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THE CITY CHALLENGES AND EXTERNAL AGENTS. METHODS, TOOLS AND BEST PRACTICES

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The cover image is a photo of the 1966 flood of the Arno in Florence (Italy).

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Transit oriented development: theory and implementation challenges in Ghana

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Abstract
Transit Oriented Development (TOD) encourages densification around transport nodes with a combination of work, educational facilities, commercial activities and other essential services. Implementing TOD in Ghana would, however, be faced with several challenges. The systematic review approach, which is based on published scholarly works was adopted. The paper aimed at exploring the significant characteristics, benefits, as well as the institutional and operational challenges of TOD in Accra. The paper identified the possible benefits of TOD in Accra to include a reduction in motorisation and congestion, promotion of walkability and other forms of non-motorised transport. It will also promote public transit ridership and improvement in the liveability of neighbourhoods. The challenges that would be associated with the implementation of TOD in Accra include the absence of a clear policy initiative of the concept in Ghanaian cities; inadequate budgetary support for strategic urban land use planning and development control; the existence of different ownership regimes within a sizeable stretch of land; and the existence of an ill-planned urban transportation system. Policy options suggested included a new housing policy that will encourage densification, mixed-income housing schemes with stronger government-private and sustainable financing schemes; and a planning regime that integrates transportation, land use and housing development.

Keywords
Ghana; Accra; Transit oriented development; Transportation; Corridor

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1. Background to the study

The Sustainable Development Goal 11 calls for sustainable, inclusive, safe and resilient human settlement. Strategies to achieve this include expanding public transport systems, improving upon accessibility and the development of sustainable human settlements. The New Urban Agenda also advocates for spatial development strategies that ensure accessible and well-connected, well-planned urban population densities, services and infrastructure, creation of inclusive and livable neighbourhoods, and controlling urban sprawl (United Nations, 2016).

Ghanaian cities, like others in sub-Saharan Africa (SSA), are facing a myriad of challenges that bother on congestion, pollution, and urban sprawl. In the Greater Accra region of Ghana, it has been estimated that between 1985 and 2014, the percentage share of urban land increased from 4.43 per cent to 14.46 per cent, representing an annual growth rate of 7.8 per cent (Osei et al., 2013). Several land use and spatial planning laws and legislative instruments have been introduced in the country to ensure sustainable urban development. These include the Local Governance Act 2016, Act 936 which defines local government structures of the country, Metropolitan/Municipal/District Assemblies (MMDAs) as planning authorities; Land use and Spatial Planning Act 2016, Act 925 which guides the preparation, implementation, enforcement, and monitoring of planning schemes; and the National Buildings Regulations 1996, LI 1630 which regulates the construction of new buildings and prescribes the procedure for the processing of building construction permits.

However, in the implementation of land use policies and laws, public regulatory agencies are faced with several challenges. This could partly be attributed to different regimes of land ownership in the country, insufficient resources for monitoring and enforcement of planning schemes, and the low level of political will to enforce planning regulations. In contemporary urban development thinking, there is emphasis on the need to curtail urban sprawl and traffic congestion. Suggested solutions include measures to help reduce the need to travel, the efficient use of non-motorised forms of transportation, and the promotion of the complete streets concept. This has led to the overarching need for Transit Oriented Development (TOD).

Transit Oriented Development focuses on the total development of transit stations and their broader precinct surroundings of neighbourhoods located within 10-minute walk from the stations. It promotes sustainable modes of transportation, such as public transit and non-motorised forms of transportation. It is a useful travel demand management tool as it assists in reducing the need to travel for services outside the TOD neighbourhood (The State of Queensland, 2010). Mirmoghtadaeez (2016) asserts that TOD could be an avenue to address urban transportation problems in countries faced with the challenge of increasing motorisation and vehicular pollution. In this regard, TOD should be well planned to ensure a reduction in the use of automobiles and hence traffic congestion. It should promote compact and increased density of people and mixed-use development around transit stations. This will help encourage walking and other non-motorised forms of transportation.

Concerning the importance of population densities, Masoumi and Shaygan (2016) in their study of densities within the pedestrian sheds around metro stations in Teheran, recognised the importance of densities in TOD planning.

It has also been argued that Transit Oriented Development could ensure equitable access to resources of the city by connecting underprivileged communities to more endowed communities with more resources and job opportunities. This calls for an examination of the prospects of using Transit Oriented Development as a strategy to help solve urban congestion, pollution and sprawl in Ghana.

The next section of the paper explains the concept of TOD with the authors proposing a conceptual framework for it. The paper delves into the argument for TOD in Ghana and the likely challenges that would be associated with its implementation. It concludes with policy recommendations for consideration.

1.2 Methodology

The systematic review approach, which is based on published scholarly works was adopted. This was necessitated by the broad nature of the study, which required gathering enough information and evidence about TOD and its application in the Ghanaian context. The systematic review approach as indicated by Mensah et al. (2016) and Victor (2008) deals with using a straightforward approach to search, appraise and synthesise available literature to satisfy the aim of a given topic under study. It often uses information from books, journals, conference papers, reports, among others. The use of systematic review allowed a wide range of published works (both theoretical and empirical) to be synthesised to answer a specific research question(s). It helps provide more accurate and reliable conclusions because the secondary materials or information utilised had already been tested in other studies (Victor, 2008; Akobeng, 2005). This helps to minimise bias and makes this approach more robust and comprehensive. The following steps or processes as prescribed by Perera and Mensah (2019), Bryman (2012) and Uman (2011), to make the systematic review approach more transparent and reproducible were followed in this study.

1. Defining the scope and purpose of the review: This stage focused on defining the scope and purpose of the review to make the review well-structured and get relevant secondary materials related to the study. In doing this, some questions were posed as follows: What does TOD entail? And how has it been implemented elsewhere? To further narrow the scope to focus on the study area, specifically, the following sub-questions were asked: How can TOD be implemented in Accra, Ghana? What challenges will the implementation of TOD face in Accra, Ghana?;
2. Identifying relevant publications on the topic under study: At this stage, several databases were searched. These included Scopus, Thomson Reuters, Science Direct, Social Science Research Network, Google Scholar, Directory of Open Access Journals (DOAJ), JSTOR, Ingenta Connect, and Web of Science. In addition to this, some search engines such as Google and Yahoo were used to search for more data. These efforts were further supplemented with the manual search for additional hard copy materials from the University of Cape Coast library. In all, over 200 publications were found at this stage;
3. Appraising the publications according to the purpose of the paper: The quality and credibility of the reviewed publication were assessed about the purpose of the study. In doing this Bowler et al. (2010) quality assessment criteria for publications were utilised. Much emphasis was given to publications from accredited institutions and peer-reviewed works. This reduced the number of publications to 103 for final inclusion in the study;
4. Synthesising the results: At this final stage, rigorous content analyses were conducted on the finally selected publications. This was done to tease out essential information on the topic under study and also to answer the research questions posed at the first stage. The findings from these analyses were afterwards organised and used to discuss various sections of this paper.

