

# Land Use Plan: A Guide to Sustainable Development of Waziri Umaru Federal Polytechnic, Birnin Kebbi, Nigeria

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**Abstract:-** The importance of a land use plan cannot be overemphasized hence its inclusion in the requirement for the establishment and continuous accreditation of any tertiary institution by the regulatory bodies in Nigeria such as the National Board for Technical Education, National University Commission, and National Commission for Colleges Education. Pursuant to this, the Waziri Umaru Federal Polytechnic commissioned its department of Urban and Regional Planning to prepare a land use plan as a guide for the development of her permanent site. The beauty of any plan is in its implementation and tertiary institutions are seen as models in midwifing theory and practice and should be above board in the implementation of its development plans. Eleven years after its approval by the Management of the institution, there are observed deviations from the provisions of the plan, which necessitate this research that seeks to determine the extent of deviation. The paper relied on information and spatial data from the Waziri Umaru Land Use Plan 2010, googleearth pro high resolution image and coordinates obtained using differential Global Positioning System to establish areas of deviation in the implementation of the plan. Explanations for deviations came through interview of the officials of the Physical Planning Department (PPD) and the management of the institution. Results revealed gross deviation from the proposals where the sizes of lands proposed in the plan were not complied with; change of location of proposals without recourse to the plan, introduction of items that were not initially captured in the plan among others. Reasons for deviation included but not limited to the following: poor understanding of the provisions of the land use plan; non-recruitment of planners to help interpret the land use by the PPD; and poor funding. A review of the land use plan is recommended and employment of planners in the PPD should be mandated as ways of curbing future deviation and ensuring sustainable development.

## I. INTRODUCTION

One major requirement for the establishment of polytechnics in Nigeria by the National Board for Technical Education (NBTE) is the preparation of a campus plan. A campus plan sets the direction, guidelines, phasing for the development of an institution. Once signed into law, it becomes the only document that provides the basis for physical development of the institution. In pursuant of this, the Waziri Umaru Federal Polytechnic, Birnin Kebbi in June 2010 commissioned the Department of Urban and Regional Planning to prepare a Land use plan to guide its development.

Eleven years post endorsement and acceptance as the blueprint for the development of the institution, provides an opportunity for assessment of its implementation vis-à-vis notable deviations in the implementation of the plan.

Plan implementation generally has become a huge challenge in developing countries as good plans are prepared but end up on the shelves of offices without recourse to implementation. In some cases, good plans are prepared but implementation is carried out in variance to the proposals in the plan. This is a common practice in Master Plan implementation in Nigeria, but one would expect a different approach from tertiary institutions, where best practices are championed.

University of Regina Campus Plan (2011) defines a campus plan as an approved policy guide for the development of a campus building on the strategies of the previous plan and maintaining continuity in responsible development in consistent application and regular updating and review. The Waziri Umaru Federal Polytechnic (2010) sees a campus plan as an attempt to provide a sustainable guide for effective physical development of a conducive learning environment. In urban planning, land use planning seeks to order and regulate land use in an efficient and ethical way, thus preventing land use conflicts (Long, et al, 2020). Land use planning is a tool used by government to manage the development of land within their jurisdictions. In doing so, the governmental unit can plan for the needs of the community while safeguarding natural resources (Silberstein & Maser, 2013).

### A. Conditions Necessary for Land Use Planning

- Community relation: This refers to the involvement of the residence of the community being planned.
- Government and legal support: the government supports land use planning initiatives in a diverse ways. The first is by financing land use planning activities and the second way is by reducing bureaucracy and administration bottlenecks that comes with its implementation (Savini&Aalbers, 2016).

### B. Principles and concept of the Waziri Umaru Federal Polytechnic Land use Plan

The central administration area and the surrounding development around it are patterned on a integrated concept. Allocation of land uses around the Central Administrative block is in linear pattern but generalized in nature. They include the Bookshop, ICT 1, Staff Residential areas, staff school, Rector's residence, polytechnic lodge, and council Lodge. The administrative block is the focal point of attraction while other land uses are allocated around it in a generalized approach in linear nature which allows some degree of flexibility in its implementation and development.

