A Methodological Prescription for Quantitative Cost Assessment of sub-Saharan Africa Urban Land Use Planning Systems

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Abstract

Consensus signifies that the cost of compliance with land use planning regime requirements is a major link to the weakness of sub-Saharan Africa (SSA) urban land use planning systems. Yet scanty knowledge exists on the extent and magnitude of the cost of the sub-region's land use planning systems. This is compounded by the complexities associated with conventional quantitative methodologies usually used in the developed world to estimate the cost of land use planning policies and their huge volumes of organised data requirements. This study initially examines the main conventional methodologies and the nature of SSA land use planning systems based on evaluation of the extant literature. Subsequently, a customised methodology(ies) is prescribed taking cognisance of insights from the conventional methodologies, nature of the sub-region's planning systems and its organised data constraints. Having

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prescribed a bespoke methodology for estimating the extent of cost of SSA planning systems, it is expected that policy makers and implementers will adopt it in their bid to fashion out suitable planning policies in the sub-region.

Keywords: Cost, land use planning, methodology, sub-Saharan Africa, quantitative

1. <u>Introduction</u>

The weakness of land use planning systems in economies of SSA has received much attention in the literature (see Kironde, 2006; Rakodi, 2006; Musandu-Nyamayaro, 2008; Watson, 2009). A major cause of this weakness is high cost of compliance with planning requirements (UN-Habitat, 1999; Egbu *et al.*, 2008). To date, little evidence exists on the extent and magnitude of the cost of land use planning systems in the sub-region to provide a basis for devising a far reaching policy solution. For example, a recent policy study on human settlement and land use planning in Ghana identified high cost of compliance with planning requirements as a major cause of low compliance with land use planning regulations. However, the policy study was silent on the extent of compliance cost of these regulations. Yet the study was supposed to provide such guidance to aid on-going planning reforms in the country (see GoG, 2009). This lack of quantitative evidence on cost of planning systems in SSA is further compounded by complexities of conventional methods adopted in the developed world and their huge volumes of organised data requirements (see Adams *et al.*, 2005; Quigley, 2007), which are hardly encountered in the sub-region.

This paper interrogates the conventional methodologies for estimating the cost of land use planning policies. The aim is to prescribe a customised methodology to aid the assessment of cost of SSA land use planning systems to form the basis for far reaching policy formulation. The remainder of the paper is organised as follows. Section 2 discusses the conventional methodologies usually adopted in the

developed world to assess cost of planning policies after which, section 3 takes a look at the overview of planning regimes in the sub-region. On the basis of sections 2 and 3, section 4 proposes a customised methodology. Section 5 draws conclusions of the paper.

**2.** **Cost of Land Use Planning Policies – Methodological Issues**

Fundamentally, the idea of estimating cost of land use planning policies is traceable to the welfare economics thinking (see Harberger, 1971; Garber *et al.*, 1996). Though debateable, the welfare economics thinking holds that regulation, such as land use planning policies are promulgated to advance societal interest or ensure collective good (Moroni, 2006; Cheshire and Vermeulen, 2009). At the heart of the societal interest argument is the utilitarian calculus, which was originally promoted by classical utilitarianists such as Jeremy Bentham (1748-1832) and John Stuart Mills (1806-1873) (Pinkerton *et al.*, 2002). This utilitarian calculus espouses that action is assessed on the basis of its production of utility and dis-utility. However, to classical utilitarianists utility and dis-utility are measureable in discrete units. Therefore, they are subject to mathematical analysis. Assessment of an action is undertaken by intuitively comparing its total utility also known as benefit or welfare to the total dis-utility referred to as cost. Action is adjudged to be right when it produces greater utility compared to its dis-utility (Garber *et al.*, 1996; Pinkerton *et al.*, 2002).

From this welfare economics standpoint, several methodologies have been developed to examine the impacts of regulations. Khakee (2003) classifies them into: highly aggregated methods, such as cost-benefit and cost effective analyses; intermediate methods like planning balance sheet/community impact evaluation (Lichfield, 1996) and multi-criteria analysis (Vreaker and Nijkamp, 2006); and highly dis-aggregated methods like positional analysis. However, the main method usually employed to estimate cost of regulation, and in this context, social cost of regulation is the Harberger Triangle technique (Harberger, 1954).