2. Theoretical and conceptual overview

2.1 Transit oriented development concept

The California Department of Transportation (2002) defines transit oriented development as "moderate-to-higher density development located within an easy walk (i.e. approximately half a mile) of a major transit stop, generally with a mix residential, employment and shopping opportunities designed for pedestrians without excluding auto" (p.3). Transit Oriented Development leads to the creation of an area where residents live very close (a walking distance) to a transit station that offers many services. It thus tends to reduce the number of trips, provides accessibility to job centres and other destinations, encourages non-motorised forms of

transportation and creates a pro-pedestrian neighborhood with increased transit ridership (State Highway Authority of Maryland, 2013; Cervero, 2008; Suzuki et al., 2009).

In his pioneering work on transit oriented development, Calthorpe (1993) argued for rethinking the American dream to include cities with neighbourhoods with mixed development, mixed-income, racial, different age cohorts, in effect inclusive neighbourhoods. The author argued for the introduction of transit oriented development to help address urban sprawl, promote non-motorised forms of transportation, make goods and services accessible in the community to help manage travel demand. Calthorpe introduced a model (Fig. 1) to help illustrate transit oriented development.

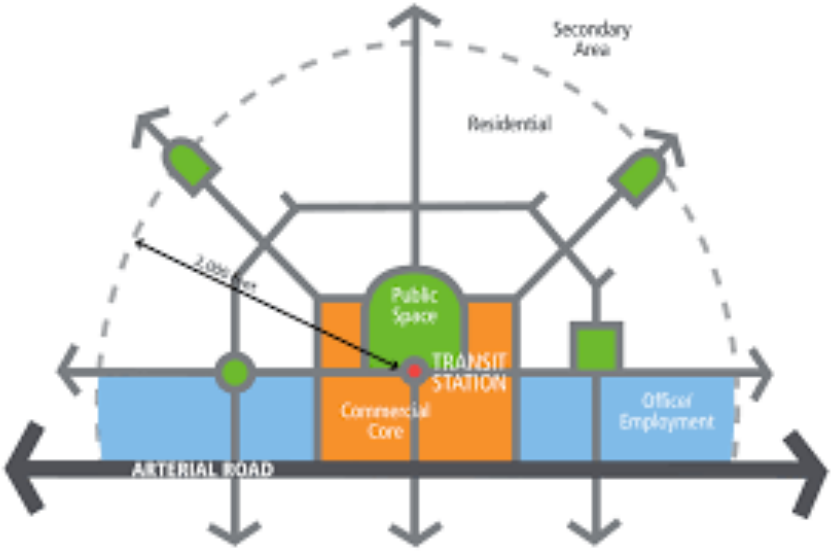


Fig.1 Transit Oriented Development design (Calthorpe, 1993)

Transit Oriented Development as a planning and design strategy aims at achieving compact, pedestrian and other forms of non-motorised transportation in a mixed-use neighbourhood that is well integrated with the transit stations. It survives on the basis that locating services, employment avenues, commercial and residential facilities around transit nodes encourages public transit ridership as well as the promotion of non-motorised transportation forms (The World Bank, 2017; Calthorpe, 2011; Institute for Transport and Development Policy, 2013). Centre for Transit Oriented Development in research concluded that the number of people in the United States who preferred living close to transit nodes has been increasing. The centre projected that by 2030, about a quarter of households would prefer to own or rent housing in higher-density zones near transit (LISA, 2009).

Centre for Transit Oriented Development (2009) advocates two dynamic steps that would assist in the creation of more livable transit oriented development systems. First is the proper co-ordination of transit and real estate development; and second is the need to pursue the goals of TOD beyond densification of estate development and, embracing conditions for livable neighbourhoods. Livability benefits outlined include employment opportunities, education and job training centres, affordable housing schemes for the working force and open spaces to facilitate recreation. In other words, there is an emphasis on enhancing the sustainability of the metropolis as a system.

Transit Oriented Development has been associated with the concept of "complete communities". A complete community is described as being endowed with opportunities for all residents, including quality housing, good educational facilities, commercial, healthcare and transportation as well as cultural oriented facilities. The community should also provide facilities and services that will make it children-friendly (The Centre for Transit Oriented Development, 2012). Transit Oriented Development, therefore, adopts the complete streets concept. Indeed, the North Carolina Department of Transportation (2012) explains that "Complete streets are designed

and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to move along safely and across a complete street (p.10)."

Transit Oriented Development planning may also require considering not only a single station but also understanding the entire chain of stations along a transportation corridor or regional chain of TOD places. A good appreciation of the real estate market, main employment points and travel patterns in the area under consideration will be critical. At the regional level, a successful TOD project would warrant coordinating the policy and programs at different segments of government and harmonisation of an existing growth, housing development and jobs creating and development plans. It would also require coordinating and negotiating with relevant stakeholders such as local government and land management authorities as well as transit agencies (Centre for Transit Oriented Development, 2007).

At the corridor level, a transit corridor is defined as "the walkable areas around all the stations along a transit line. Different transit technologies will define different areas of influence". Corridor planning can include region-wide analysis of the potential impact of transit and can lead to a projection of areas where real estate developers may be attracted. In situations where there are existing lines already, these areas could benefit from TOD, if it incorporates urban revitalisation. Again, the poor and the vulnerable would benefit if it makes the necessary housing provisions for residents who are already threatened with displacement as a result of fluctuations in the prices of real estate as dictated by market forces (The Centre for Transit Oriented Development, 2010a).