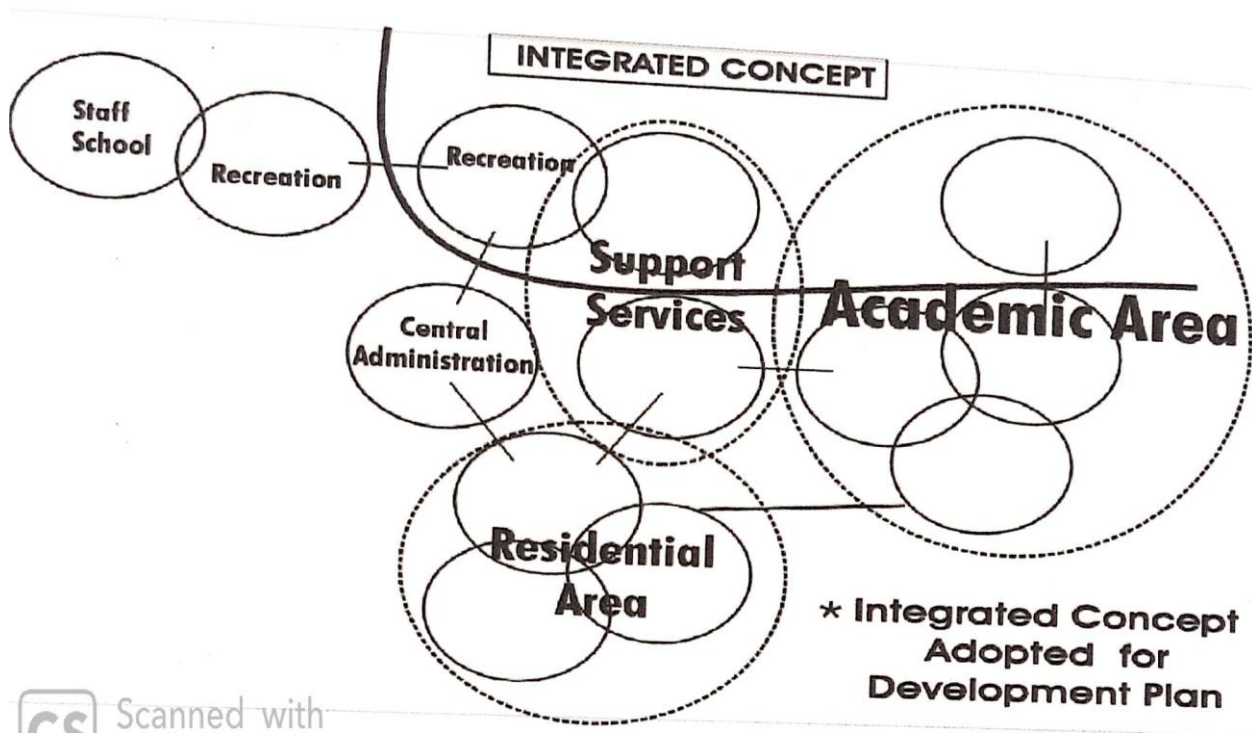


Fig. 1

**Source:** Waziri Umaru Federal Polytechnic Land Use Plan 2010

The concept maintains a walking distance for instructional activities within the plan, a walking radius of 15 – 20 minutes between the colleges to another is ensured. It anticipated the emergence of academic programmes and technological needs of the institution. It organizes uses to appropriate clusters in the campus such as administrative and academic clusters. Provide enough land to realistically support land uses, especially future development of the colleges, staff and student housing. Accessibility within the campus is enhanced by keeping facilities in close proximity near the core academic area.

## II. METHODOLOGY

The research relied on spatial data for assessment of deviations and ascertaining actual areas of various activities using Google earth pro imageries in an Arc-GIS software. Also the land use plan was sourced from the Physical Planning Department of the Polytechnic. The acquisition of spatial data was undertaken using the following procedures:

- Collection and scanning of the land use plan of the study area
- Downloading of Google earth pro imagery of the study area
- Differential GPS survey was used to obtain Coordinates
- Geo-referencing of the imagery and land use plan of the polytechnic. The coordinates generated are contained in table 1.

