

INNOVATION AND INTELLECTUAL PROPERTY MANAGEMENT: TWIN DRIVERS OF EFFECTIVE TVET AND GLOBAL COMPETITIVENESS

Ashaolu T. A.

Dept. of Estate Management & Valuation, The Federal Polytechnic, Ilaro, Nigeria
Thomas.ashaolu@federalpolyilaro.edu.ng; info@taashaolu.com +234 8023220961

Abstract

There is an identifiable line of divide between conventional university education and TVET-focused polytechnic curricula. A parallel can be drawn in the distinction between invention and innovation by stressing the significance of the latter in achieving the goals of TVET in a typical developing, low-technology economy striving for global relevance. This is review paper identifying a gap revolving around advocating for the establishment of intellectual property (IP) Management subsystem within any innovation-creating organisation. It demonstrates that vocational training is industry- (or market-) oriented with an ultimate goal of producing entrepreneurs. In effect, this enhances innovative activities which are oftentimes, market-pull phenomena with greater potentials for commercialization as against created inventions, usually associated with the basic education route that promotes academic attainment. It observes that actualizing these potentials in TVET requires purposeful educational pedagogy centred on developing analytical (not critical, though) thinking, alongside the existence of IP management unit to plan, strategize and manage the system from conception through development to fruition. The paper therefore, recommends that TVET education should be appreciated as being designed to generate innovations which incidentally, are better positioned for commercialization, but with proviso that such should be properly anchored on appropriate IP system that is managed with expertise, not only to mitigate regulatory inadequacies but also for value creation, global recognition and competitive edge.

Keywords: Innovation, Global competitiveness, IP Management, TVET.

Introduction

Technical and Vocational Education and Training (TVET) has been defined as ‘aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating occupants in various sectors of economic and social life’ (UNESCO and ILO, 2001). It is often perceived as either last resort for tertiary education or a training route to the university by those experiencing some entry deficiencies (Tamrat, 2019). This perception would not be utterly out of place but the ultimate design is not to project inferiority. Polytechnics are however, neither for basic education nor are they established for pure research. Hence, we must naturally, expect inventive ideas required to drive national growth to concentrate in the Universities and the various research and development institutions. However, the Polytechnics occupy a unique position in developing economies characterized by low technologies in production. Through technical-oriented education combined with vocational (hands-on) engagement, ample opportunities exist for innovative improvement of existing ideas, designs, methods and processes in various fields. In other words, while inventors create new ideas and products, innovators make improvements or significant changes to what already exists. Taking example of the *Respirator* developed by the Federal Polytechnic, Ilaro at the peak of recent COVID-19 pandemic, this is an innovative improvement, making an otherwise hi-tech equipment available locally, more cheaply and yet comparably functional. The same device can as well be improvised using lower quality materials but delivering acceptable functionalities at much cheaper rate. An innovator may come up with another version having significantly superior features and capabilities at a competitive price. All of these are innovations on the conventional medical respiratory device that can possibly secure different segments of the market, if properly managed. An inventor would however, most likely discover an alternative device (often providing superior features and functions) and radically different to the conventional respiratory approach towards addressing the same need.

Incidentally, innovations often prove more realistic and market-ready, compared to inventions. Either way, Haughey (2015) had remarked that inventors and innovators constitute the great people capable of creating new products and services to transform lives. Thus, effective delivery of TVET is bound to produce creative leaders in various sectors of the society. There is nevertheless, a long tortuous chain between the creation of invention/innovation and its beneficial exploitation to achieve needed impact on both the inventor/innovator and the society at large. This paper intends to shed light and provide clues to successfully navigating these chain-links.

OECD (2009) has defined innovation as “the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.” Innovation is therefore, a pervasive concept that is expected to emerge across all units and segments of the society or any given organization. The Brookings Institution (2020) identified five innovative ways to reconciling education with the new economy – changing nature of skills, expanding teachers’ role, better integration of technology, involvement of non-state actors and more flexible accreditation criteria. In other words, each aspect and all TVET stakeholders are expected to thrive in innovation in meeting ever-changing needs in the society. Innovation is synonymous with growth and a system that refuses to innovate tends to fizzle out. Specifically, Otero (2019) summed up innovation in TVET to comprise ‘substantial change in the way TVET is practiced by an institution, making it progressively more relevant to its economic, social and environmental context’.