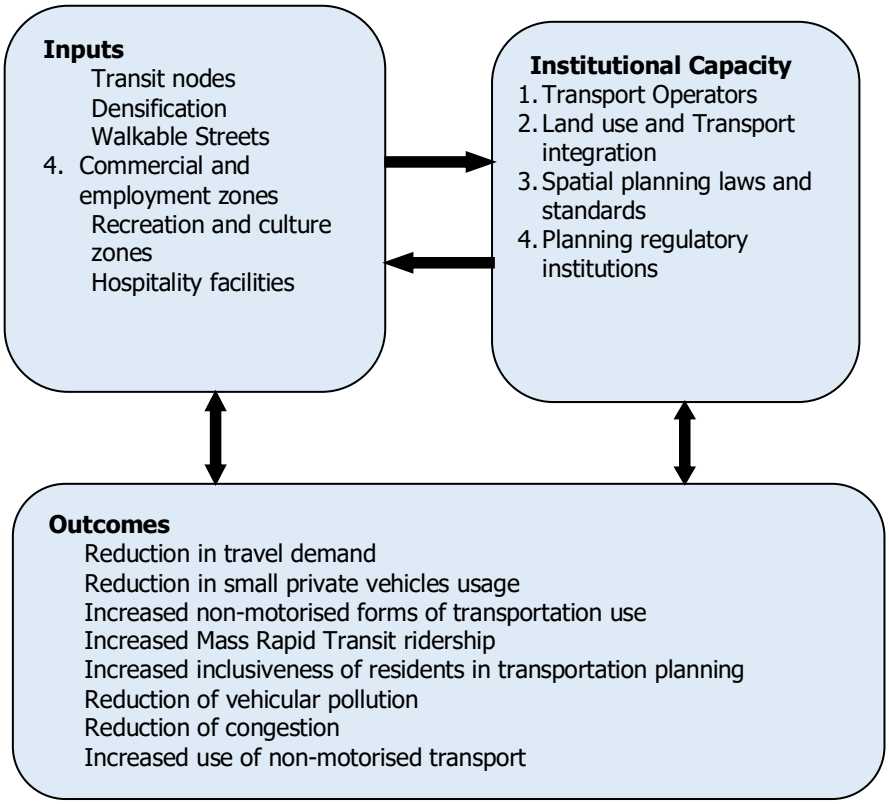


Fig.2 Framework for Transit Oriented Development

Transit Oriented Development planning promotes densification with a fair mix of human, job, and housing densities around significant transit stations outside the core of the city. This assists in the creation of polycentric centres, to complement the core, which is linked with transit to offset the one-way flow of traffic to the core during peak hours. (The World Bank, 2017).

There is also the micro area planning for Transit Oriented Development. Local Initiatives Support Corporation (2009) explains that station area plans are unique conceptual plans developed around a station. Although the

details of the plans would be station specific, the plans contain essential elements such as "zoning, design standards, parking requirements and information about transit access and bike and pedestrian circulation" (p.3).

A proposed conceptual framework has been suggested for Transit Oriented Development (Fig.2). The framework which operates on the systems thinking principles identifies several inputs that are very important for the development of TOD. Transit Oriented Development would require mixed-use development around transit nodes incorporating densification, commercial zones, recreation and cultural zones, walkable streets and tourism and hospitality facilities. There is the need for the requisite institutional capacity, which should include the right legal and regulatory framework, land use and transport integration and transport operators. The expected outcomes for the implementation of TOD should include a reduction in travel demand, reduction in small private vehicles usage, improved transit ridership and increased participation in transportation planning, among others.

2.2 TOD theory in practice

In Portland and Arlington in the United States, the planners followed a participatory approach to get community members to appreciate the need to focus on the type of city and region they prefer to live in rather than on the type of strategy. There was a focus on the advantages of densification and the benefits of making their respective cities more livable (The German Marshall Fund for the United States, 2013). The city of Portland achieved success in TOD by linking transportation and land use planning. It enabled the city to meet its goals on densification, compact development and commercial zones. The introduction of the Portland Streetcar assisted in the development of a transit oriented neighbourhood at the Pearl District of the city. Portland also exhibits an excellent example of private sector participation in the development of TOD. Partnership with Hoyt Street Properties assisted in the development of affordable dense housing facilities (Schematic Workshop Makers, 2009).

In China, Xu et al. (2017) explained that the objective of the introduction of TOD was not to curb low urban density and urban sprawl, as was the situation in the United States. The purpose of TOD in China was to help address the problems that were associated with high density by making public transit systems more efficient in such neighbourhoods. Lu et al. (2018) explained that there are some TOD new towns in the New Territories of Hong Kong with characteristics such as densification, pedestrian friendly neighbourhoods around transit stations and mixed-use. The authors, however, observed that individuals who lived close to the transit stations benefited more from walking than those living quite far away from the transit stations in the newly developed towns. One characteristic feature of TOD in Hong Kong's new territories is that adjoining land around TOD areas is predominantly rural.

The city of Bogota incorporated inclusive measures into transit oriented development planning by the introduction of Metrovivienda, an affordable housing scheme program, around transit stations. The Metrovivienda also improved access to social facilities such as education, health, green spaces and libraries. It assisted in providing affordable housing to low and middle-income families, reduced the cost of travelling as well as the need to travel (Suzuki et al., 2013).

Copenhagen used long term planning to shape urban development and growth with the use of the railway as the transport mode for transit oriented development. The construction of railway infrastructure along desired areas earmarked for urban growth triggered population growth and significant infrastructure along the railway corridors. This was combined with the creation of adequate public spaces that are pedestrian and community-friendly and bike routes (Suzuki et al., 2013).

The city of Denver, USA, made transit oriented development, more inclusive by addressing the challenges of low-income neighbourhoods. The city collaborated with the state authorities and philanthropic organisations in the creation of job avenues for low-income households. The city was able to get citizens participation

throughout the planning and implementation through open communication, commitment, and getting focused towards agreed goals (Living Cities and Institute for Sustainable Communities, 2011).

A careful analysis of the TOD examples given shows several characteristics that were common in all the cases. Transit Oriented Development promoted livability through increasing access to basic and commercial services, and a general pedestrian-friendly environment. There was also the introduction of affordable housing units in a mixed-use zoning environment with some level of densification. The participation of the private sector in the implementation of TOD was also evident. The importance of mass transportation in the implementation of TOD also came to bear with the introduction of intermodal and multimodal transport systems. In effect, all these factors served as travel demand management measures by helping to reduce the need to travel.

2.3 Accra: developing country city

Accra and Kumasi are the two major primate cities in Ghana. Although with an annual population growth rate of 2.2 per cent which was lower than the 5.5 per cent growth rate in Kumasi, Accra accounted for 16.6 per cent of the total urban population in Ghana (The World Bank, 2014). Accra city-region, as referred to in the National Spatial Development Framework has the highest net in-migration in the country, recording 153, 154 and 901,780 as net in-migration for 1984 and 2000 respectively. Data from the 2010 Population and Housing Census indicate that in-migration accounted for over one million of the total population of 4,010,054 (Ghana Statistical Service, 2014).