S/N	NORTHING (m)	EASTING (m)
1	633329.531	1378621.342
2	632573.711	1378330.741
3	633127.861	1377634.921
4	633518.472	1376684.261
5	635048.511	1378912.627

Table 1: Coordinates of Points used for geo-referencing

Source: Field Data, February 2022



Fig. 2: Digitized map showing points used for picking coordinates

- Digitization of the geo-referenced imagery and land use plan. The google earth pro image and land use plan were digitized using Arc-GIS 10.2 thereafter areas of various land uses were determined and attribute data generated.
- Validation

The essence of validation is to ensure that whatever process used in computation of areas through the digitized image is accurate. Below is the calculations used in checking validation. The first three coordinate on the table above were used.

$$633329.531 \quad 1378621.342$$

$$632573.711 \quad 1378330.74$$

$$DE= -755.821 \quad DN= 290.601$$

$$D = \sqrt{DE^2 + DN^2} = \sqrt{755.821^2 + 290.601^2} = 809.761m$$

$$632573.711 \quad 1378330.741$$

$$633127.861 \quad 1377634.921$$

$$DE= 554.150 \quad DN=-695.820$$

$$D = \sqrt{DE^2 + DN^2} = \sqrt{554.15^2 + 695.82^2} = 889.529m$$

S/N	Measured distance (m)	Calculated distance(m)	Difference (m)
1	809.770	= 809.761	0.009
2	889.529	= 889.521	0.008

Table 2: Validation table

Interview was used to acquire information relevant to the deviations in the implementation of the land use plan from the Director of Physical Planning Department as well as the top management of the polytechnic.

