

The Roles and Contributions of Nigerian Polytechnics in the Development of Surveying and Geo-informatics Education; Issues,Prospects and Challenges: A Global Perspectives

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Key words; Education, Geo-informatics, Polytechnic and Surveying.

SUMMARY

The aim of establishing Polytechnics in Nigeria is to train technologists, technicians and management skills in courses leading to the awards of Certificates, ND, HND and Advanced Professional Diploma which are relevant to the needs, aspirations and the development of the nation's diverse economy and industries. It is with that hope that such acquired training from such Polytechnics would lead to the transformation of the country's economy and industrial development. Surveying in particular is the bedrock of all developments, therefore the strengthening of training institutions particularly the Polytechnic sector must be of paramount importance.

The paper explored amongst other issues the Act establishing Federal Polytechnics in Nigeria and Polytechnics offering courses in Surveying and Geo-informatics. The prospects and challenges in such training were critically examined. Other issues examined include: the polytechnic sector vis-a-vis the administration, the curricula contents, the students admission requirements, the teaching staff qualifications, the equipment/facilities needs, the duration of training, the expected roles after graduation in employment industries and career progression, budgetary provisions and the allocation of funds, as well as the placement/recognition for registration by professional bodies and so on. The strengths and prospects of Polytechnics offering Surveying and Geo-informatics as well as the challenges were enumerated. Conclusion and recommendations towards the strengthening of Surveying and Geo-informatics training were provided in order to respond and aligned competitively with national and global needs.

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INTRODUCTION

*"Developing countries and countries with transition economies risk being further marginalised in a competitive global knowledge economy because their education and training systems are not equipping learners with the skills they need"*⁶

There are many ways to keep and sustain a profession from extinction. The first and the surest way is to keep on recruiting and training the young ones to come into the profession as the older ones are fizzling out from the scene due to either ageing, incapacitation or death. Without training of younger ones into it, the profession will die naturally.

The act establishing the Polytechnic is aimed at training and retraining the necessary manpower to manage and maintain the expected growing resources and technologies in industries and factories. The paper would look into the polytechnic education in Nigeria with the view to studying specifically the Surveying and Geo-informatics courses offered to ascertain its adequacies or otherwise that will cater for the Nigerian land mass (size) and population of the country's requirements. Nigeria has a total population of over 170 million people with a land mass of 930,000 sq km which is subdivided into 36 states and the Capital Territory which is serving as the Nigeria's capital city. Land issues and demands will continue to escalate to an unbearable situation if the surveying training is deficient in either quality or quantity. It is with this concern that the author deemed it fit to look into the training of this cadre of professionals at the Polytechnic sector. All the necessary criteria needed for the adequate training of such cadre will be examined; issues, prospects and challenges identified will be highlighted.

In conclusion, recommendations will be offered towards the strengthening the Surveying and Geo-informatics education in the Nigerian Polytechnics in order to respond to the national in particular and global needs in general.

1. Historical Perspective of Technical Education in Nigeria

Technical Education was established by the British colonial masters on realisation of the deficiencies and inadequacies of technical and vocational skills that were required for the production of services and the processing of raw materials to feed the ever demand of such in their homeland. Training of such skills in Nigeria was considered cheaper and more convenient than to train them in Britain. The first set of such training institutions were established at Kaduna Technical School, Yaba Technical School and IMT Enugu which were later upgraded to Kaduna Polytechnic, Yaba College of Technology Auchu Polytechnic and Institute of Management and Technology Enugu to a National Diploma and Higher National Diploma awarding status from mere Certificates and proficiency test awards. ~~From the above perspectives, the number of Polytechnics and Colleges~~

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of Technology continue to grow even after the colonial masters had left. At present there are many Polytechnics in Nigeria offering various courses leading to the award of Certificates, National and Higher National Diploma. Out of these number only few Polytechnics offer courses related to Surveying and Geo-informatics including the specialised institutions.