It is an essential economic hub in Ghana. The area accounts for 25 per cent of the nation's Gross Domestic Product and leads or is second concerning total non-primary sector economic activities (Government of Ghana, 2015a). The area is the most important destination of Foreign Direct Investment (FDI), accounting for 25 per cent of FDI (Government of Ghana, 2015b). All these factors have contributed to the attraction of population to Accra with its resultant land use and transportation challenges.

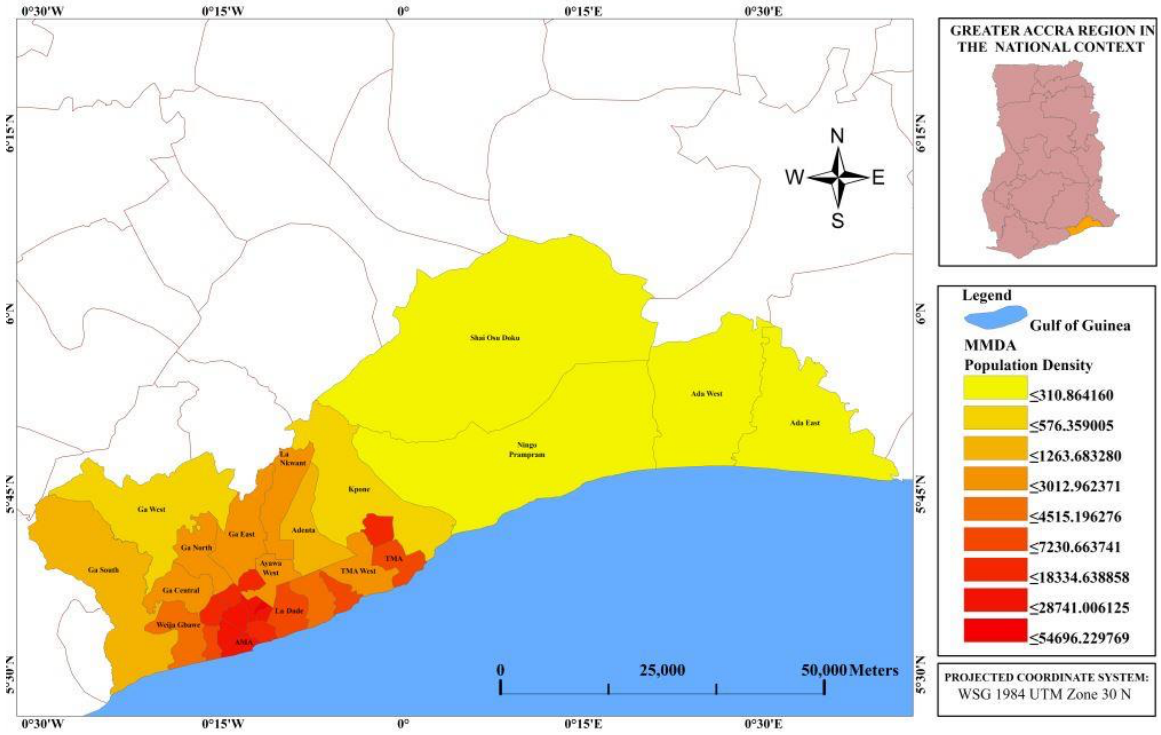


Fig.3 Greater Accra population density (GIS and Cartography Unit, Department of Geography and Regional Planning, UCC, 2020)

The influx of in-migrants has led to pressure on urban housing in the Greater Accra region. The resultant effect of the increasing population is inadequate affordable livable accommodation for the inhabitants of the city. About 8 per cent of the population dwell in uncompleted building structures, metal cargo containers and kiosks

(Ghana Statistical Service, 2014). The increasing population has also resulted in high population densities, especially in the inner-city areas. Figure 3 illustrates population density in the Greater Accra region. It could be seen that there are very high population densities of above 20,000 persons per square kilometre in the inner-city areas. Accra has a significant challenge concerning development monitoring and control. There are several unauthorised structures in waterways, reducing the ability of the city to deal with perennial flooding. Management of urban expansion has been a problem, with the city being allowed to grow "naturally" (Addae & Oppelt, 2019). The Ministry of Transport, Ghana, describes the urban expansion in Accra as characterised by sprawl of settlement with increasing population and vehicular ownership. Transit Oriented Development should also be recommended for Ghanaian cities because of the increasing rate of urban sprawl as identified by Osei et al. (2013), Ministry of Transport (2016) and Ministry of Local Government and Rural Development (2012). The figure below explains the extent of urban sprawl in Accra from 1999 to 2019 (Fig.4). The introduction of TOD will therefore be an avenue to reduce urban sprawl in Ghanaian cities. The Land cover maps (Fig.4) illustrates that the extend of urban sprawl has been increasing significantly between 2009 and 2019. Spatially, the city has been extending beyond the Greater Accra Region to other neighboring regions. This high rate of sprawl will lead a further increase in the extent of motorisation in the Accra city-region.

