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INTELLECTUAL PROPERTY RIGHTS PROTECTION OF PUBLICLY FINANCED RESEARCH AND DEVELOPMENT OUTCOMES: LESSONS KENYA CAN LEARN FROM THE UNITED STATES OF AMERICA AND SOUTH AFRICA

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I do hereby declare that I have read and understood the regulations governing submission of a Masters of Law dissertation, including those relating to length and plagiarism, as contained in the rules of this University, and that this dissertation conforms to those regulations.

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DECLARATION

I, Perpetua Njeri Mwangi, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

Signature…….

Date…….

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ABSTRACT

This dissertation explores the protection of intellectual property rights (IPRs) as they relate to publicly financed research and development (R&D) outcomes. Kenya has the opportunity to learn from the experience of the United States of America (US) and South Africa (SA). The US enacted the Bayh-Dole Act (BDA) in 1980 while SA enacted the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR-PFRD Act) in 2008.

The main research question is whether Kenya ought to enact similar legislation. In addition to the main research question, there are six other secondary questions.

The first and second research questions are explored in chapter two which discuss the enactment of the BDA and its impacts in the US. The dissertation uses literature to look at the legislative journey of the BDA which upon its enactment created a uniform approach towards the protection of federally funded R&D outcomes. Literature also points to the fact that years later, the BDA still invokes debates across the US and beyond. There is no consensus on the impact of the BDA. Despite the lack of a clear stand point on its exact effect, several countries have emulated the US and still continue to do so.

The third and fourth research questions discussed in chapter three adopts a similar approach but focuses on SA, the first African country to emulate the BDA. The IPR-PFRD Act has been operational since 2010. The limited period of its existence means that the literature available is work in progress. Despite that, SA has had some impacts experienced so far across its leading universities in the form of; realignment of IP policies to comply with the provisions of the IPR-PFRD Act as well as discussions among researchers, innovators and the National Intellectual Property Management Office (NIPMO). There is evidence that Universities, industries and NIPMO are trying to implement the spirit as well as the letter of the IPR-PFRD Act.

The fifth and sixth questions discussed in chapter four turn to Kenya. The dissertation tries to establish whether there is a demand in Kenya for legislation that regulates publicly financed R&D outcomes. It proposes that the time is not yet ripe for Kenya to have a BDA model, but that Kenya needs to first develop sustainable capacity and infrastructure to support the protection, management and ownership of IP. Chapter five concludes that Kenya can learn invaluable lessons from the US and SA when it considers regulating publicly-financed R&D outcomes.

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LIST OF ABBREVIATIONS

AG	Attorney General
ANC	African National Congress
ARIPO	African Regional Intellectual Property Organisation
AUTM	Association of University Technology Manufacturers
BBBEE	Broad-Based Black Economic Empowerment
BDA	Bayh-Dole Act
CIPC	Companies and Intellectual Property Commission Office
DoD	Department of Defence
DST	Department of Science and Technology
GAO	General Accounting Office
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
HEW	Department of Health Education and Welfare
IP	Intellectual Property
IPA	Institutional Patent Agreement
IPR-PFRD Act	Intellectual Property Rights from Publicly Financed Research and Development Act
IPRs	Intellectual Property Rights
KEMRI	Kenya Medical Research Institute
Kshs	Kenya Shillings
MTAs	Material Transfer Agreements
NIH	National Institute of Health
NIPMO	National Intellectual Property Management Office
OECD	Organisation for Economic Co-operation and Development

OA	Open Access
Open A.I.R	Open African Innovation Research & Training
OTTs	Offices of Technology Transfer
PCT	Patent Co-operation Treaty
PROs	Public Research Organisations
R&D	Research and Development
RCIPS	Research Contracts and Intellectual Property Services
SA	South Africa
SMEs	Small Medium Enterprises
STI	Science Technology and Innovation
SUPA	Society of University Patent Administrators
TRIPS	Trade Related Aspects of Intellectual Property Rights
TTO	Technology Transfer Office
TTOs	Technology Transfer Offices
UCT	University of Cape Town
US	United States of America
USPTO	United States of America Patent and Trademark Office
WIPO	World Intellectual Property Organisation
Wits	University of Witwatersrand
WTO	World Trade Organisation
ZAR	South African Rand

CHAPTER ONE

KNOWLEDGE-BASED ECONOMY AND THE ROLE OF INTELLECTUAL PROPERTY RIGHTS

1.1 Introduction

The United States of America (US) through the enactment of the Bayh-Dole Act (BDA)[1] in 1980 sought to maximise returns on investments that were being channelled towards publicly-financed research and development (R&D). Congress hoped that it would achieve that goal through acceleration of knowledge transfer, development of entrepreneurships, increased innovation and ultimately economic growth. It is purported that the BDA made universities and public research organisations in the US become more business-focused.[2] Other developed countries followed suit in light of the perceived benefits of strengthened university-industry links especially in terms of stimulating innovation and promoting technology transfer.[3] Policy makers in developing countries such as South Africa (SA) were drawn to the accolades attributed to the BDA and went further to enact similar legislation. SA's BDA model is the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR-PFRD Act) 51 of 2008.

Over thirty years since the BDA, many more countries in both high and low income economies have continued to advocate for institutional ownership and commercialisation of inventions from publicly funded universities and research institutions. This has led to the development of diverse legal and policy frameworks and practices.[4] Diverse because in some countries they are constantly being progressed while in others, they are largely being transplanted from other counties especially from the US.[5] The diversity has given rise to a broad range of legal and policy approaches aimed at maximising benefits of publicly funded research.[6] This research is limited to the experience of the US and SA with a view to reflect on Kenya's

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[1] Amendments to the Patent and Trademark Act Pub. L. No. 96-517 (Dec. 12, 1980), codified at 35 U.S.C. §§200-12.
[2] P Zuniga and S Wunsch-Vincent 'Harnessing the Benefits of Publicly-Funded Research' *World Intellectual Property Organisation (WIPO) Magazine*, June 2002, available at *http://www.wipo.int/wipo_magazine/en/2012/03/article_0008.html*, accessed on 18 June 2014.
[3] Ibid.
[4] Zuniga and Wunsch-Vincent op cit (n2) 2.
[5] Ibid.
[6] Ibid.

position on protection, ownership, management and commercialisation of publicly financed R&D outcomes and thereafter, offer an opinion on the way forward.

Transfer of knowledge and technology from public universities and research institutions to the private sector occurs through an array of channels including research collaborations, licensing of inventions from universities and public research institutions, joint ventures, publications, conferences, informal meetings, patenting, research contracts, personal exchanges and hiring university students and researchers.[7] Patents are said to play a small role in knowledge transfer relative to other channels.[8] It is also argued that intellectual property (IP) (noting patents is one of the forms of IP) can also play a key role in terms of fuelling innovation and driving business development for instance through incubators, science and technology parks and university spin-offs.[9] Despite the debate on the degree of the role played by patents or IP generally, it is agreed that there is a role that it plays in knowledge and technology transfer thus necessitating this research.

The effects of the BDA remain controversial judging from the disparate results and evidence recorded in literature. Proponents of the BDA have placed reliance on patenting as a key channel of knowledge and technology transfer. Various scholars and practitioners have however cautioned developing countries in particular seeking to emulate the BDA model.[10] It is their opinion that given the myriad socio-economic and cultural realities that are present in developing countries, it is prudent that a different approach that suits their realities is considered, that is, a country specific model.[11] It is suggested that a number of different laws and policies may be needed as opposed to or in addition to a BDA model framework if developing countries are to best achieve the goals of innovation, transfer of knowledge and technology and economic growth.[12]

The BDA in the US has spanned over 30 years, while in SA it has been a little over four years since the IPR-PFRD Act became operational. SA's experience is likely to shed more light

[7] Zuniga and Wunsch-Vincent op cit (n2) 1.
[8] A Agrawal 'University-to-industry knowledge transfer: Literature review and unanswered questions' (2001) 3 *IJMR* 285 at 297.
[9] Zuniga and Wunsch-Vincent op cit (n2) 1.
[10] M Kochupillai 'The Protection and Utilisation of Public Funded Intellectual Property Bill, 2008: A Critique in the Light of India's Innovation Environment' (2010) 15 *JIPR* 19 at 19.
[11] S Boettiger and A Bennett 'The Bahy-Dole Act: Implications for Developing Countries' (2006) 46 *IDEA* 261 at 272-273.
[12] Kochupillai op cit (n10) 19.

into the impact of a BDA model especially because; it is from a developing country perspective. Owing to its relatively brief existence, there is not a lot evidence to go by leaving room for exploratory conclusions. The debate as to whether or not the BDA or IPR-PFRD is desirable is far from over, necessitating further research in this area.

1.2 Knowledge-based economy

The World Bank acknowledges that presently the application of knowledge is one of the key sources of growth in the global economy. Knowledge Economy (KE) 'is one where organisations and people acquire, create, disseminate and use knowledge more effectively for greater economic and social development'.[13]

Countries that emphasise the importance of knowledge are able to strengthen their economic and social development by providing more effective ways of goods and service production and their delivery to a greater number of people more efficiently and at lower costs.[14] This approach has a flip side referred to as the 'knowledge-divide' between advanced countries that generate more knowledge and developing countries which are net importers of knowledge.[15] The growth of this divide is attributed to limited awareness, poor economic incentive regimes and weak institutions in developing countries.[16] In order to capitalise on the so called 'knowledge revolution' to improve their competitiveness and welfare, developing countries have been called upon to build on their strengths and to carefully plan investments in their human capital, institutions that are effective, relevant technologies and enterprises that are both innovative and competitive.[17]

This call to developing countries is no new concept. Developing countries are aware of the need to further develop themselves by all means necessary and to rid themselves of the array of problems associated with under development. One such way is the presence of a legal environment key to this research, IP law that enables economic growth and development. It is stated that in a global knowledge-based economy, intellectual property rights (IPRs) are central

[13] The World Bank 'Knowledge for Development' (2011), available at *http://go.worldbank.org/94MMDLIVF0*, accessed on 18 June 2014.
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Ibid.

to international competiveness of both countries and businesses.[18] This call has been accepted as the gospel truth by most countries that have continued to modify and strengthen their IP laws.

1.3 IP law: Relevance in a knowledge-based economy

IP law is an area of law that concerns itself with the rights that accrue from the creative efforts of the human mind and/or the rights associated with commercial reputation and goodwill.[19] IP rights are regarded as rewards for the investment made in creative endeavours and creation of knowledge.[20] IP is protected through various instruments such as patents, trademarks, plant breeders' rights, copyright, trade secrets, geographical indicators, industrial designs, and utility models among others, accorded by international and national legal instruments.

Knowledge is said to be non-rivalrous because it can be consumed without being diminished.[21] The early writings of Thomas Jefferson are believed to best elaborate the concept of non-rivalrousness. He says, 'he who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me.'[22]

In economics, it is stated that the greatest level of economic efficiency occurs with the widest possible dissemination of new knowledge.[23] However, if everybody is free to access the new knowledge, little incentive is left to investors to commit time and resources to produce it.[24] IPRs thus become very relevant for they transform knowledge from a public good into a private good, albeit for a limited duration.[25] IPRs enhance market power and owners are able to recoup investments made to come up with new knowledge.[26] According to economists, the non-rivalrous nature of knowledge makes its protection necessary. Hence, IPRs are incentives to engage in innovation that will facilitate economic growth through sale of innovative goods, services and transfer of technology and in turn enhance global competitiveness.

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[18] J Langford 'Intellectual Property Rights: Technology Transfer and Resource Implications' (1997) 79 *Amer.J.Agri.Econ.* 1576 at 1576.
[19] DI Bainbridge *Intellectual Property* 9ed (2012)1.
[20] NS Screenivasulu *Intellectual Property Rights* (2007)3.
[21] R Chadwick and S Wilson 'Genomic database as global public goods?' (2004) 10 *Res Publica* 123 at 128.
[22] See PB Kurland and R Lerner *The Founder's Constitution: Thomas Jefferson to Isaac McPherson* ed (1987).
[23] MK Maredia *Application of IPR in Developing Countries: Implications for Public Policy and Agricultural Research Institutes* (2001) 14.
[24] Ibid.
[25] Ibid.
[26] Ibid.