2. Development of Surveying Education in Polytechnic System

The development of Surveying in Nigeria started way back to pre-independence when the colonial masters were in charge of the affairs of the whole territory and survey departments both regional and national were being headed by them. The locals were junior staff and at best as apprentices. At the eve of independence, as a parting gifts, Nigerian Technicians were locally and internationally trained as senior professional and those who served well and diligently were given certificates that would authorized them to practice surveying on retirement. Later on surveying training institutions were established in Kaduna, Enugu, Okene, Oyo and Lagos for the training of low and intermediate staff.

Later on these institutions were metamorphosed leading them to the award of degrees in surveying disciplines in the following institutions; Ahmadu Bello University, Zaria, University of Nigeria, Enugu and Lagos University, Yaba College of Technology, Kaduna Polytechnic and Auchi Polytechnic commenced the award of National and Higher National Diploma in Surveying for production of Technicians and Technologists. Kaduna was the headquarters of Northern Region therefore the merging of northern survey headquarters with the Kaduna Polytechnic was easy due to the proximity and the urgent desire to train surveyors to take up the positions of the departing colonial masters after independence. There are now a total of 33 Polytechnics, Colleges of Technology and specialised institutions that offer Surveying and Geoinformatics and other related courses leading to the awards of ND, HND and Post HND.

There are 101 polytechnics and colleges of technology with one specialised surveying institution in Nigeria, out of these number only 34 of them offer Surveying and Geo-informatics programs. It is therefore evident from this number that the program needs further boost in order to address the inadequacies of surveyors who are to solve the foreseeable land related challenges for industrial and economic advancement of Nigeria in which very little of its 930,000sq km land is surveyed. The low turnout of surveyors from polytechnics has resulted in low number of registered surveyors. The total number so far of registered surveyors qualified to practice is 3360 in Nigeria since inception and the majority of them work for government establishments. Few of them opted to set up their companies for private practice.

3. Surveying and Geoinformatics Applications

Surveying as it is explained by (FIG) is, "the art and science of measurement, to assemble and assess land and geographic (spatial) related information to use that information for the purpose of planning and implementing the efficient administration of land, the sea and structures thereon and to instigate the advancement and development of such practices". From this definition, one can appreciate the magnitude of the needs for surveying profession in Nigeria. The applications of surveying are wide and deep into economic, social, political as well as religious dimensions

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especially where a question of location, size, formation and time are relevant and critical. The following areas of surveying applications are decimally utilised. The contents in the curricula developed and delivered at the polytechnics are however adequate for the needs of the following functions⁷:

{Topographic mapping (Cultural/ Administrative/ Education), Cadastral Surveying (property boundaries/ utilities/ engineering, land-in-dispute, control surveys, layout, mining surveys, etc), Hydrographic Surveying, Photogrammetric Surveying, Population Study, Forestry, Tourism/Sports, Transport/Aviation, Agriculture, Power/ Oil/Gas, Water Supply, Forensic Surveying, Satellite Surveying, Geodetic Surveying, Remote Sensing, Land related matters, etc}

The above listed areas are very relevant towards the socio-economic and political development of the country in all respect. However, due to lack of planning far less is exploited to the advantage of the country. There are enormous challenges in Surveying despite the yearning gap created by lack of adequate training equipment and personnel.

4. Requirements for the Establishment of a Polytechnic in Nigeria

There is an Agency called National Board for Technical Education (NBTE) which is charged with the responsibility of approving the establishment of a Polytechnic and its supervision to ensure quality assurance and uniformity in curricula contents and delivery nationwide. The Act establishing the National Board for Technical Education (NBTE) in January 1977 has in it the following functions⁹:

- a. to determine the general program to be pursue by Polytechnic and College of Technology in order to maximize the use of available facilities and avoid unnecessary duplication while ensuring that they are adequate to the manpower needs of the country
- b. to advice on, and take steps to harmonize entry requirements and duration of courses at technical institutions
- c. to lay down standards of skills to be attained and continually review such standards as necessitated by technology and national needs.