What the Brookings Institution identified above is innovation in TVET strategy and delivery. There is however, the innovation facilitated through TVET which is our focus in this paper. One thing that distinguishes TVET is emphasis on practical training. Pickersgill (2004) posited that, from Australian history, successful technical and other forms of education and training must be based on practical developments in current workplaces. Incidentally, practical skill development does not depend on academic performance or even intellectual capacity. Creative ideas can be innate, reactive, spontaneous or accidental. Whatever be the source, once it is novel and potentially useful, it must be harnessed, developed, protected and launched for beneficial use.

In reality, there is a very thin line of partition between invention and innovation but it is safe to understand that invention generally precedes innovation, though not necessarily preferred. Bogoro (2014) described Ivory Towers as ‘the bastion of intellectualism and the breeding ground for creativity, original thinking and innovations’. Here lies a major divide between the universities and the polytechnics. The universities are so referred to as ‘Ivory Towers’ because of their overly academic perspectives creating a disconnect from the world of reality. Indeed, it could require rare creativity to get out completely novel product. But experience from the computing and mobile communication sectors for instance, indicate that the life cycle of modern products (newly introduced or pre-existing) is increasingly getting shorter. New designs, features and functionalities are being innovated in droves whereby market sustenance require upwardly mobile minds. Digital economy and online marketing are creating interconnectivities that are gradually turning the entire globe into a village thereby making competition ever stiffer than before. Conversely, opportunity to expand and capture limitless geographical market boundaries is also brightening for start-ups and the small and medium enterprises (SMEs) that receive appropriate guidance. See Fig. 1 for typical career progression that often breed inventive and innovative creations.

