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FOSTERING THE INNOVATION POTENTIAL OF SMES IN THE GLOBALIZATION ERA:
THE ROLE OF PATENTS

*prepared by Mr. David A. Okongwu, Director General, National Office for Technology
Acquisition and Promotion (NOTAP), Abuja*

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INTRODUCTION

1. The SME sector has been recognised by Governments and development experts as a potential engine of economic growth and a major factor in promoting private sector development and partnership. In today's technologically-driven global economy, in which the quest for innovation has taken the centre stage of all human drive for technological progress and well-being, the development of SMEs must constitute the prime element in the growth strategy of national economies. In this paper, I shall present an African (essentially Nigerian) viewpoint of the subject, in order to highlight the present attempts at fostering innovation in SMEs through patents, in a technologically-backward region that is seeking to integrate into a highly globalised world economy.

2. In Nigeria, Micro Small and Medium-scale Enterprises (MSMEs) are classified in terms of capital investment and employed labour force by the National Council on Industry (NCI: 1996) as follows:

	<u>Capital</u>	<u>Labour force</u>
Micro	₦0.1m	11
Small	₦40m	35
Medium	₦100m	100

3. It is estimated that the Micro, Small and Medium Enterprises (SMEs) account for most of total industrial employment, production and value-added. The SMEs represent therefore a vital component of the national industrial system. Thus in spite of the giant multinational oil companies such as Shell, Mobil, etc., the Nigerian National Petroleum Company (NNPC), the National telecommunications monopoly (NITEL), the United African Company (UAC), the Breweries, etc., it is the SMEs that generate the industrial wealth of the nation and hold the key to real economic development and wealth creation. The SMEs therefore truly represent the vital component of Nigeria's industrial system. In this context, the same holds true for the economies of most nations, including the nations of the North. Infact global surveys point to the fact that the giant Transnational Corporations (TNCs) account for only just about 25% of all global productions.

FEATURES AND PROSPECTS OF SMES IN AFRICA

Characteristics of SMEs

4. SMEs are generally distinguished by the nature of their production and management arrangements, trading relations, financial practices, internal competence, etc. Typically they are characterized by the following features in varying degrees:

- small units, often rural-based and family-owned
- small independent enterprises, standing alone and producing for a well-defined market
- specialized firm, producing specialized products, selling to the international and/or local markets
- rely on low cost raw materials, low energy costs, low labour costs, low division of labour
- flexible and often small production runs
- low capital formation
- largely labour intensive units with low-level technologies; but note the emergence of high skill and technology-intensive SMEs, especially in high technology industries.

Advantages of SMEs

5. The peculiar character of the SMEs endow them some special advantages, amongst which are:

- generation of employment
- poverty alleviation
- breeding ground for entrepreneurs
- driving force behind interrelated flow of trade, investment and technology
- contribution to substantial local capital formation
- high levels of productivity and capability
- mechanism for technological and managerial growth
- increase in competitiveness and export capability
- channel for ensuring industrial diversification and dispersal
- active instruments for rural and social development
- development of specialized product niches
- quick response to market changes and opportunities
- rapid absorption of technological innovation
- immediate end-users of indigenous research findings

Problems militating against development of SMEs in Africa

6. Notwithstanding the advantages of SMEs, but mainly because of their inherent characteristics, SMEs suffer major constraints that militate against their development and growth in Africa and thus preclude them from meeting the full expectations. Major among the constraints are:

- poor managerial capacity
- poor skill level of workers
- poor financing or lack of access to financial capital
- poor support services
- weak industrial and social infrastructure
- poor marketing and distribution network
- inconsistency of public policy
- perhaps, most important of all, lack of scientific and technological knowledge, that is to say, *the prevalence of poor intellectual capital climate*.

7. This poor intellectual capital climate manifests itself generally in the following forms:-

- (a) lack of equipment, which need to be imported at great cost; which often arrive late, or the arrival date is uncertain and cannot be programmed, and generally require expatriate skills, which have to purchased at great costs.
- (b) lack of process technology, design, patents, etc, which involve payment of huge royalties, technology transfer fees, etc
- (c) lack of technical skills in the form of technological and strategic capability.
- (d) inability to compete competitively in export markets, either because of poor quality products, or ignorance of export market strategies and networks.
- (e) inability to meet stringent quality requirements such as environmental/health standards set by some developed countries, often considered subtle form of trade barrier.
- (f) inability to compete even in home markets with cheap imports coming from the technologically advanced countries, on account of their more efficient processes, and therefore superior and often cheaper products.
- (g) lack of financial capital; financial capital is in a sense derived from value addition to a thing or a natural resource; and value addition in itself is achieved by technology, or in other words, intellectual resource.
- (h) politico-social instability, which derives from the lack of discipline that science and technology culture instills in a society.
- (i) lack of maintenance culture;
- (j) lack of institutional and administrative framework or linkage to support and sustain SMEs development, which, in itself is a reflection of poor technological capability or intellectual resource. Where these exist, they are either mismanaged or under-funded.

Resolving the constraints of SMEs

8. All the above problems, as real as they are, can be effectively overcome by fostering innovation within the SMEs. The Nigerian SMEs are gradually coming to terms with the fact that they must have to vigorously innovate to remain in business and be competitive in today's globalised market, (both in the domestic market against imports, and in the export market) and thus contribute fully and effectively to national and regional development.

9. There is also a growing recognition of the power of Intellectual Property system for spurring innovation (thanks to the various initiatives and cooperation programmes of WIPO, such as capacity-building and awareness-building programmes, seminars, support services, etc). Innovation can be fostered actively in SMEs by the exploitation of Intellectual Property system, mainly patents, through the following major avenues:

- (a) patent licensing, and
- (b) use of patent information as strategic tool for, e.g.
 - simulating technological changes within an enterprise,
 - identification and comparative evaluation of technologies
 - monitoring global technological changes
 - avoiding collision with existing patent rights
 - forecasting future technological developments and industrial cycles, etc.

The relationship between innovation and SME competitiveness can be better appreciated from a historical review of innovations.