2.1 The Harberger Triangle

The Harberger Triangle technique is a product of the seminal work of Arnold Harberger (1954). The work sought to provide a quantitative notion of the social cost of regulation and the extent to which regulation promotes allocative efficiency in the American society, using data from the manufacturing sector. The motivation for the development of the technique was premised on the public choice economics philosophy that regulations are promulgated to advance the interests of the minority. As such, they negate welfare economics position of allocative efficiency. The Harberger Triangle technique employs partial equilibrium analysis to estimate social cost of regulation based on the concept of deadweight loss (Harberger, 1954; Tullock, 1967; Wenders, 1987; Gömüs, 2007).

The presumption is that minority interest groups, such as monopolists rent seek to ensure promulgation of regulations. However, since regulations ultimately result in increases in prices of goods and services above competitive prices, society at large loses by way of reduction in consumer surplus. The operation of the Herberger Triangle as applied to land use planning regulation is summarised by Figure 1.1.
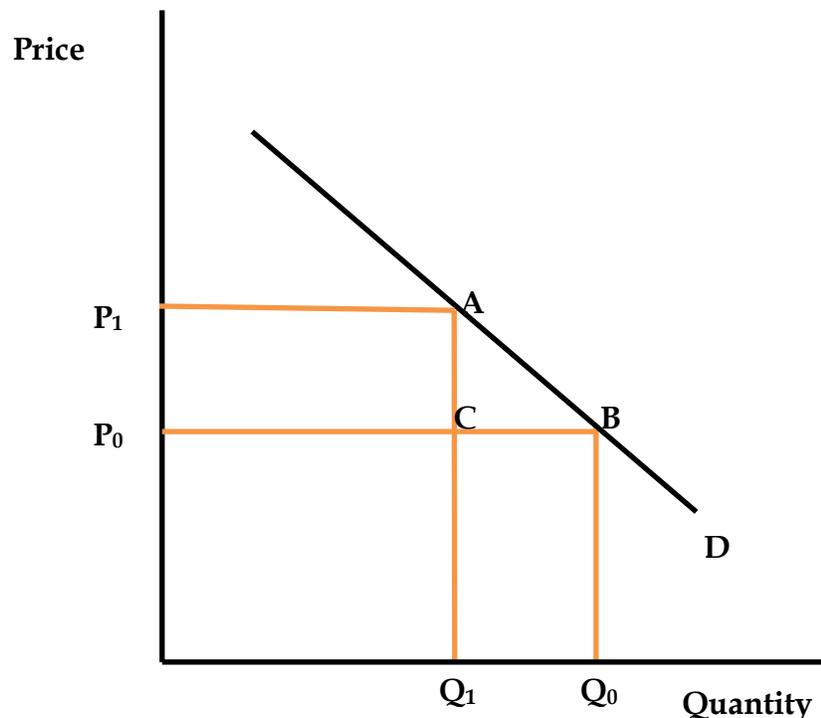
Figure 1.1 Social Cost of Land Use Planning Regulation.
Source: Adapted from Harberger (1954)

In Figure 1.1, D, P_0 and Q_0 denote the demand curve for a real estate product say: a 4-bedroom house, competitive price and quantity demanded of the house respectively. If government promulgates regulation, for example, the acquisition of building permit prior to construction of such houses, which results in price increase above the competitive price to P_1, quantity demanded falls to Q_1. This ultimately culminates into reduction in consumer surplus by (P_1-P_0) and creates a deadweight loss of triangle (ABC). This triangle is known as the Harberger Triangle and represents the social cost of regulation in addition to the inability of other people in society to enjoy such real estate product.