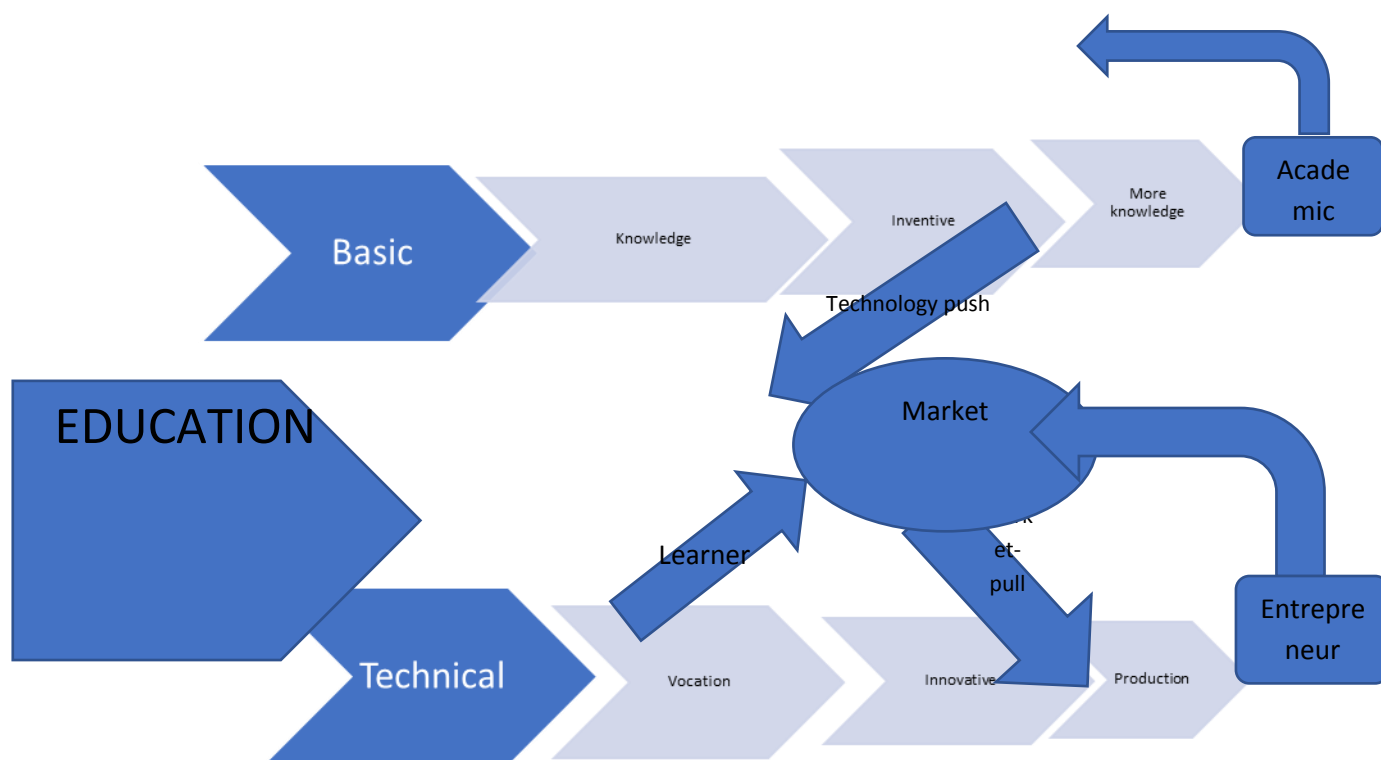


Fig. 1: Focal differences between Basic and Technical education

Figure 1 demonstrates the vantage position of TVET learners to identify and harness innovative opportunities. As shown, basic education pursues knowledge which goes with critical thinking, leading to invention of new or 'idealistic' products or processes while vocational training from technical education breeds practical inquisitiveness (analytical thinking) that births innovative products and processes. As the innovation is derived from interaction with the market, it is like a response to (or a pull/demand from) market yearnings for improved products unlike a novel technological idea (invention) that must be 'pushed' and 'impressed' on the market until it finds acceptance. Besides, basic education route often encourages continuation to seeking advanced knowledge towards becoming a 'professor' or an academician in the field. The technical and vocational graduate on the other hand, is cut for the industry and progresses to practicing the innovative product as an entrepreneur within the same market he was at different times a vocational learner and innovative creator.

The Intellectual Property (IP) system

Innovation must be compartmentalized as a proprietary asset and be capable of being exploited to have commercial value. Intellectual Property (IP) system provides the necessary protective tool here. Association of Southeast Asian Nations (ASEAN, 2019) likened a protected IPR as a fenced piece of land within which you can exercise ownership rights. There are various categories of IP regimes available, depending on the nature of invention or innovation at hand, and less often, the choice and circumstances of the inventor or innovator. The common ones are the limited-term but strong patent right, the long-term copyright and related rights associated therewith, trade secrets, trademarks, trade dress and/or industrial design as well as geographical indications. Briefly, patents if effectively granted, are used to provide potent legal exclusivity cover for technological and related discoveries (especially products, processes or methods) for about 20 years after which the invention or innovation enters into the public domain (free use by all). What would otherwise have gone for patenting might be given the less formal trade secret protection. While trade secret could be less expensive and last longer than patent, the legal rights afforded put more burden on the owner and may easily be extinguished by law, carelessness or legitimate bridging by competitors through 'reverse engineering'. For architectural designs, artistic works, musical and literary products, copyright protection is the route. Trademarks, trade dress, industrial designs, trade names (including domain names) all belong to business sector to brand and package goods and services for the market. They are often used to perpetuate IP protection longer than patents and copyrights. For TVET stakeholders however, the emphasis is usually on the more popular patents.

Patenting in Nigeria

Like all nations of the world, patenting has a long history in Nigeria. Presently, we have the Patent and Designs Act of 1970 (now Cap 344 of the Laws of the Federation of Nigeria, 1990) but much before that were the Patents Ordinance 17 of 1900 for the colony of Lagos and the Patents Proclamation Ordinance 27 of 1900 applicable to the Southern protectorate of Nigeria while in 1902, another Patents Proclamation Ordinance No. 12 came up for the Northern Protectorate. In spite the dated history however, not much has been achieved in these areas in Nigeria and even until now, the culture of invention/innovation and seeking relevant IP protection has not really grown. Oyewale (2006) found that patenting is low in Nigeria due to factors of ignorance and failure to recognize patent database as source of research data, positing that patent education of researchers is one way out.

Tables 1 shows that between 1971 and 2018, the highest annual patent application among residents of Nigeria was 120. From Table 2, the picture becomes gloomier realizing that between 2011 and 2013, an average of 95% patent applications in the Nigerian patent office were filed by non-residents seeking to launch their inventions/innovations into the Nigerian market. Besides, not many of Nigerian resident patent applicants found it necessary to extend their patenting rights beyond the Nigerian shore (Table 2).

