

*Full Length Research Paper*

# **Transit oriented development in medium cities in Africa: Experiences from Kisumu, Kenya**

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**Transit Oriented Development (TOD) is a planned area with land use that has optimal reach of public transport by urban populace it serves. Availability and accessibility of public transport minimizes reliance of use by private users and this is the cardinal rule of TOD Principles have been developed that provide a framework for understanding TOD. Kisumu is used as a case study in exploring these principles and their validity in medium sized African city. The application of these principles in guiding city planning and development highlights how TOD can be an effective driver of sustainable urbanization. The paper presents the concept of TOD and then builds into the case study city: Kisumu. It enables the reader to contextualize the discussions in the subsequent sections. The paper then addresses TOD conceptualization. It looks at the broad categories of TOD that has been demonstrated in Kisumu as a result of the interventions of various actors. It finally looks at the challenges and opportunities that exist for TOD as a planning and development framework.**

**Key words:** Transportation, densification, accessibility, sustainable urban development, Kisumu.

## **INTRODUCTION**

Globally, it has been noted that most urban dwellers are not able to access their cities especially within the urban passenger transport system. This type of transport focuses non-motorized transport, formal public transport, informal (motorized) transport and private motorized transport (UN-Habitat, 2014). Sustainable urban development must always utilize the available urban space for different types of land use activities such as residential, commercial and recreation. These land uses must also be within walking distance of public transport (Caves, 2004). Mixed use development which sees a

combination of land uses such as residential, workplaces and commercial reduces trip distances, thus making it possible to complete trips by foot or bicycle (UN-Habitat and Institute for Transportation and Development Policy - ITDP, 2018). Planners advocate for the promotion of dense and compact urban form to ensure that there is space for efficient public transport use. This is further reaffirmed by the New Urban Agenda's global commitment to sustainable urban development which is a critical step for realization of sustainable development in an integrated and coordinated manner at various spatial

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levels, taking into consideration the views of relevant actors. To implement the New Urban Agenda, the 2020 Agenda for Sustainable Development must be localized. This will thus lead to the achievement of the Sustainable Development Goals (SDGs) and targets (UN, 2017). This includes Goal 11 of making cities and human settlement sustainable through inclusivity and resilience. It also strives to ensure that the environment is protected for its urban environmental quality as noted by (Li and Weng, 2007).

Cities in Africa have in the past suffered because of poor governance and management. In order to achieve sustainable urbanization, governance and management, they must be streamlined with the SDGs and the New Urban Agenda. This Agenda seeks to give direction on how to link sustainable development and urbanization (UN, 2017). Transit Oriented Development (TOD) comes in handy in order to achieve this objective.

Transit Oriented Development (TOD) creates a focus on non-automobile as the mode of transportation, to reduce pollution and enhance fuel efficiency. TOD is expected to lead to sustainable livable cities (Chan et al., 2016). TOD tries to enhance access to public transport and non-motorized transportation through nodes that are centrally located to allow for easy access for citizens in high density commercial and residential development (Dittmar and Ohland, 2012, Thomas et al., 2018). The use of TOD in planning and development of medium sized cities, such as Kisumu, allows for exploration of this concept in sustainable city growth. Kisumu is going through transformation as the County Government implements policies on transportation and densification of urban development. This provides an opportunity to assess application of the TOD principles in a middle-sized African City. The objective of this paper is to assess the use of TOD principles in planning of Kisumu City in the last five years. It demonstrates through existing interventions the application of these principles. Although it has its unique characteristics, Kisumu represents a typical medium sized Sub-Saharan African city, going through rapid urbanization with minimal resources to provide urban transport infrastructure.

TOD transit centers are usually rail stations that link the rail system and the city creating meeting points (Knowles, 2019). TOD is being recognized internationally as the new paradigm for transport and development planning, which has the aim to achieve more sustainable and equitable cities. TOD tries to connect mass transit and non-motorized transport with centrally located terminal facilities surrounded by high density residential and commercial neighborhoods (Dittmar and Ohland, 2012).

Zhang et al. (2019) emphasise that TOD is one of the key tools in urban spatial planning. There are three aspects showing how TOD is related to urban spatial structure. *Firstly*, TOD focuses on the complete quantification of different urban elements, *Secondly*, TOD can be applied as a method of recognizing the urban

growth or dynamism and *Thirdly*, TOD emphasizes a balanced growth, structure and sustainability of cities.

Chan et al. (2016) provides Principles of Transit Oriented Development. These ten principles are "1) Put stations in locations with highest ridership potential and development opportunities, 2) Designate 1/2 mile radius around station as higher density, mixed-use, walkable development, 3) Create range of densities with highest at station, tapering down to existing neighborhoods, 4) Design station site for seamless pedestrian connections to surrounding development, 5) Create public plaza directly fronting one or more sides of the station building. Create retail and cafe streets leading to station entrances along main pedestrian connections, 6) Reduce parking at station, site a block or two away, direct pedestrian flow along retail streets, 7) Enhance multi-modal connections, making transfers easy, direct, and comfortable, 9.) Incorporate bikeshare, a comprehensive bikeway network, and ride-in bike parking areas, and 10) Use station as catalyst for major redevelopment of area and great place-making around station" (Chan et al., 2016:178). Goodwill and Hendricks (2002) provides a comprehensive assessment of TOD that demonstrates how TOD can be used to shape the growth and development of a city. There are cases where there is a deliberate policy to institute TOD as demonstrated in Johannesburg where TOD was a deliberate planning strategy adopted by the City government (Harrison et al., 2019). This would have been the best approach for a city like Kisumu however the authors did not see a structured approach to the use of TOD hence the focus on the principles and to assess if they apply to Kisumu's planning interventions.

## METHODOLOGY

Key Informant Interviews were conducted to tap on the experiences from the policy makers and practitioners. This information was collected through interviews with the City Director of Planning, City Director of Environment, County Chief Officer Planning, staff at School of Planning and Architecture Maseno University, School of Spatial Planning Jaramogi, Oginga Odinga University of Science and Technology and Urban Researchers at Kisumu Local Interaction Platform. These are persons who have been engaged in planning and policy research in Kisumu for over five years. The information was consolidated to generate the general thematic areas. Data obtained from these interviews was processed and coded using the content analysis by putting issues based on differences and similarities. Documentation was reviewed to triangulate these findings and shared in roundtable meetings to create consensus around the thematic areas and their interpretation. Information was also drawn from activities of University researchers from Kisumu and Gothenburg in the last decade, which though limited in scope, provides an opportunity to present a perspective on sustainable urban development.

