

Intellectual Asset Management for Sustainable Research

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Abstract—Value addition at reasonable cost leads to competitiveness in any market and is achieved through use of proprietary information in the form of improved technology or effective exploitation of Intellectual Property (IP) assets.

The inability of enterprises in Kenya to compete effectively in the market could be a consequence of the underdeveloped internal knowledge management capabilities and this challenge may be overcome if specific IP asset management needs are addressed. The relationship between value chain, competitiveness and market access in a globalized economy manifests itself in aspects which players must master to survive; namely:-

- With the growing division of labour and the global dispersion of the production of components, systemic competitiveness has become increasingly important for market participation.
- Efficiency in production is a necessary condition for successfully penetrating local or global markets.
- Entry into global markets which allows for sustained income growth – that is, making the best of globalization - requires an understanding of dynamic factors within the whole value chain

IP asset management-as a key component within any value chain-has become the pillar of business in knowledge economies. Investment in IP requires businesses to find ways to manage their knowledge appropriately to avoid the erosion of their competitive edge.

Systematic transfer of knowledge from research to enterprises has been a major challenge in Kenya. Research is often not based on industry demand; and, enterprises often do not have strategies to commercialize new products and do not know where to get advice on how to manage their IP. Cultural attitudes relating to the African social ideals, beliefs and inherited business practices are also a challenge to IP asset management. For a number of entrepreneurs, peer recognition seems to suffice, whenever they innovate and develop IP that could provide a market advantage as information is often shared freely to achieve “Bragging Rights” by the innovator. Further some entrepreneurs believe that the government owes them more than could be realistic-in terms of infrastructure and support services.

This paper tries to analyze IP asset management, value chain and market competitiveness with respect to sustainability of demand driven research.

Keywords—demand driven research, IP asset management, market competitiveness, value chain.

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I. INTRODUCTION

INTELLECTUAL ASSETS (IA) denote a body of proprietary information and knowledge owned by an organization or an individual; and which has the potential to generate some value or advantage when reduced to practice. Intellectual asset management (IAM) is fast becoming one of the most important systems for driving economic value and competitiveness. Value addition at a reasonable cost to any manufacturer is the key to remaining competitive in the free market. Such value addition is achieved through advantageous use of proprietary information as a manifestation of successful and effective leveraging of some form of knowledge or Intellectual Property (IP).

Few local organizations are aware of the potential of their intellectual assets or have concrete strategies for extracting maximum value therefrom. Records available at the Kenya Industrial Property Institute indicate that the Jua-Kali sector in Kenya is the leading source of locally created and registered Industrial Property Rights (IPR). Interestingly, very few people even within this sector believe that any research goes on in this sector; as compared to the formal Research and Development (R&D) Institutes and Universities. The commercialization of the created IA or possible exploitation of other IP in public domain does not seem to be effectively imparting competitiveness or growing the market participation of these enterprises. The trend where formal R&D institutions seem to be appropriating very little of their IA is a clear indicator that the R&D Institutes are not effectively managing their IA.

A. *The Intellectual Property System in Kenya*

The IP system in Kenya is relatively underdeveloped; but consists of an industrial property regime, a plant breeders’ rights protection system, and, a copyright regime. Each of the IP regimes is administered by a specialized semi autonomous government agency. In terms of public perception, the copyright system is the most widely understood regime. It has considerable user activities related to enforcement, setting up of collecting societies and related advocacy which has resulted into a comparative general public respect for such rights.

B. *Market Participation*

The market participation or earnings from market activities of Kenyan enterprises has remained low. This is partly due to use of obsolete technologies and inefficient production processes. Most entrepreneurs seek to utilize the IP system as a means of monopolizing business ideas or technologies without regard to their actual origin or even possible existence in the public domain.

As a consequence of globalization and economic liberalization,

previously protected and regulated economies have opened up to all competitive suppliers of goods and services; thus exposing businesses to competition from all over the world. The consequence has been that some enterprises which had limited resources or did not redesign their business models to achieve higher levels of productivity and competitiveness have been driven out of business by free market forces. This situation is worsened by the fact that some of the products offering stiff competition could be subsidized cheap imports or counterfeit¹. Whereas competition affects all enterprises, its impact on the struggling manufacturing sector has been felt more than in any other sector since these enterprises have limited resources they could use to respond to challenges associated with changing markets. It is for example often stated that most locally manufactured products cannot compete against imported products which look better and are cheaper.