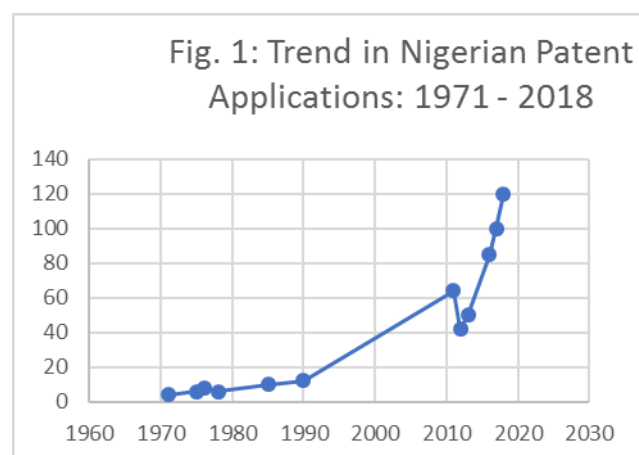
Table 1: Patent Applications in Nigeria 1971-2018

Year	No. of Applications
2018	120
2017	100
2016	85
2013	50
2012	42
2011	64
1990	12
1985	10
1978	6
1976	8
1975	6
1971	4

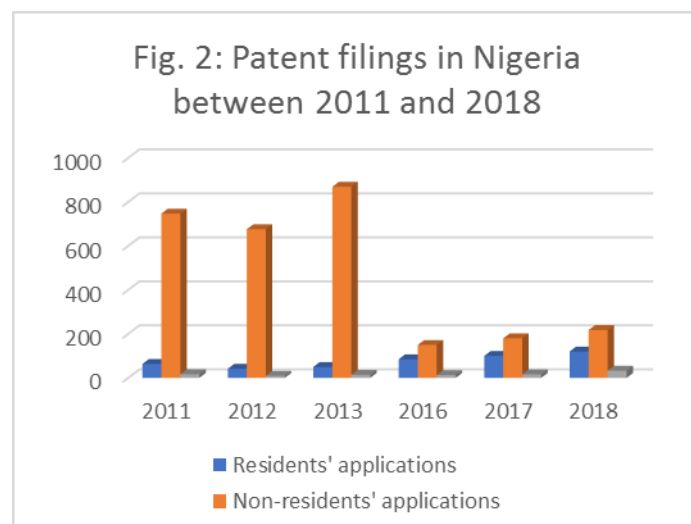
Source: Extracts from: Trading Economics (2020);
<https://tradingeconomics.com/Nigeria/patent-applications-residents-wb-data.html>

Table 2: Patent Applications in Nigeria (2009-2018)

Year	Applications from Residents	Applications from Non-Residents	Applications made Abroad
2009	N/A	N/A	22
2010	N/A	N/A	40
2011	64	747	17
2012	42	676	10
2013	50	869	14
2014	N/A	N/A	11
2015	N/A	N/A	60
2016	85	150	13
2017	100	180	16
2018	120	218	33



Source: Extracts from: Trading Economics (2020);
<https://tradingeconomics.com/Nigeria/patent-applications-residents-wb-data.html>



Source: Extracts from: Trading Economics (2020);
 op.cit.

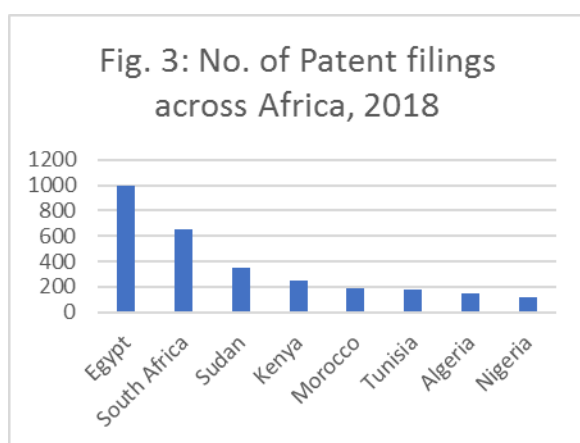
With 120 applications in 2018, Nigeria occupied 67th position in the world, but far behind several other African nations as shown in Table 3, with just 4% of total from 8 African nations where Egypt and South Africa accounted for 35% and 23% respectively.