This paper utilizes *framework analysis* which builds on the thematic analysis (Smith and Firth, 2011). It allows the authors to assess the cross-sectional descriptive data and capture the various phenomenon under investigation. Framework analysis is a tool for

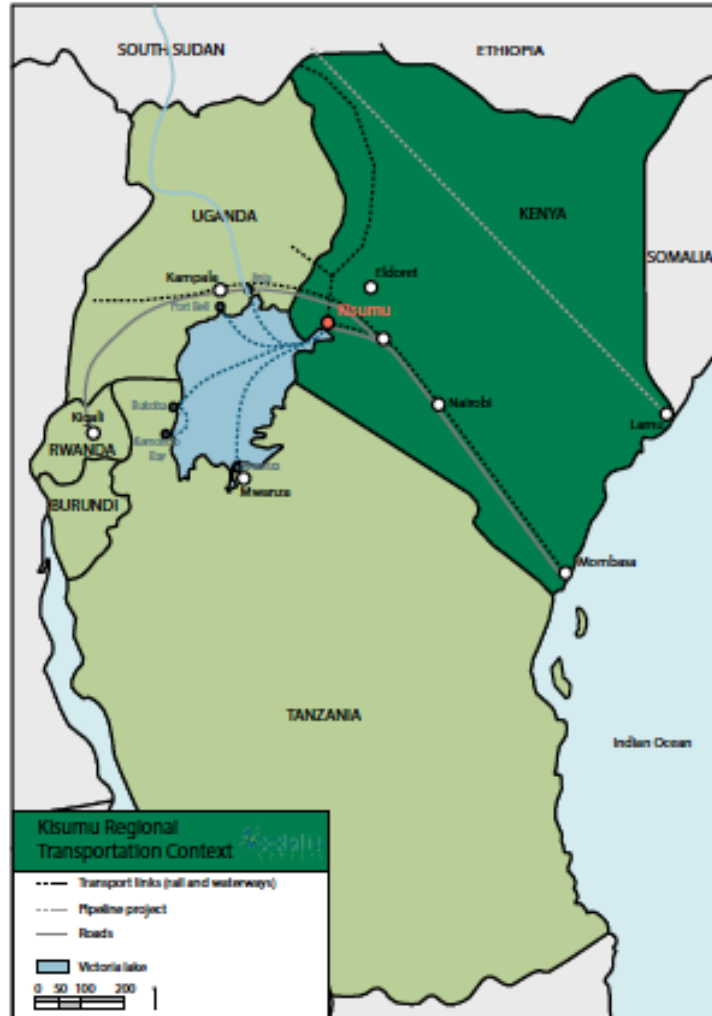


Figure 1. Kisumu in regional context.

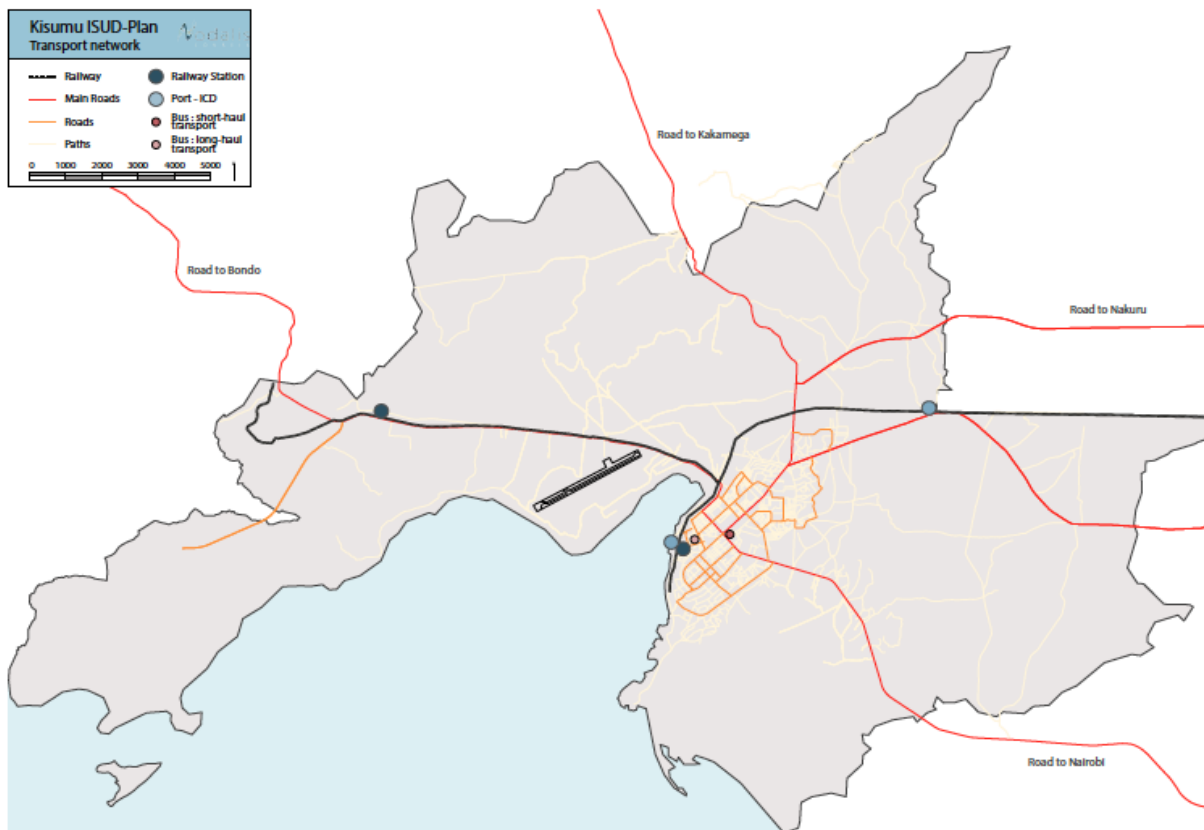
analyzing textual material to create an audit trail between the original material and the final conclusions (Dymitrow and Brauer, 2017). They ensured familiarization with the data by the Key Informants through round table discussions. The authors then used the TOD as a framework for further discussion and assessment. Data were coded based on the identified thematic areas relating to TOP principles and placed in excel chart for ease of further assessment. These were 1) stations in accessible locations, 2) mixed-use, walkable development, 3) range of densities, 4) pedestrian connections, 5) public space and retail and cafe streets, 6) Reduced parking at station, 7) Enhance multi-modal connections, 8) comprehensive bikeway network and 9) station as catalyst for redevelopment.

