

# **Education for Spatial Planning and Design: Integrating Surveying and Mapping Sciences as a Foundation**

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## **Summary**

Spatial Planning has been integral to the socio-politico-economic policies in the modern world. This paper aimed at providing a first-hand information on Spatial Planning education and its related programmes as well as how this is being developed at the University of Mines and Technology (UMaT) in Ghana. The need for the development of Spatial Planning training in this institution and the current status of the programme that have been developed so far are discussed. The adoption of integrated approach to planning has necessitated the development of the programme with Surveying and Mapping Sciences as the core of Spatial Planning programme. The planned growth, direction, expected impact on the Spatial Planning profession and its allied disciplines in Ghana are explored. Various strategies being employed and the challenges facing some Spatial Planning institutions in the country have been discussed.

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## 1 INTRODUCTION

Spatial planning refers to the methods and techniques used by policy sectors to influence the distribution of people and activities in spaces of various scales (local, regional and national) in order to improve the built, economic and social environments of communities (Koresawa and Konvitz, 2001). This implies that through an effective coordination of sectoral policies, spatial planning can help ensure the even distribution of economic resources within the country that would have otherwise not been achieved. According to Cullingworth and Nadin (2006), spatial planning embraces the task of integrating the economic, social and environmental dimensions of national, regional and local-level strategies with the ultimate goal of ensuring that development outcomes are feasible and sustainable. On other hand, spatial design or urban design involves the arrangement and design of buildings, public spaces, transport systems, services, and amenities. It is the process of giving form, shape, and character to groups of buildings, to a whole neighborhood, and city. It is undoubtedly that a combination of spatial planning and design could help address spatial challenges if the needed education is given to students and professionals in the sector.

Hence, spatial planning system of a country must be one of the well-established systems through which the government carries out the implementation of plans, ideas and policies. Over the years, the spatial planning system for Ghana has been weak, ineffective and inefficient (Yeboah 2002; Owusu 2008) in the delivery of their mandate due to some challenges. Notable among them is the lack of adequate personnel with the requisite expertise to hand and manage spatial data for town/urban planning. Any programme developed to address the shortfall in the spatial planning sector is necessary and relevant. Programmes at the university level is supposed to provide the combination of course relevant to town/urban planning. Unfortunately, spatial planning and related programme at some universities in developing countries such as Ghana does not adequately address the issue of incorporating more surveying and mapping sciences into the programmes.

Ghana currently has Land Use and Spatial Planning Act, 2016 (Act, 925). The act establishes the Land Use and Spatial Planning Authority in Ghana. The act is to “revise and consolidate the laws on land use and spatial planning, provide for *sustainable development of land and human settlements* through a decentralised planning system, ensure *judicious use of land* in order to improve quality of life, *promote health and safety in respect of human settlements* and to *regulate national, regional, district and local spatial planning*, and generally to provide for *spatial aspects of socio economic development* and for related matters” (Anon.,

2018a). To achieve this in the act, a holistic approach is needed in the training of planners. The pivot of the planners' knowledge base should be introductory courses in surveying and mapping sciences, which include: surveying, cadastral surveying, 3D and multi-purpose cadastre, Global Navigation Satellite System (GNSS), Geographic Information System (GIS) and Remote Sensing (RS). A well-developed spatial planning and design with surveying and mapping sciences will help the spatial planner and designers in: resource inventory, analysis of existing situations, modelling and projection.

In view of that, the Spatial Planning and Design programme that is being considered at UMaT addresses such pitfalls to help in the full implementation of the functions of Land Use and Spatial Planning Authority at the regional, and district levels of Ghana. UMaT currently runs a BSc/MSc/PhD programmes in Geomatic Engineering and thus has the requisite staffs to handle these courses.