INNOVATION AND INDUSTRIAL DEVELOPMENT

Global perspective on technological innovations

10. Structurally, industrial development consists of continuous generation and exploitation of series of technological innovations over time, leading to creation and development of new products and processes, substitution of new and cheaper materials in an existing product or service, better ways of marketing or distribution of products or services. And the SMEs are the most efficient systems or units for exploiting most technological innovations. Indeed the link between the exploitation of new technological innovations and the SMEs has been well known and is fully evident through analysis of global economic activities over the past 200 years.

11. Such analysis first shown by S. Kondratieff and later by Schumpeter, revealed the place of technological innovation as the engine that drives industrial development. Figure 1* shows the series of business cycles since the first industrial revolution, each powered by clusters of industries:-

* The Economist, London Vol 350, No 8017

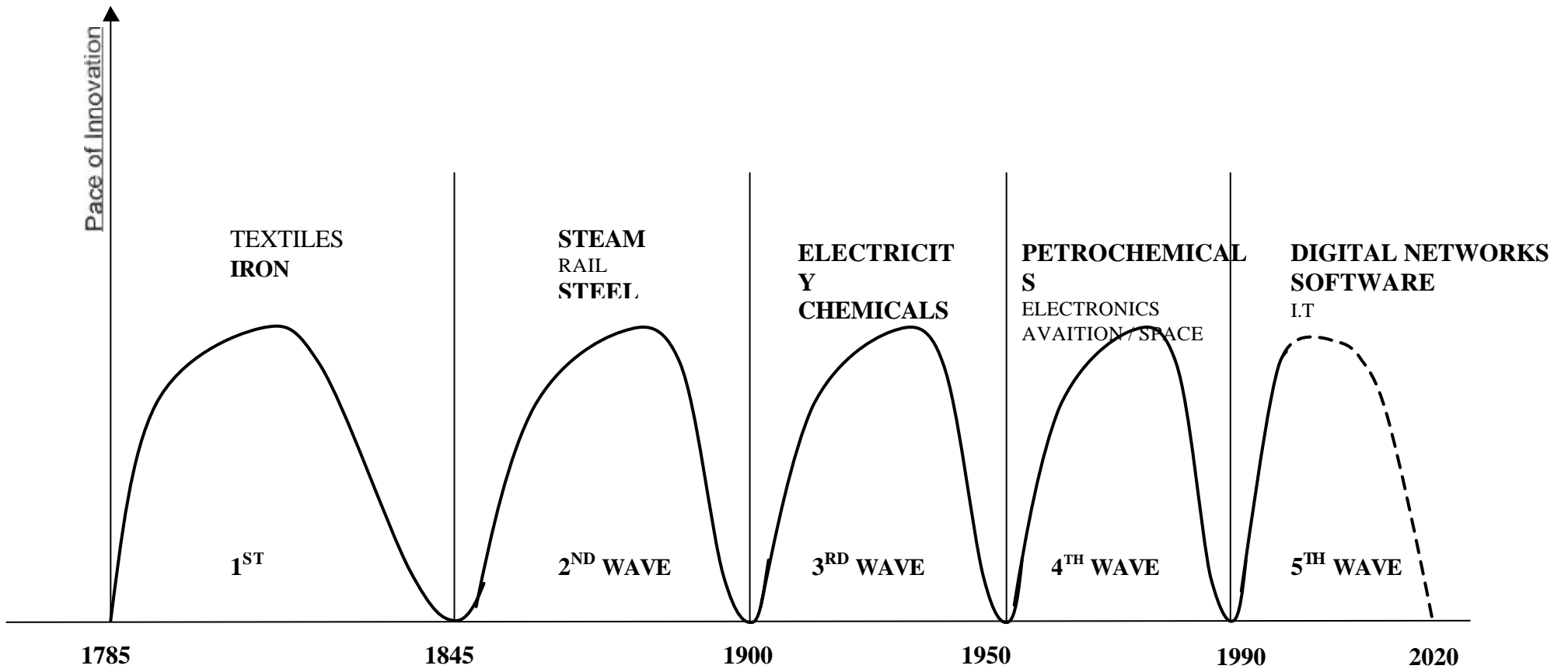
- 1st Wave, about 1785: Water power, Textiles, Iron
- 2nd Wave, about 1845: Steam power, Rail, Steel
- 3rd Wave, about 1900: Electricity, Chemicals, Internal Combustion engine
- 4th Wave, about 1950: Petrochemicals, Electronics, Aviation
- 5th Wave, about 1990: Digital networks, Software, Biotechnology

12. In each of these business cycles, the enterprises that were suitably positioned and able to respond promptly and to decisively and maximally capitalise/commercialise the emerging technological innovations generally exploited the market, reaped the benefits of the blossoming venture and became the giants, while others lagged behind or fizzled out. The SMEs on account of their flexibility and obvious advantages are able more generally to respond promptly and profitably to innovations.

13. Especially within the last 10 years, there have been unprecedented global upsurges in innovations, in patent granted, and in the growth of SMEs competitiveness. Acquisition and exploitation of technological innovations have therefore become the key to guaranteeing competitiveness both at the enterprise level and the national level.

Thus enterprises, and equally governments all the world over, are searching and encouraging technological innovations that will enhance their competitiveness and survival, and are devoting and marshalling funds, efforts, time and personnel at the search for new technologies. Such technologies or innovations are most easily commercialised through SMEs.

FIG 1. GLOBAL INDUSTRIAL CYCLES (KONDRATIEFF WAVES OF INNOVATION)



Nigeria's economic/business cycles – A brief review

14. A brief review of the major economic activities in Nigeria over the past 40-50 years reveals some business cycles. Figure 2 shows qualitatively the major activities and their peaks.

There have been three major booms of economic activities over the past 50 years.