In Kenya, the industrialization policy was previously founded on import substitution. Consequently, Kenyan enterprises had no motivation to improve their efficiencies or to aspire to be globally competitive as the local market was guaranteed. This trend led a majority of the enterprises to enjoy huge returns with minimal effort from a captive local market. Most manufacturers never contemplated a market outside the country's boundary; and stuck to safe products that were guaranteed to sell. Such products mostly included basic and household goods which were difficult to import. With liberalization, prefabricated furniture components from Turkey and China found their way into the market, for example. The imported furniture was of superior finish and made up of standardized parts which could be replaced if necessary.

The previously guaranteed local market suddenly began shrinking. Since production processes were inward looking and technologically stagnated or stuck to the past, the affected entrepreneurs could not seriously venture into export markets. A number of these enterprises have less than ambitious business models or aspirations. In some instances, even the raw materials previously used by the manufacturing sector including scrap metal, found better paying buyers from offshore. This implied that free market forces offered competition in the local finished product market as well as along the supply chain.

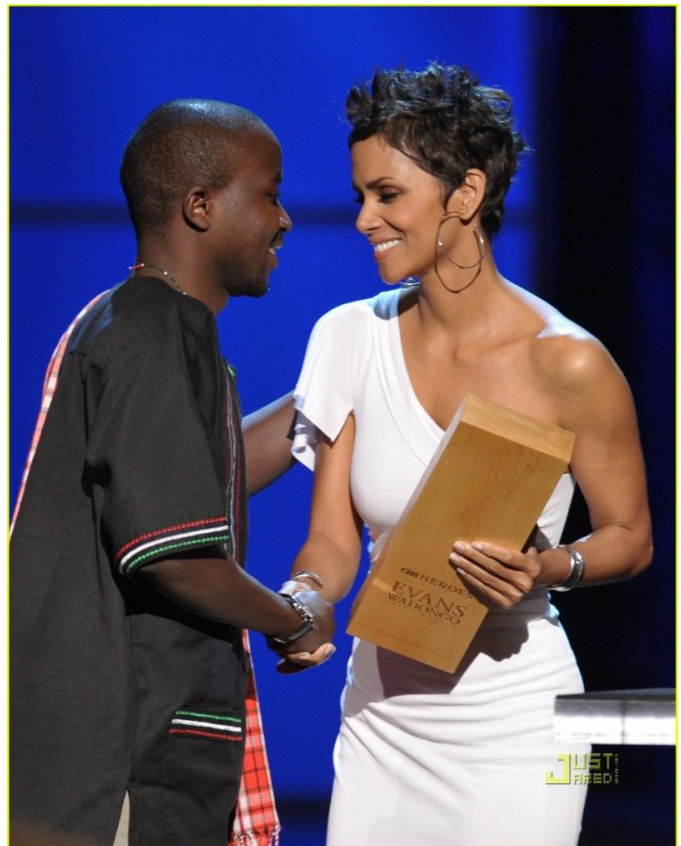
The most common challenges facing manufacturers which relate to the adopted production technology; and which are directly amenable to effective IAM include:-

- The products are too expensive.
- The products are less attractive than similar products from other sources.
- The products are not standardized; and in case of machine components, no spare parts are available to repair broken down parts.
- It is impossible to trace the source of individual products.

Costly products are often the result of production processes using inefficient techniques. Product presentation and traceability in terms of branding and packaging could be improved if the entrepreneurs embraced industrial designs, innovation and trademarks. Standardization of product parts is also easily achievable through use of technologically advanced manufacturing processes including mechanization and production involving the use of modular parts that can be subcontracted.

C. Sustainable Research

Sustainability of any activity has been defined as the capacity to endure; while research may be construed to mean thorough scholarly or scientific inquiry leading to a detailed and accurate presentation of the findings. Since research is expensive; it can only be enduring if it has an in-built capacity to attract funding. R&D, especially within Public Research Organizations (PROs) competes for funding with other commitments and attempts must be made to make R&D generate its own funding by generating revenue from its findings. This can only be achieved through effective commercialization of R&D findings. For practical reasons, it is only possible to commercialize research findings if they solve specific needs in a society; or if industry may directly apply these findings to deliver a new product or service to the market. This implies that research must be demand driven at best; or at least sensitive to industry demands to be sustainable. Prudent IAM would ensure that revenue attributed to R&D findings is properly appropriated to support further research activities; hence sustainability of research.