IP rights protection transcends the subject of law and is today perceived as a subject of general and public interest. It is a social, economic, and political subject as well. It is also interdisciplinary in that it cuts across science and technology, agriculture, trade and service industries, manufacturing, literature, arts, academia and many other important fields which have significant impacts on the day to day life of the modern world. This aspect of IPRs makes them a very topical issue that requires time and careful consideration.

The World Bank stated that 'IPRs are a compromise between preserving the incentive to create knowledge and the desirability of disseminating knowledge at little or no cost'.[27] According to the World Bank, IPRs are necessary for the greater public good. The significance of IPRs and the justifications put forward bring to light the inherent tensions that exist in IP law that is, user versus creator/inventor rights. The ideal position put forward is that IP should try to balance the two interests. This research concerns public institutions that utilise public funds to generate IP. The debate is delicate because, public funds are from tax payers who are also users of the IP outcome. In addition, the institutions are public meaning that they are expected to favourably meet the needs of the people.

1.4 Universities and public research institutions as agents of economic growth

'Universities have been viewed traditionally as creators of knowledge, trainers of young minds, and as transmitters of culture. To these established roles we must add a fourth: universities as major agents of economic growth.'[28]

The above words were uttered during a knowledge economy conference. A knowledge-based economy was being advocated and the role to be played by universities was identified as pertinent towards achieving that end.[29]

It was emphasised that the ability to compete successfully depended on the ability to create an economy that is genuinely knowledge-driven and that universities must be at the heart of the country's productive capacity.[30] Further it was asserted that universities are the 'seed-bed

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[27] The World Bank *World Development Report: Knowledge for Development* (1999) 33.
[28] Lord Sainsbury of Turville (Department of Trade and Industry) 'North West Knowledge Economy Conference, 9 January 2001,' available at *http://collections.europarchive.org/tna/20010703005423/http://dti.gov.uk/ministers/speeches/sainsbury090101.html*, accessed on 18 June 2014.
[29] Ibid.
[30] Ibid.

for *inter alia*, new industries, products and services and that they are at the hub of the business networks and industrial clusters of the knowledge economy'.[31]

IPRs may give universities the power to control the intellectual content in ways that protect, among others, freedom of inquiry and new research developments thereby increasing the public domain in the long run.[32] Further, universities are more likely to ensure an invention that has profound research significance is licensed widely at a reasonable cost and more generally for public benefit.[33] In that regard, universities are compared to a commercial entity that may deliberately choose to use IPRs to block further research and or limit the dissemination of information as the same will be locked up in private rights.[34]

For a country that generates more research, innovation and technology as opposed to raw materials and capital, it is agreeable that universities have a key role to play. Indeed if a knowledge-driven economy is the new mantra for any country seeking to be competitive globally, its universities have to produce high quality research which can be effectively commercialised.

As the research unfolds, one clear message that will emerge is that national laws and regulations as well as polices, whilst significant, are not enough to prompt sustained patenting by research institutions. For instance, in the US, patenting in universities is driven not only by an alleged favourable legal environment, but also by the expansion in technological opportunities in the biomedical and other high-tech fields.[35] To that extent, developing countries need to move beyond glorifying the BDA entirely to accepting that, in addition to a favourable legal environment, a lot more is needed to trigger increased university patenting, commercialisation, knowledge transfer and ultimately economic growth. Emphasising again, a lot more than policy formulation is required and for a developing country like Kenya, extensive studies, monitoring and evaluation are needed before considering its own Bayh-Dole model.

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[31] Ibid.
[32] A Monotti and S Ricketson *Universities and Intellectual Property: Ownership and Exploitation* (2003) 47.
[33] Ibid.
[34] Ibid. A good example is the *Myriad* case involving a private company which for years before the dispute was resolved managed to lock up important research through private rights preventing use by other researchers. The case is explored in detail in chapter 2.
[35] Zuniga and Wunsch-Vincent op cit (n2) 2.

1.5 Contribution of this research

This research contributes to the body of knowledge in Kenya by offering an advisory opinion informed by research on the experience of US and SA. The two countries have legislation that governs publicly funded research. Kenya does not have such legislation. However, it is anticipated that with the enactment of the Science Technology and Innovation Act, 2013 (STI Act) which has increased the amount of funding for R&D, a BDA model for Kenya might soon feature. This research seeks to propose a suitable direction for Kenya when such legislation will be considered by legislators or, the very least, policy makers in Kenya's pursuit for an IP policy.[36]

1.6 Research questions and layout of thesis

This thesis attempts to answer the primary question of whether Kenya ought to enact legislation that protects publicly financed R&D outcomes.

Answering this important question gives rise to the following secondary questions:

1) What led to the enactment of the BDA in the US?
2) What impact did the BDA have?
3) What necessitated the enactment of SA's IPR-PFRD?
4) What impact did the IPR-PFRD have in SA?
5) Considering Kenya's Vision 2030, the STI policy, STI Act, legal and innovation environment, is a BDA model necessary and/or viable?
6) If it is not, what is the way forward?

Chapter two attempts to answer questions one and two by providing a brief history of the BDA in US, the rationale behind its enactment and the current prevailing standoff as far as its exact impact in the US is concerned.

Chapter three attempts to address questions three and four by looking at SA's relatively brief experience since the IPR-PFRD Act became operational. This chapter also addresses the rationale behind enacting the IPR-PFRD Act. It further briefly considers case studies and reports on it effects in SA.

Chapter four attempts to answer questions five and six by looking at Kenya, a developing country, which is striving to grow its economy the best way possible and, ultimately to improve

[36] See section 4.3.3 where Kenya's pursuit of a National IP policy is briefly highlighted.

the lives of its citizenry. The chapter begins by looking at Kenya's development blue print which highlights STI as a key aspect in a modern economy. In such an economy, knowledge plays a key role in the creation of wealth, so as to improve the social-economic welfare of the people and to enhance the competitiveness of a country in the global economy

Chapter five then concludes the research by proposing a way forward for Kenya as far as protection, management and commercialisation of publicly financed R&D is concerned.

1.7 Methodology

This dissertation relies primarily on written texts. The key primary materials consulted include the BDA, IPR-PFRD, briefly international treaties and declarations, decided cases, national legislation and policies and other official documents.

The main secondary sources relied upon include books, journals newspaper articles, research reports, speeches and internet sources.

1.8 Jurisdictions considered

Whereas the primary focus of this thesis is to offer an advisory opinion to Kenya, it has extensively considered the experience of the US and SA. The US primarily because it was the first country to legislate on publicly financed research. US enacted the BDA which revolutionised the protection, management and commercialisation of publicly financed R&D in the US. Later, other countries emulated the US.

SA, a developing country, is the second country considered because it is an economic power house in Africa, a pioneer in research and development on the African continent and the first African country to emulate the US. Importantly, SA is emulated by many developing countries in Africa for its perceived better practices. Looking at SA's albeit limited experience with the IPR-PFRD Act, it is nonetheless a necessary case study and particularly informing to Kenya in its endeavours to develop economically.

CHAPTER TWO

BAYH-DOLE ACT: HISTORY, RATIONALE AND THE BIG DEBATE ON ITS IMPACT ON THE US.

2.1 Introduction

This chapter focuses on the BDA and it relies extensively on *inter alia* opinions, comments, case studies and other works by authors who have researched on it. It is largely a restatement of what others have commented on as far as the BDA is concerned, noting that the US was the first country to expressly provide regulation on publicly financed R&D outcomes.

A discussion on the period before its enactment is included to offer some understanding on the process the US went through prior to its passage. The enactment of the BDA was a long awaited policy and legislative outcome because it was necessary to have a uniform approach towards the ownership of results generated by federally funded R&D.[37]

The BDA is a contentious piece of legislation, as will be further discussed, because there is no consensus on its effects, whether positive or negative, on the US. Some scholars contend that prior to its passage, norms of open science characterised US's academic and research environment.[38] However, that changed when Congress, in a bid to promote commercialisation of new technologies coming from universities and other research institutions, encouraged them to patent those technologies and discoveries that were federally funded and to transfer their technology to the private sector. This shift is today the centre of a huge debate among scholars who cite evidence and figures to support their arguments.

After the Second World War, the US was characterised by a realisation of the need to grow its economy through research in key areas identified by Dr. Bush[39] that is; health, defense, economy and training of skilled research investigators.

Thirty four years later, the BDA is still the subject of discussion in academic circles and has continued to inspire both advanced and developing economies in enacting similar legislation.

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[37] TJ Siepmann 'The Global Exportation of the U.S Bayh-Dole Act' (2004) 30 *U. Dayton L. Rev.* 209at 210.
[38] See MA Heller and RS Eisenberg 'Can patents deter innovation? The Anticommons in Biomedical Research' (1998) 280 *Science* 698.
[39] Dr. Vannevar Bush was the then Director of the Office of Scientific Research and Development in the US.

2.2 The journey towards enacting the BDA in US

2.2.1 Post-war US

'On the wisdom with which we bring science to bear against the problems of the coming years depends in large measure our future as a nation.'[40]

By 1945 the US had already come to the realisation of the importance of a knowledge-based economy. The then President Franklin D. Roosevelt addressed a letter to Dr. Vannevar Bush seeking advice on the lessons learned and a proposed way forward for post-war US. Dr. Bush submitted a detailed report titled 'Science, the Endless Frontier' which he had prepared with the help and recommendations of four committees of distinguished scientists and other scholars. It was published in July 1945.

An overview of the report evidences the importance attached to basic research as a pillar of growth and development of a post war US.

Dr. Bush stated:

> 'Basic research leads to new knowledge. It provides scientific capital. It creates the fund from which the practical applications of knowledge must be drawn. . . Today, it is truer than ever that basic research is the pacemaker of technical progress. . . A nation which depends upon others for its new scientific knowledge will be slow in its industrial progress and weak in its competitive position in world trade, regardless of its mechanical skill.'[41]

Dr. Bush identified key fundamental areas that basic research would steer the US forward;

- In finding solutions to major disease problems;
- In the national defense of US;
- In economic growth and development of new products;
- In training and full development of skilled research investigators.[42]

Dr. Bush placed at the centre of basic research, public and private colleges as well as research institutes which he opined bore the responsibility of furnishing new scientific knowledge and well trained research personnel. Further, he emphasised the importance of strengthening the centres of basic research through public funding so that they would be able to

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[40] V Bush Science, the endless frontier (1945) A Report to the President on a program for post-war scientific research Washington DC: Government Printing Office, available at*https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm*, accessed on 28 August 2014.
[41] Bush op cit (n40) at 19.
[42] Ibid.

meet the demands of industry and government for new scientific knowledge.[43]Dr. Bush also dedicated a chapter on scientific reconversion in which he called for publication, dissemination of scientific knowledge as well as scientific collaboration.[44]

Making recommendations on patent policy, he held the view that the National Research Foundation would achieve the promotion of scientific knowledge if it cooperated with other organisations outside the government. He further advised that in the pursuance of such cooperative efforts, the foundations should ensure adequate protection of public interest while providing adequate incentive for the cooperating organisations to freely exercise scientific research.[45]

Dr. Bush's report is credited for shaping the concept of public funding of research and the importance of dissemination of knowledge the so called 'open-science'.[46] Dr. Bush's approach to the importance of knowledge was holistic and not only focussed on economic growth.

2.2.2 Before the BDA

Before the passage of the BDA, the following key features appear to have characterised US' academic and research environment.

2.2.2.1 Open science

'If I have seen further, it is by standing on the shoulders of giants.'[47]

This famous aphorism best elaborates what 'sociologists of science' such as Merton referred to as the norms of open science. He stated that 'university-industry knowledge transfer' disseminated through important channels such as publications, conferences and informal information exchange, advance academic research because information is shared and communicated.[48]

The end result of scientific research is to be able to benefit the relevant industry as well as enhance future academic research when it is disseminated openly. As already stated, Dr. Bush

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[43] Ibid.
[44] Bush op cit (n40) at 30.
[45] Bush op cit (n40) at 38.
[46] A Barratt 'Lessons from Bayh-Dole: Reflections on the Intellectual Property Rights from Publicly Financed Research and Development Act' (2010) 35 *Journal for Juridical Science* 30 at 38.
[47] See HW Turnbull *The Correspondence of Isaac Newton: Volume 1, 1661-1675* (1959).
[48] BN Sampat 'Patenting and US academic research in the 20th century: The world before and after Bayh-Dole' (2006) 35 *Research Policy* 772 at 774.

had come to the realisation of the importance of sharing and dissemination of scientific research so as to enable others to build on the already existing knowledge.

