

Strategy for Organising a Smart Department of Geomatics in Nigeria – a case study

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ABSTRACT

The department of Surveying is the engine room for the production of smart surveyor and surveying knowledge. The simple set up of traditional department cannot produce smart surveyors because of challenging and changing geospatial market, technology, knowledge and the unpredictable environment. The limited resources in Nigerian universities further exasperate the problem, also very limited support from outside the university. It further hard for an entirely new department in which case there will be low grade academic staff and harder if the university is situated in the Borno state of Nigeria where there is insurgency going on – very difficult to attract high calibre lecturers. This work reviews the tradition setting of surveying departments and the minimum benchmark required by Nigerian Universities Commission (regulatory body) in order to examine their capacity to produce smart surveyor for the Nigeria market and survive.

The work will use personal experience of how typical organisation of a geomatics department is structured, for example Department of Geomatics, A. B. U. Zaria. And compare it to how the departments are structured in Europe and America. A further literature review is carried out on university standard virtual courses and collaboration that can be adoptable in surveying training.

The results will involve coming up with courses that will produce smart surveyors, course that could be taught virtually, hence the department must not have staff on ground, and courses that must be taught directly on ground. The nature of diplomas to be issued. The literature review will show the advance in organising and delivery of courses, and researches needed.

Department of Surveying can no longer be organised in the traditional way if it wants to survive and produce smart surveyors. Geospatial knowledge is ever increasing in demand far beyond the traditional survey, this work provides a direction on department could transform with limited facility.

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INTRODUCTION

The establishment of a typical department in a university in Nigeria is mainly guided by the university's Senate, National University Commission (NUC) and how similar departments are organised in other Nigerian universities. The above only provides guidance, the university must find the resources to make the department functional. It is in the issue of finding resource that a new Geomatics department has problems. It is particularly in the issue of staffing that is difficult for a place like Maiduguri (the epicentre of Boko Haram Insurgency). In ordinary times it very difficult to hire high level geomatic staff, the issue of insurgency adds to the problems. Therefore, there is need for strategy.

A geomatic department is involved in producing knowledge and skills. A knowledge and skill for a particular market, otherwise it will not survive. The evolution of Geomatics (Bédard, 2007) and geomatic education (Jaton and Bédard, 2007; Fajemirokun et. al., 2002) has some that it is necessary to innovate in order to survive in the geomatic field. It is very necessary to demonstrate innovation in various aspect of the department.

Geomatics is essentially technology driven programme or department (Bédard, 2007) with human dimension within a university system. It is one thing to get the department function by getting the technological resources available; it is another to get the human dimension to produce geomatic knowledge and skill; and yet the graduates of its programmes meet the needs of the society and their personal needs.

The concept of smart has been applied many aspects of like for example cities (Greco and Cresta, 2015; Maro et. al., 2017), smart technology (Worden, et.al., 2003), and is often associated particular area of studies or human endeavour, for example Education (Borisenko and Volodina. 2015), and smart university (Nuzzaci and La Vecchia, 2012). A smart university creates technological infrastructure and culture that enhances students' academic, 'Enhance interaction, activating and exploiting ICTs', flexible learning systems; and 'Increase the attention given to personal evaluations and to the effects of real feedbacks', enhanced capacity through network (Nuzzaci and La Vecchia, 2012).

The struggle of developing a geomatic department with little expert around is not new. Ahmadu Bello University (ABU) Department of Geomatics Zaria is a good and a close by example. And indeed ABU Geomatics has made progress. However, as the Department of Geomatics University of Maiduguri (Unimaid Geomatics) must not simply copy ABU. To do that the following question must be asked of ABU Geomatics: what are its the weakness and strength in producing geomatics knowledge and skills? Is it really a smart department according to some

criteria by Nuzzaci and La Vecchia , 2012 (although they were referring to a university)? How smart it is in relation to its market?

This paper first describe the organisation of ABU Geomatics and analyse it and make recommendation for Unimaid Geomatics.

The Structure and Programmes of ABU Department of Geomatics

The Mission of the Department of Geomatics, Ahmadu Bello Bello University (ABU), Zaria is to provide its students and faculty, “with the best possible resources and conditions for learning and research... dedicated to excellence, equity, societal progress, international exposure and mutual respect through:”

1. *Co-operating with government, business, industry, professional bodies, and the general community, to apply new knowledge, prepare its students for fulfilling careers, and improve the quality of life through leading-edge education and research.*
2. *maintaining a viable, efficient and relevant academic unit providing high level undergraduate and continuing education in Geomatics, suitable for productive professional and technical careers with principal emphasis on satellite systems, spatial data collection techniques, digital mapping, and spatial analysis using geographic information technology while constantly working to build Geomatics into a discipline of increased recognition and reward; and*
3. *Providing accredited undergraduate programs in Geomatics which satisfy the requirements of the National Universities Commission (NUC) and its authorised agents, the Surveyors Council of Nigeria (SURCON), and other specializations for outstanding practice of their profession.*

The Organisation

The training of land surveying in ABU Zaria started under the Department of Civil Engineering. It then became Department of Surveying, sharing the department with Quantity Surveying. The department from inception offered B.Sc. Land Surveying, but then changed to offer Bachelor of Engineering in Geomatic Engineering in 2006 and revert back to B.Sc. Geomatics. This change also coincides with moving it from Faculty of Engineering to Faculty of Environmental Design.