Table 3: Comparative position of Nigeria patent application across Africa, 2018

Country	No. of Patent filings	%
Egypt	997	35
South Africa	657	23
Sudan	349	12
Kenya	244	8
Morocco	187	7
Tunisia	180	6
Algeria	152	5
Nigeria	120	4
Total	2,886	100

Source: World Intellectual Property Indicators 2019;

Access: [wipo_pub_941_2019.pdf](#)



Source: World Intellectual Property Indicators 2019

Inadequacies with Nigerian patent rights

Patent processing is rather hard and technical; hence it often takes time and fairly expensive to procure. But generally, patents and other IP rights are territorial. Hence, for Nigeria residents having patents registered only in Nigeria, their sphere of influence is localized. Unfortunately, however, the Nigeria Patent Office has not been disposed to affording the full course of patent searching and examination. Rather, what is operational is the deposit system whereby the rights obtained under the patents are provisional in nature and could easily fail feasibility and international infringement tests (Akpotaire, 2013). The reasons are not far-fetched:

- i) Each country is at liberty to adopt, within international agreements, various patenting procedures and requirements, including search and examination system suitable and affordable to it. For instance, Australia has two categories of patents – standard patents and innovation patents – with differing registration terms (Commonwealth of Australia, 2014);
- ii) Ideally, what is to be patented must be searched to ensure it is not within the scope of prior art (truly new or novel) and examined formally to have met patentability criteria and also examined substantially to be technically sound and practicable within the field;
- iii) Patent registration is partly social service to regulate relationship between the patent owner, third parties and the judiciary adjudicating any disputes thereon, hence there is no compulsion on the part of patent office to go beyond given limit;
- iv) The patent office requires minimum number of applications across different fields (currently unattainable) to make inauguration of field-specific patent examination feasible and viable;
- v) The country is not strong in industrial production (and in turn, only small proportion of registered patents are effectively exploited for commercial benefits) thereby not quite justifying excessive concerns;
- vi) Unlike some other African nations (who are members of either African Regional Intellectual Property Organization – ARIPO - or African Intellectual Property Organization - OAPI), Nigeria is not a member of any regional patent organization that could have enhanced resources for substantive patent examination in different individual technical fields. According to the Director General of ARIPO, no African nation can afford to carry out patent examination single-handedly (AITCR, 2020);
- vii) Many patent applicants in Nigeria are non-residents who either ride on Patent Cooperation Treaty (PCT) or are direct applicants (extending their market outlets to Nigeria) and presenting needed substantive examination already undertaken in their home/primary Patent office; and
- viii) Effective search and examination require substantial investments in personnel recruitment, training and acquisition of up-to-date search tools which would in return, heighten the cost of patent registration.

By implication therefore, obtaining a formal patent in Nigeria could be very far from owning a profitable asset. Rather, the responsibility for due diligence before, during and after patent registration lies on the patent owners or their advisers, managers or collaborators to avoid stockpiling dummies and liabilities (apart from initial cost, the patents must be regularly maintained by way of annual renewal fees).

Necessity for IP Manager

At the core of discerning the need for IP, directing creation and/or sourcing for them, protecting, utilizing and efficiently exploiting IP resources is the manager. He is next to the inventor or innovator, acting as bridge between him and the market. With background training and expertise in related economic and financial analysis of assets and investments, coupled with being a market-player, the IP Manager is required to give needed direction on what to innovate, which protective rights and continuum framework to seek to earn freedom to operate (FTO), when and how to create value from the IP rights, including appropriate oversight duties on regular maintenance of legal/statutory protection, carrying on due diligence, audit and assessment of IP assets, among others. WIPO (2020) described IP management as a fiduciary relationship ‘to actively reconcile opportunity with market context and allocate resources to realize a profitable end’. This reinforced the position of Hatcher (2009) that, in the long term it is essential that IP be integrated into a business and the business into the IP. Traditional docketing, spread sheet and content analysis are defensive in nature but IPM heightens the stake by pursuing strategies to secure economic utility and growth of IP assets.

As noted earlier, patents with first registration in Nigeria are potentially weak as what is ‘patented’ might fail the prior art test or even amount to outright duplication of pre-existing patented rights. Until proper novelty

searches have been undertaken, financial institutions and investors are bound to view the IPR as very risky assets.

Besides, the saying ‘*the fact there is gap in the market does not mean there is market in the gap*’ is very apt for IP. In other words, what is rightly conceived as capable of bridging a gap in the market may end up not being marketable as ideals often deviate from realities. Risk analysis is therefore necessary as guide to investment decisions here.