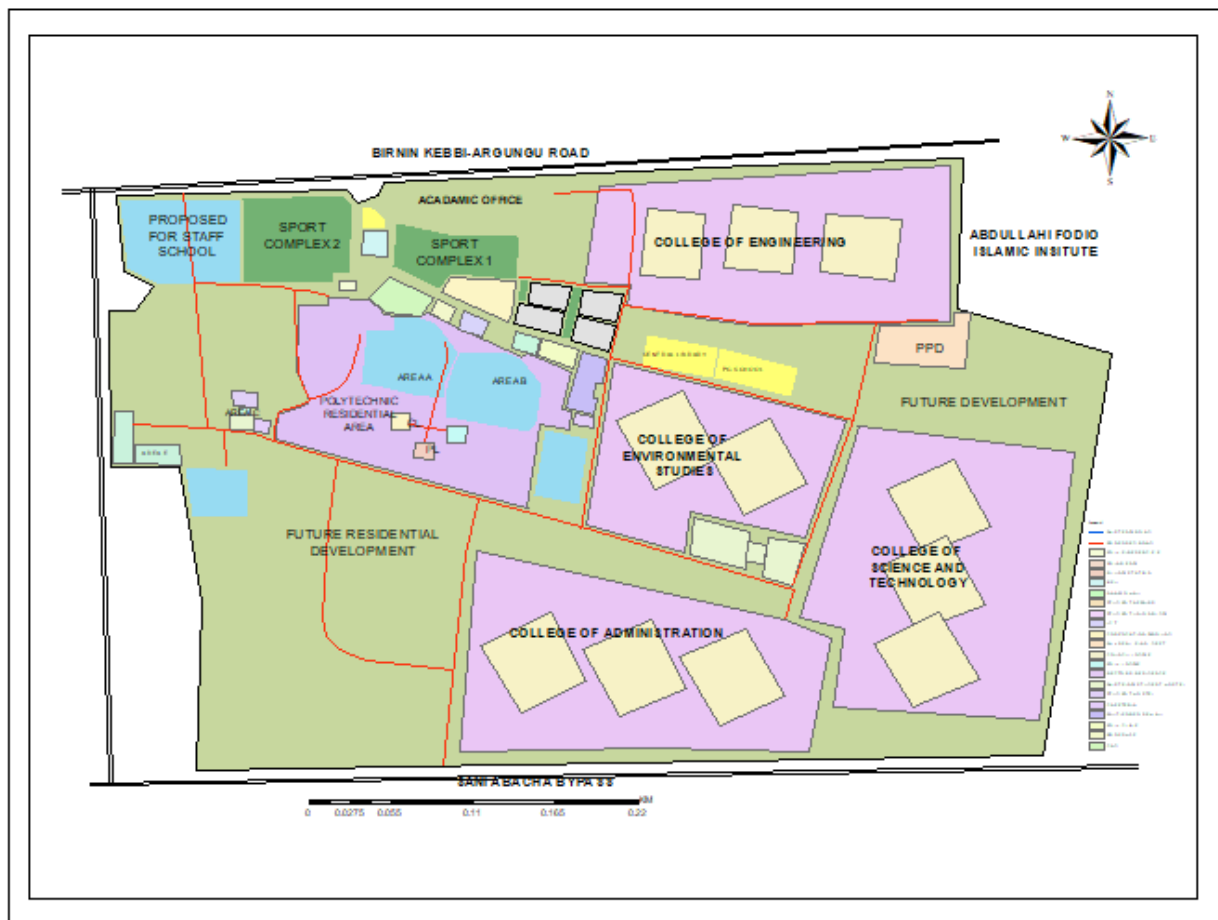


Fig. 3: The proposed Land use Plan of Waziri Umaru Federal Polytechnic

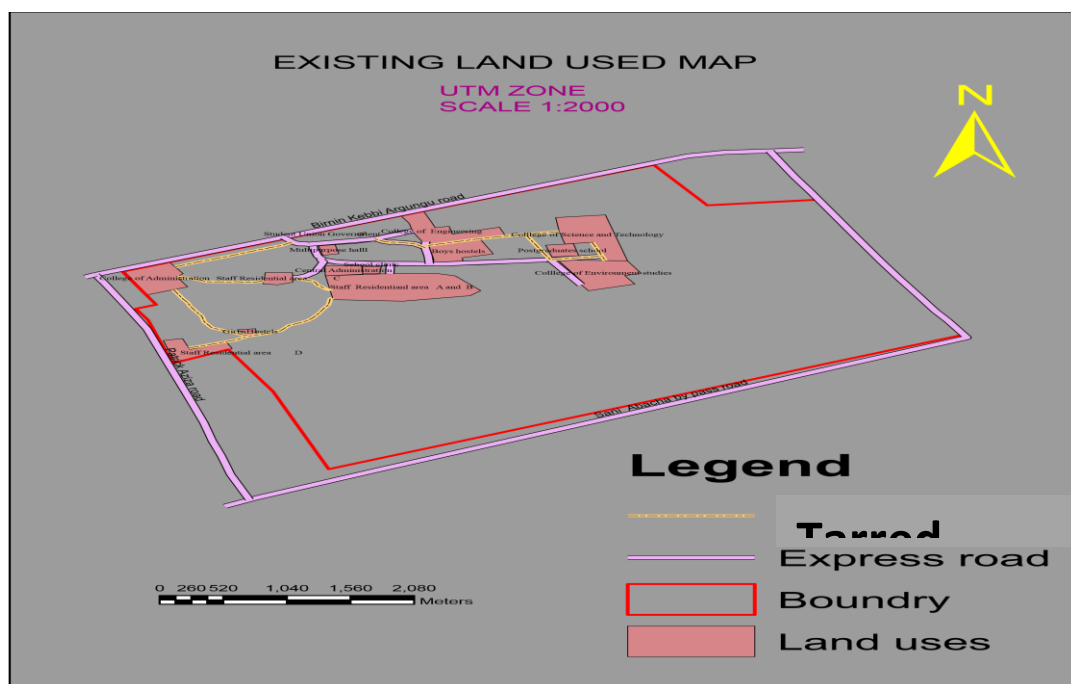


Fig. 4: Existing Land use of Waziri Umaru Federal Polytechnic

### III. ANALYSIS

College	Status	Proposed area (Ha)	Actual area used (Ha)	Difference (Ha)	Percentage of developed area	Percentage of undeveloped area
Administration	Not developed	53.0112	Nil	53.0112	0	
Engineering	Developed	46.2745	4.5410	35.4450	9.8	90.2
Environmental studies	Developed	31.5527	6.1222	21.8327	19.40	80.6
Science and Technology	Partially developed	58.1369	6.2339	48.5569	10.72	89.28
Total		189.5753	16.8971	172.6782		

Table 3: Deviations in the core academic area

Source: Adapted from Waziri Umaru Land Use Plan, 2010

It can be deduced from table 3, that the development of colleges in the permanent site has not exceed the proposal in the land use plan. This is because the plan envisaged expansion of colleges through the introduction of new programmes and additional streams of students. It can also be deduced that there is over allocation of land in the proposal which does not indicate sustainable use of land. The college of administration is the only college that its development is yet to commence hence its percentage of development remains unchanged at 100%. The college of

engineering is fully developed likewise the college of environmental studies yet both still have land difference that is three and two times larger than the already developed land respectively. While the college of science and technology is not fully development but the area being developed is five times less than their reserved land as proposed. There is also a slow pace of development of the campus which is majorly attributed to paucity of funds as explained by the school management.