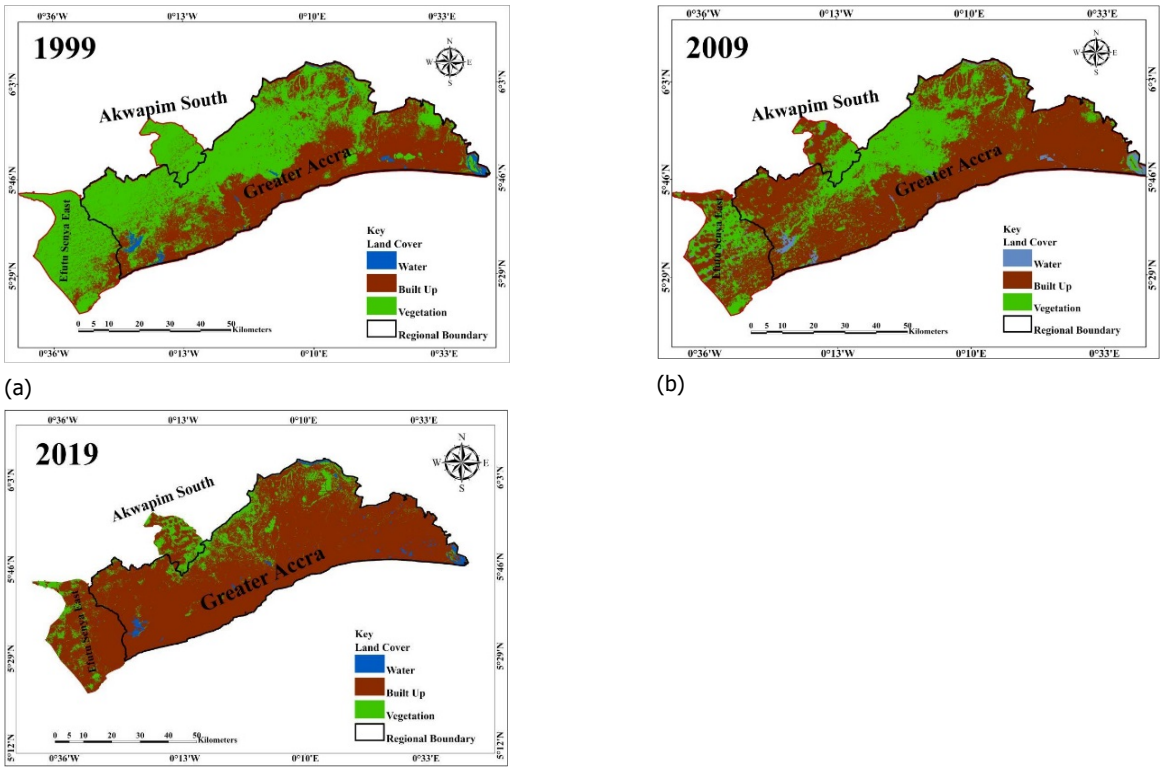


Fig.4 Land Cover Maps for 1999 (a), 2009hop (b) and 2019 (c) showing urban sprawl in Accra (GIS and Cartography Unit, Department of Geography and Regional Planning, UCC)

The high rate of sprawl would also imply that many people would have to stay at distances away from their workplaces and commute to work. Fig.5 illustrates the distances travelled by urban workers in Accra to work daily in 2007 and 2012 (Ghana Statistical Service, 2014). It could be seen that in 2007 more than 24 per cent journeyed for over 5 km to work and with over 18 per cent doing same for 2012.

A study by Agyemang (2019) indicates that commuters using their personal private small vehicles journey for several kilometres to work. Out of a sample of 430, it was realised that only 16.4 per cent journeyed for less than 10km to work. It surfaced that 30.70 per cent commuted for 10 to 14km; 22.79 per cent for 15 to 19 km; 10.00 per cent for 20 to 24 km; and 19.77 per cent journeying for over 25 km with their small private vehicles to work in inner Accra daily. This situation will contribute to traffic congestion, as shown in Fig.6.

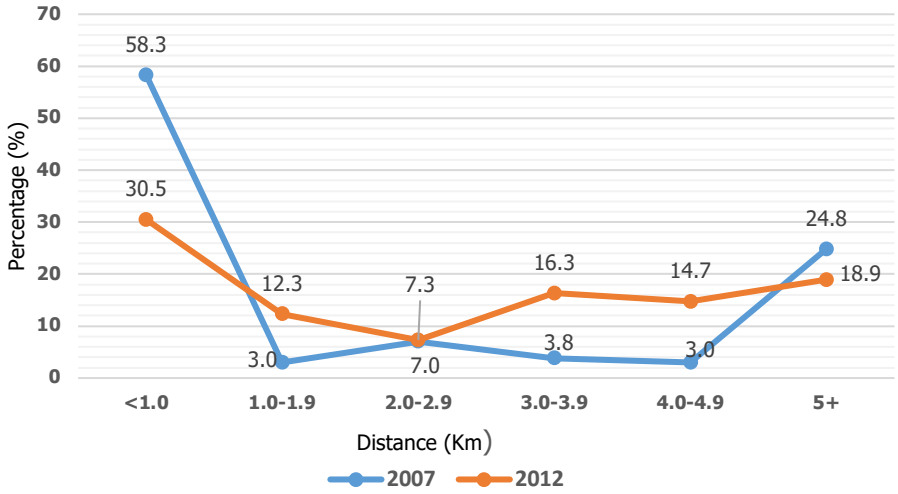


Fig.5 Average distance (Km) from residence to place of work in Greater Accra Region (Ghana Statistical Service, 2014)

The daily commuting from the hinterlands and other parts of the country to Ghanaian cities, especially Accra also calls for a second look at land use and transportation planning to incorporate some element of Transit Oriented Development. It has been estimated that outside the actual inhabitants of the city, there is additional daily inflow and outflow of commuters of between 2.5 million and 3.0 million to and from Accra for commercial and services purposes (Ministry of Transport, 2016; Ministry of Local Government and Rural Development, 2012).

The national transport policy document recognises the delicate relationship between transport and the quality of life of citizens. It explains that efficient transportation systems have positive impacts on the quality of life and business opportunities for the citizens (Ministry of Transport, 2008). Transit Oriented Development in Accra and other Ghanaian cities could be an avenue to help solve congestion in Ghanaian cities. Figure 6 shows traffic congestion at Kaneshie in Accra (Fig.6).

Fig.6 Traffic Congestion at Kaneshie, Accra (Bokpe, 2017)

Mass Rapid Transit (MRT) is not well developed in Ghana with the informal private sector, taking a very active role in urban transportation in Ghana (Abane, 1993; Abane, 2011). Frazier (2011) observed that the transportation network in Accra could be classified as failing, and one of the most dangerous globally. The dominant mode of public transportation in Ghanaian cities is some form of buses which account for 70 per cent of person trips in the cities and occupies less than 25 per cent of the road space in the cities. The more

significant contribution of road space is by Taxis and small private vehicles which occupy 70 per cent of road space in the cities but account for only 30 per cent of the person trips (Department of Urban Roads, 2015). The high risk of roads fatalities in the country calls for the introduction of TOD to help reduce travel demand in general, emphasis on mass transit and help reduce road fatalities eventually. Annual road crashes in the country was 11, 506 in 2010 and 10,887 in 2011 and increased to 14,914 in 2014 (Ministry of Transport, 2014).