Studies such as Stigler (1956), Tullock (1967), Posner (1974), Wenders (1987), Antwi (2000), Yoon (2004) and Hammond and Antwi (2010) have dwelt on the insights from the technique to analyse social cost of regulation in several disciplines. However, the method has not gone without criticisms. For example, it is argued that monopolists in seeking rent to ensure the passage of regulation spend a lot of

resources, which is a waste to society. Thus, the abnormal profit; the area of the rectangle P_0P_1AC in Figure 1.1 supposedly enjoyed by monopolists actually feedback into rent seeking activities and should be estimated as part of social cost of regulation (Tullock, 1967; Posner, 1974). Similarly, in the quest to neutralise the efforts of monopolists to get regulations passed, consumers also rent seek to prevent regulation. This means that the resources spent by consumers to rent seek should be assessed as part of social cost of regulation. In fact, it is argued that resources spent by consumers to rent seek could even double the social cost of regulation (see Tullock, 1967; Posner, 1974; Wenders, 1987; Gömüs, 2007). However, data to authenticate this argument or otherwise is usually difficult to come by (Gömüs, 2007).

In the main, the criticism normally encountered in the literature with this partial equilibrium analysis of the social cost of regulation is the usually unknown elasticity of demand for real estate products regulations impinge (Bertaud and Mapelzzi, 2001; Quigley 2007). This renders assessment of social cost of regulation by the method difficult if not impossible. Hammond and Antwi (2010), for example, in their work on economic impact of SSA real estate policies assumed elasticity of demand (nature of demand) for 0.20-acre residential land in Accra, the capital of Ghana. To address these data difficulties, Bertaud and Mapelzzi (2001) suggest the use of the Bertaud Model for estimation of cost of land use planning regulations.

2.2 The Bertaud Model

The Bertaud model is in two parts. These are the Affordability and Differential Land Pricing Sub-model and the Detailed Land Use and Infrastructure Costing and Design Sub-model. The earlier version of the model was devised in 1981 and revised in 1986 (Bertaud *et al.*, 1988). The model was developed in response to the need for simplified tools and techniques to pursue: 1. a more efficient land use in terms of estimating the cost of land use regulations and devise a more affordable mix of regulations; and greater efficiency at project design level, particularly in the developing world (Bertaud *et al.*, 1988).

Essentially, the technique entails two main stages. First, it sets the ideal limits for land use planning regulations/policies based on certain criteria. This could be international or local, such as household incomes and ability to afford. At the second stage, the technique estimates social cost of regulation as additional requirements conditioned by existing land use planning regulations. This may include land, infrastructural cost and service charges (see Bertaud, 1986; Bertaud *et al.*, 1988; Bertaud and Mapelzzi, 2001). The mechanics of the technique is demonstrated by Figure 1.2.
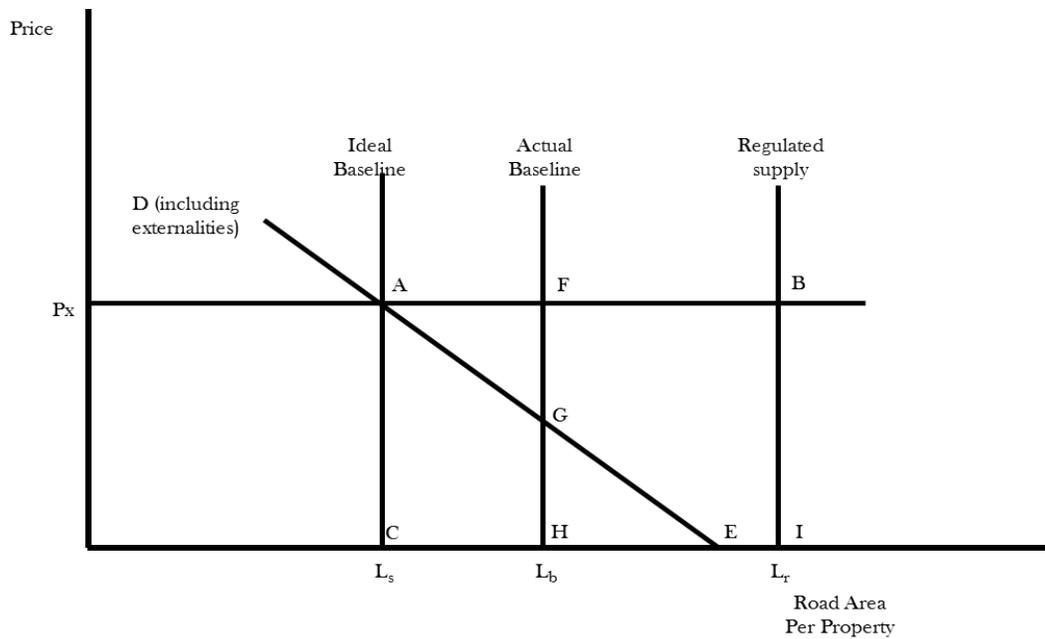
Figure 1. 2 Approximation of Cost of ULUP Regime Requirements
Source: Adapted from Bertaud and Malpezzi (2001)