Proposed land use	Status	Proposed area (Ha)	Actual area used (Ha)	Difference (Ha)	Percentage of used land	Percentage of unused land area
Administrative block	Developed	1.2747	1.1803	0.0944	92.59	7.41
Post Graduate Diploma	Developed	2.2123	0.0850	2.1273	3.84	96.16
Bookshop	Not developed	0.2415	Nil	0.2415	0	
Multipurpose Hall	Developed	0.4453	0.5338	-0.0885	119.84	-19.84
Shopping Mall	Not developed	1.3224	Nil	1.3224	0	100
Student Union Building	Developed	0.1400	0.0505	0.0895	36.07	63.93
Cafeteria	Not developed	0.1273	Nil	0.1273	0	100
Total		5.7635	1.8496	3.9139		

Table 4: Deviations in Central Administration area

Source: Adapted

The level of implementation of the administrative block is at its proposed location, findings reveals that the area developed is 92.59% constituting a shortfall of 0.0944Ha of proposal, leaving only 7.41% of unused land as proposed in the land use plan. Postgraduate School is fully developed in a different location and is occupying only 3.84% of proposal with a shortfall of implementation of 2.1273Ha, this then shows that 96.16% of the proposed land for postgraduate school has not been used. Bookshop is proposed in the land use plan but not yet implemented as such still retains its total land area of 0.2415Ha constituting 100% of unused land. The multipurpose hall has been developed and exceeds the land area proposed with

0.0885Ha constituting 19.84% beyond the proposed area indication a deviation from what is proposed. Shopping mall is yet to be developed but the area assigned for its development has been converted for Entrepreneurship development centre. The student Union building has been developed in a different location and occupies only 36.07% of the total land allocated for its development having a shortfall of 0.0895Ha, leaving 63.93% of the total allocated land in the land use plan unused. The space allocated for development of cafeteria has not been developed and the entire assigned area is still available for possible development constituting 100% of 3.9139Ha.

Hostels	Status	Proposed area (Ha)	Actual area (Ha)	Difference	Percentage of used land	Percentage of unused land
Hostel (West) Female	Developed	5.1428	3.7101	1.4327	72.1	27.9
Hostel (Central) Male	Developed	0.6161	0.2532	0.3629	41.10	58.90
Student Hostel (East) proposed	Not developed	3.5889	Nil	3.5889	0	100
Total		9.3478	7.5522	1.7956		

Table 5: Deviations in Student Housing

From Table 3, the actual area used for female hostel (west) is 72.1 percent as compared to the proposed area. Again, male hostel (central) is not up to half of proposed area as indicated in land use plan of the school as captured 41.10% against 58.90% from the table above. More land

was used in female hostel (west) as compare to male hostel (central). The proposed hostel (east) in land use plan has not been developed hence the percentage of used area 0% in table 5.

#### • Staff Housing

Types of Use	Proposed Area (Ha)	Actual Area (Ha)	Difference (Ha)	Percentage of used land	Percentage of unused land
Residential	36.4460	15.5466	20.8994	42.66	57.34

Table 6: Land Area for Staff Residential Development

This table indicates that staff residential area used not up to half of proposed area from land use plan of the school as indicated in the table, 42.66% compare to 57.34%.

Support Service	Status	Proposed area	Actual area	Difference (Ha)	Percentage of used land	Percentage of unused land
Central Library	Developed	1.9539	1.1337	0.8202	58.02	47.98
Polytechnic Clinic	Developed	0.7494	0.4214	0.3280	56.23	43.77
Bank	Not developed	0.3314	0.3314	Nil	0	100
Fire service	Not developed	0.1363	0.1363	Nil	0	100
Information, Security and Protocol Unit	Not developed	0.4584	0.4584	Nil	0	100
Petrol/ Gas station	Not developed	0.2914	0.2914	Nil	0	100
Polytechnic Mosque	Developed	2.7536	0.0732	2.6804	2.66	97.34
Polytechnic chapel	Not developed	2.4635	2.4635	Nil	0	100
Physical Planning Department	Not developed	3.6027	3.6027	Nil	0	100
Polytechnic staff school	Developed	5.0083	4.1253	0.8790	82.37	17.43
Total		17.7489	13.0373	4.7076		

