they leave in the morning. They feel that it's better for them to operate in a formal system where they pay legitimate fees to the county governments than bribing the *askaris* to be shielded from city arrests. They would advocate for reasonable fines coupled with straight forward paying procedures to discourage bribery. Hawkers suggest that their numbers grow exponentially as results of demographic changes such as the growing cases of divorced women and school drop-outs among the poor households. This requires annual expansion of markets and should not be planned as a one-off project.

**Underpinning principles to consider in allocation of space for hawkers**

First and foremost it is important to consider that street vending has a unique characteristic that requires the vendor to locate customers and not vice versa. A strategic location is a very strong success factor to the hawkers. This is the reason why they are extremely aggressive in taking the best business location at the shop fronts and at the bus terminus regardless of the harassment they suffer from the city authority. As such the vendor is highly mobile and ready to follow the customers. As a result, any policy that affects the flow of human traffic like relocation of a bus terminus directly affects the location characteristic of the street vendors market that considers it unsuitable and quickly follows the customers to the new locations. Reasons are first, they sell first moving goods and seasonal goods like umbrellas during the rainy season, success cards during examination periods, Christmas decorations and for them dead stock would mean doom to them if the right season passes with unsold stock. Others sell perishable food stuffs which demands quick sale to avoid major losses. Secondly, hawkers sell at a lower price tempting customers to make impulse buying of their goods.

A study of street vending in Bangkok revealed that lack of space is not failure factor but a good location is a success factor (Kusakabe, 2006). This clearly indicates that the street vendors in Nairobi are not only in search of just a would be urban space, but also a space with good location characteristics and of extreme importance one in close proximity to the customers within the CBD. Most previous efforts to allocate space to hawkers have failed to guarantee presence of the customers leading to lower sales. As a result, the street vendors abandon the spaces and move to the CBD which is vibrant with heavy human traffic.

On the other hand, hawkers have a ready market. Nairobi residents encourage hawking since; one, their goods are relatively cheaper than the stores. Two, they find quick access to the goods since hawkers avail the goods to them conveniently without having to search and walk far to buy daily goods. Three, hawking presents some traditional open market characteristics that Africans identify with such as bargaining, haggling and informal quantity discounts that are not entertained in the modern retail stores that use weighing scales and fixed prices of items. Noise in a hawkers' market is characteristic as vendors tend to advertise their goods and haggle with customers. For this reason, the businesses are considered as a nuisance to the modern system of market and make it incompatible to the other formally structured businesses.

For the street vendors to be settled and satisfied, it is critical to note that the space needs to be well defined and planned to meet their unique needs. While undertaking this task it is important to put into consideration that urban space are seen in different ways by different people who use them. The street vendors' associations must be well involved in decision making with regards to identification and development of the best location for the hawkers market.

This study found out that allocation of space for street vending requires proper integration of street vendors in relation to other urban spaces and not merely squeezing the hawkers to operate at a corner market. The management of the space should also be strategically positioned within urban development policies. Street vending should be recognized as a legitimate and a viable business endeavor not only in legislations but in day-to day running of the city affairs. Space allocation for street vending should not be compromised or compete for space with city beatification projects. Street vending is a commercial entity which should be integrated in the urban planning systems. Urban land is shrinking as the city population grows rapidly and therefore, mono-functional urban spaces are no-longer viable. Pereira (1994) supports the idea of the urban management adopting multi-functional and multi–layered urban spaces. This concept would lead to a mutual harmonious relationship between the spaces regularly frequented by the poor (hard up areas) and those frequented by the rich (prosperous areas). The intersection of the two spaces should be seamless without a marked boundary.

**Challenges of space allocation for hawkers in Nairobi**

The greatest challenges in allocation of a suitable hawkers market is that it prescribes a space within the CBD. Space in the CBD is of very high value and the street vendors may not afford the rents it commands. Land tenure in the CBD is mostly in the private hands or is public and cannot be allocated to individuals. More so the land in CBD is also very political and involves many interests. The NCCG desires an attractive city with a business environment that is orderly, beautiful and clean in order to attract foreign direct investments and safeguard against capital flight.

The investors of large retail stores whose target market is high and middle income clientele. The large scale investors fear unhealthy competition from hawkers who trade without overheads. As a result, they use their high advocacy and good relations with the city government to lobby for elimination of hawkers within CBD. On the other hand, the city government officials who are in most cases partial towards the modern infrastructure tend to reject the traditional markets that are livelihoods of the urban poor who operate on sidewalks and shop fronts.