It is a truism that, progress in academic knowledge and technology involves a cumulative process that builds upon itself. The process is desirable when many scientists working in a certain field or fields, evaluate, test, critique one another's work or works and build on one another's research in a bid to further the boundaries of reliable knowledge.[49] This is what one would imagine Dr. Bush meant by 'an endless frontier'.

According to Heller and Eisenberg 'open science' or a 'commons model' characterised the US, at least in the biomedical research field prior to the BDA.[50] At that time, the federal government sponsored 'upstream research' and encouraged wide dissemination of the research outcomes in the public domain.[51] For instance, unpatented biomedical discoveries were freely incorporated in 'downstream' products for diagnosis and treatments of illnesses.[52] However, this changed as will be discussed later, with the passage of the BDA, when, in a bid to promote commercialisation, universities were encouraged to patent discoveries.

2.2.2.2 Under patenting by research institutions and Universities

There was reluctance by universities to be directly involved in patenting and licensing activities.[53] This is because there was a general fear that such involvement might compromise or might be perceived as compromising the norms of open science and, their institutional missions as centres of knowledge advancement and dissemination.[54] As a result many universities did not involve themselves with patenting and licensing activities but those that did so, chose to outsource the management and administration of their patent operations to third parties such as Research Corporations or legally separate but affiliated research foundations that they established.[55]

[49] Sampat op cit (n48) 774.
[50] Heller and Eisenberg op cit (n38) 698.
[51] Ibid.
[52] Ibid.
[53] Sampat op cit (n48) 774.
[54] Ibid.
[55] Ibid.

2.2.2.3 Lack of uniform legislative and/or policy framework and non-commercialisation of research

Despite increased federal support in the form of funding for scientific research, innovations that resulted from such endeavour significantly failed to benefit the American people economically because they were not commercialised.[56] The shortfall was said to be due to the lack of a uniform policy to shepherd technological innovations from the laboratories to the market places. The scientific breakthroughs that the US was enjoying stalled in the very academic institutions that achieved those advancements.[57]

This period was characterised by the lack of a consistent approach by the US government in determining who held clear tittles to research innovations from federally financed research outcomes.[58] By 1943, President Roosevelt had come to the realisation that the US was in need of better patent policies for licensing the numerous innovations that were emanating from government-funded research. The insight Roosevelt had led to the creation of the National Patent Policy Commission. However, the president's original imperative was lost when in 1947 the then Attorney-General (AG) Thomas Campbell Clark, produced final recommendations on government patent policy.[59] One such recommendation was that, government should retain title to patents that emanated from research it had funded, subject only to limited exceptions whereby heads of government agencies would grant title.[60]

The outcome of the AG's final recommendation saw agencies take up either of two policy options, that is 'title in the contractor policy' or 'title in the government policy'.[61] For instance, the Department of Defence (DoD), the leading research funding agency during post-war US, while backing the AG's recommendation followed the 'title in the contractor policy' in which it allowed government contractors including universities to retain title to an invention. Similarly, it allowed subsequent licensing for commercial development in exchange for a royalty fee.[62]

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[56] Bayh-Dole25,Inc 'The Bayh-Dole Act at 25' (2006) 10.
[57] Ibid.
[58] Ibid.
[59] Ibid.
[60] Bayh-Dole25,Inc op cit (n56)11.
[61] Ibid.
[62] Ibid.

Other agencies followed the AG's report and employed some form of the 'title in the government policy' which saw government retain title to patents. At the instance of the agency, inventions were licensed generally free of royalties and in some instances granted limited exclusivity subject to some royalties.[63]

This lack of consistency in policy among agencies and uncertainties surrounding the criteria for deciding on either of the policy options, discouraged private investment in commercialising innovation.[64]

2.2.2.4 Institutional Patent Agreements (IPAs)

Post-war US was faced with divergent views over government patent policy and this went on for about three decades. Those who opined that government agencies ought to retain title to IPRs argued that, allowing contractors to retain patent titles to publicly funded research outcomes, favoured large firms at the expense of small businesses.[65] Whereas those who felt that contractors should retain patent titles argued that, failure to do so, would make it difficult to attract qualified firms to perform government research and, also that, the absence of patent titles, would reduce incentives to invest in commercial development of those inventions.[66] Aside the two divergent ideas, the other contentious issue was a uniform patent policy to apply across all federal agencies.[67]

Until the 1970s, deliberations and debates of the three contentious issues of title *vis a vis* licence policies or uniform patent policy rarely focused on universities. This lack of focus on universities was largely because, during post-war US, the majority of federal funds for R&D went to private firms compared to universities and, universities themselves were at that time reluctant to become involved in patenting and licensing.[68]

That deadlock left agencies to their own devices. Those that funded universities took the initiative to negotiate improved technology transfer terms directly in the form of IPAs.[69] Among the first departments to negotiate such an arrangement was the Department of Health Education

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[63] Ibid.
[64] Ibid.
[65] Sampat op cit (n48) 777.
[66] Ibid.
[67] Ibid.
[68] Sampat op cit (n48) 777-778.
[69] Bayh-Dole25, Inc op cit (n56) 13.

and Welfare (HEW).[70] HEW went a step further and liberalised its licensing technology procedures. The move was of great significance due to the fact that HEW controlled the budget of the National Institute of Health (NIH), which at that time accounted for nearly half of all federal financing of academic research.[71] Within a few years of the inception of IPAs many leading universities and research institutions had entered into them.[72]As soon as IPAs were in place, universities slowly, but strongly began to advocate for improved technology licensing procedures.[73]

As part of an effort to extend the IPA policy more widely, the University Patent Policy Ad Hoc Committee, of the Committee on US Government Patent Policy for the Federal Council on Science and Technology was convened.[74] Its chair, Latker sought to negotiate a uniform government-wide IPA for universities. A model universal IPA policy was intended to apply terms that were common in all government dealings and its interactions with research institutions.[75]

The IPA policy triggered an interest in universities seeking to see the improvement of technology licensing procedures.[76] These institutions had come to realise that the situation in which federal agencies continued to determine their own individual policy was both inefficient and uncertain.[77] Thus in a bid to charge up their efforts, universities created the Society of University Patent Administrators (SUPA) in order to promote more effective technology transfer policies.[78] Although SUPA's efforts did not bring immediate changes, there were already increasing concerns particularly in Congress that the US economy was not reaching its full potential due to the lack of growth driven by technology.[79]

As already stated, HEW had established policies that allowed the retention of ownership rights to discoveries made with government funding. The move was HEW's bid to encourage commercialisation of discoveries made by grantees of its funding. Similarly, HEW allowed the

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[70] Ibid.
[71] Ibid.
[72] Ibid.
[73] Bayh-Dole25, Inc op cit (n56) 13-14 referring to the interview with Norman J. Latker, 30 November 2005.
[74] Bayh-Dole25, Inc op cit (n56) 14.
[75] Ibid.
[76] Bayh-Dole25, Inc op cit (n56) 14.
[77] Ibid.
[78] Ibid.
[79] Ibid.

university to apply for patents rights and to license to private companies to develop and market the research outcome.[80]

However in 1977, HEW decided to review all petitions for ownership rights when its 'Office of the General Counsel' expressed concerns that university patents and licenses were likely to increase healthcare costs.[81] It also reconsidered its patent polices by restricting university patenting. Universities felt aggrieved and expressed their concerns over the restrictions to Congress.[82]

In 1978, the General Accounting Office (GAO) reported that out of the approximately 28,000 government-held patents, fewer than 5 per cent were licensed for commercial use.[83] At the start of the same year, some members of Congress felt that the US was receiving minimal returns on its then considerable annual investment.[84] At nearly $ eight billion, in largely university-based R&D, it was the general feeling that the returns had to improve. Awareness was growing of the need for change towards successful commercialisation of federally funded research.[85] That same year Senator Robert Dole criticised HEW policies and together with Senator Birch Bayh, introduced S.414, the University and Small Business Patent Act in a bid to remedy the situation.[86] It is from the combination of their surnames that the BDA gets its name.

The journey towards implementation of reform was not a simple one. Congress engaged in extensive debates, discussions and hearings in order to reconcile the interests of business, academia and various federal agencies.[87]

By 1980, there was a solid bipartisan consensus that a new approach should, at the very least, be tried by the federal government. In view of that, the BDA was presented to President Carter on 1 December 1980 for signing which he did on the 12th of that same month and year. It became effective in July of the following year.[88]

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[80] NK Eskridge 'Dole Blasts HEW for "Stonewalling" Patent Applications (1978) 28 *Bioscience* 605 at 605.
[81] Ibid.
[82] Sampat op cit (n48) 779.
[83] Bayh-Dole25, Inc op cit (n56) 13.
[84] Bayh-Dole25, Inc op cit (n56) 18.
[85] Ibid.
[86] Sampat op cit (n48) 779.
[87] Bayh-Dole25, Inc op cit (n56) 19.
[88] Bayh-Dole25, Inc op cit (n56) 19.

2.2.3 The BDA era

The BDA proposed a uniform patent policy giving universities and small businesses blanket rights to any patents that were the outcome of government-funded R&D.[89] It fundamentally changed US patent policy as far as federal research was concerned.[90]

The objectives of the BDA as set out by Congress include:

> 'to encourage utilisation of research; to promote collaboration between commercial concerns and non-profit organizations including universities; to enhance the commercialisation and public availability of the inventions; to ensure that the Government obtains sufficient rights in federally supported inventions so as to meet the needs of the Government and protect the public against non-use or unreasonable use of inventions and to minimise the costs of administering policies in this area.'[91]

The BDA adopted a uniform policy that of 'title in the contractor' which was to be applied throughout, in determining patent rights, subject to certain exceptions. In that regard, contractors and non-profit institutions such as universities and/or small business had the right to retain title to inventions that the federal government had financed. The change was intended to make it easier for universities to engage in technology transfer. The BDA explicitly obligated universities to file patent applications in the inventions that they owned. Universities were required to give small businesses preference when granting licenses and were to limit the time frame when awarding exclusive licenses to large businesses. Subsequent changes to the BDA extended to all business and not just small businesses.[92]

2.3 Effects of the BDA

While assessing the effects of the BDA, it is important to point out that there appears to be no consensus on the extent of its effects in the US.

It is contended that growth in university patenting and licensing as well as technology transfer activities predated the BDA and that it is as much an effect as it is a cause of the expanded growth that was experienced.[93]

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[89] Sampat op cit (n48) 779.
[90] Bayh-Dole25, Inc op cit (n56) 19.
[91] See Bayh-Dole25, Inc op cit (n56) 19-20 for a summary of the objectives of the BDA.
[92] Bayh-Dole25, Inc op cit (n56)20.
[93] DC Mowery and BN Sampat 'The Bayh-Dole Act of 1980 and University-Industry Technology Transfer: A Model for other OECD Governments?' (2005) 30 *Journal of Technology Transfer* 115 at 119.

The late 1960s and the decade of the 1970s represented a watershed moment in the growth of US university technology transfer and patenting and licensing activities. University patenting expanded especially in the biomedical fields with the universities assuming more prominent roles in managing patenting and licensing activities, thus replacing the Research Corporations that they had been using.[94] Another factor that led to increased patenting was the individual agreements between federal agencies and universities. Prior to the BDA, a number of universities had established technology transfer offices (TTOs) while others increasingly hired technology transfer officers.[95]

2.3.1 University licensing and patenting

The BDA, unlike the IPAs which were negotiated,[96] granted blanket permission to recipients of federal funding, to file for patents on the outcomes of their research, to grant licences for the patents, as well as grant exclusive licences to other parties. The environment created by the BDA facilitated university patenting and licensing because, firstly it replaced the system of IPAs that federal agencies negotiated with universities by creating one uniform policy and secondly, it expressed congressional support for the negotiation of exclusive licences between universities and industrial firms for the outcomes of federally funded research.[97]

Relying on statistics from the Association of University Technology Manufactures (AUTM), Sampat observed that only a few universities were involved in patenting and licensing in the early century, with the numbers rising during the 1970s and later accelerated after the BDA came into operation.[98]

2.3.2 Technology transfer

Prior to the passage of the BDA, many universities had already established technology transfer programs, but once it came into effect, many institutions prioritised technology transfer thereby becoming more involved in it.[99]

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[94] Ibid.
[95] Ibid.
[96] See section 2.2.2.4 on the discussion on IPAs.
[97] Ibid.
[98] Sampat op cit (n48) 781. AUTM is the successor of SUPA. See AUTM 'The Founding of SUPA/AUTM', available at *http://www.autm.net/The_Founding_of_SUPAAUTM/8118.htm*, accessed on 28 August 2014.
[99] Bayh-Dole25, Inc op cit (n56) 22.