Figure 1.2 demonstrates demand and supply situation for a common land use, say road. The price, ideal supply (ideal baseline) for the land and demand for road are denoted as P_x, L_s and D respectively. With the given level of demand for road, if land use planning authorities regulate supply of land for road to point L_r, the social cost of regulation can be assessed as ABCI – ACE. This is because more land is allocated to road than what society actually needs. However, ACE (the nature of demand) is not known and P_x (L_r- L_s) is not a good measure of the social cost since it does not take into account ACE. If the ideal supply of land for road is set at L_b (the actual baseline supply), the area ACGH will not matter in the cost assessment. This implies a cost of AFG, which is equally neutralised by the benefit shown as area GHE neglected. As such, P_x (L_r- L_b) or the area denoted by FBHI is considered as a good approximation of ABCI – ACE, and therefore, the social cost of regulation.

The method comparatively appears simple and straightforward, and has been applied previously in countries like Malaysia, India, Thailand, Peru, Senegal and Russia. However, it requires considerable amount of data and resources for its

implementation (Bertaud and Mapelzzi, 2001). Again, the method's conceptualisation of cost appears to hide the actual cost of regulation. Also, setting baseline standards for cost assessment could be very onerous given the existence of different socio-economic conditions and standards across the globe, and national and local settings.

The foregoing notwithstanding, questions have also been asked as to whose cost do cost methodologies, such as those discussed seek to address: is it individuals, companies or local authorities? Which cost and benefits, in geographical terms, should be taken account of? Should the decision relate to efficiency or also equity and social justice? (Lichfield, 1996). Given these complexities and the data requirements for these methodologies, which are usually difficult to come by in SSA (see Egbu *et al.*, 2008; Hammond and Antwi, 2010), a customised methodology is required to calibrate the cost of land use planning regimes in the sub-region. To prescribe any such method, it is imperative to demonstrate from the outset the nature of planning regimes in the sub-region. This is the focus of the next section of the paper.

3. **SSA Land Use Planning Systems**

Excepting Republic of South Africa which has adopted integrated planning system, SSA planning systems are relics of colonialism (Musandu-Nyamayaro, 2008; Watson, 2009). Planning systems in the sub-region, in the main, still operate modernist rational comprehensive planning model with the use of master plans. In essence, these planning systems are underpinned by the land use segregation concept with its cardinal principles of unifunctional land use, discrete zoning, regulation and consensus (see Afrane, 1993; Njoh, 2009). Consequently, the sub-region's planning systems are usually characterised by hierarchy of statutory plans and sets of development control regulations. These are linked to local government

administrative laws, and are driven by government and its officials to the exclusion of the larger populace (Wekwete, 1995; Rakodi, 2006).

These planning systems usually stipulate that no development should be undertaken in a community or area declared a statutory planning area by government unless that area is zoned and covered by an approved sub-division planning scheme. As applied to residential development in the case of Ghana, for example, such zoning and sub-division plans should be undertaken by planning authorities – Metropolitan/Municipal/District Assemblies (MMDAs). Subsequently, prospective developers must acquire building/development permit prior to the commencement of their developments. However, these developers require pre-permit items, such as architectural designs, formalised title and in some cases environmental and traffic impact assessment reports.

Additionally, upon commencement of development, planning authorities are supposed to check and approve every stage of construction of proposed development. They are also supposed to issue certificate of occupancy prior to occupation of newly constructed buildings. The rationale behind all these requirements is to ensure that building projects are properly screened to meet desired standards (see Afrane, 1993; Baffour Awuah *et al*., 2011). Figure 1.3 gives a simplified version of the operation of Ghana's planning regime as applied to residential development. That said though not expressly stated as a binding requirement, SSA planning regimes are also to ensure provision of infrastructure and amenities[1] prior to commencement of actual building developments. The planning systems therefore promote plan, service, develop and occupy principle (see Oyugi and K'Akumu, 2007).