CNN Top Ten Hero, Evans Wadongo, and Oscar Award winning actress Halle Berry during the All Star tribute show in Los Angeles, California in November 2010

A good example of such a finding is the solar lantern whose creator founded a program in 2004 as a young college student; to design, make and distribute, solar powered lanterns dubbed **MwangaBora!**² to poor communities, and help them set up

economic ventures, partly from the money initially spent on kerosene. The lanterns are helping to improve education standards, reduce respiratory & eye related diseases, reduce climate change and reduce poverty, in poor rural communities in Kenya. To date, over 65,000 people have benefited directly from the program, out of which over 60% are school going children.

D. Competitiveness

The most practical; though flawed, definition of competitiveness is a country's share of world markets for its products. This view makes competitiveness imply that one country's gain comes at the expense of others and is used to justify intervention to skew market outcomes in a nation's favor in the name of industrial policy. It also underpins policies intended to provide subsidies, hold down local wages and devalue the nation's currency, all aimed at expanding exports. True competitiveness, however, refers to the productivity with which a nation utilizes her human, capital and natural resources to improve on her citizen's standard of living. Productivity has a direct dependence on the processes and technologies adopted during the utilization of available resources to generate wealth.

The inability of enterprises in Kenya to compete effectively in the market is largely due to the underdeveloped internal knowledge management capabilities and this challenge may be overcome if specific IP asset management needs are addressed. The relationship between value chain, competitiveness and market access in a globalized economy manifests itself in aspects which players must master to survive; namely:-

- With the growing division of labour and the global dispersion of the production of components, systemic competitiveness has become increasingly important for market participation. Production has become extensively specialized; and sub-contracted, with each producer only focusing on what they are best at.
- Efficiency in production is a necessary condition for successfully penetrating local or global markets. These markets are accessible by all the players; unlike in the past.
- Entry into global markets which allows for sustained income growth – that is, making the best of globalization - requires an understanding of dynamic factors within the whole value chain

Rank	Previous Rank	Brand	Country of Origin	Sector	Brand Value (\$m)	Change in Brand Value
1	1	Coca-Cola	United States	Beverages	70,452	2%
2	2	IBM	United States	Business Services	64,727	7%
3	3	Microsoft	United States	Computer Software	60,885	7%
4	7	Google	United States	Internet Services	43,557	36%
5	4	GE	United States	Diversified	42,808	-10%
6	6	McDonald's	United States	Restaurants	33,578	4%
7	9	Intel	United States	Electronics	32,015	4%
8	5	Nokia	Finland	Electronics	29,495	-15%
9	10	Disney	United States	Media	28,731	1%
10	11	HP	United States	Electronics	26,867	12%
11	8	Toyota	Japan	Automotive	26,192	-16%
12	12	Mercedes-Benz	Germany	Automotive	25,179	6%
13	13	Gillette	United States	FMCG	23,298	2%

IP asset management-as a key component within any value chain-has become the pillar of business in knowledge economies. Investment in IP requires businesses to find ways to manage their knowledge appropriately to avoid the erosion of their competitive edge.

As an illustration of the value of IA when compared to traditional “brick and mortar” assets, one may want to recognize that no single non-IP asset compares to the universally accepted value of the top brands above³.

II. INTELLECTUAL ASSET MANAGEMENT IN RESEARCH

A. Context of IP Exploitation

Effective management of intellectual assets requires a portfolio approach that encompasses both defensive and offensive strategies. Defensive strategies need to be focused on the pro-active monitoring of market and competitor behaviour to ensure that intellectual assets have adequate protection in this regard. Offensive strategies should be based on the commercial exploitation of intellectual assets in core and non-core applications and must be done in a manner that ensures maximum return on investment and sustainable business competitiveness. Value addition is achieved through advantageous use of proprietary information in the form of improved technology. Competitiveness in the market for any enterprise is often related to the ability to produce superior products as compared to alternatives available, or to produce at a lower cost, or even reducing wastage in the production processes. Attaining the necessary level of competitiveness has been a major challenge to all manufacturers in Kenya. Due to the relative underdevelopment of technologies employed locally, the IAM for a number of enterprises could simply be the development of adequate capacity to effectively mining existing IP databases for public domain disclosures of useful and appropriate technology they may use in order to become competitive.