Trune and Goslin conducted an analysis of the financial profitability or loss of technology transfer programs in US universities, hospital and research centres for the year 1995. They extracted data from AUTM surveys and other available published information. Royalty payments were compared to estimates of TTO costs, patent fees, legal expenses, and new research grants.[100]

Their conclusion was that technology transfer programs on a national scale appeared to be profitable for some institutions and also provided huge benefits to their local communities.[101] Transfer programs that were more established made more profits compared to smaller university technology transfer programs which had only been in existence for a period of five to ten years and had thus not transferred sufficient technology for a profitable royalty stream.[102]

They acknowledged that many universities were not operating programs with an underlying motive of making profit; rather, they considered technology transfer an administrative function that was necessary to support the increasing number of faculty involved in research that had commercial potential.[103] Consequently, it was acceptable if university technology programs made losses or operated on a break-even basis. The programs that were making huge profits were certainly the exception and not the rule.[104]

It was their view that, on a national scale universities were not 'getting rich' because of the BDA; rather that the institutions were simply helping their faculty in the true spirit of the legislation, which is to transfer scientific and technological achievements from the institutions to the public as quickly and efficiently as was possible.[105]

Sampat argues that technology transfer took place in the absence of patenting and licensing activities of universities and he cites two examples to substantiate his position. The first is the Cohen-Boyer recombinant DNA technique which was being used by industry before the Universities of California and Stanford began to license their patents. He asserts that licensing did not facilitate technology transfer; it only allowed the universities to generate income.[106] The

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[100] See DR Trune and LN Goslin 'University Technology Transfer Programs: A profit/Loss Analysis' (1998) 57 *Technological Forecasting and Social Change* 197.
[101] Trune and Goslin op cit (n100) 203.
[102] Ibid.
[103] Ibid.
[104] Ibid.
[105] Ibid.
[106] Sampat op cit (n48) 783.

second example is that of a biotechnology research tool, Richard Axel's co-transformation process which was patented and licensed by Columbia University. Shortly after the technology was described in the scientific literature, and prior to grant of a patent, firms were already using the technology.[107]

Sampat is convinced that the two examples demonstrate that there was already technology transfer before the BDA came into effect. He further asserts that in instances where universities patent inventions that would have been utilised or developed even without IPRs, society is only burdened by non-competitive pricing of 'patent-sanctioned monopolies'. In addition, he states that research tools invented by universities may lead to few sources of further development and application as opposed to multiple competing research effort which is more socially beneficial in promoting rapid advancement of technology.[108]

Although the BDA is not solely credited for the biotechnology revolution that took place in US universities, it is nonetheless credited for providing incentives for technology transfer in biotechnology as well as other fields. Some of the product breakthroughs in biotechnology that resulted from technology transfer include: an artificial lung surfactant for babies born with respiratory distress system a research outcome by the University of California; a new treatment for Crohn's disease and other inflammatory bowel diseases by Washington University in St. Louis. Breakthroughs in scientific and engineering disciplines included: electronics nanotechnology by Texas A&M University; the Super Ensemble computer software for weather forecasting by the Florida State University, [109] among other significant breakthroughs.

The actual effects of the BDA as far as patenting, licensing and technology transfer is concerned, are in the fact that universities prioritised and accelerated these activities after the BDA. Sampat does not agree that the BDA alone facilitated technology transfer. However, what is undeniably evident is that patenting, licensing and technology transfer activities accelerated and were prioritised by universities after the BDA came into operation.

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[107] Ibid.
[108] Sampat op cit (n48) 783-784.
[109] Bayh-Dole25, Inc op cit (n56) 24.

2.4 Criticisms of the BDA

2.4.1 Overstated claims

The late 1990s and early twenty-first century were characterised by accolades from commentators, policy makers and other stakeholders all directed towards the enactment of the BDA.

First it was opined that the BDA had been a critical catalyst for the growth of universities' contributions towards innovation and the economy.[110]

Mowery *et al* analysed the systematic records of faculty inventions, patents and licences of three leading US universities, namely; the University of California, Stanford University and Columbia University in a bid to find out the effects of the BDA on US. Their data on California and Stanford Universities suggested that, universities that were already active in patenting and licensing, the BDA resulted in expanding efforts to market academic inventions. Their data also suggested that Columbia University as well as other research universities that had been inactive, their faculties entered into large scale patenting and licensing of inventions.[111]

They asserted that, the BDA was just but one of the factors which stimulated the growth of patenting and licensing at US research universities during post 1980. One of the other factors was the significant increase in the importance of biotechnology as a productive field that yielded research findings of great interest to industry.

Another was the case of *Diamond v Charkrabarty*, [112] decided by the US Supreme Court. The case advanced the feasibility of technology patenting and licensing in biotechnology.[113] The court held that, although it was not possible to patent laws of nature, physical phenomena and abstract ideas, genetically engineered bacteria could nonetheless be patentable because they were products of human ingenuity. The court further interpreted the term patentable subject matter to cover 'everything under the sun made by man.'[114]

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[110] DC Mowery *et al Ivory Tower and Industrial Innovation: University-Industry Technology Transfer before and after the Bayh-Dole Act* (2004) 93.
[111] Mowery *et al* op cit (n110) 126.
[112] *Diamond v Charkrabarty* 447 US 303 (1980).
[113] Mowery *et al* op cit (n110) 126-127.
[114] *Diamond v Charkrabarty* supra (n112) at 309-310.

Mowery *et al* thus concluded that developments in research, industry and policy combined to increase licensing activities by US universities and that while the BDA was an important tool it was not the only determinant. Similarly, that in the absence of the BDA, patenting and licensing activities by universities would still have increased during the 1980s and 1990s.[115]

They also point out that their data indicated growth in patenting and licensing activities in the two universities that were already involved in patenting and licensing before the BDA and, that at Columbia University, there were already internal discussions to expand patenting of faculty research results before the BDA.[116] Nonetheless, they acknowledge that the BDA did hasten entry by universities that had earlier avoided patenting and licensing activities.[117]

Second, it is believed that patenting and licensing of universities' inventions were indispensable to support the transfer of those inventions to the industry and for their commercial development.[118] Mowery *et al* argue that not much evidence is cited to support the assertion that patenting and licensing of university inventions is necessary to support transfer of the research to industry as well as the commercial development of the inventions.[119]

It is their view that discussions on the role of US research universities and their contribution to the US economic boom in the 1990s exaggerates the role played by the BDA. US universities have always been important sources of knowledge and have also contributed significantly to industrial innovation throughout the twentieth century. This contribution to the economy has relied on other channels to transfer technology, not just patenting and licensing.[120]

As a caution, they state that it is important for other nations emulating the BDA while assessing the role of US universities towards economic growth, to recognise other diverse channels, through which university research influenced industrial innovation and economic growth.[121]

> 'The BDA was motivated by the belief that university patenting would facilitate transfer of university discovery to the industry for commercial development. Based on their research and acknowledging that it is not definitive rather suggestive, they indicate that research

[115] Mowery *et al* op cit (n110) 127.
[116] Ibid.
[117] Ibid.
[118] Mowery *et al* op cit (n110) 94.
[119] Mowery *et al* op cit (n110) 1.
[120] Mowery *et al* op cit (n110) 179.
[121] Ibid.

> results and knowledge between university and industry flows through diverse channels including publications by academic researchers, conference presentations, faculty consulting and movement of personnel between university and industry. It was their conclusion that before and since the BDA much of the interaction between the university and industry was through other diverse channels and not patenting and licensing.'[122]

2.4.2 Conflict of interests

The BDA has been criticised for creating an environment where 'faculty conflict of interest'[123] is thriving. Those words have been defined as;

> 'all situations or sets of circumstances in which the personal interest of a faculty member including the person's financial, potential, familial or other individual interests may be at odds with what their peers, their employer, the government, or even the society at large sees as their responsibilities as a scientist, scholar, teacher or member of an academic community.'[124]

The spirit of the BDA was to increase collaboration between industry and academia. Partnership between the private industrial world and research institutions grew as a result of promulgation of federal and state laws on technology transfer as well as other enactments that were intended to increase patenting and commercialisation of outputs developed by publicly funded university research.[125] The BDA is credited for being among the first and most influential enactments that introduced the concept of university ownership, patenting, licensing and commercialisation of all discoveries arising out of federal funded research.[126]

The collaboration brings with it two faces, on one part economic growth, and on the other, the potential of skewing the research agenda of faculty members.[127] It is feared that faculty's objectivity may be compromised, creating an environment of conflict of interest between the university and the private industry's competing interests in terms of time and effort commitment, as well the IP that arises out of their research and expertise.[128]

There is also the possibility of negative perception by the public who view the collaboration as an avenue for the faculty researchers to 'sell out' their objectivity and

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[122] See Mowery *et al* op cit (n110) 2.
[123] PJ Harrington 'Faculty conflicts of interest in an age of academic entrepreneurialism: An analysis of the problem, the law and selected university policies' (2001) 27 *J.C & U.L.* 775 at 775.
[124] Harrington op cit (n123) 775-776.
[125] Harrington op cit (n123) 775.
[126] Ibid.
[127] Harrington op cit (n123) 779.
[128] Ibid.

independence in exchange for money or prestige.[129] The public as a result of this collaboration are increasingly distrusting research outcomes or view it with suspicion. Lack of public trust in the reliability of scientific findings is viewed as the greatest harm to the growth of industry-academic relationship.[130] It is also felt that the increased dependence by academia on industry for funding has the potential of making the entire academic system susceptible to manipulation.[131]

Academic institutions that had once prided themselves as autonomous from politics and favouritism, and were held as upholders of objectivity have now found themselves in collaborative ventures with private industries.[132] The industries often have 'singular and non-objective motivations' and thus faculty members find themselves at crossroads due to such collaboration.[133] The new found arrangement has the propensity to manipulate faculty not only at the scientific level but also at the administrative level.[134]

2.5 Perceived negative effects of the BDA

Some negative effects the BDA is perceived to have brought to the academic field are discussed below.

2.5.1 Proprietary Science versus open Science

The BDA is said to have transformed the model of science in the US from 'open science' employed in the US and advocated by Dr. Bush to 'proprietary science' which is characterised by ownership and restrictions of scientific findings through patents and commercialisation.[135] Prior to the BDA, majority of inventions, methodologies, tools and materials produced at universities and other research institutions were availed freely. The post BDA era witnessed an increase in university patenting leading to restrictions on free access.[136]

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[129] Ibid.
[130] Ibid.
[131] Siepmann op cit (n37) 237.
[132] Ibid.
[133] Ibid.
[134] Ibid.
[135] Barratt op cit (n46) 40.
[136] Barratt op cit (n46) 41.