Transit Oriented Development would, in a way assists in reducing the demand to travel by providing commercial services around transit nodes (The California Department of Transportation, 2002). It also incorporates the promotion of non-motorised forms of transportation (The World Bank, 2017; Calthorpe, 2011). It will assist in the re-organisation of the public transportation system in Ghanaian cities and contribute to a reduction in the CO_2 emissions (Global Environmental Facility, 2006).

2.4 Land use planning comparable to transit oriented development in Accra

A critical observation of the development of inner Accra reveals the city has been developed around five main transport terminals being, the Achimota, Kanashie, 37 Military Hospital, Tema station and Kwame Nkrumah Interchange terminals (Agyemang, 2019). These transport terminals have busy traditional market centres and business areas around them with residential facilities and business establishments. Figure 7 illustrates the area under review with the transit routes (Fig.7). It can be observed that, the area could be developed into a perfect city-scale transit oriented system that will "create a network of transit-oriented places and sites that integrate different functions and activity centres within easy access of transit" (The Centre for Transit Oriented Development, 2010b). The stations can also host multimodal transportation systems of Bus Rapid Transit and Commuter Rail Transit. An in-depth geospatial analysis of the individual stations under review reveals some attributes of TOD at the station scale.

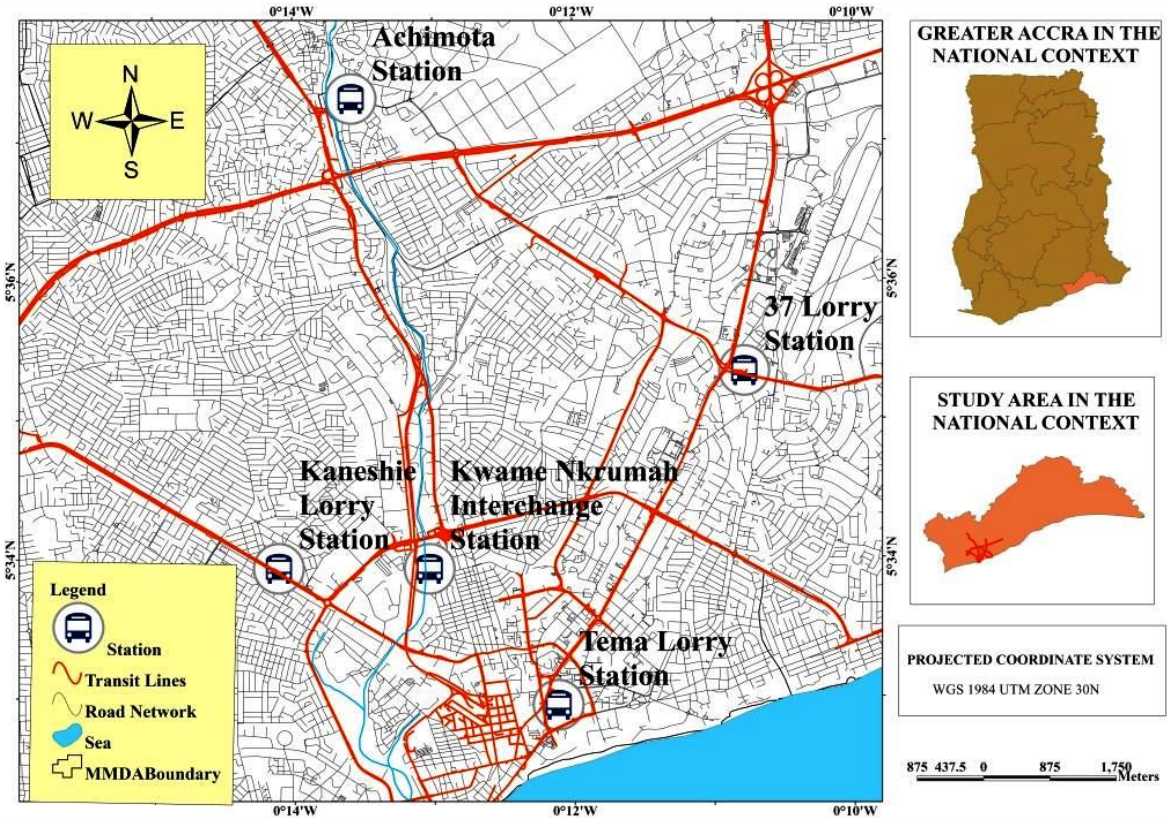
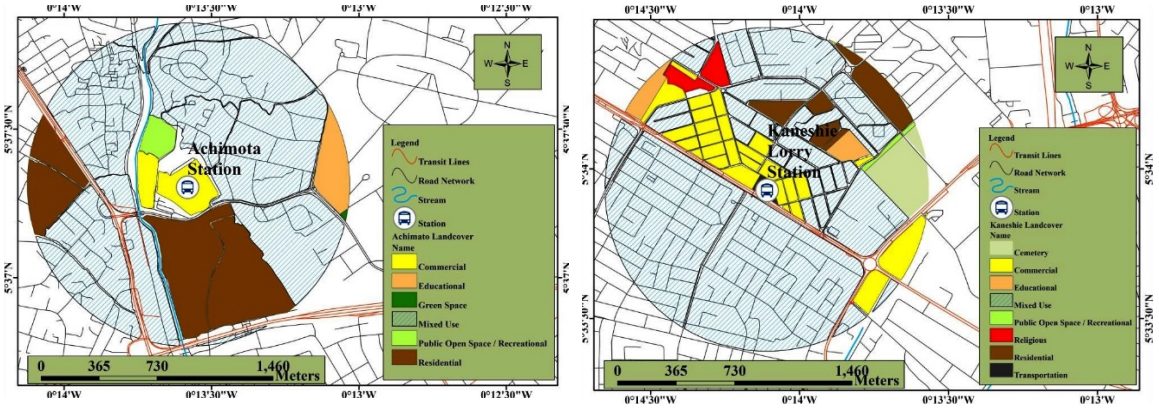


Fig.7 Major terminals and transit routes of inner Accra (GIS and Cartography Unit, Department of Geography and Regional Planning, UCC)



(a) (b)

Fig.8 Land use maps for Achimota (a) and Kaneshie (b) stations (GIS and Cartography Unit, Department of Geography and Regional Planning, UCC)

Using a radius of 1 km from the centre of the stations based on TOD standards, as explained in ITDP (2017), the characteristics of the land use pattern bear some semblance of TOD. Areas within walkable distances from the stations have land-use characteristics such as commercial, residential, mixed-use, educational, public open space/recreational as shown in Fig.8 for the Kaneshie and Achimota stations.