The requirements and guidelines for the establishment of a polytechnic are given as follows⁹:

- i. Philosophy and Objectives
- ii. Site and building
- iii. Organization, administration and Control
- iv. Governing Council
- v. Academic Board
- vi. Admission, Graduation, Probation, Students Welfare
- vii. Library
- viii. Educational Program
- ix. Academic Staff
- x. Financial stability and reputation

5. Mandate of a Polytechnic in Nigeria

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When the need for the establishment of more Polytechnics was realised in 1979, a decree was promulgated by the then Military Government to set up seven Polytechnics across the country with the view to producing more technicians and technologists in areas of technology, applied science, commerce and management that would respond to the yearnings and aspirations of the economic, agricultural and industrial development of the country.

The functions of each Polytechnic shall be;

- a. *to provide full-time or part-time courses and training*
 - i) *in technology, applied science, commerce and management*
 - ii) *in such other fields of applied learning relevant to the needs of the development of Nigeria in the areas of industrial and agricultural production and distribution and for research in the development and adaptation of techniques as the Council may from time to time determine;*
- b. *to arrange conferences, seminars and study groups relative to the fields of learning specified in paragraph (a) above may serve to promote the objectives of the Polytechnic;*
- c. *to perform such other functions as in the opinion of the Council.*

The above functions applied generally to all states and privately owned polytechnics in Nigeria.

6. Quality Assurance

In order to ensure uniformity in standard nationwide, the NBTE as the supervisory body and Surveyors Council of Nigeria (SURCON) as the Professional body would frequently and at a regular time visit the approved institutions to enforce compliance and ensure adherence to the standard of teaching and learning in order that institutions maintain their accreditation at all times. The SURCON was established by an Act number CAP 425 Law of 1990. Its mandate is to define who a surveyor is and also control the survey practice and to determine who is qualify to practice. The Act therefore empowers SURCON to;

- a. Determine who are Surveyors for the purpose of the Act
- b. Determine what standards of knowledge and skill are to attained by person seeking to become registered as a member of the profession of Surveying and review those standards from time to time as the circumstances may require.
- c. Securing in accordance with the provisions of this Act the establishment and maintenance of a register of persons entitled to practice the profession and the publication, from time to time of such persons.
- d. Regulating and controlling the practice of the profession in all its ramifications.
- e. Maintaining, in accordance with this Act of discipline within the profession,
- f. Performing the other functions conferred upon the Council by this Act.

7. CONTRIBUTIONS OF POLYTECHNICS IN THE DEVELOPMENT OF SURVEYING AND GEO-INFORMATICS

The feedback mechanism from industries, ministries and other parastatals engaged the services of surveying graduates from polytechnics is very weak and unofficially collated. The contributions of polytechnics in the development of surveying in Nigeria has multifaceted dimensions but can be enumerated as follows:

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i. Institutional approach.

The establishment of polytechnics in Nigeria has contributed immensely towards the development of the surveying. There are 33 Polytechnics in Nigeria offering courses leading to the awards of either ND, HND, post graduate Diploma.

ii. Curriculum Development

The Polytechnic sector has in its course contents inundated with practical and theory in the 70:30 ratio. In addition to making a minimum of mandatory three weeks of survey camp in final year. The constant review of the curricula by polytechnics provides constant relevancy of the polytechnics graduates to the industries by responding to the ever changing demands of the society.

iii. Performance of HND Graduates of Surveying

The outcome of the professional examinations conducted yearly by SURCON for both polytechnic and university graduates show appreciate differences in performance in favour of polytechnic graduates especially on field projects. The table 1 below shows the recorded scores for the last six years.

Year of Professional Examinations	University Candidates	Polytechnic Candidates
2012	59	61
2013	48	60
2014	77	99
2015	111	100
2016	156	130
2017	204	139
TOTAL	655	589

Table 1: Statistics of passes for Professional Examinations¹⁴

There are numerous organisations eager to employ graduates of polytechnics in view of the competency in hands-on exposure and the high practical contents in their curricula. In government ministries and parastatals over 70 percent of the field workers are polytechnic graduates.

Private and Multi nationals companies are daily being attracted to employing polytechnic graduates not only because they are ready made in terms of field work but because they do not want to waste time and funds on retraining newly employed staff; a cost saving strategy.