Specifically, IP Management office in a typical TVET institution:

- i) creates, manages and aligns IP portfolio with overall strategic vision of an institution;
- ii) oversees all aspects of IP from conception, invention and/or innovation, pre-development analysis, registration to marketing analysis and commercialization;
- iii) facilitates the reputation of the institution in quality teaching and research;
- iv) enable filtering of research publications to guard against premature disclosure of protectable IP rights;
- v) facilitates and maximizes beneficial relationship with investors, financiers and collaborators;
- vi) organizes training and re-training of institution’s staff and students towards spurring creativity, IP-awareness and capacity building;
- vii) provides window for market research to keep tap on contemporary niche demands;
- viii) monitors competitors’ IP registrations to guard against infringements and preserve freedom to operate (FTO);
- ix) organizes necessary IP due diligence analysis, audit and valuation assessments, as deemed necessary; and
- x) serves as framework for establishing and maintaining sustainable culture of invention and innovation in the institution.

Complementary role of the Legal consultant

Much as legal department is pivotal to IP, it is often erroneous delegating strategic planning and decision-making activities of IP management to it (Fisher III & Oberholzer-Gee, 2013 and WIPO, 2020). The legal consultant is usually engaged by IP manager to plan, draft and seek protection over specified IP rights, and to provide enabling legal framework for their utilization, including enforcement thereof and prosecution of infringers. Before the legal team is introduced, what has been invented must be clear-cut in terms of technical design, description, associated know-how, use-applications etc. To forestall unnecessary investments in IP creation and protection as well, the IP Manager must ascertain its preliminary productive feasibility and economic viability, realistic value-creation options to envisage, determine the befitting IP regime to exploit, including available IP continuum route to strategize for. Only then can the legal consultants be appropriately briefed and commissioned to build effective and sustainable legal framework for the IP assets. The legal unit is to provide enabling legal framework for market activities in respect of IP rights midwived into existence by IPM after which he (IPM) resumes by overseeing detailed handling and exploitation of the assets, including periodic due diligence, auditing and assessment.

IP Manager and Technology Transfer Office (TTO)

IPM and TTO are interwoven but with strikingly different objectives. TTO is meant to disseminate results of R and D into the industry, thereby creating necessary impact of the institutions on the society, not income-focused (Spasic, 2008). An IPM however, targets efficiency of resources committed to R and D, the results and their economic exploitation, among others. Also, while TTO harvests completed R and D activities, IPM is involved all through the process. In other words, IP Manager represents the mainstay before, during and after the activities of TTO.

Escalating global competitiveness through innovation and IPM – the Chinese example

That ‘IP is the oil of 21st century’ is no gainsaying. For more than two decades (1960 – 1981) Nigeria’s Gross Domestic Product was consistently higher than that of China. By 2018 however, China’s \$13.37 trillion figure was about 34 times Nigeria’s \$398.19 billion. Between 1979 reform and 2017, China was reported to have

experienced real GDP growth averaging 10% per annum thereby unarguably, becoming what the World Bank described as ‘fastest sustained expansion by a major economy in history’ (Congressional Research Service Report, 2019). The same report easily observed that ‘Chinese government has made innovation a top priority in its economic planning through a number of high-profile initiatives’ so much that by 2017, the American government was forced to launch ‘investigation of China’s innovation and intellectual property policies’. Admittedly, the Chinese fragmented system of governance has been found to negatively impact its administration of IP rights, especially as it affects foreigners (Brander et al, 2017). Fundamentally however, vibrancy in economic activities evidently engendered competition which in turn enforces innovative behaviour. Theirs is rapid, low-cost innovation facilitated by large population and market size (McKinsey Global Institute, 2015). This partly explains why China that is reputed to be responsible for about 28% of global productive activities could account for some 46% of worldwide patent filings in 2018, with a figure of approximately 1.4 million compared to Nigeria’s 120. Secret of Chinese innovative superpower includes higher growth rate of R and D spending, higher number of students studying science and technology as well as increased attraction of venture capital investments (World Economic Forum, 2020). Perhaps, as the state of infrastructure like power supply and transportation in Nigeria seldom allow room for meaningful economic activities, the urge for innovation has been low. If our moribund industrial establishments in the sectors like steel, textile, footwears, rubber, oil and gas were to be operational with accompanying service providers, the spate of innovative activities by different units (especially R and D) of the organizations alone would have put Nigeria in reckoning position. Notwithstanding, our precarious state of infrastructure and economy vis-à-vis strong population/market environment, are themselves latent with niches across all sectors awaiting exploration by creative-minded people.