Patenting of innovations is a paradox of some sort. This is because it may deter as well as stimulate innovations. Maskin, commenting on David's observation,[137] notes that there are two major effects on innovation when IPRs are strengthened.[138] The direct effect is that an innovator is encouraged if he knows that he will be rewarded with a longer or broader patent.[139] On the flip side; the indirect effect, stronger IPRs deter innovation because the monopoly granted over one's invention makes it more expensive for another to innovate thus disincentivising that innovator.[140]

Technical progress builds upon a foundation provided by earlier innovators and as a result most innovators 'stand on the shoulders of giants' and especially in the evolution of high technology.[141]

Owing to the evolutionary nature of science and technological progress, patents are said to inherently slow follow-on R&D.[142] The proprietary model that came about following the enactment of the BDA had negative impacts particularly because; it led to rise in patenting of basic research tools.[143]

2.5.2 Rise in patenting of basic research tools

As already pointed out the advancement in science and technology is as a result of build-up on existing research. It is feared that IP protection of 'upstream research' may make it difficult for follow-on research to improve and build up on science and technology that is protected by patents.[144]

In biomedical research, the proliferation of IPRs suggests a 'tragedy of anticommons' in which there is underuse of scarce resources due to the fact that multiple owners block each other from those scarce resources.[145] IPR protection leads to privatisation of biomedical research

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[137] See PA David '*Koyaanisqatsi* in cyberspace: The economics of an "out-of-balance" regime of private property rights in data and information' in K Maskus and J Reichman (eds) *International Public Goods and Transfer of Technology Under a Globalized Intellectual Property Regime* (2005) 88-90.
[138] E Maskin 'Public Goods and Public Science' in K Maskus and J Reichman (eds) *International Public Goods and Transfer of Technology Under a Globalized Intellectual Property Regime* (2005) 139.
[139] Ibid.
[140] Ibid.
[141] S Scotchmer 'Standing on the shoulders of Giants: Cumulative Research and the Patent Law (1991) 5 *Journal of Economic Perspectives*29 at 29.
[142] Barratt op cit (n46) 41.
[143] Ibid.
[144] Ibid.
[145] Heller and Eisenberg op cit (n38) 698.

which may result in fewer useful products necessary for improving human health.[146] It is suggested that privatisation of biomedical research ought to be carefully deployed if it is to serve the public good and this should particularly be done by ensuring that upstream research is sustained, and downstream product development is not curtailed.[147]

Barratt illustrates the negative impact of proprietary science by highlighting concerns in the field of genetics research. Explaining how foundational science is essential to conduct follow-on research and technological application, she points out that, encouraging patenting of university research increases the tendency to patent foundational science, which comprises research tools needed by other researchers. Significant research tools such as genetic and molecular research tools are widely used and have yielded important breakthroughs in medical, agricultural and industrial products and technologies.[148] According to Barratt, it is undesirable when such basic tools are patented because they create a myriad of potential problems including those discussed below.

2.5.2.1 Refusal to issue licences

Patent holders may at times refuse to grant licenses to other researchers who desire to use patented materials for further research. This is especially the case when patent holders wish to prevent researchers from competing with them.[149] For instance, the negative effect of gene patenting has been experienced in gene testing. The effects of such patents can impede improvement of the quality of a test if the patent holder decides not to issue a licence.[150] Although other measures such as compulsory licences or march-in rights may be used to remedy such situations, it has been argued that there has been failure by the US to apply such measures to shield the public from limited access to basic research tools, high drug prices and other negative impacts.[151]

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[146] Ibid.
[147] Heller and Eisenberg op cit (n38) 701.
[148] BE Arnold and E Ogielska-Zei 'Patenting Genes and Genetic Research Tools: Good or bad for innovation? (2002) 3 *Annu.Rev.GenomicsHum.Genet*. 415 at 415.
[149] Barratt op cit (n46) 44.
[150] N Thumm 'Patents for genetic inventions: A tool to promote technological advance or a limitation for upstream inventions? (2005) 25 *Technovation*1410 at 1414.
[151] See S Subramanian 'Non-use and unreasonable use of federally funded technology protected by US patents' (2010) 5 *JIPLP* 874.

The *Myriad* case,[152] illustrates how patenting of research tools impedes follow-on research especially when patent holders refuse to grant licences. Genetic research had been funded by the US government and was primarily undertaken at a public university. The researchers discovered correlations between two human genes and breast cancer. The breast cancer genes were referred to as *BRCA1* and *BRCA2*. The *BRCA* genes are valuable diagnostic tools as it had been discovered that women with certain mutations of the two genes had a significantly higher incidence of breast and ovarian cancer.[153] The initial identification and localisation of the *BRCA* genes and their mutation as well as the links to breast and ovarian cancer had been achieved from collaborative efforts of university scientists based at the United Kingdom, US and Canada. Some follow-on research had also been performed by Myriad Genetics, a private company.[154]

A lot of the research was conducted at the University of Utah which had been funded by the state to facilitate its *BRCA* research. The university obtained several patents to both *BRCA* genes and exclusively licensed from Myriad Genetics which also owned several *BRCA* patents in its own right.[155]

By 2009, Myriad Genetics had exclusive control of *BRCA* genes, their corresponding proteins and all their known mutations. In May of that same year, a class action was brought against the US patent and Trademark office (USPTO) challenging the validity of the *BRCA* genes. Myriad Genetics had obtained monopoly over *BRCA* screening and diagnosis and this prevented other laboratories from performing screening and diagnostic tests based on the *BRCA* genes. The case was also a response to the way other universities were prevented from conducting further research using the *BRCA* genes.[156]

Scientists felt that the patents prevented critical important cancer research.[157] The court disallowed the *BRCA* patents holding that naturally occurring DNA segments are products of nature thus not patentable.[158]The *BRCA* gene patents had impeded follow-on research for a long

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[152] *Association for Molecular Pathology v US Patent and Trademark Office (USPTO)* 702 F. Supp 2d 181(2010).
[153] *Association for Molecular Pathology v USPTO* supra (n152) at 203.
[154] *Association for Molecular Pathology v USPTO* supra (n152) at 201-202.
[155] *Association for Molecular Pathology v USPTO* supra (n152) at 202-203.
[156] *Association for Molecular Pathology v USPTO* supra (n152) at 188-189.
[157] Barratt op cit (n46) 45.
[158] *Association for Molecular Pathology v USPTO* supra (n152) at 229.

period of time and despite the positive outcome of the case, there are still many other essential genetic tools still held by patents.[159]

2.5.2.2 Restrictions on use of research tools

Patent holders while issuing licences often place significant restrictions in the manner in which research tools may be used.[160] Reports gathered from university technology transfer professionals revealed that agreements presented for the transfer of research tools impose increasingly onerous terms.[161] Scientists reported having to wait for months or even years to conduct experiments while their institutions attempt to renegotiate terms of 'Material Transfer Agreements' (MTAs), database access agreements and patent licence agreements.[162]

Similarly, it was reported that as a condition to making research tools available, providers of such tools may seek royalties on future product sales, preserve the option to acquire exclusive or non-exclusive licences under future patents, or even the outright ownership of future inventions.[163] Such restrictions on sharing of research tools may impede scientific cooperation which as pointed out, is vital for scientific advancement.[164]

2.5.2.3 Limitation on scientific exchange

Patenting practices may limit scientific exchange.[165] Data suggests that geneticists based in universities and engaged in commercial research are more likely to withhold data from fellow academic scientists than their peers.[166] Campbell *et al* partly concluded that 'the commercial applications of genetics research, coupled with increasing dependence on industry funding and the rise of commercial norms in academia may be partially responsible for the withholding of research information.'[167] Their survey, over a three year period revealed that about half of all geneticists polled, had been unable to access information or material from other geneticists based

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[159] Barratt op cit (n46) 46.
[160] RS Eisenberg 'Bargaining over the transfer of proprietary research tools: Is the market failing or emerging?' in RC Dreyfuss, DL Zimmerman and H First (eds) *Expanding the Boundaries of Intellectual Property* (2001) 225.
[161] Eisenberg op cit (n160) 225.
[162] Ibid.
[163] Eisenberg op cit (n160) 230.
[164] Barratt op cit (n46) 46.
[165] A Kapczynski *et al* 'Addressing global health inequities: An open licensing approach for university innovations' (2005) 20 *Berkeley Technology Law Journal* 1031 at 1054.
[166] Kapczynski *et al* op cit (n165) 1054.
[167] EG Campbell *et al* 'Data withholding in Academic Genetics: Evidence from a national survey' (2002) 287 *JAMA* 473 at 479.

in other universities and, 24 per cent had as a result, abandoned a promising line of research.[168] It is important to point out that some vital reasons reported for refusing to grant access to other researchers was the need to comply with an agreement with an industrial sponsor, or the need to preserve the commercial value of the results.[169]

2.5.3 Price implications on tax payers

Another concern levelled against the BDA is that US citizens are being 'billed twice' for the same invention. First, through taxes for government funded research and secondly paying for increased costs and limited supply of the invention when it gets to the market.[170] For instance, they are made to pay for prescription drugs that carry increased costs.[171] Such increased costs are due to license fees passed on to them through industries engaged in collaborative research projects with universities.

2.6 Positive outcomes of the BDA

Criticisms levelled against the BDA have not prevented some scholars from perceiving its positive effects. The following are some of the positive outcomes attributed to the BDA.

2.6.1 The figures

Siepmann is one of the scholars who opine that the BDA has had positive effects. He extensively relies on statistics from AUTM to explore some positive effects of the BDA. According to AUTM's report at the end of fiscal year 1999, over 21,000 licensing agreements were created, 2,922 new business ventures were generated and there were 12,324 patent invention disclosures. It is stated that the new activities by the universities generated a reported $ 862 million in royalties for teaching hospitals and universities in fiscal year 1999 alone. It is also estimated that the financial benefits yielded an influx to the US economy of $ 40.9 billion per year. As at the time of the report, it was estimated that the BDA supported over 270,000 jobs, that patents issuance to the universities increased over 10 fold and further, that the universities collected a

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[168] Campbell *et al* op cit (n167) 478.
[169] Campbell *et al* op cit (n167) 475.
[170] RS Eisenberg 'Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research' (1996) 82 *Virginia Law Review* 1663 at 1666.
[171] Subramanian op cit (n151) 874.

staggering $ 1.26 billion in adjusted gross income through the translation of government-funded research into the private market in the year 2000.[172]

2.6.2 Economic growth

Closely related to the above positive impact, the AUTM study further reveals many other positive impacts the US economy experienced because of the BDA including creation of new high technology jobs and billions of dollars in revenue gained from those interactions. The BDA proponents argue that the revenue generated is a representation of 'tax payers' dollars being recouped and recycled to further research and generate more results. The public eventually benefits from the outcomes of publicly funded research economically, in increased quality of life, as well as extended life from lifesaving inventions. By and large, the tax payer eventually saves more money and strain on the US health care system is relieved.[173]

The view that, economic growth depends on US' ability to develop and apply new technologies is taken by Remington.[174] He suggests that inventions arise primarily from the outcome of basic research and that patents stimulated by the BDA, have the potential to produce the basis for new products and industries. Further that, the flow of expertise, creation of new products and start-up companies and, the stimulation of jobs taking place in US is impressive. He opines that universities are at the vortex of research, innovation and technology transfer with the private industry participating in bringing universities' innovations to the market place.[175]

2.6.3 University collaboration with private industry

One of the objectives of the BDA was to promote collaboration between commercial enterprises and non-profit organisations which included universities. Prior to the enactment of the BDA, researchers at the universities engaged in technologies that where wholly owned by the private sectors, grappled with two choices; either to pay monopoly fees to the private sectors in order to

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[172] See Siepmann op cit (n37) 230 citing AUTM Licensing Survey: FY 2000: A survey summary of Technology Licensing (and Related Performance for U.S and Canadian Academic and Non-profit Institutions and Patent Management Firms), 6 (Lori Presman ed., 10th Anniversary ed., Assn of U. Tech. Managers, Inc 2002).
[173] Siepmann op cit (n37) 233.
[174] MJ Remington 'The Bayh-Dole Act at Twenty-Five Years: Looking Back, Taking Stock, Acting for the Future' (2005). (Author's print). Remington wrote an article which was originally published in the Journal of AUTMadmitting that he wrote from a political perspective and with a bias in favour of the BDA.
[175] Remington op cit (n174) 2.

acquire the right to use the material under investigation, which was often costly or, forget about that line of research and pursue other related but different research fields.[176]

However, since the BDA came into operation, private industries and universities were able to partner and in some instances, private industries fund the entire joint project thus allowing use of the protected technology to further research and discovery.[177]

The BDA dramatically changed the relationships between universities and private industries as it facilitated the creation of a new profession of TTO at the university level and stimulated the creation of a large number of incubated companies and licensing opportunities, with established companies particularly in the biopharmaceutical industries.[178]

2.6.4 *Quid pro quo*

The *quid pro quo* between the society and the inventor is one of the primary justifications for having any patent system. An inventor exchanges the *quid* which is disclosure of useful information and technology to the public, for *quo* from the state, a monopoly granted to him for a limited time.[179] Upon lapse of the duration, the invention is free for use by others as it falls into the public domain.[180]

In addition, the standard rationale advocated for patent law is that it provides an efficient method that enables the outcomes and benefits of R&D to be realised.[181]This promotes technological progress and innovation.