Assessment and interpretation of the data were done to validate the conclusion that is drawn with regards to how the TOD principles are applied in Kisumu. It is used to organize and manage research by means of thematic summary, creating outputs which allows for analyzing data on a thematic basis. The method is most effective for analysis of primary data, such as in systematic reviews of published texts, where it can be used to test a concept or to develop it (Smith and Firth, 2011; Srivastava and Thomson, 2009; Ward et al., 2013). In order to present a comprehensive picture, the analyzed data material included scientific publications about

TOD and Kisumu, Acts of Parliaments and policy documents relating to Kisumu. Although subjective, the method allowed the authors to capture diversity around TOD in Kisumu. However, the methodology allowed for assessment of the relationship between the principles entailed in TOD and the planning implementation in Kisumu through an iteration process that involved the Key Informants.

### Kisumu city

Kisumu City, a typical medium sized African city and the third largest in Kenya, is located on the shores of Lake Victoria with a population of 567,963 (Government of Kenya, GoK, 2019). Kisumu was established in 1901 as a terminal of the railway from Mombasa to Uganda. It also has a port connecting lake ports in both Uganda and Tanzania (Figure 1). Kisumu is the leading commercial/trading, fishing, industrial, communication and administrative center in the Lake Victoria basin. It has grown as a transportation hub for Western Kenya. Linking, Kenya to the East African Countries via rail, road, water and air (Onyango and Agong, 2018). The City provides typical features that one finds in post-colonial African cities struggling to grow and develop in a competitive global environment.



**Figure 2.** Transport Network in Kisumu City  
Source: CGoK (2014).

However, the use of the automobile has influenced the expansion of the city quite substantially. Kisumu has gone through various planning regime starting with 1899 Framework map, a land-use map in 1900 providing impetus for growth and a Physical Plan prepared in 1984 that was never fully implemented. The elevation to a City Status in 2001 created an urgent need for a comprehensive plan that would ensure sustainable growth. The Kisumu Integrated Strategic Urban Development Plan (CGoK 2014) provided the basis for the latest plan, the Local Physical and Land Use Development Plan (LPLUDP 2020). Some of the key challenges the City is grappling with include transport, housing and related support infrastructure.

The growth of the City has created four distinct areas, the Urban Core made up of the 1) built up areas of the old city, 2) the Slum belt made up of informal settlement of Nyalenda, Manyatta, Nyamasaria and Bandani which form a belt around the urban core, 3) the Eastern Extension which is made up of a rapidly urbanization areas stretching to Ahero town, and 4) Northern/Western area that is basically rural in nature but slowly being developed as low-density residential suburbs. The development in each of these areas creates unique mosaic with regards to transit development and densities. The ISUD Plan and the LPLUDP envisions the City growth being driven by urban nodes connected through arterial roads with densified residential and commercial development (Figure 2).

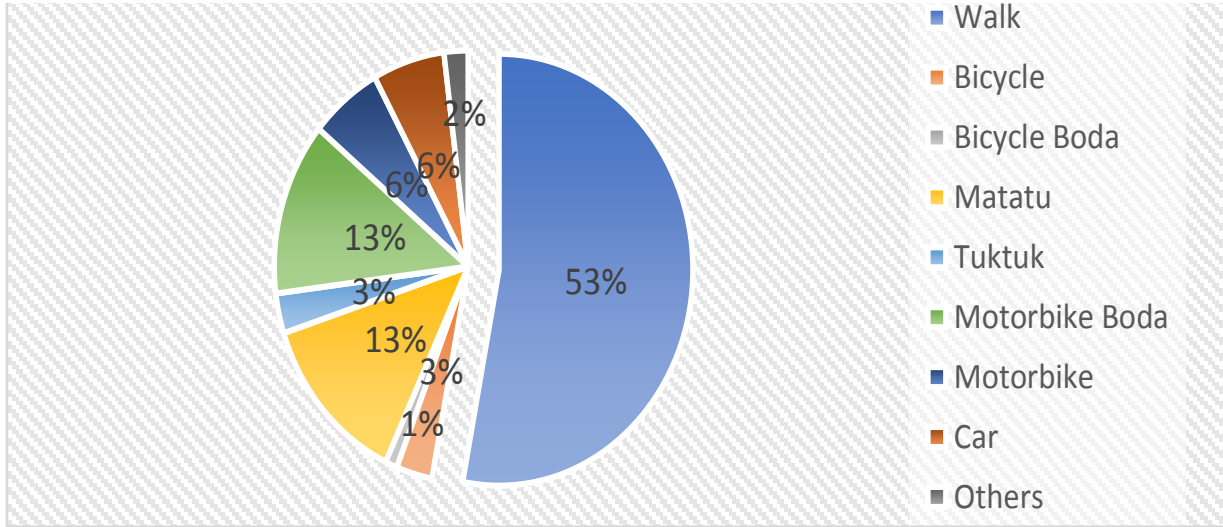
Kisumu is basically a City with over 50% of movement done by walk (Figure 3). "53% of daily trips in Kisumu are pedestrian trips. After walking, significant modes include matatus (13%), motorcycle boda-bodas (13%). Other modes include private motorcycles (6%),

car (6%), bicycle (3%), tuk-tuk (3%), and bicycle boda (1%)" (ITDP, 2020). It thus presents a perfect opportunity of integrating transit planning that is not automobile oriented.