1 st Wave, about 1956:	Agricultural produce (export cash crops – cocoa, palm oil, groundnuts, etc) <i>collapsed with the advent of petro-dollars</i>
2 nd Wave, about 1971:	Commerce (import of consumer goods, import- substitution industries, civil engineering construction) <i>fuelled by the petro-dollars</i>
3 rd Wave, about 1986:	Services (banking, transportation, petroleum products marketing) <i>fuelled by liberalisation</i>
4 th Wave, about 2002	Most likely:- upsurge in industrial activities based on SMEs (food processing, household goods, energy, biotechnology, mineral processing) <i>fuelled by innovations.</i>

15. Nigeria's business/economic waves (Fig. 2) show that most of the profitable ventures in the past 25 years have concentrated on imports and services, which do not contribute much value-addition to the economy. The industrial sector is yet to experience a major boom. The SMEs in the industrial sector are not fulfilling their expected role and are clearly under pressure from the global market, a feature that is fast deteriorating with the increasing globalisation. The SMEs are yet to get well-rooted. They still have to come of age and fulfill their role in the nation's economic life in order to capture the coming 4th Wave. It has become obvious that the SMEs must innovate; must need to go for acquisition and commercialisation of abundant technological innovation, and utilise their inherent comparative advantage to exploit the abundant natural resources. They need to study the market, anticipate the trends and the demands, quickly locate and fruitfully access the required technologies.

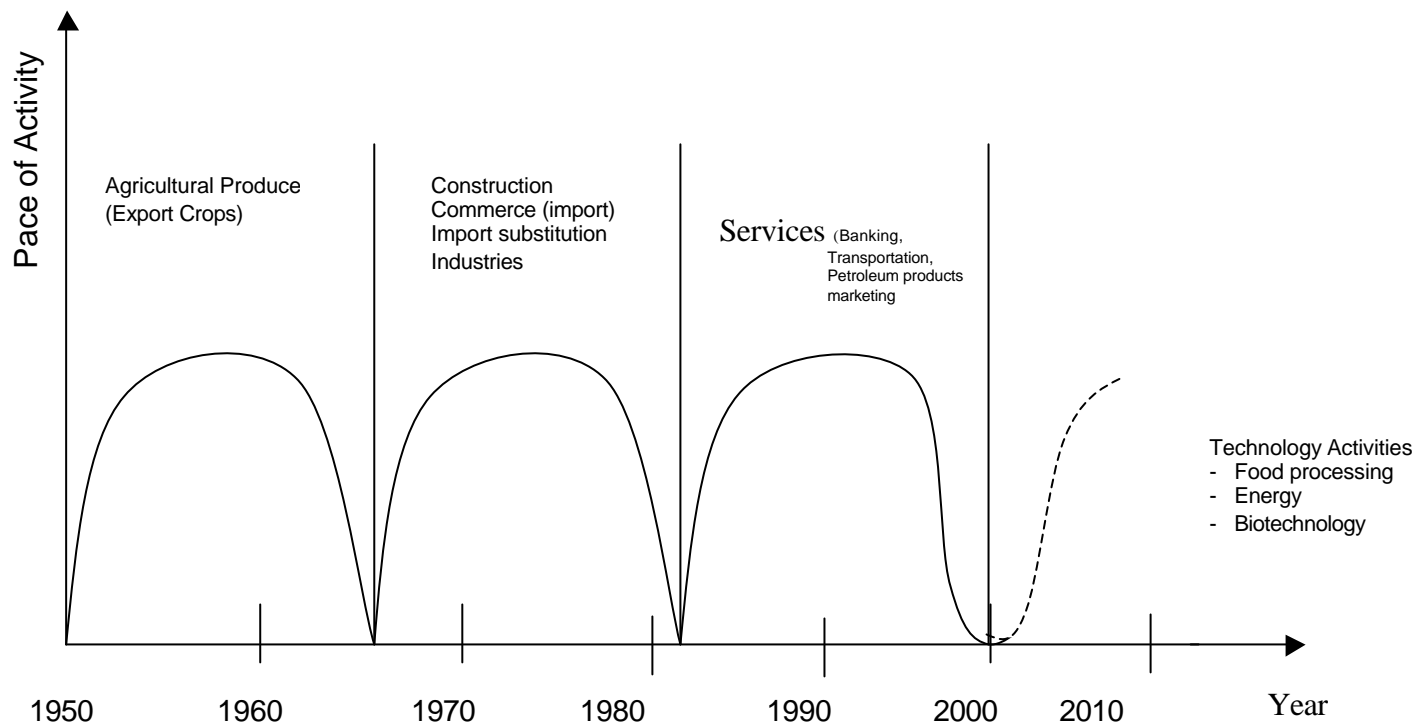
PROGRAMS FOR FOSTERING INNOVATION IN SMES

Promotion of innovation potential in Nigeria's SMEs

16. In a bid to enhance SMEs competitiveness, some key programs have recently been mounted by Government of Nigeria to foster innovation potential of SMEs. Two such programs which have demonstrated the potential to make the greatest impact are:

- Strengthening of the National Office for Technology Acquisition and Promotion (NOTAP)
- Establishment of Technology Business Incubation Centres (TBICs)

Fig. 2: Waves of Economic Activities of SMEs in Nigeria



National Office for Technology Acquisition and Promotion (NOTAP)

17. The National Office for Technology Acquisition and Promotion (NOTAP), formerly National Office of Industrial Property (NOIP) and renamed as NOTAP by Decree No. 82 of 1992, was established by Decree No. 70 of 1979 as an Agency with a legal identity to implement the acquisition, promotion and development of technology so as to ensure the acceleration of Nigeria's drive towards a rapid technological evolution by an efficient absorption and adaptation of foreign technology and a concerted development of indigenous technological capability through a pro-active commercialisation of inventions or research results and promotion of locally motivated technologies.

18. The mandate of NOTAP covers essentially the following four major areas of activities:

- Registration of all technology transfer agreements between Nigeria and foreign transferors and the encouragement of a more efficient process for the identification and selection of foreign technology
- Commercialization of inventions and research results
- Compilation, and dissemination of patent information and technology data through the Patent Information and Documentation Centre (PIDC) to entrepreneurs, Micro, Small and Medium-scale Enterprises (MSMEs), researchers and inventors.
- Encouragement of appropriate technology collaboration arrangements for transferring technology from research organisation to industries, and strengthening the industry-research linkage.

The linkages between NOTAP and other institutions for the execution of the above activities are given in Fig. 3.

Foreign technology inflows

19. The key objectives in the registration of technology transfer agreements are:

- (i) to ensure a more efficient transfer of technology from foreign technology transferors to Nigerian SMEs, and
- (ii) to provide a directory of foreign technology transferors which is generally published and made available to entrepreneurs regularly – a potential source of technologies.