The urban management dilemma is in balancing the two interests of the formal and informal business operators. The government appreciates that the street vending is a critical pillar in job creation for women and youth and doubles up as a source of livelihood for many households in the city. The large scale businesses are also a major stakeholders in the city development platform since they are major payers of taxes and rates that sustain the city infrastructure and services that all citizens utilize. The formal businesses get upset by the fact that they pay huge rents to access the urban space in CBD in order to operate their businesses in advantaged locations aiming at meeting their cost and making profits. To their disappointment, the street vendors illogically and unfairly intrude into their shop fronts, display similar goods at a lower price. In the process they block access to their premises and cause congestion leading to unsafe streets. As a result the middle income clients are slowly relocating to the major shopping malls at the city periphery where they are assured of short–time parking as business visitors mostly at a fee, order, safety and attractive environments (Harvey, 2000). Presence of hawkers around the CBD blocks stores, cause congestion and public disturbance through noise nuisance as they loudly advertise and haggle with customers. This scenario scares the middle and high income customers who are sensitive to noise and congestion. They value environments that are orderly. As a result, the CBD blocks are experiencing capital flight as many corporate businesses are relocating to peripheral business districts like Upper Hill and Westlands. The large Indian retail stores are gradually closing down and spaces being converted into exhibitions for SMEs stalls. SMEs are trading on imports from China such as electronics like mobile phones and computer accessories in addition to new clothes, shoes, handbags and a few stationeries.

The scenario does not spell good urban economic sense to the City. As a matter of sense no single economic

class of urban citizenry should displace or deny the other right to the city. The urban management should ensure right to the city by all regardless of the economic class. Inability of the NCCG to bring order to the street vending market prompts the hawkers to intrude the urban space in a disorderly manner. This scenario will soon decay the CBD through capital flight and this is pitiful for the envisaged world class city in Vision 2030 blue print.

## CONCLUSION

The study established that hawking in designated areas is regularized by the MSE Act of 2012. The County City Government has designated areas for different uses such as shoe shinning, newspaper vending and book selling and also erected modern formal *kiosks* (small shops) to cater for small scale street traders. Places like the Muthurwa hawkers market have been built to accommodate the street vendors. The County City Government also rents tents to hawkers that are used to display and sell their items. These designated areas are inadequate and ill designed; with the hawkers even lacking sanitation facilities for their use. Despite the effort by the County City Government to allocate areas to street vendors, there is an outcry that the areas are not conveniently located leading to them being abandoned whereas the street vendors go back to the undesignated street areas where they hawk their laid out merchandise. This was normally happening along the shop front verandahs consequently blocking the pedestrian walkways and entrances to the shops as well as bus terminuses. This inconveniences shoppers and makes shop owners feel they are unfair competition as the hawkers do not pay rent for any premises and taxes on their trades. The competition for urban space among shop owners, motorists, pedestrians and street vendors is real and affects the image of the urban public space negatively. As a majority of street vendors have no operating period or place, they encounter regular eviction and arrests by the county authorities.

The study also found that street vendors were very mobile and followed the customers. They also sold fast moving items which are cheaper than stores. Finally, the study found out that the informal vending market had characteristics of the traditional open markets where business happens in the open; bargaining with the customers, there was variety of items being sold and advertising of the wares was by shouting or showing card prices of the goods on sale. Noise is a major characteristic of business in the hawkers market and it attracts and engages the customers and makes the public space vibrant and active.

## RECOMMENDATIONS

The study recommends that:

Vendors should be allowed to operate at night from 6 pm to 6 am and they should ensure that the areas they were operating from are left clean.

Vendors be allowed to pay legitimate license fees for their businesses.

Vendors be allowed to pay legal fines for violating the laid down vending by-laws.

The Government expands the designated areas for vending in consideration of the growth of this sector.

There be constructive politics in the vending business sector.

The rights of small scale traders to urban space are recognized.

The vending market or designated hawking area should be located at strategic place and in close proximity to attract the customers (street passers-by).

The street vendors association should be involved in decision making, especially in urban planning policy formulation, with regard to identifying and developing appropriate urban space for the vending business. The principle of urban planning in this case should be to integrate street vending business with other urban activities.

The urban managers and planners should endear to achieve an urban business environment that is orderly, healthy, safe and secure. The outcome of this is that it will attract direct investment and safeguard the beauty of Nairobi City.

The urban managers have a role to balance the interest of the formal and informal business operators in such a manner that all have access to the valued customer who always has a choice where to buy.

The good qualities of informal markets should be embraced in the planning and managing the public urban spaces.

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