There are powerful impulses behind the pressures on R&D organizations (RDOs) in general; and more specifically public sector⁴ R&D organizations (PROs) to maximize the returns on use of all assets used in R&D. Coming from longer term efficiency drives under performance contracting and dwindling monetary allocations, there has long been emphasis on gaining more benefit from assets created by the R&D. Up until comparatively recently, that emphasis has been on physical and service type assets. But it has been realized that the country needs to begin transforming its economy to the more productive knowledge based one and release the returns for

wider economic. More focus is being seen among policy makers and government on the potential to be unlocked in IA.

Over the years the RDOs have developed, acquired or paid for a wide range of IP, much of which lies undisturbed in archives and the memories of those who commissioned and oversaw the projects. Such IA include data, software, inventions, processes, patents and trademarks – anything which is the product of human knowledge and which has potential value, even if not recognized formally in any balance sheet. The Kenyan PROs have generated considerable amounts of IP but face real difficulties in assessing and realizing its value.

IA exploitation process often requires a systematic approach and includes:-

- Developing intellectual asset management strategies that are aligned with overall institutional mandates and objectives. If the institution's primary reason for conducting research is to facilitate teaching or training then the IAM strategy must further enhance training by encouraging generation of new ideas and effectively disseminating the generated knowledge. However, a deliberate and effective system must be put in place to commercialize research findings; and if possible focus research on providing solutions to industry problems.
- Assessing and implementing organization structures, work processes and technologies to support IAM strategies. In case of identified shortcomings, concrete steps must be taken to provide the institutional infrastructure for IAM.
- Evaluating R&D result commercialization strategies and practices to accelerate time to market and enhance the effectiveness of industry research investment decisions.
- Developing intellectual asset inventories and categorizing the assets for on-going portfolio tracking and management
- Evaluating and executing alternative monetization strategies for all the IA in the portfolio.
- Assessing the value proposition, addressable market, risk factors and value of IA to inform IP transaction business decisions and exploitation strategies.
- Providing internal competencies to advice on IAM and strategic transaction negotiations during acquisitions, divestitures, joint ventures and licensing.

Effective IP exploitation produces both unquantifiable and quantifiable benefits for the RDO, University, or Resource Centres, and for the staff involved (the inventors). The unquantifiable benefits include not just enhanced research standing, but also improved links to end users, and hence to sources of future research ideas and teaching needs. The researcher is also better able to demonstrate contribution to society and to wealth creation. The quantifiable benefits are primarily financial, and can be substantial. Income and profits can also contribute significantly to the income of individual resource centres. Individual academics can also expect a share of the profits or royalties from their inventions and this can on occasion provide an extremely effective way of retaining staff with scarce and highly marketable skills. The purpose of IP Exploitation especially among PROs is to promote the wider use of the output of the PRO's research, teaching and services; hence to contribute to

wealth creation and quality of life; enhance the PRO's research standing and links with the users of its academic output as well as creating opportunities for its staff and students; to generate additional income to support the PRO's academic activities; and to position the PRO as a national leader in the field of IP exploitation.

B. Barriers to IP Exploitation

Due to diminishing resources and the consequent push for PROs to make better use of assets created in the public task-say of teaching- but with utility and value beyond that; the focus needs to increasingly shift from physical and service type assets to IA, which had hitherto generally been ignored, with the exception of the data and information assets exploited by different government planners.

Several factors have contributed to the continued under-valuation of IA on the basis of tradition and practical circumstances including:-

- Traditionally, RDOs exclusively emphasized on dissemination by means of publication of research findings; and did not provide any incentives for researchers to simultaneously seek avenues for IP exploitation
- RDO staff have not been sufficiently sensitized on the value of IP or IAM practices
- A number of RDOs do not know what IP they already hold; and there is no systematic inventory of any research findings
- There are no clear policies and guidelines how to assess the potential value of IA. A number of RDOs do not have any comprehensive IP policies in place; and such issues as ownership of IP, sharing of any exploitation benefits, and recognition for researchers have been a major hindrance to IP exploitation
- IA assessment as a specialist skill is not normally within the toolkit of RDO
- Availability of clear-cut routes and processes that could lead to cost effective exploitation (eg tools, skills and incentives) are not developed or nurtured in a manner that can short circuit the path to success
- There is considerable complexity and ambiguity around the compliance frameworks which can inhibit effective IP exploitation
- Occasionally, funding is sourced from different organizations with divergent interests; and who seek to control disclosure and manage all IA