20. Analysis of Technology Transfer agreements between Nigerian enterprises and foreign transferors over the period 1982 to 2000 reveals (Figure 4 & 5) that Technical and Management Services Agreements have been the most common type of arrangement, accounting for over 60% of all Technology Transfers. On the other hand, patent licensing accounts for only about 4%. However in the recent times there has been growing awareness of the immense value of patents, and indications are that patents shall increasingly become a major source for technology transfer and means of fostering innovation in SMEs.

Figure 3: NOTAP Linkages

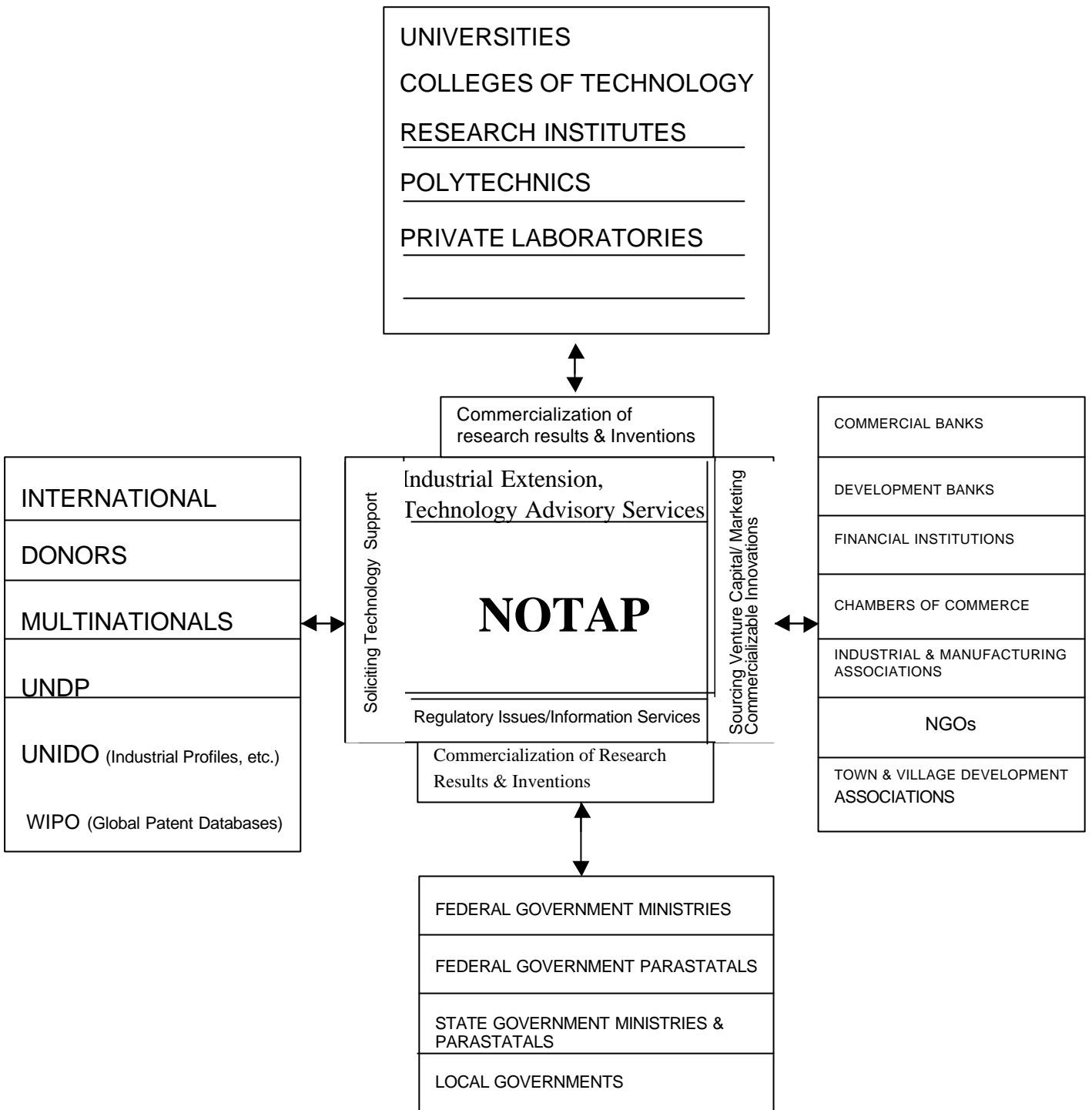
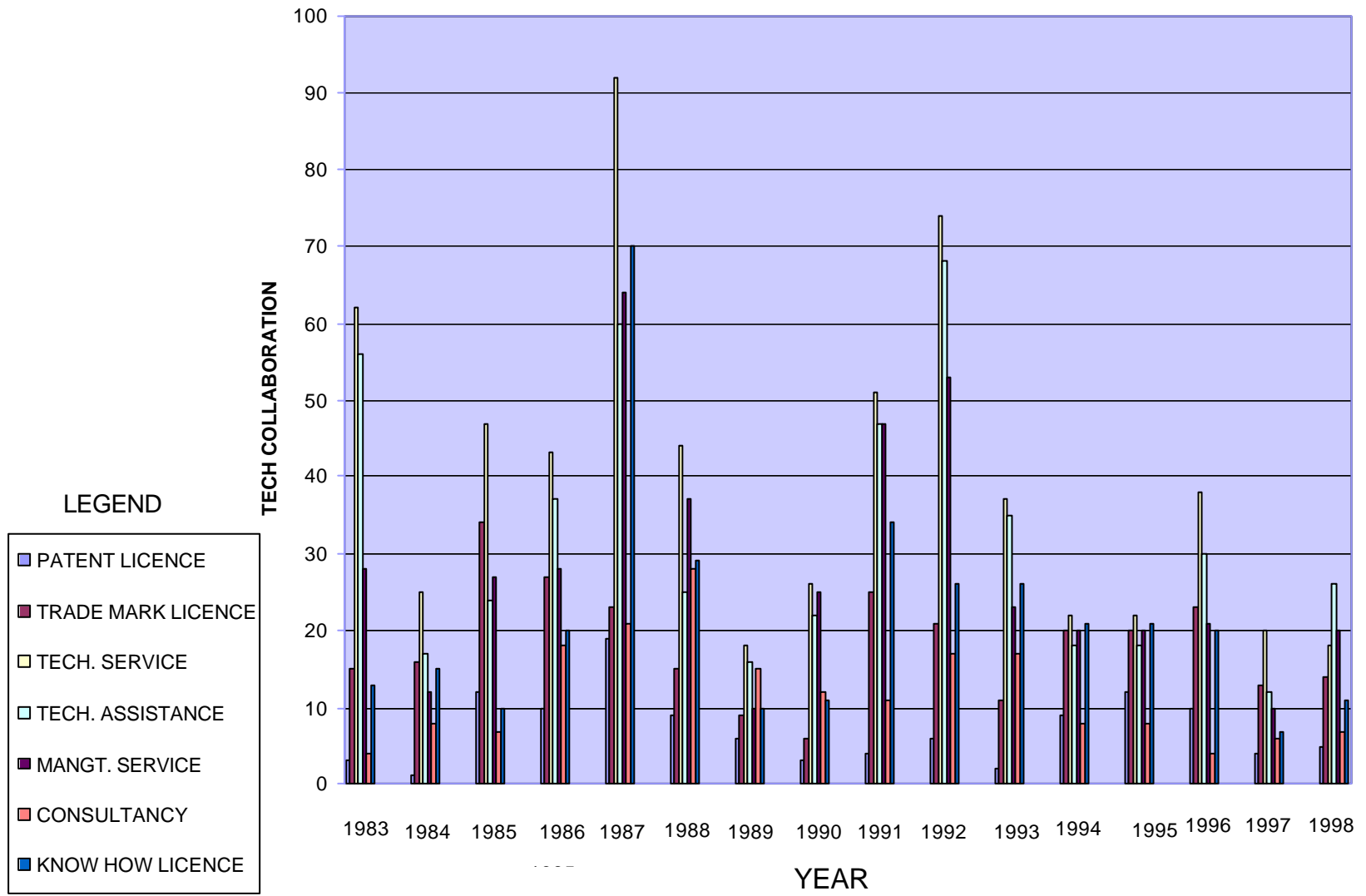
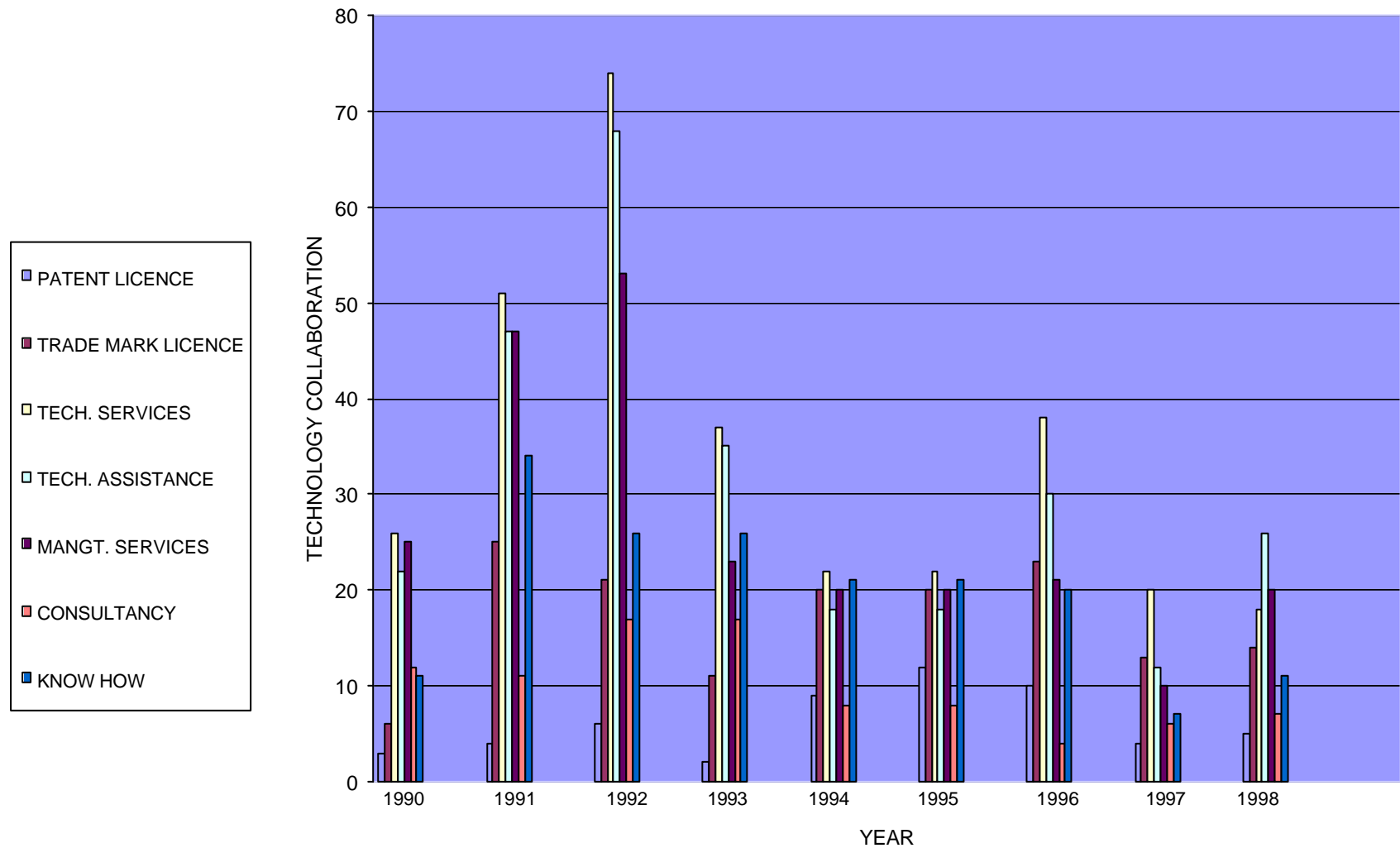


Figure 4: TECHNOLOGY COLLABORATION TYPES (1983-1998)



**SOURCE: NOTAP -
NIGERIA**

Figure 5: TECHNOLOGY COLLABORATION TYPES (1990 - 1998)



SOURCE: NOTAP -
NIGERIA

Commercialisation of research results and inventions

21. The program on commercialisation of research results and inventions ensures that viable inventions and innovations do not just lie on the shelves in the laboratories, but are taken to the market. Equally important is the fact that it generates a compendium of research results and inventions which is regularly updated and made available to both the SMEs, the researchers and Government, and it also encourages the acquisition of patents by researchers/inventors and thus breeds a patent culture in the society. The various steps adopted for transforming a typical research result or innovation into a product or process are outlined in the sketch given in Fig.6.