The criticisms levelled against increased patenting by universities are countered by the obligation imposed upon patent applicants. The process of filing a patent obligates the applicant to publish the information, whether the applicant wants that information disclosed or not. The US patent law, just like the patent laws in many jurisdictions comprise of this condition precedent. The USPTO is required by law to make public patent applications, no later than 18 months after

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[176] Siepmann op cit (n37) 232
[177] Ibid.
[178] Remington op cit (n174) 2.
[179] C Park, A Prabhala & J Berger *Using Law to Accelerate Treatment Access in South Africa: An Analysis of Patent, Competition and Medicines Law* (2013) 46.
[180] Ibid.
[181] WM Landes and RA Posner *The Economic Structure of Intellectual Property Law* (2003) 294.

the date of patent filing. The process of patent filing thus promotes, rather than retards timely flow of information that can be used by other researchers to further research.[182]

2.6.5 International emulation

> 'Possibly the most inspired piece of legislation to be enacted in America over the past half-century was the Bayh-Dole act of 1980. Amendments in 1984 and augmentation in 1986, unlocked all the inventions and discoveries that had been made in laboratories throughout the United States with the help of taxpayers' money. More than anything, this single policy measure helped to reverse America's precipitous slide into industrial irrelevance.'[183]

The BDA is credited for revolutionising the US. Decades later it continues to inspire other industrialised countries as well as developing countries into enacting similar legislation.[184] Siepmann questions whether countries emulating the BDA are incorrect about the apparent positive effects the BDA has had on the US research economy. He concludes that the consensus is clear in that most countries while weighing the positive *vis a vis* the negative effects of the BDA are importing it for its perceived positive impact on the economy.[185]

2.7 Conclusion

The enactment of the BDA did not take place overnight. There were a lot of discussions, debates and experiments with other policy options. Years after its passage, there have been criticisms as well as discussions on its negative and positive effects.

The BDA is credited by some for increased patenting and licensing activities by universities while others state that patenting and licensing activities predates it. Technology transfer from the universities to the private sector is also credited to it but some state that technology transfer would have taken place in its absence.

From an analysis of both arguments, it is evident that patenting and licensing and, technology transfer activities were happening before the BDA was passed. However, as soon as it came about, those activities were prioritised and they increased in figures. These increases happened post the BDA.A discussion on whether such accelerated growth would have been experienced without the BDA has been avoided by scholars from either school of thought.

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[182] Bayh-Dole25, Inc op cit (n56) 34.
[183] The Economist Technology Quarterly 'Innovations golden goose', 12 December 2002, available at *http://www.economist.com/node/1476653*, accessed on 31 July 2014.
[184] Barratt op cit (n46) 40.
[185] Siepmann op cit (n37) 243.

One of the objectives of the BDA was to promote collaboration between commercial concerns and universities. University-industry relationship indeed accelerated after the BDA. Such increased collaboration is another area of contention. The linkage led to positive outcomes such as creation of incubated companies and at the same time presented an opportunity for conflict of interest.

Siepmann concludes, that at a minimum, the translation of academic publicly funded R&D into commercial application is significant to the US's economy, and that every country just like the US will at some point have to revise its IPRs law to conform to some of the provisions of the BDA for its perceived positive impacts on the US economy.[186] In his view, the positives attached to the BDA surpass the negatives.

Remington points out that the BDA is subjected to review every five years and that federal agencies have authority and responsibility periodically, to audit grantees and contractors for compliance with the BDA.[187] This appears to be one of the checks and balances that the BDA goes through to ensure that the US realises its full benefits.

The negative effects of the BDA stem from negative impacts that come about with patent laws generally. In addition, patenting is taking place at academic and research institutions that receive public funding, a fact which ought to be a cause of concern to countries emulating the BDA.

The BDA might not have been the sole factor for the significant economic growth in the US but, at the minimum, it is a factor that brought about significant changes. For that fact, countries ought to explore further on this area and when considering similar legislation, such countries ought to embrace its positive effects and at the same time, exercise caution by inserting checks and balances to counter potential negative impacts

[186] Siepmann op cit (n37) 243.
[187] Remington op cit (n174) 4.

CHAPTER 3

IPR-PFRD ACT: SA'S EXPERIENCE SO FAR

3.1 Introduction

This chapter is an analysis of the IPR-PFRD Act beginning from its genesis and rationale to its effects and impact in SA. The IPR-PFRD Act is largely modelled on the BDA,[188] implying that its possibly a 'legal transplant'.[189] The expansion of European influence through war and conquest greatly contributed to the transplantation of laws to countries in Asia, Africa, North America and Latin America. Some countries however transplanted laws voluntarily.[190] Berkowitz *et al* argue that for law to be effective in any particular country, a demand for that law must exist so that the law as written on paper will be used in practice. Further, they state that legal intermediaries who are tasked with developing the law act in response to that demand.[191]

Several years after the end of European influence, countries still borrow from other countries.[192] While not excluding that possibility of borrowing from other countries, Berkowitz *et al* suggest meaningful adaptation of imported laws to local conditions.[193] That is, borrowing laws from other countries by adapting them to suit the often unique circumstances in the borrowing country.

This chapter will similarly attempt to determine whether SA transplanted the BDA model as is (without modifications) or transplanted it with the necessary calibrations.

SA has already experienced some effects of the IPR-PFRD Act, and because it is relatively new, only time will author its significant effects and impacts. The legislation has not been unanimously appreciated by scholars. Some feel that it has created more uncertainty than

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[188] GD Graff *Echoes of Bayh-Dole? A Survey of IP and Technology Transfer Policies in Emerging and Developing Economies: A Handbook of Best Practices* (2007) 184.
[189] See D Berkowitz *et al* 'The Transplant effect' (2003) 51 *The American Journal of Comparative Law* 163 at 170. Transplanting of laws or 'legal transplant' may refer to the existence of formal order in countries shaped by transplanting of laws that had evolved in several European Countries in the late eighteenth and early nineteenth centuries.
[190] Berkowitz *et al* op cit (n189) 172.
[191] Berkowitz *et al* op cit (n189) 167-168.
[192] See DA So*et al* 'Is Bayh-Dole Good for Developing Countries? Lessons from the US Experience' (2008) 6 *PLoS Biology* 2078 at 2078.
[193] Berkowitz *et al* op cit (n189) 190.

ever and that it was not necessary to begin with, especially because it is more of a patent law than an IPR law as the title suggests.[194]

It is more than prudent to discuss SA's experience, limited as it is, in a bid to determine whether it is necessary for other countries in sub-Saharan Africa to even dream of having similar legislation. Many African countries look up to SA by borrowing what they assume to be better practices in its approach to many things. To offer an understanding of its provisions, a brief legislative review of the IPR-PFRD Act is discussed followed by a discussion on the effects and likely effects. The experience of its implementation at leading universities is discussed briefly and a conclusion is then drawn.

3.2 Genesis and rationale of IPR-PFRD Act

The IPR-PFRD Act follows on the Intellectual Property Rights and Publicly Financed Research Policy Document that emanated from the Department of Science and Technology (DST) and was published in July 2006.[195]

The context of the IPR-PFRD Act is also said to be the DST's Ten Year Innovation Plan which aims to foster the rise of knowledge-based economy through innovation.[196] Chetty holds the view that the IPR-PFRD Act is a partial response to the recommendations of a study on research utilisation. That research revealed that certain factors *inter alia*, an existing state of 'inadequate sources of knowledge or information', 'the secrecy around IP' and 'the conflicting agendas of industry and academia in the context of R&D collaboration and outsourcing', inhibited utilisation of publicly funded research findings.[197]

The policy document outlined the importance of IP by highlighting that in all sustainable economies, IP has gained significance as a basis for competitiveness and economic growth.[198] Bearing this in mind, it went further to emphasise that an enabling framework and clear

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[194] C Visser 'Intellectual Property Rights from Publicly Financed Research: The Way to Research Hell Is Paved with Good Intentions' (2007) 19 *SA Merc LJ* 363 at 364-365.
[195] Visser op cit (n194) 363.
[196] See DST 'The Ten-year Plan for Science and Technology' (2007); see also National Advisory Council on Innovation (NACI) 'Utilisation of Research Findings Extent, Dynamics and Strategies, synthesis report and discussion document' (2003).
[197] P Chetty 'Legislative Review of IPR Act and Regulations: Intellectual Property Rights From Publicly Financed Research and Development Act, Act No 51 of 2008, Republic of South Africa' (2009-2010) 10 *AJIC* 78 at 78. See also NACI op cit (n196) ix.
[198] DST IPR and Public Funded Research Policy Document 'Intellectual Property Rights (IPR) from Publicly Financed Research Framework' (2006) at pg 5. (Hereafter DST policy document).

regulations are required to secure IP, particularly, patents from publicly financed research.[199] As such, an enabling environment will stimulate universities, other research institutions, their staff and students, to invent and secure their inventions. The policy document also pointed out the importance of expanding the capacity of universities and other institutions in commercialising their IP.[200]

The policy document expressed the imperative to secure patents that arose from publicly funded research because there was no policy or legislation in SA regulating that domain, other than what was outlined in the National Research and Development Strategy and had been accepted by cabinet in 2002.[201]

The policy document outlined concerns, such as:

- Little appreciation for the value of IP as an instrument of wealth creation and in the management of public risks in SA;
- The significant leakage of IP that was publicly financed into overseas jurisdictions;
- The lack of government walk-in rights due to the absence of legislation-which absence lead to multiplicity of different approaches by different public institutions.[202]
- The predominance of 'inward patenting'- where SA's patent system was used to secure inventions that originated outside SA, as well as very low levels of patenting by institutions that received public funding.[203]
- The stagnation of SA's patent filing compared to other developing countries. In particular, it was cited that since 1998, SA had barely doubled its number of patent applications under the Patent Co-operation Treaty (PCT) whereas the number for South Korea had increased seven fold since 1998, while that of India had increased almost by 12 fold since 1999.[204]

[199] Ibid.
[200] Ibid.
[201] DST policy document op cit (n198) 8.
[202] Ibid.
[203] DST policy document op cit (n198) 5.
[204] DST policy document op cit (n198) 12.

These were some of the concerns highlighted in the policy document when an urgent need for the creation of a proper framework as well as an enabling legislation for the effective management of IP arising from publicly financed research was proposed.[205]

Appendix 2 to the policy document, an executive summary of the report titled 'Turning Science into Business-Patenting and Licensing at Public Research Organisations (PROs)' highlights some justifications offered in recommending the enactment of legislation to deal with the highlighted concerns.[206]

The summary points out that, universities, national laboratories and other research organisations in many 'Organisation for Economic Co-operation and Development' (OECD) countries that received significant public research funds had become aware of the value of their IP. Also that, the awareness was a reflection of their governments' recognition, that in certain instances, placing the results of publicly funded research in the public domain was not sufficient to generate social and economic benefits from research. The awareness and demand to generate more economic benefits from public support to R&D had focused the attention of policy makers' (in those countries beginning with the US) on laws and rules that governed ownership and exploitation of IP at PROs.[207]

The summary makes reference to the BDA which as discussed in Chapter two, gave universities and firms the right to patents that emerged from federally funded research. It further highlights how other OECD countries and beyond widely view the BDA as a catalyst for increasing the social and economic benefits of public research funding.[208]

The policy, though visibly motivated by the imperative to secure patents that arise from publicly funded research, is similarly reflective of some pitfalls associated with patenting by universities.[209] For instance, it recommended development of guidelines on the following;

- Conflict of interests;[210] one potential conflict of interest scenario the policy document envisaged involves a situation whereby an inventor forms part of a start-up to which

[205] DST policy document op cit (n198) 8.
[206] DST policy document op cit (n198) 57.
[207] Ibid. The policy document refers to universities, national laboratories and other research organisations that receive significant public funds as PROs.
[208] Ibid.
[209] Barratt op cit (n46) 32.
[210] DST policy document op cit (n198) 46.

publicly funded IP is to be licensed. In such situations, it was recommended that the inventor ought not to be entitled to benefit-sharing under institutional policies because entitling him to benefit-sharing would amount to 'double dipping'.[211]

- Preference for non-exclusive licensing;[212] Such preference entails the institution retaining freedom to license the technology to other parties in addition to the primary license agreement. Such retention permits wider access to other actors within the economy and under certain circumstances, creates performance incentive. The policy document was nonetheless cognisant of the importance of exclusive licensing in developing early stage technologies which require further development work. The recommendation preferred non-exclusive licensing and maintained that exclusivity could be considered when circumstances required.[213]
- Government 'walk-in-rights'[214] among other ameliorating measures. SA government (as a source of public research financing), may use the invention for public purposes on such conditions as may be agreed upon with the patentee or determined by the commissioner of patents. The proposed legislation was to make it clear that government will exercise these rights in cases of national emergency as well as times of great national need.[215]

The most obvious outcome of the policy document is the enactment of the legislation itself. The IPR-PFRD Act[216] was promulgated on 22 December 2008, and came into operation in August 2010. It has accompanying regulations that detail its implementation methods. Those regulations also facilitate an understanding of the practical implications as well as underlying objectives of the IPR-PFRD Act.[217]

Visser describes the DST as well meaning in its call for the need for SA to move towards a knowledge-based economy,[218] a similar realisation the US had, prior to the enactment of the BDA. Whether the IPR-PFRD Act has addressed concerns and achieved desired outcomes will be highlighted as the chapter unfolds and as Visser correctly puts it, the devil is always in the

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[211] Ibid.
[212] DST policy document op cit (n198) 35.
[213] Ibid.
[214] DST policy document op cit (n198) 32.
[215] Ibid.
[216] IPR-PFRD Act 51 of 2008.
[217] Barratt op cit (n46) 33.
[218] Visser op cit (n194) 363.

detail.[219] Similarly, whether the IPR-PFRD Act transplanted or calibrated the BDA will be briefly explored.