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[1] Developments are usually defined to include infrastructure and amenities.
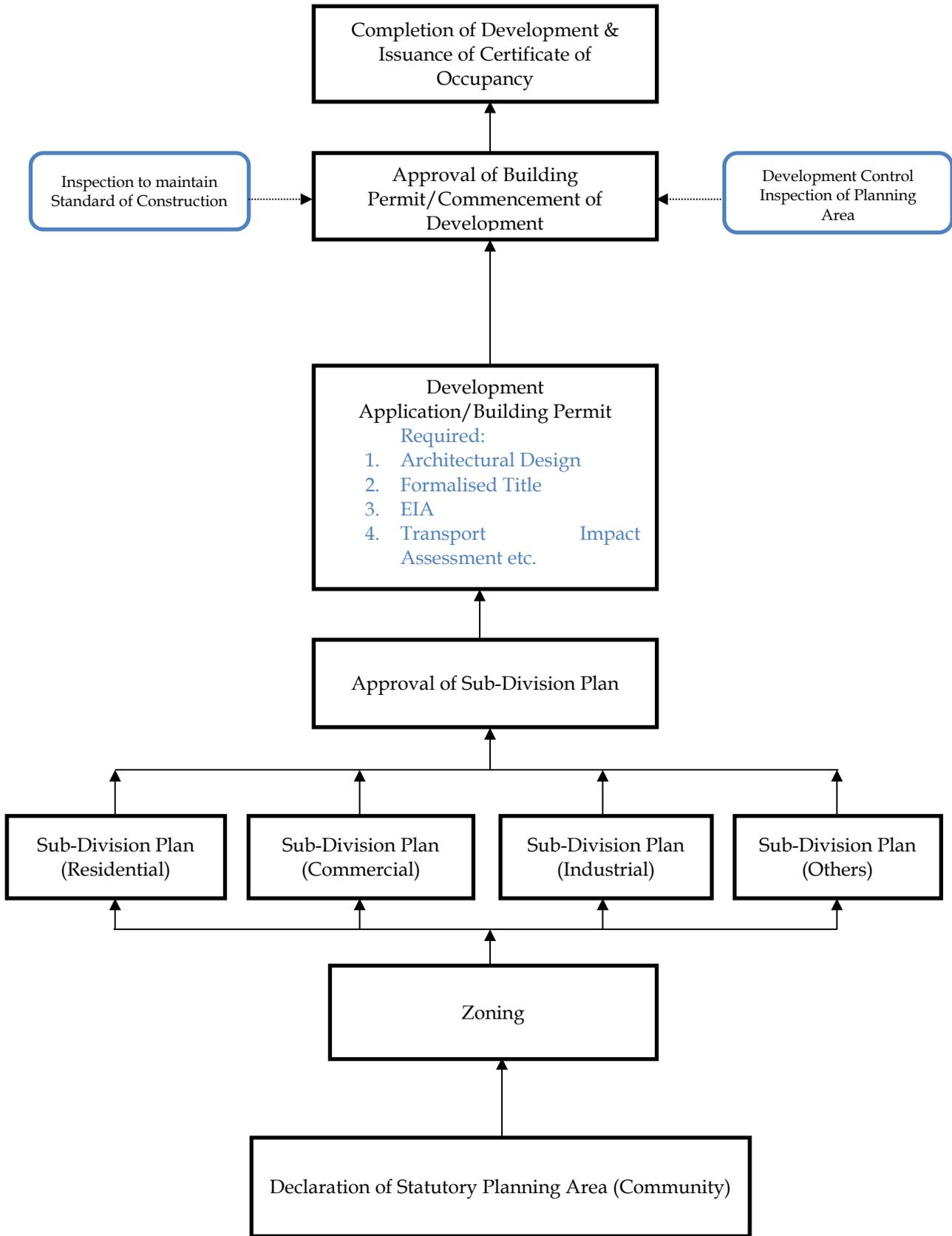
Figure 1. 3 Simplified Version of the Operation of Ghana's Planning System
Source: Adapted from Baffour Awuah *et al*. (2011)