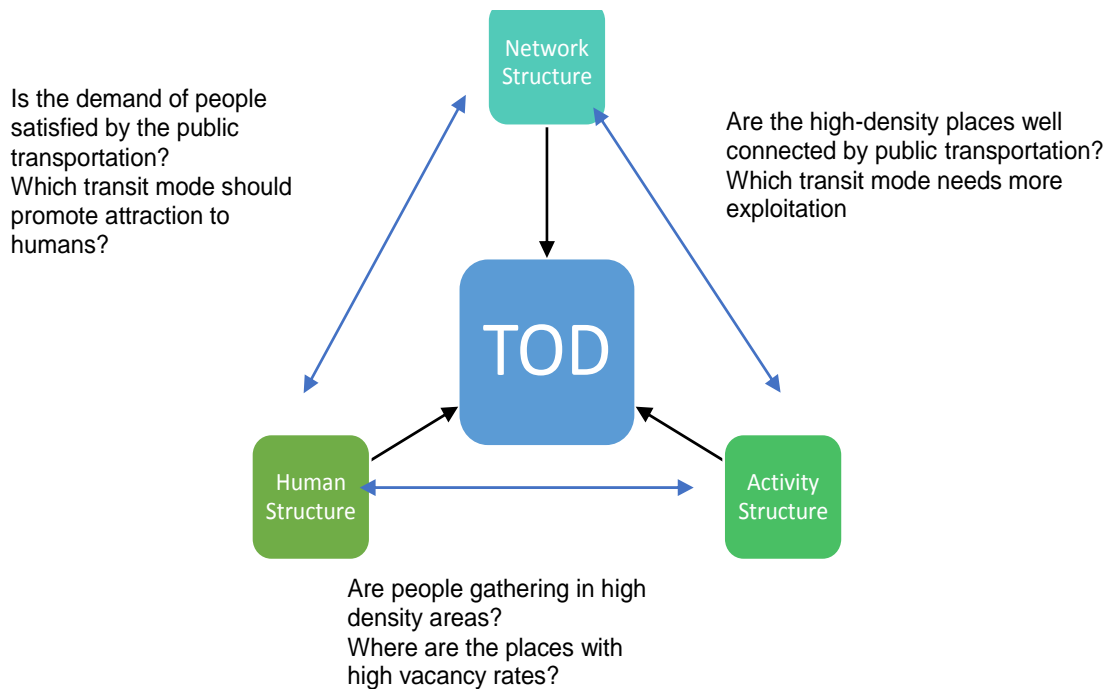
## RESULTS AND DISCUSSION

### Footprints of Tod in Kisumu

The growth and development of Kisumu has to be inexorably linked to transport development in the country. Kisumu was established as a railway terminus. The railway station formed the core of the town's development. The railway station was linked to the port with eventually RORO Ferries operating to connect the town and other destinations around the Lake Victoria (County Government of Kisumu-CGoK, 2018). The essence of planning is to ensure that urban growth is organized and developed with due consideration for convenience, efficiency, conservation, environmental quality and social equity (Dambeebo and Jalloh, 2018). Despite this, it is pertinent that there are many challenges to consider when planning a city which is currently developed. The challenges concern issues such as governance, social justice and the right to the city,



**Figure 3.** Modal split. Source: ITDP 2020).



**Figure 4.** Network-activity-human model. Source: Zhang et al. (2019).

accessibility and public transportation, aesthetics and liveability in the area but also the risk of gentrification. These challenges are best tackled during public participation forums whereby all stakeholders are brought on board thus the need for community participation. Figure 4 shows the relationship between activities,

human structure and network structure which enhances TOD.

TOD is a planning strategy in Kisumu that is not deliberately applied, but enables a future that is more sustainable and where the car is not the main means of transportation. There is also a focus of increasing the



**Plate 1.** Improvement of pedestrian walks and cycle paths in Kisumu CBD.

accessibility to basic services such as schools, health care, common spaces and leisure time activity. Through this, it is possible to develop an innovative, human and sustainable Kisumu city, creating possibilities to use the city as a test bed for innovation for sustainability. The challenge is how to go about planning a sustainable city (Ngetich et al., 2014). The transportation network is the framework of the city and this includes the public transportation system. Each component of the network comprises of lines and nodes (Taylor, 2017). These structures result in multiple land-use patterns creating the base for TOD.

Careful management and modification of the natural environment into built environment is fundamental to improving the quality of life for residents in Kisumu (Owino et al., 2017). This can only be successful if it is integrated with transport planning. Efficient transport and easy access to jobs, shopping, education, and leisure facilities is a path to a strong, prosperous, and equitable economy. This can be achieved by actively shaping the pattern of the urban growth around transport with a focus on sustainable access. This calls for the need to influence the location, density, design, and mix of land uses to bring jobs, housing, and services closer and make it safer and easier to walk, cycle, and use public transport (ITDP, 2020).

### **Tod development strategy**

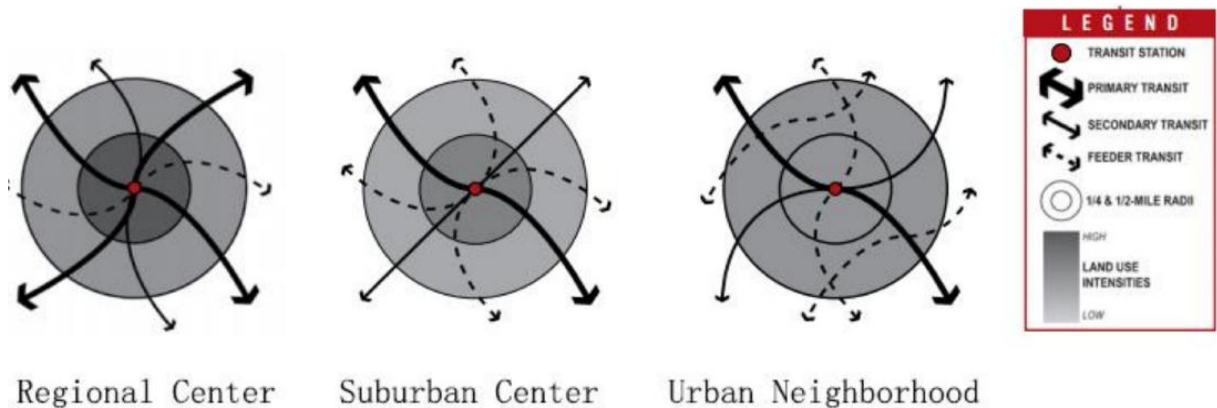
The use of Chan et al. (2016) principles to assess TOD in Kisumu provides an opportunity for a standardized approach to assessing TOD approach to structure and planning in the city. It must be pointed out that in the

planning processes there is no deliberate philosophical grounding based on TOD but rather the use of the principles in such processes.

### ***The railway and bus terminals***

The first principles look at *the* railway stations and bus terminals as locations with highest ridership potential and development opportunities. The physical environment and quality of life has deteriorated as a result of the widening gaps between supply and demand for infrastructure in transportation thus interfering with the positive aspects of urbanization (Owino et al., 2017). Kisumu has a central bus station and a railway station which has not been operational for over two decades.

Transportation is a vital land use activity which transforms the natural and built environment. Due to transportation, rural communities neighbouring the City have transformed into urban neighbourhoods which grow as unplanned and linear in form. Such urban areas face a number of planning challenges such as inaccessibility and poor development control (Jhawar et al., 2013). Uncontrolled development results in mismanagement of resources leading to substandard living environment (Jhawar et al., 2013; UN-HABITAT, 2014). Transport planners and urban designers have endeavored to create car-oriented communities which are more transit friendly by using physical design features. TOD as a concept tries to enhance movement by discouraging reliance on the automobile and encouraging use of alternate modes of transportation such as transit, walking, and biking. A number of streets in Kisumu are being developed to make them pedestrian and cyclist friendly (Plate 1). With



**Figure 5.** Transit Oriented Development Land-use patterns.  
Source: Tong et al. (2018).

the advent of new technologies, architects, planners, engineers and builders have been able to come up with environmentally friendly urban designs that offers better living standard. The designs conform to the planning standards and regulations (GoK, 2007, 1998, 1968).