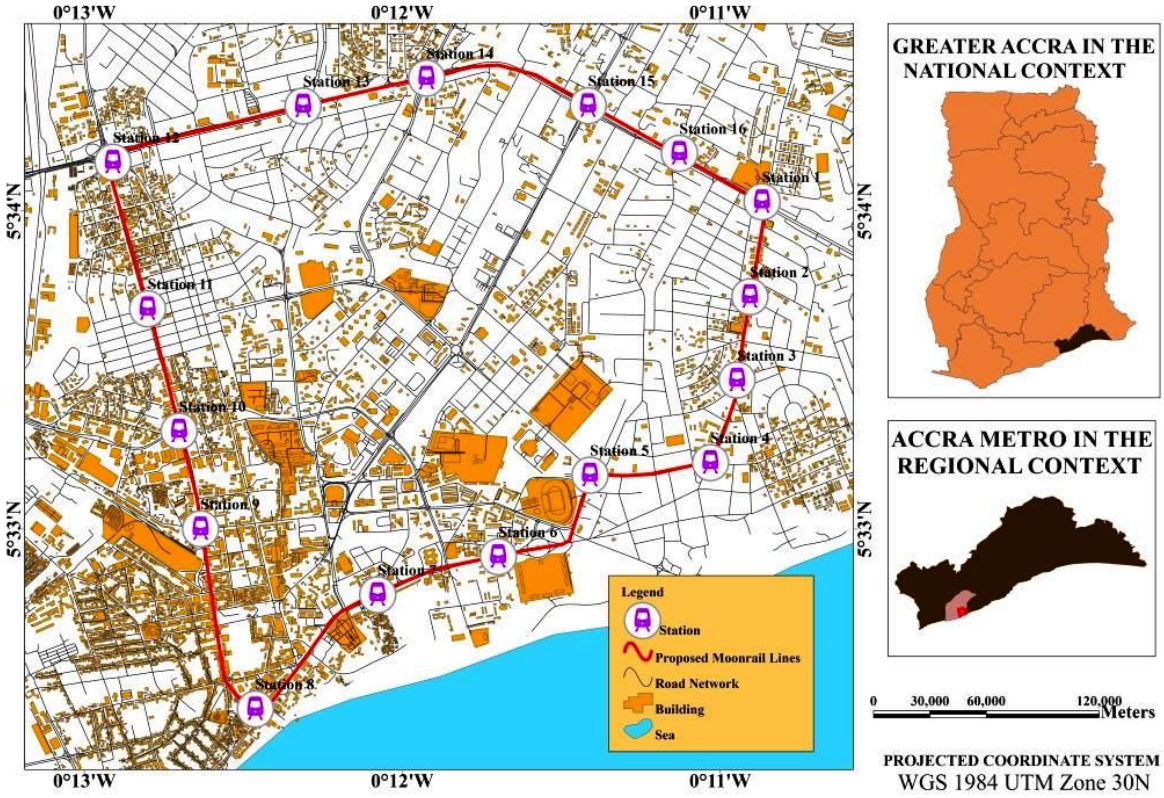


Fig.9 Proposed monorail routes and stations for Accra (GIS and Cartography Unit, Department of Geography and Regional Planning, UCC)

These areas, however, do not meet some of the essential standards for TOD. Institute for Transportation and Development Policy (2017) explains the standards for transit oriented development to include reduced land occupied by motorised transportation modes; safe and vibrant pedestrian realm; protected and shorter bicycling routes with secured parking; transit terminals accessible by foot; and affordable housing units.

One project that had some element of transit oriented development was the proposal to introduce monorail transportation system in the city of Accra by a private company, Intercontinental Commerce Corporation (ICC), of United States of America (USA) in 2010. The company planned the development of 16 stations along a proposed monorail corridor of 12.8 km in Accra (see Fig.9).

There was also a proposal to develop significant shopping malls at some of the monorail stations to serve neighbouring communities and transit riders. Some other stops were to have shops and food corners and coffee shops (Intercontinental Commerce Corporation, 2011). The proposed project however, did not have the full complement of a standard transit oriented system by lacking integration with bicycle routes and provision for the safe, walkable environment.

2.5 Challenges of adopting transit oriented development in Accra

Although the Ghana National Urban Policy Framework and Urban Policy Action Plan have policy initiatives on urban housing and transportation, there is no clear policy initiative on Transit Oriented Development in Ghanaian cities. This does not augur well for a discussion on TOD for Ghanaian cities (Ministry of Transport, 2012a; Ministry of Transport, 2012b). Transit oriented development projects are sometimes affected by upstream decisions made by policy and planning level decision-makers, operating many years ago before this era (Carlton & Fleissig, 2014). This makes current land use in most parts of the city, not incongruent with the standards for transit oriented development.

In Ghana, spatial planning faces a big challenge because of inadequate budgetary support for strategic urban land use planning and development control. This has resulted in urban sprawl in the major cities with its associated informal settlements and deficient urban infrastructure and services. There is also an ill-planned urban transportation system and its resultant traffic congestion (Ministry of Local Government and Rural Development, 2012).

Similarly, the Sector Medium Term Development Plan (SMTDP, 2014 to 2017) of both the Ministry of Transport and the Ministry of Roads and Highways failed to recognise the potential of TOD in transportation planning in the country. Unlike the Portland TOD project that benefited from the presence of a large tract of land under single ownership (Carlton & Fleissig, 2014), the existence of different ownership regimes within a sizeable stretch of land in Ghana could serve as a challenge for the development of a sustainable Transit Oriented Development.

Transit oriented development has been noted for swelling the value of land around transit nodes. Unbridled gentrification pushes out low-income occupants of the area under TOD planning. To offset this problem city authority could provide incentives to estate developers at TOD enclaves to incorporate the development of affordable real estate schemes to render TOD as a socially inclusive program (The World Bank, 2015).

Looking at the promotion of Transit Oriented Development in cities, Bertaud (2002) argues that urban structures exhibit resilient qualities and are not easily altered. Some cities have already developed a spatial pattern that did not pay much attention to transit and which would be difficult to reverse. Again, it is argued that predominantly monocentric cities with medium to high density would be better off by focusing on appropriate regulations and infrastructure investment which will probably favour an increasing use of public transport. On the other hand, in cities with predominantly polycentric structure and low density, the convenient transportation measure may be to focus on pollution and congestion reduction.