### **1.1 Brief Information About Ghana**

There are ten (10) administrative regions in Ghana, which are further divided into Metropolitan, Municipal, and Districts Assemblies. There are currently a total of 216 Metropolitan, Municipal and District Assemblies (MMDAS) in Ghana (Fig. 1). Out of the 216 MMDAS, 161 constitute the Districts, 49 Municipal and 6 Metropolitan Assemblies. It will interest you to know that over the years, new districts have been created because of the large size of some of the Assemblies. However, the large size did not facilitate the full implementation of local government policies hence, the need for the creation of new ones under the Local Government 2016 (Act 936). The criteria for the creation of new districts, municipal and metropolitan assemblies in Ghana include: population; economic viability of natural resources; potential for sustainable revenue generation; geographical contiguity; and ethnic homogeneity among others.

The current estimated population of Ghana based on the latest United Nations estimates is about 29 277 587 people with a total land area of 227 540 km<sup>2</sup>. The population density for Ghana is 129 per km. The urban population stands at 54.4% (Anon., 2018).

## **2 IMPORTANCE OF SPATIAL PLANNING**

This section present some of the importance of spatial planning towards national development. Spatial planning contributes to the development of tourism through the promotion and protection of the landscape and conservation of cultural environments that encourages local employment (Brackhan and Karkhainen, 2001). Vulnerable natural areas such as the beaches and mountains are especially endangered by increasing tourism but also by the recreational needs of the urban populations. Designating areas for recreational purposes can be based on a strategy seeking to develop the quality of such areas. For example, improving facilities for tourists and developing a type of tourism that respects the distinctive characteristics of the location, protects urban, natural and cultural environments creates local

employment (Brackhan and Karkhainen, 2001). Hence, it can logically be stated that spatial planning can help prevent the natural environment from being further destroyed.

Additionally, spatial planning plays a key role in providing a mid-term to long-term framework for development and coordinating policies across sectors of the economy (Belka, 2008). It provides a vision and common direction for policies and programmes and identify priorities for policy initiatives. It therefore helps to avoid duplication of effort by different departments and spheres of government and can assist in the coordination of sectoral policies. In doing so, it helps to promote economic growth and investment while guiding the policies for protecting the environment and promoting efficient use of resources for the development of the economy (Belka, 2008).

Spatial planning contributes to achieving balance in urban development between using undeveloped land versus reusing old urban sites and promoting compact urban development (Brackhan and Karkhainen, 2001). Compact development reduces the use of new land for urban development. For example, spatial planning can revitalize old industrial and harbour sites or districts by converting them to take on new urban functions. Reusing old urban districts, on the other hand, allows various urban functions to be integrated if this does not cause excessive adverse effects on the community environment (Brackhan and Karkhainen, 2001). Sustainable spatial planning requires preventing uncontrolled urban sprawl in the open landscape. Urban sprawl results in problems in land use and the environment such as increased use of undeveloped land, more transport and dependence on car transport, excessive infrastructure costs and increased use of energy.

Through spatial planning, potential environmental risk such as flooding could be addressed. This is because in the spatial planning process, the terrain or landscape of the area is taken into consideration which enables the planners to know locations where there is the likely to get flooded. In most instances where community participation is part of the spatial planning process, the needs of the local communities in policy development are also considered. This involves taking into account the provision of local facilities where they are lacking while preserving important environmental, historic and cultural assets.

In summary, the importance of spatial planning and design towards the development of countries cannot be overemphasized. The importance of spatial planning cuts across every sphere of a country by helping to improve the social, economic and environment aspects of it. Therefore, fully developed spatial planning and design is indeed a necessity of every country at the local, regional and national levels.

### **3 CHALLENGES OF SPATIAL PLANNING IN GHANA**

One of the main challenges of spatial planning is how to tackle growing urbanization, especially in a more sustainable way (Herlin, 2004). The object of this will be to maintain ecological factors such as biodiversity, conserve natural resources and at the same time

improve upon the quality of the human environment in terms of infrastructure, aesthetic quality, cultural heritage, health, social functions and public open spaces (Selman, 2000; Herlin, 2004). Currently, Ghana is undergoing an increased rate of urban growth, with most of its population living in urban cities and with a high demand on urban land. The increased growth in the density of towns and cities often takes place through the development of the remaining open spaces within the urban area. This results in loss of open spaces and green spaces, which comes with negative consequences for urban recreation and local distinctiveness within the urban centre (Herlin, 2004).