The composition of lecturer cadre to technology/instructor cadre require that for each one lecturer there is to five instructor/technologist. Therefore for a department to satisfy NBTE accreditation requirement for an ND program it must satisfy a minimum of one lecturer to five technologists ratio. In this argument, more polytechnic graduates are required in five folds to a university graduate.

7.1 Prospects of Surveying and Geo-informatics in Polytechnics.

There are growing demands by the polytechnic sector to introduce degree programs without losing its identity and name as a polytechnic. This agitation was created by government policy and societal image where a polytechnic graduate is being discriminated against in favour of a university graduate in terms of appointment and progression. In the civil service, a university graduate has no limit in his career progression, the sky is his limit whereas a polytechnic graduate with HND has a limit or a ceiling from where he cannot progress without acquiring additional qualification.

If this agitation scale through, a degree (B Tech) holder would be far more marketable than a holder of B Sc due to many reasons. In the first instance, the B. Tech holder would have gone through ND and HND and had acquired enough practical experience in addition to his additional degree qualification. He has also gone through lengthy period of training than a B Sc holder. In this case polytechnics would be turning out better trained graduates and ready for self employment.

7.2 Retention of Administrative and Academic staff

The yearning gap and differentials in salary scale and other incentives existing between the staff of polytechnic and university have been narrowed considerably. The factor has slowed down the movement of staff from polytechnics to universities. This development has contributed a lot in stabilising the polytechnic academic system. The teaching staff at polytechnics do get prompt release to go for further studies on securing admissions.

7.3 Funding the Institution

The funding of polytechnic at the federal level has improved tremendously. The biggest source of funds outside the normal budgetary allocation is through tertiary trust fund(TetFund). The sharing formula though need to be improved upon, the release of the fund to the polytechnic is very timely and consistent. this has gone very far in improving the teaching and learning of surveying in the polytechnics.

The normal budgetary allocation has also improved considerably. For example the allocation for education this year 2016 receives the highest percentage ever in the recent history.

With the current drive against corruption, allocation, appropriation and utilisation of funds are strictly monitored thereby improving teaching and learning in the polytechnics. The continuing role of polytechnic in the training of surveyors will forever be relevant.

More foreign collaboration is being sought from external sources for donations to develop technical education. It is expected to yield positive result.

7.4 Traditional Surveying and the polytechnics

The traditional surveying such as property surveys, boundary delineation, land in dispute, layout surveys, mining cadastral, engineering surveys form the bulk of surveying practices where government surveyors are pre-occupied within ministries and government agencies.

8. THE CHALLENGES OF POLYTECHNIC EDUCATION IN NIGERIA

There are many challenges facing the polytechnic sector despite its glaring stride towards the provision of technical and vocational education. The following issues have certainly contributed to the slow pace of its development;

8.1 Curriculum review

The constant review of the curricula as it is required from time to time as the circumstance of technology advances is not being maintained. The fast changing world requires that curricula be reviewed in line with dictate of the moment. Financial constraint is the major hindrance as the cost of the review is very high and time consuming.

8.2 Staffing

Polytechnic has a unique disadvantage, it has no specific institution where to train its staff as it is the case in Colleges of Education. For example, in Colleges of Education, for one to qualify for employment as an academic staff, one must possess a university degree and combined with a teaching qualification. It is also the case for a University academic staff who must possess a university degree to qualify as an academic staff in a university. The polytechnics derives their academic staff directly from Universities. Such a situation has left polytechnics with no option than to be recruiting its academic staff from the universities. In a competitive situation sympathy and loyalty of staff in this case are placed on university cause rather than for polytechnics cause.

8.3 Equipment

The polytechnic system is by all intents and purposes require more equipment and also is highly practically oriented in its training contents in all ramifications, therefore the system is bedeviled with expensive equipment acquisition especially in this dwindling finances and coupled with high cost of their maintenance. Surveying equipment are very expensive indeed and difficult to come by especially when providing for large classes.