3. Discussion and policy implications

Transit Oriented Development should not lead to excessive gentrification and replacement of current residents with new residents who can afford prices of property that have been skyrocketed under gentrification. This was achieved in Pearl area TOD by moderating construction cost and pricing of housing to avoid gentrification eliminating original community members due to high prices of housing (Portland Development Commission, cited in Carlton & Fleissig, 2014)

Centre for Transit Oriented Development (2009) outlines the benefits of TOD to include livability. Livability from the context of the centre should include the creation of employment avenues, education and job training centres, affordable housing schemes for the working force and open spaces to facilitate recreation. Transit

Oriented Development should be pursued to include the goal of breaking the monocentric pattern of Ghana's cities to further serve as a travel demand management measure to reduce vehicular pollution and congestion. Complete streets, as explained by the North Carolina Department of Transportation (2012) to mean streets designed and managed to ensure the safety of all users, will also be a challenge. It will call for the redesigning of most neighbourhood streets in the country which will come at a tremendous financial cost to municipalities. This could, however, be carried out in stages with priority given to streets with heavy vehicular activities and noted for vehicular-pedestrians accidents.

Affordable housing as a requirement for a better TOD system will further be a challenge in the country. The real estate industry in the country is under the control of the private sector who are focused on the provision of housing schemes for the higher and middle-income population segments of the country. A shift in policy for housing promotion that will incorporate Public-Private Partnership (PPP) will be desirable. This would require proper participatory planning with the participation of the private sector and other relevant stakeholders in the transport and real estate value chain. The adoption of Public-Private-Partnership in the development of housing schemes assisted in the attainment of the mixed-use and densification in the Pearl area TOD (Carlton & Fleissig, 2014).

The development of Mass Rapid Transit (MRT) routes could complement the introduction of Transit Oriented Development neighbourhoods in the city. In the development of a new suburb and schemes for selected settlements around new outer ring roads, Transit Oriented Development could be employed with MRT systems linking the newly developed community with other suburbs in the city. A new housing policy that will encourage densification, mixed-income housing schemes, promote stronger government-private, and sustainable financing schemes will augur well for the development of TOD in Ghana. Financing schemes could include declaring TOD zones as tax exclusive with special tax incentives to housing developers who would be prepared to develop mixed-income and mixed-use and densification-focused housing schemes in designated TOD zones.

Proper community engagement and participation is very important for the success of Transit-Oriented Projects. The Centre for Community Innovation (2009) explains that one barrier to the development of TOD is the opposition from residents of the proposed area to accept some of the components of the project especially the high-density neighbourhood and mixed-income housing. This is usually borne out of the idea of Not-In-My-Backyard (NIMBY). Planners could offset this problem by sustainably engaging the community and key stakeholders and effectively explaining the perceived benefits of the project to the overall development of the community and the nation at large.

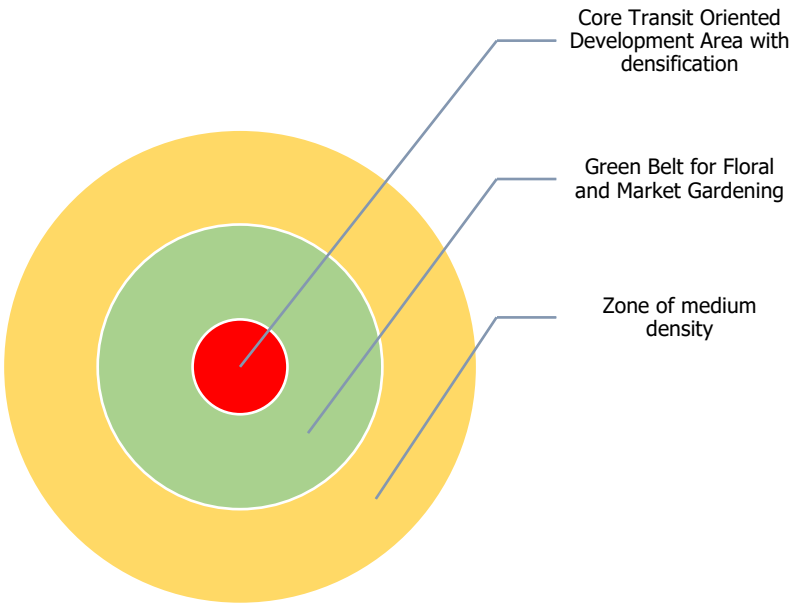


Fig.10 Transit Oriented Area with Green belt and Medium Density Zone (Authors' Construct adapted from Calthorpe, 1993)

To cater for the concerns of some middle and upper-middle-income class who may not be in favour of densification, we propose that transit oriented developed could be modified to include a green belt around the original TOD zone. This zone could serve as inner-city agricultural and nature reserve belt for floral and market gardening. This belt could be followed by a belt medium density neighbourhood to cater for the middle class and other citizens who may not be in tune with the high density of the original TOD zone but could walk, ride a bicycle or drive and park at a parking zone within the TOD area and join public transit or rapid mass transit (Fig.10).

The issue of fragmentation of land ownership has been as identified as a challenge to the development of TOD in the country. It is therefore recommended that city authorities/government could identify owners of land in a proposed TOD zone, pay the economical price and legally acquire to re-sell to developers for Transit Oriented Development. Additionally, a planning regime that integrates transportation, land use and housing development is indispensable. Under the development of an efficient transportation system to assist in sustainable TOD in Ghana, modal integration would ensure intermodal and multimodal transportation system development. The development of central transport nodes that incorporates stations for different transportation modes will assist in the easy transfer of passengers from one mode to another and increase the options that passengers have concerning different transport modes.

Transit Oriented Development implementation may be associated with some challenges for Ghanaian cities, the benefits that are associated with the implementation of TOD necessitate that city authorities and policymakers follow the winds of change in current urban transportation planning and commit resources for further research and the development of TOD systems to help promote liveable and sustainable cities.

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Image Sources

Fig.1: Calthorpe, 1993

Fig.2: Authors

Fig.3: GIS and Cartography Unit, Department of Geography and Regional Planning, UCC

Fig.4: GIS and Cartography Unit, Department of Geography and Regional Planning, UCC

Fig.5: Ghana Statistical Service, 2014

Fig.6: Bokpe, 2017

Fig.7: GIS and Cartography Unit, Department of Geography and Regional Planning, UCC

Fig.8: GIS and Cartography Unit, Department of Geography and Regional Planning, UCC

Fig.9: GIS and Cartography Unit, Department of Geography and Regional Planning, UCC

Fig.10: Authors

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