3.3 Legislative review

3.3.1 Objectives

The objects of the IPR-PFRD Act is 'to make provision that IP emanating from publicly financed R&D is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for social, economic, military or any other benefit'.[220]

The outlined objectives are similar to those of the BDA. Both call for patenting and commercialisation of state funded research. The IPR-PFRD Act just like the BDA promotes such protection by providing that, creators whose work led to the creation of IP, as well as the institutions that employ them, should receive a portion of the financial benefits accruing from protected IP.[221]

3.3.2 NIPMO

The IPR-PFRD Act establishes the National Intellectual Property Management Office (NIPMO);[222] an administrative body within the DST tasked with *inter alia,* the functions of promoting the objects of the IPR-PFRD Act including statutory protection, management and commercialisation of publicly funded IPRs.[223] NIPMO plays a critical role as far as implementation of the IPR-PFRD Act is concerned. It is an interface body between the public and private sectors in a number of issues, particularly in ensuring that R&D environment thrives and, the management and commercialisation of IP is achieved successfully for the benefit of the people of SA.

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[219] Visser op cit (n194) 364.
[220] Section 1 IPR-PFRD Act 51 of 2008.
[221] Barratt op cit (n46) 34. See Section 10(2) IPR-PFRD Act 51 of 2008; See also section 202 of the BDA.
[222] Section 8 IPR-PFRD Act 51 of 2008.
[223] Section 9(1) IPR-PFRD Act 51 of 2008.

3.3.3 Obligations upon recipients

Recipients[224] of state funding are obligated to:

- Put in place appropriate mechanisms for 'identification, protection, development, and management' of IP and IP transactions as well as, establish mechanisms for commercialisation of the IP where applicable;[225]
- Provide 'effective and practical' procedures for disclosure of inventions that might be suitable for IP protection and ensure that IP emanating from publicly financed R&D is protected before results are published or publicly disclosed.[226] In reference to publication, Sibanda observes that protection of IP should always precede publication so as not to destroy novelty.[227]As pointed out in the previous chapter, publication is important for the advancement of academic research. This obligation raises an important scholarly question; whether withholding publication for purposes of patent protection, will do more good than harm to academic research in SA, bearing in mind the period of time it takes for patent protection to be granted, *vis a vis,* the evolutionary nature of certain aspects of science and technology?
- Ensure personnel engaged in R&D make disclosure to them within 90 days of identifying potential IP;[228]
- Asses research to determine whether it merits IP protection and where appropriate apply for such protection;[229]
- Refer to NIPMO within 30 days when they elect not to obtain IP protection;[230]
- (In the case of institutions) manage revenues due to it from IP transactions and commercialise thereof, including managing benefit sharing agreements with their IP creators;[231]

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[224] Section 1 IPR-PFRD Act 51 of 2008 defines recipient to mean; 'any person, juristic or non-juristic, that undertakes R&D using funding from a funding agency and includes an institution'. Statutory institutions such as the Human Sciences Research Council, Council for Scientific and Industrial Research or the Medical Research Council (MRC) are also recipients. Chetty op cit (n197) 79.
[225] Section 5(1) (a) IPR-PFRD Act 51 of 2008.
[226] Section 5(1) (b) IPR-PFRD Act 51 of 2008.
[227] M Sibanda 'Analysis of the South African Patent Landscape: The state of patenting in South Africa (special Report) (2007) at pg.i, section 25(5) Patent Act 57 of 1978 provides that; 'an invention will be deemed to be new if it does not form part of the state of the art immediately before the priority date for that invention.'
[228] Section 5(1) (c) IPR-PFRD Act 51 of 2008.
[229] Section 5(1) (d) IPR-PFRD Act 51 of 2008.
[230] Section 5(1) (e) IPR-PFRD Act 51 of 2008.

- Negotiate and enter into IP transactions with third parties;[232]
- Make reports to NIPMO twice a year on all matters pertaining to IP;[233]
- Furnish NIPMO with full reasons in respect of any IP they have not commercialised;[234]
- (In the case of institutions) to put in place mechanisms to annually asses, record and report to NIPMO on the benefits to society of publicly financed research conducted by them.[235]

3.3.4 Ownership

Firstly, IP emanating from publicly-financed R&D shall be owned by the recipient.[236] In instances where the recipient elects not to retain ownership of IP, or not to obtain statutory protection, it must inform NIPMO of such decision.[237]

According to Tong, situations not to retain ownership or seek statutory protection may arise for instance, where the recipient wishes to disseminate the research results to the public in terms of a collaboration agreement.[238] NIPMO after weighing the reasons for failing to protect, may acquire ownership of the IP and seek statutory protection itself, if it concludes that the IP needs to be protected.[239] In the event NIPMO decides not to take up ownership, the recipient is still under an obligation to offer the option of acquiring ownership first to any private entity or organisation co-funders and then, to the IP creators.[240]

Tong points out that the IPR-PFRD Act has altered the general position under the Patents Act,[241] which provides that the IP creator is entitled to first ownership of the IP.[242] Chetty

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[231] Section 5(1) (f) IPR-PFRD Act 51 of 2008. The Act in section 1 defines commercialisation as 'the process by which any IP emanating from publicly funded R&D is or may be adapted or used for any purpose that may provide any benefit to society or commercial use on reasonable terms'.
[232] Section 5(1) (g) IPR-PFRD Act 51 of 2008.
[233] Section 5(1) (h) IPR-PFRD Act 51 of 2008.
[234] Section 5(1) (i) IPR-PFRD Act 51 of 2008.
[235] Section 5(1) (j) IPR-PFRD Act 51 of 2008.
[236] Section 4(1) IPR-PFRD Act 51 of 2008.
[237] Section 4(2) IPR-PFRD Act 51 of 2008.
[238] LA Tong 'Ownership of IP derived from publicly funded research: the state steps in' (2010) 5 *JIPLP* 409 at 410.
[239] Section 4(3) IPR-PFRD Act 51 of 2008.
[240] Section 4(4) IPR-PFRD Act 51 of 2008.
[241] Section 27(1) Patent Act 57 of 1978, 'an application for a patent in respect of an invention may be made by the inventor or by any other person acquiring from him the right to apply or by both such inventor and such other person'.
[242] Tong op cit (n238) 411.

questions whether creators ought to rank last after recipients, the state and other funders or whether they should rank second after the recipients.[243]

It can be contended that Tong and Chetty's concerns are mitigated by the benefit-sharing provisions in the IPR-PFRD Act and its regulations, which are measures that ensures creators are not prejudiced. Recipients are obligated by the IPR-PFRD Act to put in place where there are none, provisions on benefit-sharing agreements.

Section 10(2)[244] entitles creators of IP from publicly funded research or the creator's heirs to at least 20 percent of the first South African Rand (ZAR) 1 million in revenue generated by the IP. They are similarly entitled to at least 30 percent of the net revenues in excess of the first ZAR 1 million earned. Section 10(3)[245] provides for equal sharing of revenues among creators unless there is an agreed benefit-sharing formula. Section 19(1)[246] provides that creators are entitled to timely access to monetary and non-monetary incentives. Section 9(3)[247] requires institutions to formulate policies to be approved by NIPMO for benefit-sharing of non-monetary benefits with IP creators.

It was also confirmed by a representative from NIPMO,[248] that although ownership vests in the institution, patent applications are in the inventor's name. This assures an inventor of the right of attribution to his or her invention.

Secondly, the IPR-PFRD Act also provides that any private entity or organisation may become a co-owner of IP emanating from publicly financed R&D that is undertaken at an institution under specified circumstances:[249] if there has been contribution of resources such as relevant background IP; where there is joint IP creatorship; if appropriate arrangements for benefit sharing have been made; and if an agreement for the commercialisation of the IP between the institution and private entity or organisation has been concluded.[250]

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[243] Chetty op cit (n197) 79.
[244] IPR-PFRD Act 51 of 2008.
[245] IPR-PFRD Act 51 of 2008.
[246] IPR-PFRD Act 51 of 2008.
[247] Regulations No. R.675 of 2010 of the IPR-PFRD Act 51 of 2008.
[248] J Weyers (NIPMO representative) 'South Africa's IPR-PFRD Act' presentation during the combined 3rd Global Congress on IP and the Public Interest and Open African Innovation Research & Training (Open A.I.R) conference on Innovation and IP in Africa held in Cape town from 9th to13thDecember 2013, available at *https://www.youtube.com/watch?v=PxSzP605qDg*, accessed on 12 September 2014.
[249] Section 15(2) IPR-PFRD Act 51 of 2008.
[250] Section 15(2) (a-d) IPR-PFRD Act 51 of 2008.

Lastly, if any R&D is undertaken at an institution and funded on a 'full cost'[251] basis, ownership shall be by the private entity or the funding organisation. In such cases, the IP shall not be deemed to be publicly-financed, hence the provisions of the IPR-PFRD Act shall not apply.[252] Parties can elect to negotiate the ownership of such IP.

Public funding of R&D in SA continues to feature prominently to the extent that part of the African National Congress's (ANC) election manifesto is to spend by the year 2018, 1.5 per cent of SA's Gross Domestic Product (GDP) on R&D.[253] SA's government is the main funder of R&D contributing 45.7 per cent of the Gross Domestic Expenditure on R&D (GERD), while the business sector contributes 42.7 per cent of the GERD.[254] This structure of funding is said to be more common in developed countries where the business sector plays a key role.[255] According to a survey carried out on SA's R&D spending, it was found that in 2012/2013, of the ZAR 23.871 billion spent on R&D, ZAR 10.832 billion came from the government, while ZAR 9.152 billion came from the business sector; another ZAR 3.117 billion came from overseas funders and ZAR 770 million from other sources.[256]

The above figures on SA's R&D spending demonstrate that it is not possible to talk exclusively of public funding. This is because the ZAR 10.832 billion coming from government is to be distributed across all public universities and institutions engaged in research. Upon such distribution, money channelled to a single research entity may not be sufficient to meet all its research needs and hence, the much welcomed funding from other sources. This reality is what has probably caused alarm among some scholars when the IPR-PFRD Act introduced the concept of 'full-cost' funding. The view held is that, it is not possible to separate public from private funding and that, there is always a combination of funding.[257] It is hence feared that

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[251] Section 15(4) (b) defines 'full cost' to mean the full cost of undertaking R&D as determined in accordance with international financial reporting standards and includes all applicable direct and indirect cost as may be prescribed.
[252] Section 14(4) (a) IPR-PFRD Act 51 of 2008.
[253] T Kahn 'SA research spend fall for fourth year' *Business Day Live*, 16 January 2014, available at *http://www.bdlive.co.za/national/science/2014/01/16/sa-research-spend-falls-for-fourth-year*, accessed on 27 December 2014.
[254] SAccess *Report on South African research and innovation capacity* (2007-2013) 15-16.
[255] Ibid.
[256] N Pandor 'SA needs to invest in research-Pandor' *Fin24*, 3 December 2014, available at *http://www.fin24.com/Economy/SA-needs-to-invest-in-research-Pandor-20141203*, accessed on 27 December 2014.
[257] A Lucianne (Director LINK Centre-Wits University)'African IP & Publicly Funded Research-Roundtable Discussion' presentation during the combined 3rd Global Congress on IP and the Public Interest and Open A.I.R conference on Innovation and IP in Africa held in Cape town from 9th to 13thDecember 2013, available at *https://www.youtube.com/watch?v=X9Lt4R9BeEU*, accessed on 12 September 2014.

regulatory procedures brought by the IPR-PFRD Act may delay negotiation conclusions and implementation of contracts for private sector funding.[258]

3.3.5 Technology transfer office

The IPR-PFRD Act mandates the establishment of TTOs within 12 months of the coming into operation of the IPR-PFRD Act,[259] to develop their capacity to manage, protect, commercialise and benefit-sharing arrangements, as well as undertake other obligations outlined in the IPR-PFRD Act.[260] This obligation has no effect on institutions that already have TTOs; however, institutions that did not have TTOs have to make the necessary arrangements to establish them. Establishing TTOs may be burdensome in terms of finances, human resource and institutional facilities. NIPMO is however tasked with providing assistance to institutions in the establishment of TTOs.[261]

The IPR-PFRD Act does provide for the establishment of regional TTOs by two or more institutions.[262] Having a regional TTO for institutions that are within reasonable proximity may be cost effective especially for institutions that lack sufficient human and financial resource to maintain TTOs.