The department offers one single five-year degree program and four levels of Postgraduate programmes (Postgraduate diploma, M. Sc. and M. Phil, and PhD). The department for a long time suffered from inadequate academic staff. In order to deal with the need, it employed the use of visiting lecturers to mount a postgraduate programme. In the last 8 years it was able to get four of its staff to acquire the PhD degree within the department and 2 others from outside the university and employed about 10 graduates to its M. Sc. programme who are presently enrolled in PhD.

The department has twenty-one full lecturers: one Professor, one reader, six Senior Lecturers, four Lecturer-1 and nine are Lecturer- II. Of these four are visiting lecturers. These academic

staff can be broadly classified into Geoinformation Science group having ten lecturers and Geodetic and Navigation Science having eleven.

The BSc Geomatic Programmes

Professionally Geomatics is professionally regulated by Surveyors Registration Council of Nigeria (SURCON). This is one of the target of BSc geomatics. There is a historical relationship, in the 1970s and 1980s the geomatics department was called Land Surveying Department, and was professionally regulated by The Surveyors Licensing Board. The board in 1989 transformed to SURCON. The transformation of the two were not parallel, since it was not the same force that caused the changes, but the relationship was maintained, and fundamentally it is the same group of people in the two. Again, there is the National University Commission (NUC) a government agency that regulates programmes in universities, it also benchmarks for courses ran by universities and accredit it. Finally, the department is supervised by the Faculty and the University Senate.

ABU Department of Geomatics designed its present BSc program partly with changes going on in the field as demonstrated by other universities across the world, and in compliance with NUC and SURCON and its history of training surveyors for nearly 50 years. A student is offered over 100 courses in the department and 13 from other departments (Table 1) and a student is required to attend at least 180 credit units in 5 years before graduating. The courses within the department can be classified as shown in Table 2, with more cores in the Geospatial area (GIS, Remote Sensing and Photogrammetry, 37%), Traditional Surveying (Surveying and the computation Surveying, 19%), Geodesy (including Navigational Science) 11%; almost one quarter of the period spent to graduate will be on practicals. In general, a student going through a BSc Geomatics spends about half his time in the core geomatic courses and a third in Mathematics and basic science, the rest will be in general studies and environmental studies and less than 1% in Engineering courses (Figure 1)

Table 1: Distribution of ABU BSc program in credit units

S/No.	Department	Core	Cognate	Restricted Elective	Total
1	Architecture			4	4
2	Chemistry			3	3
3	Computer Science		2		2
4	Civil Engineering		2		2
5	General Studies		9	1	10
6	Geography		2	6	8
7	Geology		1		1
8	Geomatics	92		10	102
9	Mathematics		27	11	38
10	Physics		6	7	13
11	Quantity Surveying			6	6
12	Statistics		6		6
13	Urban and Regional Planning		2	10	12
14	Water Resources Engineering		1		1
	Total	92	58	58	
	Percentage of 180 minimum required Credit Unit	51	32	17	

Table 2: Proportions of the Aspects of Geomatics

Aspects of Geomatics	Credit Unit	%
Cadastral	4	4
Computational Surveying	7	8
Geodesy	10	11
Geospatial Information Systems	24	26
Hydrographic Surveying	4	4
Mining	2	2
Photogrammetry	6	7
Practicals	21	23
Remote Sensing	4	4
Surveying	10	11
Grand	92	100

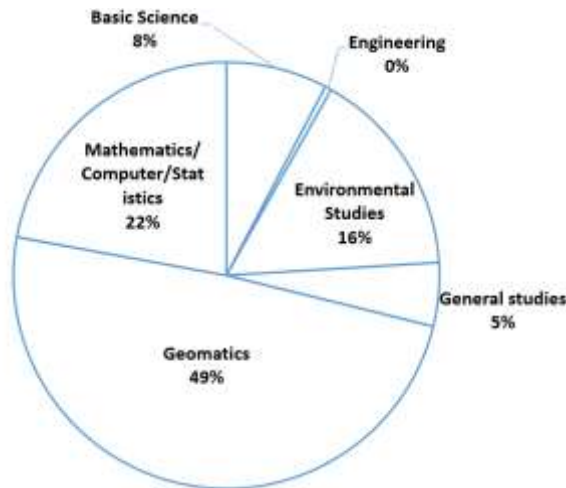


Figure 1: the grouping of ABU BSc Geomatic Courses

The Postgraduate Programme

The lowest postgraduate programme offered by ABU Department of Geomatic is Postgraduate Diploma its main target are people with third class degree and HND graduate. The second level is the MSc Geomatics. It offers two option in Geodetic and Navigation Science option or Geoformation, which not reflected in title of the degree. The third level is the MPhil and PHD programmes.