There is a weak state control in spatial planning and an over concentration on ‘formal’ plans or schemes (Roy, 2005; Watson, 2009). Spatial planning in Ghana has mostly been the preparation of formal plans/schemes without taking into consideration the social dimensions of productive engagement and involvement of the residents of the locality. The spatial planning system of Ghana creates a series of formal plans, offering the locality no opportunity to consider the complexity of the plan and to integrate uncertainty in such a way as to make it possible to develop and implement formal plans while making provision for self-organization as an integral part of the planning process (De Roo, 2010). Even as these formal plans have been prepared, there is no strict compliance of people adhering to these them since their supervisory department is ineffective in the discharge of their duties.

Again, the governmental departments in charge of spatial planning does not take into consideration the terrain or landscape of the area in the course of preparing and planning for the area. One the effects is that a piece of land for farming could be on a sloppy hill which may not be viable for the intended crops to be planted. Additionally, because the terrain of the area is not taken into consideration, a marshy area could be allocated for settlements which may be an expensive venture for anyone who would want to build in such an area. This is because the area would have to be filled with materials which will increase the cost of putting up the structure.

Moreover, haphazard development and unplanned urbanisation (Cobbinah *et al.*, 2015; Nwaka, 2005) affects spatial planning in Ghana. Oftentimes, it becomes very difficult for the governmental agency in charge of spatial planning to factor in the current state of the area into the proposed scheme and even when they want to do so, they do not involve the people living in the community. Because there is lack of community participation in the spatial planning process, knowledge and information to help improve the process (Hassan *et al.*, 2010) is limited and as such there is no consensus between stakeholders. This goes a long way to decreased general support for policies regarding the planning of the area.

In summary, the spatial planning system in Ghana has been very weak and ineffective. Lack of community participation has reduced the general support for policies regarding the spatial planning process and proposed schemes. Hence, this has really affected the development of both urban centres and peri-urban areas in the country.

#### **4 INADEQUACIES IN SKILL DEVELOPMENT**

Several public and private organizations/companies in Ghana make use of Spatial Planners and indeed some Universities in Ghana run various Spatial Planning related programmes.

- a. Kwame Nkrumah University of Mines and Technology – Department of Planning
  - i. BSc. Development Planning
  - ii BSc. Human Settlement Planning
- b. University of Cape Coast – Department of Geography and Regional Planning
  - i. BSc. Geography and Regional Planning
- c. University of Developmental Studies – Faculty of Planning and Land Management
  - i. BSc. Planning

However, for Spatial Planners and Designers to be at the forefront of handling land use, spatial planning and design issues effectively and efficiently, more spatial planners and designers are needed at the various districts, municipal and metropolitan areas with a strong surveying and mapping sciences foundation. Although these institutions have some surveying and mapping courses, there is the need to add more and revise their contents to meet the changing demand of the land use, spatial planning and design profession in Ghana. More short and refresher courses should be organised for practicing planners to broaden their knowledge and scope in the new development in spatial planning.

The skill gap currently is the inadequate planners with expertise in handling and management of Spatial and non-Spatial Information in both the public and private sectors of Ghana. This invariably will hinder the full implementation of the Land Use and Spatial Planning Authority mandates. This Spatial Planning and Design programme will develop scientific and professional capacities which will address the current educational planning issues hindering development.

Therefore, the establishment of this programme is a major prerequisite for successful implementation of the National Spatial Development Framework and the Land Use and Spatial Planning Act 2016, (Act 925). This new programme has the various courses that cover the scientific and professional aspects of a Spatial Planning and Design.

#### **5 RELEVANCE OF INTEGRATING SURVEYING AND MAPPING SCIENCES IN SPATIAL PLANNING AND DESIGN PROGRAMME AT UMAT**

Land is critical to the economic, social and cultural development of a country. The need for effective and efficient planning of the use of land cannot be over stated. Spatial planning and design can be used as an instrument to coordinate socio-economic development by preventing environmental problems and simultaneously protecting the natural and cultural environment. The challenge for planning is to ensure the efficient use of limited land resources and to

contribute to balanced regional business development and balanced use of resources, including natural and landscape resources, soil, water and air. Spatial planning has a long-term perspective, and takes into account sustainability.