Provision of patent data to SMEs and researchers

22. The activities of the Patent Information Documentation Centre (PIDC) are focussed on the SMEs, researchers and inventors. As a result of the awareness-building campaign mounted by NOTAP on the availability of patent data at the PIDC, there has been upsurge of visits and requests for patent data from the public (researchers, SMEs, entrepreneurs), as well as requests for assistance with the registration of patents by researchers and inventors.

Sourcing of technology

23. There are many sources of Technology open to SMEs in Nigeria. Figure 7 shows the two broad ranges of sources of technology: Foreign and Local, that are available within NOTAP, mainly through the Patent Information Documentation Centre (PIDC), where patent documents from various countries are contained in CD Roms, many of which are now in public domain. In addition it is expected that NOTAP would soon be linked to the global network via the WIPONET.

24. An interesting observation we have noted in NOTAP over the past 2-3 years is the SMEs' growing interest in local research institutions – universities, research institutes, polytechnics and even inventors. This no doubt is due to a new awareness of the tremendous amount of innovations and useful research results existing in these communities. There is a growing realisation, among the Nigerian SMEs and entrepreneurs, of the large pool of innovations and research data lying idle at these places. The universities are no longer being looked upon as simply breeding grounds for graduates, but rather as sources of technological innovations that would enhance the global competitiveness of Nigerian SMEs.

25. The sources of technology outlined in Fig. 7 are only useful if they are easily accessible at little or no costs and can be guaranteed at all times. Through NOTAP, the public can in principle access, free of charge, the research results in most Nigerian research institutions, the local patent data (from the Trade Marks and Patent Office of the Ministry of Commerce) and foreign patent documents (with the assistance of WIPO).

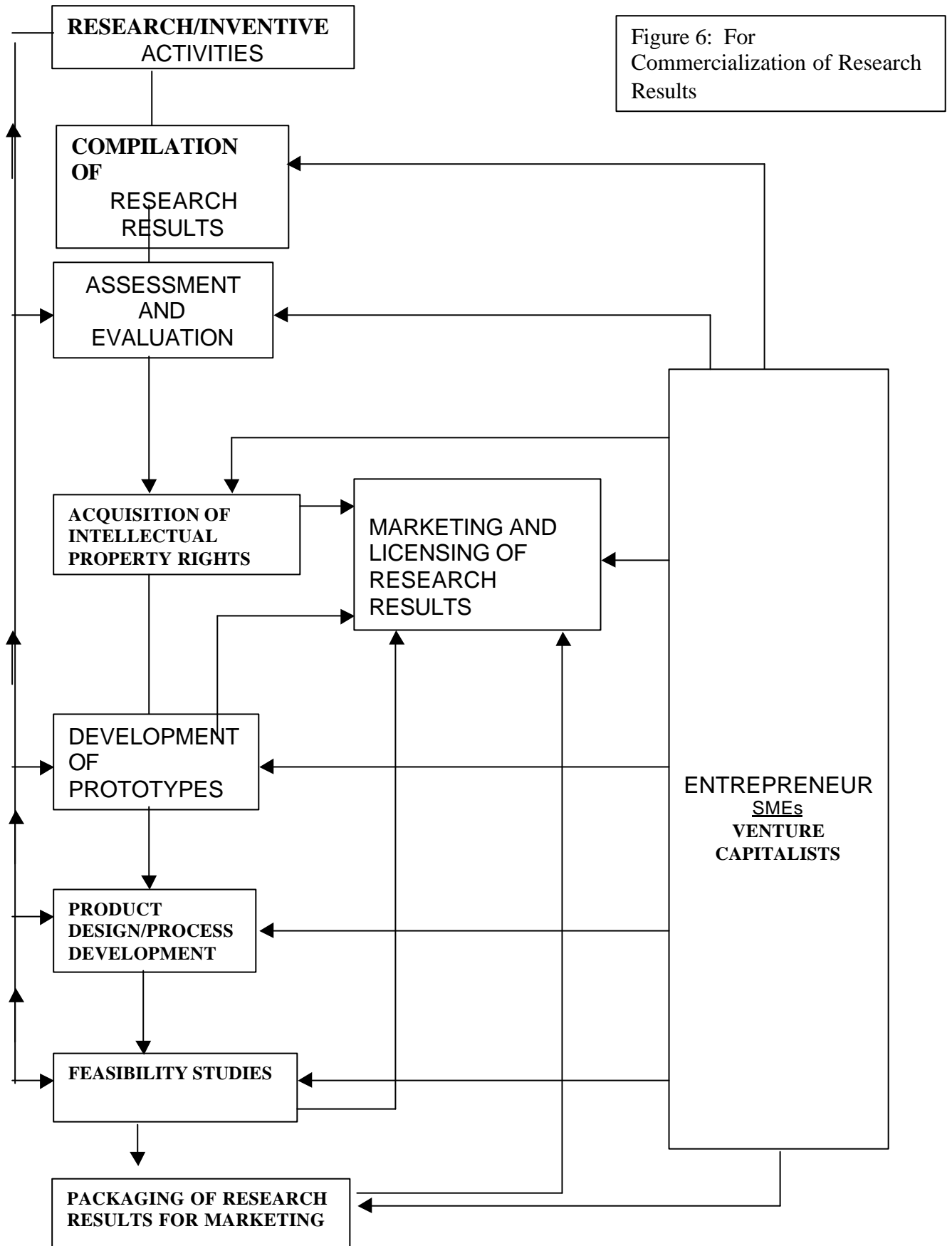
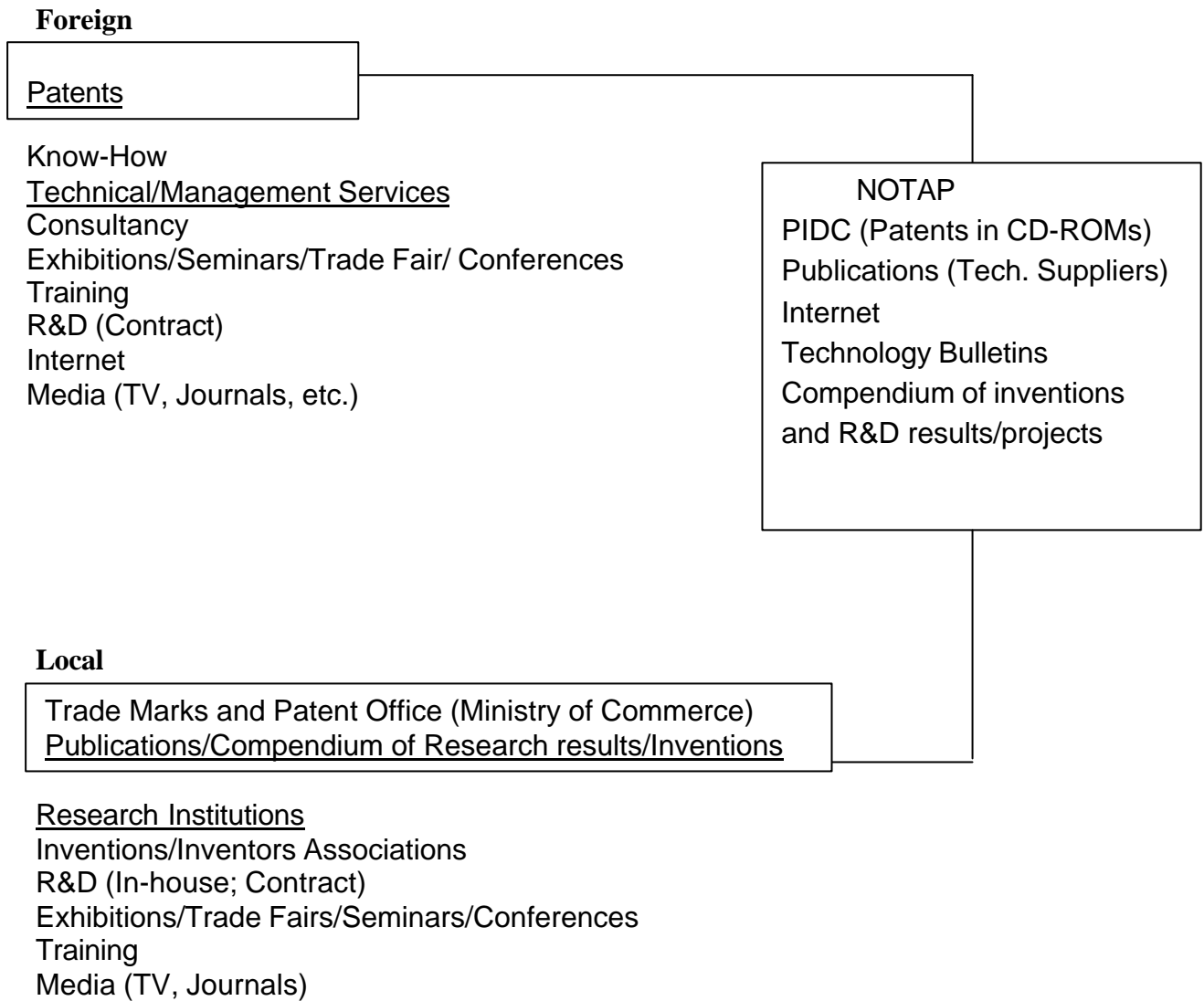