Often PROs are placed in an apparently invidious position whereby they are asked to create more efficiency, derive greater value from their assets, yet also make everything they produce freely available and ensure they do nothing to interfere with the freedom of natural markets. Some critics of IP systems within the PROs characterize it as intellectual protectionism, intellectual monopoly or government-granted monopoly, and argue the public interest is harmed by protectionist legislation such as copyright extension, software patents and business method patents

C. Possible Ideals in IP Exploitation

Whereas each RDOs may have own priorities and needs with respect to IAM, it is evident that a working system needs to be in place for IAM; and some of the elements of such a system are briefly outlined below.

1) Enabling Policy

Due to the nature of the business of the RDOs, staff create, use and control a vast amount of IP. Some of this IP has value beyond the original reason for which it was produced. Deliberate guidelines must be provided to all players on the necessary actions and procedures to adopt whenever one has to deal with IP. Policies are needed at the national and RDO levels.

Decision-makers need consistent and appropriate advice and all employees need to understand some key principles of IAM. Problems can occur through a lack of knowledge about IP issues including:-

- ownership of IP produced by employees, volunteers and others.
- Recognition of moral rights of authorship and the distinction between moral rights and economic rights.
- Processes for sharing own IP with others, in particular the granting of licenses rather than giving away IP.
- The rationale and appropriate processes for managing commercialization.

IP should be managed in a way that is consistent with other organizational goals, as articulated through policies and other strategic documents. As with any other asset such as finance, human resources and information, IP should be managed on a proactive rather than reactive basis, if its value is to be maximized

2) Practical Steps and IAM Infrastructure

A mechanism must be provided for implementing the IP Policies of both the Nation-eg through the National Council for Science and Technology (NCST)-and the RDO. The mechanism includes both a physical infrastructure; say, establishment of a technology matching and transfer office, as well as documented and established procedures relating to IAM. Authorized and public funded research managed by NCST could for example be based on priorities developed from industry demands as collated by the national technology matching and transfer office within NCST.

Giving practical effect to any initiative to realize the potential of IP assets will require consideration and implementation of key steps of:-

- a clear statement of intent – an explanation of what IP is and the importance of its exploitation in both the RDO and wider public interest
- provide an incentive framework to enable individuals or teams responsible for the successful identification and exploitation of IP to benefit from such activity. RDOs also need to have IP exploitation as an explicit goal with a framework for reward to encourage staff to see the benefits across the RDO in terms of the ability to invest some of the income in improved services and working facilities, as well as contributing to revenue generation and the wider economy

- identify existing IP by undertaking inventory of organization's assets. Much IP in public sector organisations is not exploited as either rights have been given away, are unclear or are in dispute (often with other public sector bodies!) A review of IP assets will identify possible quicker wins and scale of potential. A sense of future value or worth can be relatively quickly surmised from a systematic consideration of identified IP and a study of the market considered relevant for the IP
- seek advice on the most effective commercial route to exploit IP to provide a revenue balance between the differing stakeholders
- implement the most appropriate exploitation route

The above steps would guarantee identification of IP created in the course of employment or engagement by introducing mechanisms to identify and record IP generated by employees or consultants in the course of their duties. Similarly, engagement contracts will address IP issues specifically the issues of pre-existing IP and IP to be created during the contract.

Due to the complex nature of IP rights, it is necessary to seek advice from suitably qualified lawyers, patent attorneys or other consultants where appropriate in-house or in-government expertise is unavailable. RDOs also need to provide appropriate training of staff in IP related issues.

Whenever procuring an IA, organizations should endeavour to obtain such ownership or licensing rights as are consistent with its procurement objectives. Similarly, when a consultant is engaged, organizations must explore whether ownership of IP developed by the contractor/consultant on their behalf is the best option for maximising benefits. PROs may agree to a consultant retaining the ownership of some or all of the IP rights created by the consultant during the course of the contract if other public interests, such as supporting industry or enabling or facilitating the more efficient delivery of services to the taxpayer, are considered to be of greater benefit to the public than the ownership of IP by the PRO.

RDOs should take care in disclosing their IP to a third party or parties prior to its publication or commercialization in order to preserve novelty-for patent purposes-and the commercial value of the IA.