Several government policies and strategies have been implemented to solve the problems related to land use and spatial planning. However, efforts to solve the problems of land degradation, conflicts with planning schemes and cadastral plans, have brought to the fore many challenges. In this regard, the government has established the Land Use and Spatial Planning Authority with functions which are geared towards addressing the many challenges facing the Planning of the country. Many people argued that the challenges have been aggravated by the lack of: expertise in land use and spatial planning; proper implementation of policies; and holistic application of Geo-spatial techniques in the planning and design processes.

The education and training in the planning sectors in Ghana has not critically responded to the needs of the country and has continued to produce planners with little background in handling spatial data in the planning process at the university level. Spatial planning and design as a discipline has not been fully looked at in Ghana. The current programmes run at our universities place more emphasis on settlement and development planning with little programmes in Geographic Information System (GIS) and related applied surveying and mapping science courses. This trend is worrying because there still exists considerable need for studies in spatial planning and design. Some of the proposed courses from surveying and mapping science for this new programme are: principles of Surveying and mapping, Cadastral Surveying, 3D and Multi-Purpose Cadastre, Geo-Informatics for Disaster Management, Land Information System, Geographic Information System (GIS), Remote Sensing, Global Navigation Satellite System (GNSS), and Geo-Informatics for Transportation planning. Other relevant courses that will strengthen the knowledge in the spatial planning and design are: Critical and Creative Thinking, Spatial Multi Criteria Decision Analysis, Artificial Intelligence application to spatial planning, Computer programming and requirements for Land Use and Spatial Planning by the Land Use and Spatial Planning Authority among others. All other relevant Urban/city/town/settlement planning courses will be included alongside the courses mentioned.

## **6 PLANNED GROWTH, DIRECTION AND IMPACT OF THE PROGRAMME AT UMaT**

The planned growth of the programme is to ensure that innovations in surveying and mapping sciences as well as Spatial Planning and Design are periodically incorporated in the programme at UMaT. Emphasis will be placed on practical training. The students will undergo field camping in any selected community during their long vacations to help in addressing Spatial Planning and Design issues. This will be done in consultations with the District/Municipal Town and Country Planning officers. Practical attachment will also be organised for the students. Detailed report shall be presented to the Department using the

UMaT format for field trip and industrial attachment report writing. The programme when fully implemented will become the corner stone for the training of the much-needed spatial planners and designers for Ghana, the west Africa sub region and Africa as a whole. The impacts of the graduate of the programme will be as follows: specialised skilled spatial planners and designers in both the private and public sectors changing the phase of spatial planning in the country; graduates with excellent skills in mine infrastructure planning and design, commercial/industrial environmental planning and management and natural resources management; competent graduates who will be solving spatial planning related matters diligently, critically and logically based on the Land use and Spatial Planning Authorities guides/documents and other related guidelines in the west Africa sub-region and Africa as a whole; and competent strategic spatial planners and designers capable of using artificial intelligence in solving complex problems in the spatial planning and design sector; and graduates who possess leadership and professional qualities as well as able to contribute to the planning, management and development of land locally and globally. The impact of the products of the programme from UMaT will positively contribute to the socio-economic development of Ghana and the rest of Africa.

## 7 CONCLUSIONS

In the education of spatial planners and designers, it is imperative to carefully and holistically identify various relevant courses that will train students who will meet the needs of the spatial planning sector of the country. Surveying and mapping sciences has been identified as the bedrock of spatial planning and design and hence the need to focus more in this area.

In view of that, the Spatial Planning and Design programme being proposed at UMaT has adopted various strategies to develop a more holistic programme that incorporates surveying and mapping science courses. The researchers in this study recommends more support from sector agencies locally and globally to help achieve the aims and objectives of the programme at UMaT.

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