FIG. 7: SOURCES OF TECHNOLOGY FOR SMES IN NIGERIA



THE TECHNOLOGY BUSINESS INCUBATION (TBI) PROGRAM

Objectives of the TBI program

26. The Technology Business Incubation (TBI) program was initiated in Nigeria in 1993. The main objectives are:
- (i) To nurture the start up of small and medium scale industries.
 - (ii) To promote and develop entrepreneurship among the citizenry, especially in enterprises engaged in value-added, technology-related activities.
 - (iii) To provide incentive and support towards the commercialisation of research results, inventions or patents, especially from universities and research institutes.

Features of a Technology Business Incubation Centre

27. The key features of a TBI Centre concept include:
- (a) The provision of a comprehensive range of common services, including Incubation Space, Enterprise Counseling and Training, Shared Secretarial Support, Start-up Financial (Seed Capital, which is a non-interest revolving loan) and Assistance with Product Development and Marketing.
 - (b) Strict admission and exit rules which are designed to ensure that the TBI Centre concentrates its efforts on helping innovative, fast-growth business start-ups that are likely to have a significant impact on the local economy. Exit rules generally limit residency to a period of between 3-5 years, thereby ensuring a reasonable turnover to tenants.
 - (c) Professional management which involves monitoring tenant's businesses closely against their business plans, and ensuring the prospect of becoming financially self sustaining. Experience elsewhere indicate that, by providing entrepreneur with service on a "one stop shop" basis, and enabling tenants to lower their overhead cost by sharing facilities, a TBIC can reduce the mortality rate of start-up enterprises by as much as 80 percent.
 - (d) Liaison with, and technical support from, a near-by and relevant research institution. The organisational chart of a TBIC Centre is given in Fig. 8.