Table 7: Deviations in Support Services

Data in table --- reveals the level of implementation of support services as proposed in the plan. The Library location is not changed however, the actual development on ground covers only 58.02% of the proposed area in the land use plan, leaving 47.98% shortfall of implementation of the proposed area. The Polytechnic Clinic development complied with the proposed location in the land use but fallen short of exhausting the proposed area by 43.77. The Polytechnic Mosque location is changed and implementation represents only 2.66% of the proposed area in the Land Use plan. The polytechnic Staff School currently serving as the College of Administration records the highest level of implementation yet lower than the proposal by only 17.43%. The following support services are yet to be implemented: Bank, Fire Service, Polytechnic Chapel, and Physical Planning Department. This is attributed to poor state of funding for capital projects in the institution, where over dependence on TETFund limits the implementation of the land use plan to its full capacity.

#### IV. RESULTS AND DISCUSSION (FINDINGS)

The space allocated for shopping mall/ community market in the existing land use plan has been concerted to an Entrepreneurship Development Centre. The Polytechnic staff school is developed but currently being occupied by college of Administration. The Postgraduate Diploma School is developed at a different location from the location assigned to it. The research also found out that many support

services proposed have not been implemented such as the Bank; fire service; chapel; cafeteria; bookshop; shopping mall; petrol/gas station; Student Hostel (East); and Physical Planning Department.

The research findings revealed that the land use plan for the Polytechnic was prepared in 2010 without any specified time frame for implementation and review. This makes it difficult to alter the proposals of the plan.

A Campus Master Plan is an approved policy guide for the development of a campus, building on the strategies of the previous Plan, and maintaining continuity in responsible development, in consistent application, and in regular updating and review. The Campus Master Plan provides clear direction for the implementation of meaningful buildings, and for the creation of great quality places as well as a pedestrian oriented and accessible public realm. In addition, a Campus Master Plan recommends further detailed studies as next steps that are necessary in realizing the full Vision of the Plan. The studies include a comprehensive housing strategy, a programming strategy, a detailed open space strategy, a way finding signage strategy, and an infrastructure plan (University of Regina, 2011).

Reasons advanced by Eja & Ramegowda (2019) for deviations and poor implementation of plans and implementation of government projects in developing countries include but not limited to poor financial capacity; inadequate costing and corruption; incompetence and lack of

knowledge; poor planning and estimation; political instability; poor communication; poor contracting and contractors practices; frequent design scope changes and errors; socio-cultural and political interferences; poor leadership.

Huang, C. & Cantada, I. (2019) listed the following as reasons behind the poor implementation of cities Master Plans in Tanzania: Inherent weaknesses in the master plans themselves; disconnect between spatial planning, sector or infrastructure plans and budgeting and investment planning decisions; the lack of coordination among key agencies; lack of or ineffective development controls; unrealistic planning standards and regulations; and limited capacity and resources for enforcement;

The factors identified to be responsible for deviations and poor implementation of the WaziriUmaru Federal Polytechnic Land Use Plan are poor financial capacity; and incompetence and lack of knowledge. The poor financial capacity is due to reliance on monthly government subvention which most times is grossly inadequate to cover the running cost of the institution let alone for land use plan implementation. The second reason of incompetence and lack of knowledge is explained by the lack of a Town planner and a Surveyor on the list of staff of Physical Planning Department of the institution which makes it difficult for the land use plan to be interpreted and implemented.

## V. CONCLUSION

This research centres on land use plan as guide to sustainable development of WaziriUmaru Federal Polytechnic, BirninKebbiNigeria. The polytechnic land use plan and downloaded Google imagery were both digitized and analyzed with the aim of achieving the purpose of the research. Results from analysis reveals over allocation of land by 90.2% for the development of College of Engineering as proposed in the land use. The Entrepreneurship Development Centre was not part of the land use but currently occupies the land area allocated for shopping mall in the land use plan. The Postgraduate Diploma School has been implemented in a different location other than where it was proposed in plan. Most supporting services proposed in the land use plan have not been implemented such as Bank, Fire service, Chapel, and petrol station. These services when provided would make life easy for both staff and students on campus. Above all, the Polytechnic land use plan does not have a specified implementation period, which leaves it open for delays in implementation and review. This is because the site assigned for the development of college of administration is yet to be developed.

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