RDOs should seek legal advice as soon as any suspected infringement of owned IP is discovered. Similarly, R&D organizations must take active steps to avoid infringing the IP rights of other people or organizations

Where an institution agrees to joint ownership of IP, the contract should contain appropriate provisions relating to the use, management, commercialization and administration of IP assets.

Before commercializing an IP asset, an institution should conduct an assessment of the commercial potential of the asset and all costs and risks associated with its commercialization. Commercialization of IP should be carried out with the assistance of a third party with appropriate skills and expertise. An asset should not be commercialized if to do so reduces or otherwise detrimentally affects the on-going operational value of that asset. The commercialization of an IP asset by any institution should be conducted in a manner that is consistent with the national competition policy.

When PROs sell, dispose of or license their IP assets they should attempt to obtain the best deal for the public and should do so in an open, accountable and competitive manner.

3) *Comparison with the Bayh-Dole Act*

The American Bayh–Dole Act or University and Small Business Patent Procedures Act is the legislation dealing with intellectual property arising from government-funded research. Among other things, it gave U.S. universities, small businesses and non-profits intellectual property control of their inventions and other intellectual property that resulted from such funding.

Perhaps the most important change of Bayh-Dole is that it reversed the presumption of title. Bayh-Dole permits a university, small business, or non-profit institution to elect to pursue ownership of an invention in preference to the government.

Small businesses and non-profit organizations can retain the title in a federally funded subject invention. In exchange, the organization is required to

- Report each disclosed invention to the funding agency
- Elect to retain title in writing within a statutorily prescribed timeframe
- File for patent protection
- Grant the federal government a non-exclusive, non-transferable, irrevocable, paid-up license to practice or have practiced on its behalf throughout the world
- Actively promote and attempt to commercialize the invention
- Not assign the rights to the technology, with a few exceptions
- Share royalties with the inventor
- Use any remaining income for education and research
- Give preference to U.S. industry and small business

A subject invention under the Act means any invention that is conceived or first actually reduced to practice in the performance of work under a funding agreement. This definition covers a wide range of research activities that are either partially or completely federally funded. Two questionable scenarios do not give rise to subject inventions.

- The first happens where an invention is created in closely related research outside the scope of the federally funded research. In this case, it must be shown that the non-government research did not diminish or distract from the federal research.
- The second scenario occurs when research is wholly outside the scope of federally funded research, but may utilize some government funds (like equipment purchased for another research project). In this case, it must be shown that the research was done "without interference with or cost to the government-funded project."

Nevertheless, this definition is so broad, and it is very difficult to prove that research did not diminish, distract from, interfere with, or

cost the government funded program. As such, many institutions assume that where federal funds have been used anywhere in a lab, a subject invention exists.

III. IAM IN TECHNOLOGY TRANSFER

Systematic movement of technology from its creator or researcher to a user, especially as products or publications or the movement of new technology from developed areas to less-developed areas may be considered technology transfer. Since researchers are often not the best in business, it may be necessary to have in place a system for transmitting the research findings into manufacturing instructions or service delivery procedures for industry. Several models have been utilized in other jurisdictions as outlined below.

One fact that RDOs may need to establish with this respect is that they are not seeking solutions to their research findings most of the time.

A. *The Licensing model*

This is the easiest and most appropriate to the culture of a PRO. The PRO retains ownership of the IP while enterprise(s) get specific authorization to commercially exploit the IP in a specified manner in specific territory(ies). Licenses may be exclusive or non-exclusive.

B. *Partnering*

This can take a variety of forms and may have take into account different IP asset types. Basically, an enterprise partners with the owner of IP to achieve its commercialization.

C. *Commercialization within the Organization*

This is never the most effective means of deriving commercial asset value, but sometimes a pragmatic response to internal culture, the moderate expectations of the prize and the timeline. When the organization is convinced that the most effective commercialization route is by internal mechanisms, then it may consider going into business either directly or through a spin-off.

D. *Commercialization outside the organization*

These are best exemplified by spin-offs created to commercialize a specific IP.

Each of the above models and their variants has strengths and weaknesses appropriate to the situation. Open procurement pathways should be followed to ensure value for money and to demonstrate transparency. Whichever route is followed, it is increasingly becoming clear that government is doing all it can to remove the obstacles and perception of difficulty which lies around the whole question of IP asset utilization. PROs will have to make the judgment of whether they are doing enough themselves to realize the value of the intellectual property assets which they have accrued as part of

their public task.

E. References

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