It needs to be pointed out that governments in the sub-region for some time were unable to adequately prepare planning schemes and provide infrastructure. As such, over years, particularly since the latter part of the 1980s when virtually all the economies in the sub-region were liberalised, there have been arrangements where private land owners engage their own consultants to prepare planning schemes. These planning schemes are then sent to the planning authorities for the requisite approval. The cost for the preparation and approval of the planning schemes are paid by the land owners. The same arrangement pertains to infrastructure and certain social amenities like community parks. These arrangements have even become pronounced following the emergence of private real estate development companies in the sub-region's property markets. What is however evident is that these costs are ultimately transferred to the individual developer or house purchaser.

Besides the foregoing, planning systems in the sub-region are usually criticised as deficient. Apart from criticisms such as planning systems' inability to deliver developable lands, their complex bureaucratic processes and restrictive requirements, the cost of meeting their requirements is said to be high (see Payne and Majale, 2004; Kironde, 2006; Egbu *et al.*, 2008). These costs as demonstrated by Farvacque and McAuslan (1992) and Egbu *et al.* (2008) include:

- The actual official fees for processing planning requirements at public planning institutions;
- Extra out of pocket payments – unofficial fees, at public planning institutions to expedite action on processing planning requirements. They are usually paid to officials who work at these institutions;
- Delays with processing of planning requirements – cost of time lag;
- Commuting cost for follow-up to planning institutions to expedite action on execution of planning activities; and

- Professional fees for engaging urban development professionals to ensure execution of planning requirements' activities on behalf of their clients.

Unfortunately, studies on the extent of compliance cost of the sub-region's planning requirements' incorporating the entire incidental – indirect costs, have remained marginal. Notable among them is the extent of cost of planning requirements based on a planned development. As pointed earlier, this is partly attributed to the lack of simplified methodologies that take into account the paucity of organised data in the sub-region. The next section of the paper proposes a methodology in this regard.

4. Methodology Prescription

In prescribing a bespoke quantitative methodology for calibrating the extent and magnitude of SSA urban land and planning regime cost, the assumptions below are made.

1. Individual developers and single development – say a standard 3-bedroom residential house, constitute the unit of analysis.

2. The processes involved in undertaking planned residential development are used as the guide.

3. Ghana land use planning requirements described in the preceding section form the basis of the prescription.

4. Zoning, issuance of certificate of occupancy and government planning institutions running costs are beyond the scope of this paper.

5. Individual developers are assumed to be responsible for cost of building infrastructure and certain amenities such as Community Park under a planning scheme. Borrowed funds are used to pay compliance with requirements cost.

From discussions at preceding section, it can be surmised that compliance with SSA planning regime requirement(s) regarding urban development comprises a continuum of activities. These range from preparation and approval of sub-division planning

scheme, and building of infrastructure and amenities, to acquisition of building permit before development commences. Prior to acquisition of building permit, developers will also have to obtain architectural designs and formalised title. Amalgamation of costs on all these activities incorporating their incidental costs – indirect cost, thus, constitutes the cost of planning regime. Additionally, it needs to be remarked that in a typical planned neighbourhood common or ancillary land uses, such as infrastructural facilities benefit all individuals and institutions within the neighbourhood. It, therefore, stands to reason that the cost of these land uses should be apportioned among the beneficiary land uses.

Denoting planning regime requirements costs per property as: Approved sub-division planning scheme $= \omega_1$; Infrastructure and amenities $= \omega_2$; Architectural design $= \omega_3$; Formalised title $= \omega_4$; and Building permit $= \omega_5$, the bespoke methodology can be prescribed as follows:

Approved Sub-division Planning Scheme (ω_1)

$$\omega_1 = \frac{\kappa}{\delta} \times \left[(\alpha \times \gamma) \times (1+i)^n + \varepsilon \right]$$

Equation 4.1

Where ω_1 is as previously defined; κ is the area of land for the property and less or equal to δ; δ is total area of land with uses that is subject to approved common land uses cost allotment under approved sub-division planning scheme and is less than γ; α is approved sub-division planning scheme cost per hectare land under approved sub-division planning scheme; γ is the total land area under the approved sub-division planning scheme. $(1+i)^n$ is a compounding factor that takes account of cost of time lag, that is time value of money and has i as the capitalisation rate signifying cost of capital and n as time lag. ε is the error term that takes account of all measurement errors.