Conclusion and recommendations

TVET institutions represent breeding ground for innovative growth in science and technology. Innovations however, belong to the seeming abstract or intangible assets that could be created consciously or otherwise, thereby requiring diligence in identification, compartmentalization, protection and exploitation. Also, their existence cuts across economic, cultural and social divides, while constituting potent means of growth, sustenance and global competitiveness. Indeed, Nigerian economy in the 21st Century can no longer look towards crude oil (given its dwindling global demand), nor any tangible products as much as the timeless IP products. China had been shown to have hinged her unparallel growth on efficient innovation and IP management culture. Hence, this paper has advocated the need for our TVET institutions to take the lead through a complimentary IP management system. The recommendations for action comprise:

Encourage creativity

Our TVET system must be re-engineered to encourage creativity. The issue is whether creativity can be taught. This otherwise innate skill, can be deliberately developed. D’Agostino (2015) suggested a 5-step process, namely; Preparation, Incubation, Insight, Evaluation and Elaboration. At preparation stage, the individual immerses himself in studying to gain sufficient knowledge and understanding in his field. Then comes the incubation stage at which the mind is made to reflect on the knowledge acquired at the preparation stage, usually in a relaxed environment. Here, the subconscious mind is allowed to operate. By the time an idea therefrom springs up in the conscious mind, you have entered the insight phase. The next step is to evaluate (using fairness, objective and sincerity criteria, oftentimes by survey and analysis), the idea coming up alongside the reality encountered at the preparation stage. Where the idea passes evaluation stage, gradual development, iterative production or elaboration can commence towards turning it to marketable product. TVET institutions would benefit from inculcating this strategy into their teaching and learning.

Orji (2009) had suggested among others, that universities (and of course, polytechnics) should evolve a point system that recognizes patent counting for staff promotion and even went a step further by advocating ‘patent or perish’ as substitute for ‘publish or perish’. One cannot subscribe to any of these as incentives. Rather, the benefits of good innovations, when effectively managed to commercial fruition, with appropriate recognition of contributors, are more than rewarding enough (much beyond the studentship and staff career’s days) to spur others to creative endeavors.

Have an eye for the future

To have clear perception of what the future holds can sometimes defy common knowledge and exposure. We were told of how in 1939, *New York Times* never believed innovative discovery of television could possibly upstage the radio as it could not be imagined how many would like to sit idling away, glued to a box (Rosenberg, 2004). Developing foresight only require diligence as against ingenuity, and involves acquiring knowledge, building up experience on it, correlating ideals of theoretical knowledge with experience to identify patterns that could be fed into analysis for predicting the future.

Do not compromise industrial engagements by students

Strict enforcement of standards is indispensable to achieving progress. If TVET is to be effective with innovative potentials, the students must truly be exposed to industrial experience in establishments that are genuinely relevant to their fields whereby they can encounter challenges that could stir up analytical thinking.

Create strong IP Management unit as driver

Ideas rather than resources rule the world. The IP Manager cannot be all-knowing but strategically positioned to extract, develop and manage latent innovations within an organization or institution and providing effective framework that would turn ideas to wealth by coordinating performance of the functions of IP Management office identified above.