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8.4 Staff Unionism

The frequent strikes being embarked upon by the staff unions are telling very hard on the smooth running of the institutions' academic activities. The three unions; Academic Staff Union of Polytechnic(ASUP), Senior Staff Association of Nigerian Polytechnics(SSANIP), Non Academic Staff Union(NASU) make different and sometimes conflicting demands which are difficult to satisfy all at the same time. They all have separate, and sometimes conflicting and combined demands. It is always difficult to meet the unions' demands due to high cost of implementation. Lack of appreciation and understanding of the technical requirements by the government also contribute to prolonged strikes.

In the year 2014 due to ASUP's prolonged strike, the polytechnic sector lost one complete academic session. Over the last few years, polytechnics were being closed every semester. The result of these closure had contributed immensely to the delay in graduation, lost of talents on the part of lecturers by lazing around in addition to huge financial loss which cannot be quantified adequately. The summary of frequent staff unions' demands includes³:

{improved teaching and learning environment, discrimination on Polytechnic HND against University degree holders, removal of career progression for graduates of Polytechnics, establishment of polytechnic commission , review of conditions of service, payment of earned allowances, renegotiation of the year 2001 agreements, release of the white paper on the last visitation panel, review of the sharing TetFund formula, IPPIS/TSA cancellation, 65 years retirement age for staff, reconstitution of Governing Councils, NEEDS assessments}

8.5 Students Unionism

Students Union government do embark on demonstrations usually demanding on the following issues and facilities:

Hostels, Bus services, sports equipment and facilities, water supply, electricity supplies, students centers, arbitrary increase in school fees, delay in payment of entitlements(SIWES, Scholarship, Bursary etc), support for staff unions cause

However, students' demonstration is erratic with mob action and sometimes resulting to violent actions. Students can also go on demonstration due to perceived neglect and injustice meted on their colleagues. Maladministration also provokes students and staff to go on demonstration and strike.

8.6 Funding

The sourcing, appropriation, allocation and utilisation of funds are critical factors in the administration of a polytechnic. The government budgetary allocation of funds to all sectors are usually not adequate. The best that is expected of any good manager is to ensure the allocated funds are effectively appropriated and judiciously utilised.

There are instances where misappropriations and misallocations of funds were reported. Such act does not augur well for the good advancement of teaching and learning. This act confirms the

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saying that it is not always the issue of lack of money but lack of vision on the part of management to select or identify its priorities.

Another source of funding is from Tertiary Trust Fund (tetFund) in which millions of naira are allocated using the approved sharing formula to tertiary institutions for academic development.; ratio of 3;2;1. Universities 3, Polytechnic 2 and Colleges of Education 1. The ASUP is arguing for increase in the ratio in its favour arguing that polytechnics programs are capital intensive in terms of equipment, laboratory and workshop acquisition.

It has been reported severally that funds at tetFund are staying idle for years as most institutions fail to access them. This scenario suggests two things; either the faulting institution does not need the funds or that the management lack the capacity to access funds allocated to it. Previous allocation must be exhausted before the next allocation can be accessed. Surprisingly some institutions are in arrears of years.

8.7 Teaching Staff Retention

The condition for employment into polytechnics for a lecturer cadre is a first degree with second class lower and he is expected to acquire a second degree in the same discipline before he attains to senior lecturer cadre. Chief lecturer cadre being the peak is attained with additional academic publications from thereon.

However, any additional academic qualifications acquired by a senior or Chief lecturer his continue stay at the polytechnic is not guaranteed. He will equally be attracted by a university. Therefore most of the lecturers who acquires PhD do not stay at polytechnics to teach thereby denying the students and the polytechnic from their newly acquired expertise.

8.8 Governing Councils of Polytechnics

Governing Council membership has been a recurring issues right from their composition. They play a supervisory roles in their respective institutions. The Councils of the polytechnics are usually core politicians with little or no knowledge of management of technical education. Council decisions some times are counterproductive to the progress of the institution they head.

There are instances where the management and councils go at loggerhead with no understanding of each other. There were occasions when in fights between them resulted to the dissolutions of both the councils and the retirement of some key management staff. This misunderstanding can lead to slow pace in the development of any institution.

8.9 Management of Polytechnics

Institutional leadership of the polytechnics has always been a bone of contention for a long time. The criteria set out as qualifications for the appointment of a rector who is the chief executive and the accounting officer have been in favour of polytechnic staff. The person wishing to apply must

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attain a position not below the rank of a Chief Lecturer or equivalent and not less than five years on that post. His discipline or field of study must be one of the courses being ran in the institution.