Revamping of the 220 km long meter-gauge railway from Nakuru town, which had been neglected for over 25 years will help revive economic activities along the rail route. It is going to open various business opportunities. The rehabilitation of the meter gauge railway is being undertaken by the National Youth Service, Kenya Defense Forces in partnership with Kenya Railways Corporation (Ndambuki, 2020). The rehabilitation is an effort towards shifting some transport from the road to rail which is cheaper and enhances sustainable urban development. The success being witnessed today can be attributed to President Uhuru Kenyatta's keen interest in seeing to it that the cost of production is brought down drastically to ensure that the pillars of the Big 4 Agenda legacy are realized. The rehabilitation involves revitalization of the previously abandoned and dilapidated railway network across the country. This rehabilitation will herald the reestablishment of the missing link in the business and agriculture supply chain that faced a myriad of problems when the railway services collapsed in the eighties and the subsequent folding up of the Rift Valley Railways concession six years ago.

The Nakuru-Kisumu railway is very important to the newly-rehabilitated Sh3 billion Kisumu port which requires cargo to make it viable. Locals have been concerned that the Sh3 billion port risks being a white elephant project should the route remain neglected. The railway line once complete will provide both cargo and passenger travel services. As part of the TOD development the steamer MV Uhuru was rehabilitated by Kenya Navy at about Sh200 million and is now plying the routes from Kisumu to Uganda transporting mainly petroleum to Port Belt and Jinja. The development will further stimulate cross border commercial activities.

### **Public transit and densification**

The second principle addresses a designated 1/2 mile radius around station which supports higher density, mixed-use development that encourages walking. Such development provides connectivity to the public transport. Public transport in Kisumu City is managed by the private sector. This is a combination of different vehicles running on the city roads. They include the 16 seater shared taxis (Matatus), the three wheeler Tuk-Tuks, Motorbikes and bicycles (Onyango and Agong, 2018). The growth of public transport has enabled Kisumu to grow from a compact walking town to see the emergence of suburbia. According to Tong et al. (2018), transportation planning has led to the transformation of TOD (Figure 5) shows the transit oriented development land-use patterns. Figure 6 shows the integrating slum into the city through transit planning.

This is mainly noticed where major roads exist. The Nairobi, Kakamega and Busia highways demonstrate this concept well with the city expanding along these corridors which also act as the trunks for the public transport. Most new urban homebuyers prefer owning houses in the suburbs. Their preference to live in the suburbs poses challenges to public facilities providers who are forced to extend services farther from the urban core. The import is urban sprawl. The most defining characteristic of sprawl being low-density development spread out over large areas of land (Peirce, 2006). Planners of Kisumu City have tried to ensure that this sprawl effect is contained through densification. For approval of development to be granted, one of the conditions is that the housing development must be of a minimum four floors (CGoK 2020). Public transport corridors are developed to stimulate the densification process. The City has identified Kiboswa, Nyamasaria and Otonglo as key nodes where transport termini will be developed for long-haul public transport. This process allows for reduction of vehicular movement to the current bus-terminal in the



**Figure 6.** Integrating the Slum into the City through transit planning.  
Source: LPLUDP (2020).

heart of the city.

### **Fair, green and accessible**

In the last decade Kisumu has undertaken a number of planning interventions designed to make the city a place for all its citizens (fair), a place that enhances the natural environment in the city (green) and linked well through a transit-oriented planning that maximizes use of land (accessible). The third principle of *Creating range of densities with highest at station and getting less dense in the residential neighborhoods* has been well captured by the concept of fair, green and accessible (Simon, 2016). In order to catch up to the high speed of urban development, it is necessary to build a compact, balanced, and sustainable city through TOD. It is of great significance to analyse the relation and interaction of different urban elements and their comprehensive impact on urban structure (Zhang et al., 2019).

TOD aims to ensure that the city is made compact. Densified or compact liveable urban neighborhoods attract more people and business capitals. Planning and developing such neighborhoods becomes critical in reducing urban sprawl and protecting the environment.

The concept of compact neighborhood has included adopting redevelopment strategies and zoning policies that channel housing and job growth into urban centers and neighborhood business districts, to create compact, walkable, and bike- and transit-friendly hubs. The County Government is implementing new zoning regulations that encourage mixed development (CGoK, 2020). This includes strategies for better access for peri-urban unplanned settlements of Nyalenda, Manyatta and Nyamasaria. The Mixed-use development that allows for more than one type of use in a building or set of buildings is also encouraged in Kisumu (Plate 2). In planning terms, this can mean some combination of residential, commercial, industrial, office, institutional, or other land-uses (Schwanke, 2016). This is a strategy that reduces automobile dependency due to policies of exclusive zoning. One finds this quite common in the high-rise residential areas with commercial/light industry locations on the ground and first floors and residential areas occupying the upper floors. On the other hand, we find that buildings fronting the main roads also tend to have commercial/light industrial activities on the ground floor.

One of the Big 4 Agenda is affordable housing (GoK, 2020). The aim of affordable housing is to encourage more people to live within the city. Lack of affordable





**Plate 2.** Mini-Buses (Matatus) Tuk-tuks and Motorcycles collecting passengers along city streets.



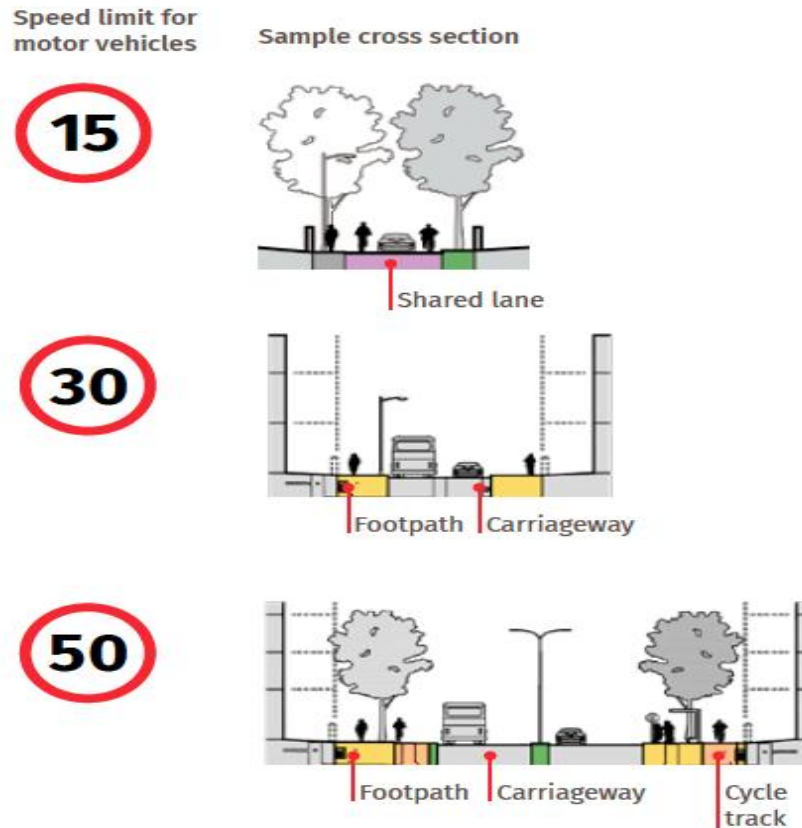
**Plate 3.** Redevelopment of slum areas of Nyalenda into mixed-use high density development.