DISCUSSIONS

ABU's model to a large extent provides pathway for Unimaid-Geomatics, in this regards here are some weakness and strength of the ABU's model:

Weakness

The history and direction of ABU Geomatic is largely focus on surveying and the existing geomatic market in northern Nigeria. For a while it offered Geomatic engineering, but change to B. Sc. Geomatics. It also had to move from Faculty of Engineering to Faculty of Environmental Design. That movement was more about what faculty should house geomatic rather than the opportunity it will give the graduates. In any case it was not about strategy. It also shows how external forces are at work on some of the decision of the department.

It is understandable that the focus of its programmes are BSc, Postgraduate Diploma, MSc and PhD and these programmes are fundamentally Surveying, though the products (students and graduates) have high flavour for the advances in geomatics. The department has failed to see the larger market consisting of people who are not interested in becoming surveyors but nevertheless need geospatial knowledge from geomatic perspective. For example, a health worker (health data expert) or a researcher would require to analyse logistics, and would want to learn how to do it. Another example is that there are many students (especially in postgraduate researches across many fields) who need small aspect of geomatics. There are no formal short term trainings targeting people that will not be surveyors - that is a market unexploited. There are virtually no marketing activities to attract the market (the non-

professionals who may need geomatic knowledge). Historically, it is unethical for surveyors to advertise the survey service.

The Geomatic curriculum involves a lot of fieldwork (Table 2), but most of the practicals are in surveying. Although, a student must learn to work with other students, there is no deliberate effort to teach cooperation and collaboration. Geomatics is a profession that works with geospatial professionals in other fields such as town planners and even non geospatial experts (health workers, as mentioned above), while students are encouraged to take courses outside geomatics, the focus is mainly in gaining knowledge of course and not on how to work with others to produce geomatic solution.

Strength

The major strength of ABU-Geomatics is its ability to build its resources. Its attempt to acquire high quality academic staff on fulltime basis was not quite successful, but it was able to get them come on Sabbatical and visiting, and channel that effort to build its staff and produce postgraduate degree holders which they employed. The second area of strength is its ability to attract postgraduate students; it has students at all levels of its postgraduate programmes continuously.

Whether ABU Geomatics is Smart

The question is whether ABU as a university and the Department of Geomatics have a technology infrastructure and culture? Rather using an elaborate list as in Nuzzaci and La Vecchia , 2012 one will use personal experience to answer the question. While ABU has deployed some level of ICT services it is yet to have continue an all presence internet service within campus with subscription to geospatial service such as ESRI, this a different experience with the service one find at Cranfield University UK. While at Cranfield one will require smart ID and have high quality services, one knows on that campus one is in a technological environment.

There is a gap in application of the GIS it teaches and student database it keeps as at the time I was there. Although there are several applications of the use of geospatial, there is no such solution directed at attracting customers or created new niche in the Geospatial market

Strategy for Smart Unimaid Geomatics

Unimaid Geomatics should see the existential threat as continuous, not cured by the change in name from land surveying to Geomatics. As technological forces forced the changes it also brought innovation, innovation is the key to survival for the profession, the department and the graduate. The department is starting with very little resources, the use innovation will help create it life and future. The following are recommendations following the analyse ABU Geomatics and related material in this paper:

1. From onset create the infrastructure for ICT based learning environment in the department and with the larger facility of the university.

2. The staff and the students in the department should develop a technology culture – from 100 level.
3. Lower cadre academic staff should find the departmental facilities adequate to facilitate the development’
4. To immediate launch a postgraduate programme that can draw resources from anywhere without necessarily having the lecturer on ground and facilitating the short term stay of lecturers
5. To inculcate the concept of marketing in building the department as a brand. Producing variety of service and enhance its finances. Produce graduate with capacity to create market niche.
6. Involving in high level research that will build its facilities.

CONCLUSION

The historical lessons of the evolution of Geomatics is the key to its present and future successes. Innovation is the keyword. In order to exploit the vast geospatial market, geomatics must not only feed existing market, it must create market. In this wise, its BSc and MSc programmes must not be a strait jacket, training to be a Surveyor that will be registered by SURCON in Nigeria. The programmes must include Geospatial or Geomatic marketing and Innovation in Geomatics.

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