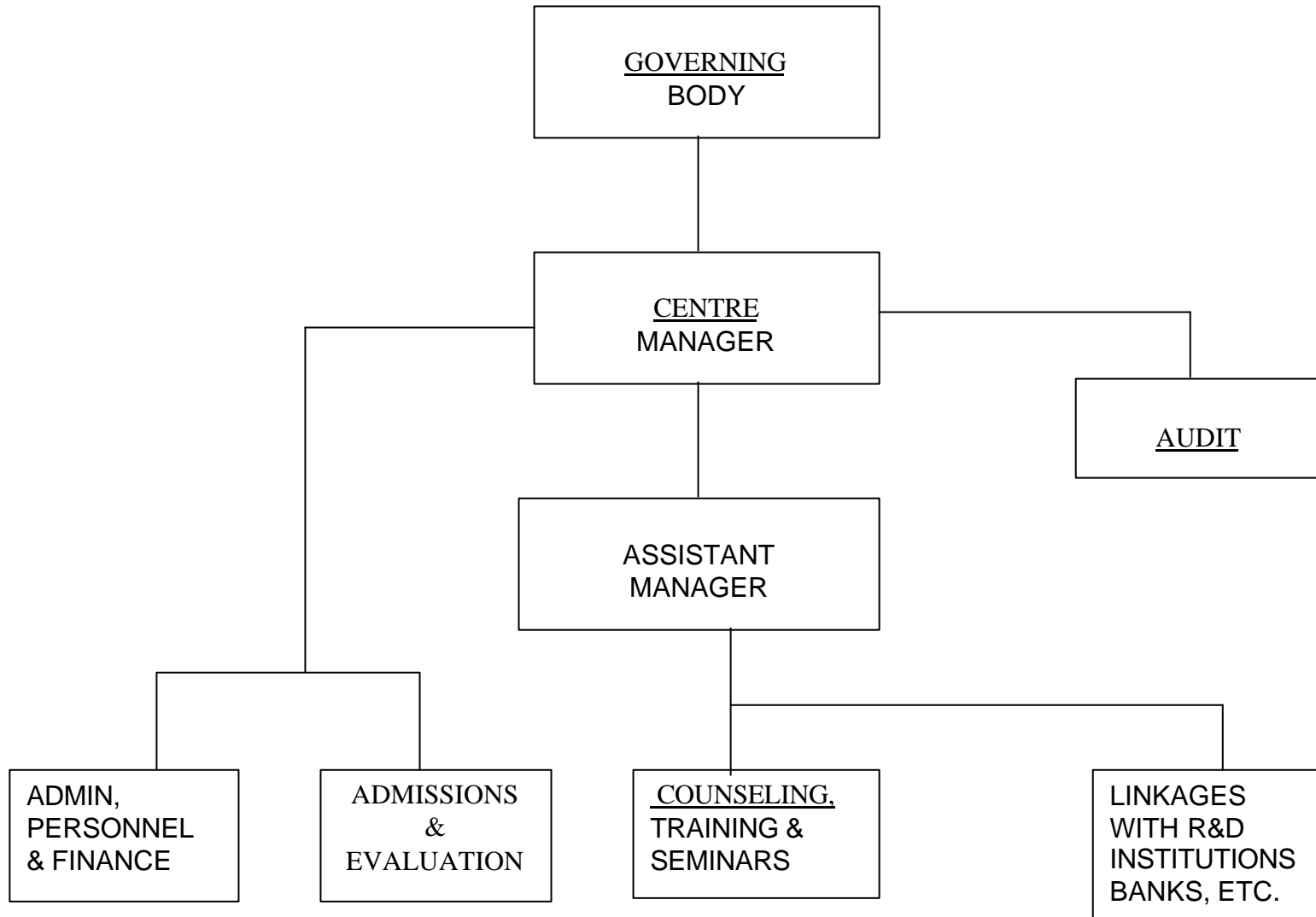
Establishment of a TBIC

28. A TBI Centre is established through the joint efforts of the 3 tiers of Governments, namely, the Federal, the State and the Local Government in whose area the Centre is to be located. The Federal Government, through the Federal Ministry of Science and Technology has responsibilities for:

- Feasibility studies for the establishment of the Centre,
- Technological and management support to the tenants;

while host State (and Local) Government will be responsible for the provision of: land, building, water and electricity supply, and access road.

Figure 8: Organisational Chart of a TBI Centre



29. The first TBIC was established in Lagos in 1993 (with 31 tenants) and to date there are now 14 TBICs in operation in various parts of the country.

30. The TBI is proving a success story in the promotion of entrepreneurship and innovation, and fostering industry-research linkage. For the plan period 2001 – 2003, 21 new TBICs are planned, and it is envisaged that there shall be a TBIC in every Local Government Area (774 in all)

Benefit of the TBIC to the economy

31. When the TBI program is fully operational, it is expected that the following benefits will accrue to the economy at large:

- Promotion of indigenous industrial development by strengthening the nation's industrial base at the small and medium enterprises level.
- Commercialisation of Research and Development (R&D) findings from Research Institutes, Universities and similar institutions.
- Easy avenue for the fostering of innovation through such schemes as provision of patent data, research results and other essential support services for budding SMEs.
- Economic diversification through the development of small and medium enterprises in manufacturing and services.
- Linkage with big suppliers, thereby reducing dependence on imports.
- Job creation and thus reduction in unemployment in the country.
- Contributing to the national revenue generation through payment of VAT, Excise Duty and Tax.

32. Common services for tenants include:

- Business Planning and Counselling, R&D assistance, Secretarial Support, Legal, Accounting and Marketing advice, and Seed Capital Financing.
- Training of entrepreneurs to develop basic business skills, as well as large scale enterprises wishing to use the facilities and expertise available at the Centre.
- Creation of a database containing a register of entrepreneurs and a directory of business services and advisors.

CONCLUSION

33. Nigerian SMEs, which since the last decade have been beset by deteriorating and weak public infrastructures, are slowly coming to accept the fundamental fact that '*innovation is the key to global competitiveness*' and ability to meet national aspirations. Patent data, research results and the development of strong industry-research linkage have become powerful instruments for fostering innovation in the SMEs.

34. The major role of NOTAP as national agency for acquisition and promotion of technology in recent times has focused on (i) building a patent culture among the key players in research and industry (ii) creating awareness of the utility of industrial property data (iii) assisting entrepreneurs and SMEs in accessing patent data, and (iv) facilitating technology transfer negotiations. These initiatives have created major doorways for fostering innovation among SMEs in order to make them competitive in a highly globalised market.

32. The TBIC program, which provides incubator spaces for start-ups and for commercialisation of research results and inventions, has become breeding ground for SMEs and a means of facilitating innovation generally. These two programs (of NOTAP and TBIC) together constitute one of the major national schemes that have been put in place to help foster innovation and strengthen the SMEs in order to guarantee their global competitiveness.

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