housing is considered to negatively impact on a community’s overall health leading to low productivity. For example, lack of affordable housing can make it more difficult to attract low-cost labor, and increase transportation costs as workers travel longer distances (Pollard and Stanley, 2007). The private sector has been at the forefront of development of new housing as evidenced in (Plate 3). The County is providing improved infrastructure to encourage investors to begin construction of housing within the city.

***Pedestrian and bicycle access***

The principle of having a station site for easy pedestrian

connections to surrounding development is well demonstrated by the Central Bus station in Kisumu. As a whole, better transport and communication will negate compact cities and lead to the dispersal of homes and workplaces as it becomes more and more possible to take the activity to human being rather than the human being to the activity. Those with the resources to do so will increasingly seek the space and solitude of low density housing where dependence on personal transport is accepted and made easy (Peirce, 2006). The only constraint will be the need to offer a range of job opportunities to members of the family, and sufficient access to educational facilities. As such, the nature of employment will be transformed by the future use of automation and by other factors. Public transport thus



**Figure 7.** Design of road reserves.  
Source: ITDP (2019).

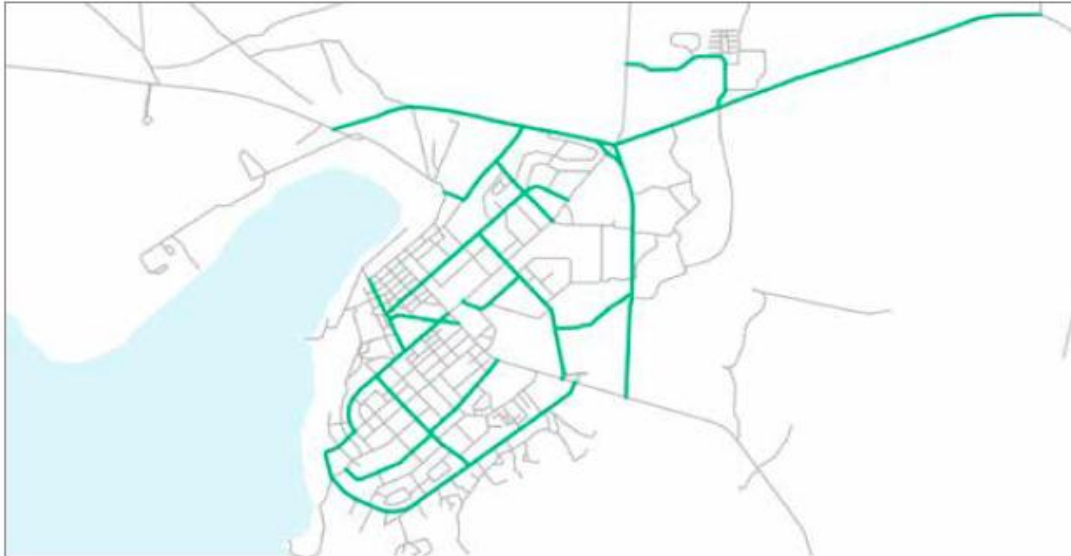
becomes critical in enhancing opportunities for all the city residents. The improvement of road infrastructure in the city is geared towards making all areas accessible by different means of transport while maintaining a green environment through mixed development. The design of the road reserve has been identified as a tool to enhance safe transit development (Figure 7) and a cycling network plan for Kisumu (Figure 8).

The principle of incorporating bikeshare, a comprehensive bikeway network, and ride-in bike parking areas is being developed in the urban core of Kisumu. The key element of the TOD strategy in Kisumu is to beautify streets, make them convenient, and safe for pedestrians and cyclists. Biking and walking instead of driving reduces greenhouse gas emissions, is economically viable, and ensures that the citizens remain healthy (Achola, 2020). Bhatta (2010), points that the goal of transportation is to transfer maximum possible people or goods within the shortest possible time. Mitullah et al. (2017), note that bicycles violate this basic assumption of transportation. Realising that bicycles are preferred for shorter trips; and a separate bicycle lane serve this purpose by reducing traffic congestion on the main streets and thereby pollution Kisumu City is developing a network of cycle paths and pedestrian

walkways in the city core. The retrofitting of city streets is providing cycle and pedestrian lanes within the city and promoting the use of cycling and walking. However, for cycling and walking to be effective the emphasis on a compact city still prevails. Interviews with the City Manager and the County Director of planning indicate that the City has embarked on implementation of the Cycling Network Plan with active engagement of the City Management with support of the County Government.

### ***Managing parking***

The other principle addresses parking at station site with direct pedestrian flow along retail streets. Cities have realized the significant impact of parking on urban land use, transport systems, traffic patterns, pedestrian access, and urban form (Biswas et al., 2017). Previously, cities focused on parking as a supply issue, making efforts to provide more parking to accommodate “projected” demand. Cities now realise that appropriate parking charges can act as a lever to discourage the use of personal motor vehicles and ensure that personal motor vehicle users compensate the city for occupying valuable street space. Kisumu, like many African cities is



**Figure 8.** A Cycling Network Plan for Kisumu.  
Source: ITDP (2020).

introducing time-based charges for on-street parking, introducing moratoriums on government-subsidized parking, and setting maximum parking standards in new private developments (De Cerreño, 2004). The goal of these parking management techniques is to control the supply of parking, especially in areas with good access to public transport, thereby encouraging a shift toward the use of public transport, walking, and cycling. The growing number of private cars in the Kisumu City has resulted in increasing demand for parking.