Infrastructure and Amenities (ω_2)

$$\omega_2 = \omega_{2_1}, \ldots, \omega_{2_j} = \frac{\kappa}{\delta} \times \left[\varphi + (\mu \times \vartheta) \times (1+i)^n + \varepsilon \right]$$

Equation 4.2

Where $\omega_2, \dfrac{\kappa}{\delta}, (1+i)^n, \varepsilon$ are as previously defined; $\omega_{2_1}, \ldots, \omega_{2_j}$ is a range of particular infrastructure/amenity ω_2 can take on at a time; roads and concrete drains, electricity, community park; φ is the land cost for particular infrastructure/amenity; μ is cost of particular infrastructure/amenity per unit area of land under a sub-division planning scheme; ϑ is the extent of land; area particular infrastructure/amenity occupies under a sub-division planning scheme.

Architectural Design (ω_3)

$$\omega_3 = (\sigma + \lambda + \upsilon)(1+i)^n + \varepsilon \hspace{3cm} \text{Equation 4.3}$$

Where $\sigma, \lambda, \upsilon$ are the architectural design charge per se per property, commuting/transport cost for follow-ups on qualified architect or draughtsman per property design to ensure design completion and collection, and professional fee per property design for engagement of a property consultant to contract an architect/draughtsman to design and ensure completion of design respectively. All other variables are as previously defined.

Formalised Title (ω_4)

$$\omega_4 = \left(\phi + \sum_{\chi=1}^{i} \chi \right)(1+i)^n + \varepsilon \hspace{3cm} \text{Equation 4.4}$$

Where ϕ is the official fee for formalisation of deed per property at public agency(ies); $\chi_1, \chi_2, \chi_3, \ldots, \chi_i$ are variables, such as cost of deed per property, commuting cost for follow ups to expedite action on deed preparation, unofficial fee for formalisation of deed per property at public agency(ies), commuting cost for follow ups to expedite action on title formalisation activities. All other variable(s) are as previously defined.

Building Permit (ω_5)

$$\omega_5 = (\phi + \tau + \pi + v)(1 + i)^n + \varepsilon$$

Equation 4.5

Where ϕ, τ are official and unofficial fees per property paid at public agency(ies) towards acquisition of building permit; π is the commuting cost per property for follow ups at public agencies to expedite action on processing of building permit and v is the professional fee per property for engagement of a property consultant to pursue procurement of a building permit. All other variables are as previously defined.

Given the foregoing, planning regime requirements' compliance cost per property can, thus, be assessed as:

$$UR_c = \sum \left(\omega_1 + \omega_{2_1} + ... + \omega_{2_j} + ... + \omega_5 \right) + \varepsilon$$

Equation 4.6

Where UR_c is planning regime requirements' compliance cost per property. All other variables are as previously defined. This constitutes planning regime cost from the individual property developer standpoint.

5. Conclusion

Land use planning systems in SSA are often criticised as weak and dysfunctional. Currently, there are efforts to reform some of the planning regimes in the sub-region. A major link to this weakness is low compliance with planning requirements. This is, in part, attributed to high cost of compliance with planning requirements. However, knowledge of the extent and magnitude of cost that planning regimes in the sub-region impose on developers is scanty, due to dearth of relevant studies. This is compounded by complexities of conventional quantitative methodologies employed in the developed world to estimate the cost of planning policies and their requirements of organised data. This paper on the basis of review of the extant literature has prescribed a simplified method for calibrating the cost of planning regimes at least from the viewpoint of individual property developers taking into account data peculiarities in the sub-region. This methodology is portable and could be employed to estimate the cost of planning

policies even across the developing world, and also for academic purpose. As such, it is expected that policy makers and implementers in the sub-region and indeed the developing world will begin to adopt the methodology to aid them in developing far reaching land use planning policies.

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