References

- Africa International Trade and Commerce Research (AITCR, 2020). Report on Africa Regional Intellectual Property Organization under African Continental Free Trade Area: Should Nigeria join or not? May
- Akpotaire, U. B. (2013). Patent strategies for Companies doing business in Nigeria; January 13, Accessible: <https://ssm.com/abstract=1801883>
- Association of Southeast Asian Nations (ASEAN, 2019). Handbook on IP Commercialization - Strategies for Managing IPRs and Maximizing Value; Jakarta: ASEAN Secretariat, November. Access: [https://www.aseanip.org/Portals/0/Handbook-IP-Commercialization-Strategies-for-Managing-IPRs%20\(2019\).pdf](https://www.aseanip.org/Portals/0/Handbook-IP-Commercialization-Strategies-for-Managing-IPRs%20(2019).pdf)
- Bogoro, S. E. (2014). Institutionalization of Research and Development (R & D) as the launch pad for Nigeria's Technological Revolution; paper presented as Guest Lecturer at the 62nd University of Ibadan Interdisciplinary Research Discourse held at the Main Hall Conference Centre, University of Ibadan, Nigeria. Tuesday, December 9th.
- Brander, J., Cui, V. and Vertinsky, I. (2017). China and intellectual property rights: A challenge to the rule of law; *Journal of International Business Studies*; 48(7); July, DOI: [10.1057/s41267-017-0087-7](https://doi.org/10.1057/s41267-017-0087-7)
- Commonwealth of Australia (2014). A guide to applying for your patent: IP Australia; Accessible: https://www.ipaustralia.gov.au/sites/default/files/patent_application_guide.pdf?acsf_files_redirect
- Congressional Research Service Report (2019). China's Economic Rise: History, Trends, Challenges, and Implications for the United States; Accessed: <https://fas.org/sgp/crs/row/RL33534.pdf>
- D'Agostino, A. (2015). "5 Stages of the Creative Process with James Taylor." *CreativeLive*. December 28. Accessed: <https://www.creativelive.com/blog/5-stages-of-the-creative-process-with-james-taylor/>
- Fisher III, W. W. & Oberholzer-Gee, F. (2013) Strategic Management of Intellectual Property: An Integrated Approach; *California Management Review* 55 (4); Summer; 157-183
- Hatcher, J. S. (2009). MBA Courses and IP: Introduction Tangible IP; January 14th; Accessed: <http://www.tangible-ip.com/2009/mba-courses-and-ip-introduction.htm>.
- Haughey, R. (2015). Innovation in TVET: Challenges and Prospects; *Journal of Asian Vocational Education and Training*; Vol. 8, pp. 1-9
- McKinsey Global Institute (2015). The China effect on Global Innovation Accessed from: https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Innovation/Gauging%20the%20strength%20of%20Chinese%20innovation/MGI%20China%20Effect_Full%20report_October_2015.ashx
- Organization for Economic Cooperation and Development (OECD, 2009). Innovation in Firms: A Microeconomic Perspective; Accessed: <https://www.oecd.org/berlin/44120491.pdf>
- Orji, E. C. (2009) Nigeria: Country presentation on IP; WIPO-JPO Study programme on IP Asset- 25 November. https://www.wipo.int/edocs/mdocs/aspac/en/wipo_ip_dev_tyo_09/wipo_ip_dev_tyo_09_ref_u_nigeria.pdf



- Otero, J. P. G. (2019). Innovation in TVET; UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training https://unevoc.unesco.org/pub/tm_innovation.pdf
- Oyewale, A. A. (2006) Nigeria's Research System and the Culture of Patenting; Access: <https://www.dime-eu.org/files/active/0/Oyewale.pdf>
- Pickersgill, R. (2004). 'The engagement of vocational education and training 20 and innovation in Australia: Some historical perspectives' in Dawe, S. (2004). *Vocational education and training and innovation: Research Readings*; National Centre for Vocational Education Research Ltd, Station Arcade
- Rosenberg, N. (2004). Innovation and Economic Growth; *OECD*, 1–6, Accessed from: <https://www.oecd.org/cfe/tourism/34267902.pdf>
- Spasic, O. (2008). Intellectual Property and Technology Transfer – WIPO Capacity Building Programs and Tools Ankara, March 12 – 13; Access: https://www.unece.org/fileadmin/DAM/ceci/ppt_presentations/2009/ip/Ankara/spasic.pdf
- Tamrat, W. (2019). Universities vs TVET – Are attitudes the problem? University World News – Africa Edition; 20 March; Access: <https://www.universityworldnews.com/post.php?story=20190315095852544>
- The Brookings Institution (2020). The top 5 education innovations needed to keep up in a new economy; Access: <https://www.brookings.edu/blog/education-plus-development/2016/10/04/the-top-5-education-innovations-needed-to-keep-up-in-a-new-economy/>
- UNESCO and ILO (2001). Technical and Vocational Education and Training for the Twenty-First Century - UNESCO and ILO Recommendations; Access: <https://www.voced.edu.au/content/ngv%3A8115>
- WIPO (2019). World Intellectual Property Indicators, 2019; accessed from: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2019.pdf
- WIPO (2020). Module I - Intellectual Property Management: Introduction and Overview; DL450E20S1 Lecture Notes; April – September
- World Economic Forum (2020). China is an innovation superpower. This is why. Accessed from: <https://www.weforum.org/agenda/2018/02/these-charts-show-how-china-is-becoming-an-innovation-superpower/>