On-street parking within the Kisumu CBD is managed by the County Government, which charges a minimum fee of USD1 per slot per day along gazetted streets, with higher fees for larger vehicles (CGoK 2018). Parking revenues help fund the overall County budget and are allocated to various projects in the County, including both transport- and non-transport-related projects. To control parking in the CBD the City management is redesigning a few street to provide for parking while removing parking from the main street (Plate 4). Most streets outside the CBD are not gazetted and thus subject to haphazard parking. Drivers often park on pedestrian footpaths or shared NMT lanes, forcing pedestrians to walk in the carriageway. Kisumu still has a challenge in meeting this principle in the areas around the transport nodes. However, with improved pedestrian walkways, previously undesirable parking is now attracting users since they can walk comfortable to destinations in the mixed development sites.

#### ***Incorporating transit service into future development/redevelopment***

The next principle requires that Public plaza directly

fronts one or more sides of the station building. In Kisumu this was provided at the old railway station and the city public bus terminus has a large park that is used for public meetings. Around the bus terminal however are traders who want to take advantage of the pedestrians walking to the bus-park to the adjoining CBD. This also builds into the principle of Retail and cafe streets leading to stations along the main pedestrian connections.

These two principles; having a *public space* in front of the terminus on the one hand and *retail and cafes* on the route to the terminus, have been well integrated into development of shopping malls in the city with transit services having well developed pedestrian walkways allowing for access to these malls and transport services (CGoK 2020). The versatility of the Tuk-tuk allows it to integrate well into the role of an inter-modal transfer vehicle in such development. The city is yet to develop a comprehensive strategy for pick-up points for public service vehicles. We thus see a lot of conflict of users (Onyango and Agong, 2018).

#### ***Adapting transit services to suburbia***

The principle of Multi-modal connections, which make transfers easy, direct, and comfortable, is important in a compact city. The public road transport system in Kisumu City is dominated by the 14-seater matatu, the motorcycles and the tricycles (Tuk-tuk). Unfortunately, they are parked haphazardly thus creating traffic congestion with very limited access space for pedestrians and cyclists including those on bicycles and providing for a smooth multi-modal connection and easy transfer (Achola, 2020). The anticipated renewals of operations of the railway and the Kisumu International Airport have taken cognisance



**Plate 4.** Retrofitted roads in the city.

of the need to provide for termini for the Matatus and taxis. This has potential of improving multi-modality and access to suburbia. However, the current operations of the low volume vehicles in public transport are still not a sustainable public transport system. Dar-es-Salaam in Tanzania for example has a Bus Rapid Transit (BRT) system (ITDP, 2018). The large buses have their own reserved lanes with shaded boarding and alighting terminus (Plate 5) and good connections to matatus for the last mile connection and have thus improved access to the city suburb.

In many African cities, the use of public transport is in most cases associated with poverty stricken people and equated to lower living standards whereas car ownership is often related to better living standards (Sietchiping et al., 2012). This culture has persisted leading to the congestion on the existing transport corridors. Planning for a more sustainable transport system in cities is a question of how they are handling and changing cultures that are related to certain norms and living standards. Kisumu has adopted a public transport policy moulded on the Dar-es-salaam model which should see the city implementing a dynamic transport system (CGoK, ITDP and UN-Habitat 2020).

### ***Overcoming community resistance***

The final principle is using the station as a catalyst for major redevelopment and focalising the station in the city

design. A quick navigation of futuristic literature on TOD indicates some common predictions and a few contradictory ones. There is a general consensus about changes in transport and communication and their effects on employment and the spreading of towns; there is an agreement also about increasing social mobility and the extension of social networks, but guidance about the rate of change, the configuration of the expanded conurbations and the future of the city is not so clear. With the exception of some politicians and members of the public, few others have ventured any opinion about the future quality of the urban environment (and of urban life in general) in contrast to the many forthright statements about the quality of the countryside and the adequacy of resources (Hull, 2010). The forecasts upon which most stakeholders agreed in order to actualize TOD may be summarized as follows. Opportunities for inter-urban and, in most cities, intra urban transport are likely to improve. The major provision will be for the motor car but in the inner areas of the city, public transport will remain necessary and, in some cases, very significant. The availability of suitable energy sources for personal and public transport may be a determining factor in future policies. People's opportunities for travel will be strongly conditioned, as now, by their journeys to work will be made, at least in part, by bus or train. There will also be improvements in other facilities for communication, particularly those which will aid the county government, industry, commerce, education and research by speeding up the collection, transfer and processing of complex



**Plate 5.** Retrofitting streets to provide for parking within walking distance to transport nodes.

information, irrespective of the distances involved. To some extent, such technological developments may restrain the otherwise increasing demand for conventional personal transport and the movement of goods.

## Conclusion

This paper has highlighted the application of TOD principles in planning and spatial development within the last decade. Interviews with Key Informants who are players in this process have helped highlight the TOD principles used. This is against a backdrop of a number of planning documents being used to transform the city of Kisumu. The assessment of the planning regimes and legislation that is being implemented in Kisumu in the last five years has seen an appreciative adherence to TOD principles. It must be emphasized that planning in Kisumu is not deliberately anchored on TOD but rather applies the principles without stating that it is using TOD. The authors note that there are a number of advantages which have been achieved by TOD oriented planning. These benefits trickle down to the entire city and the transport system in general. TOD ensures that the city is transformed into a pedestrian friendly environment which takes cognizance of all the modes of transport resulting into a balanced transportation system thus reducing the per capita cost of infrastructure development, hence sustainable. The identification of development of

commercial nodes has allowed for decongestion of the CBD while attracting investment near residential neighborhoods with mixed development, a very practical approach in TOD planning.

The challenges noted in TOD include financial risk to developers since there are no guarantees that they will reap from adhering to requirements of TOD. This is tied to high initial public investment costs in the infrastructure, unsupportive regulatory framework developed with a focus on automobile use and community resistance to densification and focus on public transport especially in the affluent residential areas. The City administration and County Government have therefore focused on putting up and improving road infrastructure, water, sanitation and street lighting to attract investors within the urban core. To enhance returns on this investment there is therefore need for a continuous and concerted education and awareness creation by champions within the city management on the benefits of TOD in the long term. It would be practical if the City Management now deliberately uses TOD as a strategy for the urban transformation that it has engaged in to enable Kisumu demonstrate the capacity for sustainable development of medium cities in Africa.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests

## REFERENCES

- Achola MJ (2020). Transport policies and interventions and the implications of motorized road transport on carbon dioxide emissions. Jaramogi Oginga Odinga University of Science and Technology PhD Thesis (Unpublished).
- Bhatta B (2010). Analysis of urban growth and sprawl from remote sensing data. Springer Science & Business Media.
- Biswas S, Chandra S, Ghosh I (2017). Effects of on-street parking in urban context: A critical review. *Transportation in Developing Economies* 3(1):10.
- Caves RW (2004). *Encyclopedia of the city*. Routledge.
- Chan NW, Nakamura A, Imura H (2016). Conclusion: Towards Sustainable Cities. Available at: [https://www.researchgate.net/publication/308984523\\_chapter\\_43\\_conclusion\\_towards\\_sustainable\\_cities](https://www.researchgate.net/publication/308984523_chapter_43_conclusion_towards_sustainable_cities)
- County Government of Kisumu (CGoK) (2014). Kisumu Integrated Strategic Urban Development Plan. Kisumu.
- County Government of Kisumu (CGoK) (2018). Kisumu County budget for 2017/2018.
- County Government of Kisumu (CGoK) (2020). Kisumu Sustainable Mobility Plan.
- Dambeebo D, Jalloh C (2018). Sustainable urban development and land use management: Wa Municipality in perspective, Ghana. *Journal of Sustainable Development* 11(5):235.
- De Cerreño AL (2004). Dynamics of on-street parking in large central cities. *Transportation Research Record* 1898(1):130-137.
- Dittmar H, Ohland G (2012). The new transit town: Best practices in transit-oriented development. Island Press.
- Dymitow M, Brauer R (2017). Performing rurality. But who? *Bulletin of Geography. Socio-Economic Series* 38(38):27-45.
- Goodwill J, Hendricks SJ (2002). Building transit oriented development in established communities. Tampa: National Center for Transit Research, Center for Urban Transportation Research, University of South Florida. Available at: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.357.3021&rep=rep1&type=pdf>
- Government of Kenya (GOK) (1968). Building code. Nairobi, Government of Printer.
- Government of Kenya (GOK) (1998). Physical planning building and development control rules. Nairobi, Government Printer.
- Government of Kenya (GOK) (2007). Physical planning handbook. Nairobi, Ministry of Lands and Settlement.
- Government of Kenya (GOK) (2020). Implementation status of the Big Four Agenda, Monitoring and Evaluation Directorate, State Department of Planning.
- Government of Kenya (GOK) (2019). Urban Areas and Cities Act (UACA) of 2019. Government Printer Nairobi, Kenya.
- Harrison P, Rubin M, Appelbaum A, Dittgen R (2019). Corridors of freedom: Analyzing Johannesburg's ambitious inclusionary transit-oriented development. *Journal of Planning Education and Research* 39(4):456-468.
- Hull A (2010). *Transport matters: integrated approaches to planning city-regions*. Routledge.
- Institute for Transport and Development Policy (ITDP) (2019). Street design manual for urban areas in Kenya. Ministry Of Transport, Infrastructure, Housing, Urban Development, And Public Works, Nairobi.
- Institute for Transport and Development Policy (ITDP) (2020). Kisumu sustainable mobility plan, CGoK, ITDP and UN-Habitat.
- Institute for Transport and Development Policy (ITDP) (2018). Sustainable transport: Dar es Salaam leads a breakthrough for African cities, 29: 2018, New York, NY 10003.
- Jhawar M, Tyagi N, Dasgupta V (2013). Urban planning using remote sensing. *International Journal of Innovative Research in Science, Engineering and Technology* 1(1):42-57.
- Knowles RD (2019). *Transit Oriented Development and sustainable cities*, Edward Elgar Publishing.
- Li G, Weng G (2007). Measuring the quality of life in City of Indianapolis by intergradation of remote sensing and census Data. *International Journal of Remote Sensing* 28(2):249-267.
- Mitullah WV, Vanderschuren M, Khayesi M (2017). Non-motorized transport integration into urban transport planning in Africa. Taylor & Francis.
- Ndambuki K (2020). Railway transport sector back on track after decades of neglect. Available at: <https://www.standardmedia.co.ke/opinion/article/2001382967/railway-transport-sector-back-on-track-after-decades-of-neglect>
- Ngetich JK, Opata GP, Mulongo LS (2014). A study on the effectiveness of urban development control instruments and practices in Eldoret Municipality, Kenya. *Journal of Emerging Trends in Engineering and Applied Sciences* 5(2):83-91.
- Onyango GM, Agong SG (2018). Governance of Cities in Devolved Government in Kenya: Experiences from Kisumu. *Management Research and Practice* 10(2):78-91.
- Owino FO, Hayombe PO, Agong' SG (2017). The effect of diminishing urban green spaces on environmental quality in Kisumu City. *International Journal of Geography and Regional Planning Research* 2(1):10-23.
- Peirce N (2006). *Urban sprawl: a comprehensive reference guide*. Greenwood Publishing Group.
- Pollard T, Stanley F (2007). Connections and choices: Affordable housing and smart growth in the greater Richmond area.
- Schwanke D (2016). Mixed-Use Development: Nine Case Studies of Complex Projects. Urban Land Institute, ASIN: B01F4B4500. Available at: <https://www.perlego.com/book/1439458/mixed-use-development-nine-case-studies-of-complex-projects-pdf>
- Simon D (2016). Rethinking sustainable cities: Accessible, green and fair. Policy Press P 152.
- Smith J, Firth J (2011). Qualitative data analysis: the framework approach. *Nurse Researcher* 18(2):52-62.
- Srivastava A, Thomson SB (2009). Framework analysis: A qualitative methodology for applied policy research. *Journal of Administration and Governance* 4(2):72-79.
- Taylor MAP (2017). *Vulnerability analysis for transportation networks*, Elsevier Inc.
- Thomas R, Pojani D, Lenferink S, Bertolini L, Stead D, van der Krabben E (2018). Is transit-oriented development (TOD) an internationally transferable policy concept?, *Regional Studies* 52(9):1201-1213.
- Tong X, Wang YE, Chan HW, Qingfeng Zhou Q (2018). Correlation between Transit-Oriented Development (TOD), Land use catchment areas, and Local environmental transformation. *Sustainability* 10:4622.
- UN-Habitat (2014). *The state of African cities 2014, Re-imagining sustainable urban transitions*. UN-HABITAT, Nairobi, Kenya.
- UN-Habitat and Institute for Transport and Development Policy (2018). *Streets for walking and cycling: Designing for safety, accessibility, and comfort in African cities*, UN-Habitat.
- United Nations (UN) (2017). *New Urban Agenda*. New York.
- Ward DJ, Furber C, Tierney S, Swallow V (2013). Using framework analysis in nursing research: A worked example. *Journal of Advanced Nursing* 69(11):2423-2431.
- Zhang Y, Song R, van Nes R, He S, Yin W (2019). Identifying urban structure based on Transit Oriented Development. *Sustainability* 11:7241.