There are a lot of wisdom in that criteria. It is expected that the chief executive is familiar with polytechnic system and not a novice to politics of the institution especially on staff and students unions. Such a rector with a polytechnic background will have a smooth take off.

In recent years, academic staff unions have been agitating against the appointment of professors to head polytechnics arguing that they do not have polytechnic background in their working careers and therefore may not have sympathy for polytechnic cause.

8.9 Admission Requirement

The minimum admission requirement into polytechnic sector is four credits pass from Senior Secondary School Certificate (SSCE) or West African Examinations Council (WAEC). In the recent time when staff unions of polytechnic are agitating for parity with university, the admission requirement is being considered to be harmonised with the five credits pass be the same for university admission.

The Joint Admission and Matriculation Board (JAMB) score requirement for polytechnics admission is 180 points while that of the university is also 180 points.

The issue at hand now is that all ambitious parents would wish that their wards acquire a degree rather than HND. Majority of candidates who possess five credits pass would opt for university. Polytechnic has always been a second choice institution. Certainly not a first choice.

This singular notion does not attract polytechnics with the best students. This therefore is a big challenge.

8.9 Discrimination

There are growing discrimination and disenchantment from the polytechnic sector between the graduates of the polytechnics and the perception of the society as it relate to placement and progression.

8.10 Industrial placement and attachment

It has been the practice to place students in industries to acquire a work environment experience in their chosen field of studies. In view of lack of adequate and relevant industries students end up not acquiring the necessary skills as expected.

Staff on the other hand are expected to go to industries for attachment to refresh their knowledge and to acquire modern trend to mould and review the curriculum to respond to the changing world.

9.0 CONCLUSION

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The polytechnic education would continue to be relevant to the Nigerian economy for industrial springboard. What is required is a strong political will on the side of the government and other stakeholders. The various commerce and industries associations must be carried along to understand the objectives of polytechnic education as it relates to their growth and development. I therefore suggest the following items for consideration.

10.0 RECOMMENDATIONS

10.1 Legislation

It is very necessary to have a legislation that would encourage the development of technical and vocational education at primary school levels. That would lead to the establishment of trade centers at local levels leading to the awards of trades and vocation certificates. The establishment of technical schools at all federal constituencies leading to the awards of Higher certificates as technicians that would also qualify them for admission into polytechnics. At each Senatorial District a polytechnic should be established leading to the awards of ND, HND and post HND.

Furthermore, a legislation is needed to ensure that all projects must contain survey data at conception level before execution.

The passage of the Polytechnic Commission act would also go a long way in strengthening and empowering polytechnic education.

10.2 Training

Intensive training and retraining for academic and non academic staff in order to make them relevant in the fast changing technology so that their products would also be globally relevant.

10.3 Equipment

Laboratories must be fully provided with the state-of-the-art equipment on a continuous basis for the staff and students to compete favourably in any environment.

10.4 Staff and Students Welfare

Staff and students must be provided with adequate incentives to motivate them for higher productivity. Sports facilities are essentials for both staff and students.

10.5 Entrepreneurship studies

In view of the squeeze in our economy the need for self employment is now adumbrating. Entrepreneurship studies must be emphasized in our curricula such all graduates of the polytechnics become employers of labour and not job seekers.

10.6 Private Practice

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The private practice in surveying in most states of Nigeria has not been encouraging, this aspect is not motivating the younger generation to come into the profession. It is therefore necessary to call on authorities in such states to pave way for private practice. Currently most of the senior surveyors who have retired from service are now wasting away at home doing nothing or at best engage in other aspects as means of their livelihood different from what they had learnt and practiced over the years in their professional callings.

10.7 Good leadership

Motivation through good governance and leadership right from management down to staff and students would go a long way in enhancing the quality of training in polytechnic sector as Prof S. Enemark has quoted that; *"modern surveyors has to be capable not only of managing within change but managing the change"*(Hoogsteden, 1998).

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