3.4 Likely outcomes of the IPR-PFRD Act based on the existing IP regime in SA

3.4.1 A portfolio of weak patents

The IPR-PFRD Act requires recipients to protect IP arising from publicly-financed R&D. One of the protections that can be sought is patent protection. It is reasonable to conclude that the IPR-PFRD Act will drive recipients towards patenting of inventions that are unnecessary and potentially with little prospect for commercial exploitation. This outcome has actually materialised to some extent. This fact is based on the outcome of a study conducted at the University of Cape Town (UCT) and the University of Witwatersrand (Wits).[263] Based on that

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[258] Ibid.
[259] Section 6(1) (a) IPR-PFRD Act 51 of 2008.
[260] Section 6(1) (b) 6(2) and Section 7 IPR-PFRD Act 51 of 2008.
[261] Section 9(4) (c)) IPR-PFRD Act 51 of 2008.
[262] Section 6(3) IPR-PFRD Act 51 of 2008.
[263] C Ncube *et al* 'Effects of the South African IP Regime on Generating Value from Publicly Funded Research: An Exploratory Study of Two Universities' in Jeremy de Beer *et al (*ed) *Innovation & Intellectual Property: Collaborative Dynamics in Africa* (2014) 295.

study, it emerged that UCT's Research Contracts and Intellectual Property Services (RCIPS),[264] has had to increase its screening work because more researchers are making reports to the office about their inventions so that they can be scrutinised for patentability. There is indiscriminate reporting by inventors for even borderline inventions something that was uncommon prior to the enactment of the IPR-PFRD Act.[265] The RCIPS is being kept busier than before as researchers and inventors tread with caution in full compliance with the IPR-PFRD Act.

Having 'a portfolio of weak patents' is probable in SA because it has a registration patent regime. SA does not examine its patent application and hence it is likely that the register will be filled with numerous patents that do not meet statutory patent requirements.[266] Some of the reasons why SA lacks a substantive patent examination regime are the fact that it is too expensive and the lack of human resources.[267]A situation whereby the Companies and Intellectual Property Commission (CIPC) finds itself with a portfolio of weak patents would be undesirable especially because, a study by Webster and Jensen on 'commercialisation outcomes for 3,162 Australian inventions'[268] revealed that in Australia patents are neither a necessary nor a sufficient condition for commercialisation.[269] It is necessary for SA to first address the lack of a substantive patent examination regime at the CIPC for local patents and the challenges that such regime often creates.[270]

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[264] The RCIPS is the office that performs TTO functions at UCT, see RCIPS website at *http://www.rcips.uct.ac.za/,*for more information on its functions at UCT.
[265] Ncube *et al* op cit (n263) 298.
[266] Ncube *et al*op cit (n263) 291.
[267] Treatment Action Campaign 'Why South Arica should examine pharmaceutical patents: How legislative reform could boost the affordability and accessibility of medicines for South Africans, December 2012, available at *http://www.tac.org.za/community/files/file/WhySAneedsanexaminationsystem.pdf,* accessed on 12 September 2014pg 5.
[268] E Webster and PH Jensen 'Do patents matter for commercialisation' (2011) 54 *Journal of Law and Economics* 431 at 431.
[269] Webster and Jensen op cit (n268) 447.
[270] See A Ward 'The BRICS wall of Protection: What South Africa's Patent Policy means for the Future of National Health' *Yale Global Health Review*, 16March 2014, available at *http://issuu.com/yaleglobalhealthreview/docs/yghr_1.1__fall_2013_,* accessed on 12 September 2014,for a discussion on some of the impacts of failing to have a patent examination system in SA.

3.4.2 Delayed scholarly outputs

Whereas the IPR-PFRD Act has carefully excluded copyright of scholarly publications from its provisions,[271] it fails to recognise that focus on patenting could still have a negative effect on written academic output.[272] It is averred that the rapid publication of research findings that relate to inventions that can be potentially patented will have to be curtailed so that novelty, one of the requirements for patentability is not destroyed.[273] The periods of time required to formalise a patent is lengthy and it is feared, that the delay in publication will have an unnerving effect on written scholarly output by SA scholars. Also that such delay will make them less competitive on the global stage of academic exchange, and they will be less able to participate in open science and open knowledge paradigms.[274]

3.4.3 Protection of R&D outcomes not recognised by current SA statutes and implications there under

IP is defined by the IPR-PFRD Act as;

[A]ny creation of the mind that is capable of being protected by law from use by any other person, whether in terms of South African law or foreign intellectual property law, and includes any rights in such creation, but excludes copyrighted works […][275]

The IPR-PFRD Act includes foreign IP law implying that SA institutions are required to obtain statutory protection in foreign jurisdictions as well, even if the R&D is not eligible for protection in SA.[276] It similarly implies that IP that is not ordinarily protectable within SA may have to be protected if it would constitute protectable subject matter in a foreign jurisdiction.[277] This raises serious concerns particularly considering other jurisdictions such as the US which has

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[271] Section 1 IPR-PFRD Act 51 of 2008 expressly excludes 'copyrighted works such all thesis, dissertation, article, handbook or any other publication which, in the ordinary course or business, is associated with conventional academic work'.
[272] Ncube *et al* op cit (n263) 291.
[273] See footnote 227 on definition of novelty in SA.
[274] Ncube *et al* op cit (n 263) 291, see also page 288 on their discussion on open science, open knowledge and open research.
[275] Section 1 IPR-PFRD Act 51 of 2008.
[276] Ncube *et al* op cit (n263) 291.
[277] Tong op cit (n238) 410.

liberal patent laws. For instance, the US Patent law does not exclude any subject matter from patentability,[278] unlike in SA where section 25(2)[279] lists what 'as such'[280] cannot be patented.

The underlying objective of the IPR-PFRD Act is to increase SA's local and international patenting activity, and to that extent, extending protection beyond SA law is said to be well meaning.[281] Mindful of Visser's the devil is in the detail caution, this same extension raises two concerns: firstly, institutions in SA now have to ensure that they possess sufficient knowledge of foreign IP law so that the required international protection is obtained; secondly, acquisition of international IP protection is lengthy and costly and this is likely to place heavy burdens on institutions.[282]

The IPR-PFRD Act seeks to address these concerns by providing for funding through NIPMO for the 'development of appropriately skilled personnel' in institutions[283] as well as the establishment of a national IP fund to finance acquisition and maintenance of local and foreign statutory IP protection.[284]

The IPR-PFRD Act envisages protection and commercialisation of R&D outcomes in accordance with SA law as well as in accordance with foreign laws.[285] Despite Tong's concerns of having to protect IP that is not currently protectable in SA, it may very well be prudent to allow such protection beyond the scope of SA law, but protectable in foreign jurisdictions, in the event of commercialisation of R&D outcomes in foreign markets.

3.5 Effects of the IPR-PFRD Act

A brief discussion on some real, as well as perceived, effects being experienced as a result of compliance with provisions of the IPR-PFRD Act is based on studies at two leading universities in SA; the University of Cape Town (UCT) and University of Witwatersrand (Wits).[286] It also follows on realities reported by NIPMO representative during a conference organised by Open

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[278] 35 U.S.C 101 Inventions Patentable 'Whoever invents or discovers any new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereof, may obtain a patent thereof, subject to the conditions and requirements of this title.'
[279] Patent Act 57 of 1978.
[280] Section 25(3) Patent Act 57 of 1978.
[281] Ncube *et al* op cit (n263) 292.
[282] Ibid.
[283] Section 6(4) (b) iii IPR-PFRD Act 51 of 2008.
[284] Section 13(2) (a) IPR-PFRD Act 51 of 2008.
[285] See section 1 IPR-PFRD Act No 51 of 2008 under definition of IP.
[286] See Ncube *et al* op cit (n263) 295.

Air in December 2013 held at Cape Town; NIPMO's recent move to ease application of the IPR-PFRD Act; other studies are a report from Innovus, the TTO at Stellenbosch University as well as a study on the impact of the IPR-PFRD Act on technology transfer processes at SA universities' TTOs. Those effects experienced so far are briefly outlined below:

3.5.1 UCT and Wits

The study was based on a series of interviews with researcher-inventors and staff members at their TTOs.

The study revealed that the IPR-PFRD Act has motivated a reflective approach to commercialisation in these two institutions. Both institutions amended their IP policy to incorporate the provisions of the IPR-PFRD Act.[287] Prior to the IPR-PFRD Act, Wits made limited financial commitments to technology transfer because it did not see value in protecting inventions if the university had no intentions of their commercialisation. However, in 2011 funding for IP protection was first introduced and in 2012, the university's budget for this activity was increased.[288]

At UCT, there were reports of a small but significant loss of industry contracted research,[289] while at Wits, many industry funders re-evaluated their approach mainly because most industrial support to the institution had not been on a full-cost basis. Prior to the IPR-PFRD Act, industry funded projects generally had additional university or government funding and IP from this research, according to Wits IP policy, belonged to the University. Industry funders' rights to the IP, such as rights to post-commercialisation rewards would be negotiated afterwards. One such industry funder that restructured its approach since the IPR-PFRD Act took effect at Wits, was the South African petrochemical parastatal, Sasol. Following the IPR-PFRD Act, the company has since developed a policy for university research funding which allows it to retain ownership of IP from research of high commercial value in return for paying full cost to the university.[290]

Prior to the IPR-PFRD Act's inception, research at both institutions had habitually been socialised and identified with significant society benefit. Contrary to fears that increased

[287] Ncube *et al* op cit (n263) 295, 301.
[288] Ncube *et al* op cit (n263) 302.
[289] Ncube *et al* op cit (n263) 297.
[290] Ncube *et al* op cit (n263) 302.

patenting will lead to secrecy among institutions, the study showed that socialisation of research has actually not being constrained by the IPR-PFRD Act.

This is evident from the traditional practices that have been maintained by the two institutions. For instance, they both signed the 2002 Berlin Declaration on Open Access (OA) and affirmed their commitment to distribute their research outputs on an OA basis.[291] Further, in July 2014, UCT achieved a milestone when it launched the Open-UCT institutional repository which enables UCT fraternity, to legally and freely make available their research, teaching and engaged scholarly resources so as to facilitate access, re-use and sharing of materials.[292]

3.5.2 Implementing the IPR-PFRD Act at Stellenbosch University

The experience at Stellenbosch University reveals that majority of the researchers at the university's TTO Innovus,[293] understand and buy into IPR-PFRD Act's rationale and adhere to its obligations.[294] However, it is regrettably reported that there have been instances of lost research funding due to unforeseen and unintended consequences of the IPR-PFRD Act. Complying with the obligations set out in the IPR-PFRD Act, is what is said to have resulted in loss of funding opportunities to other institutions outside SA, that are willing to comply with the strict rules and deadlines of external funders.[295] It is stated that complying with the IPR-PFRD Act consumes capacity and time, leading to delays in signing of contracts and equally upsets funding bodies.[296]

The loss of significant funding opportunities leads to a situation where researchers cast blames on TTOs. Such blame upon the TTO creates a situation whereby it is not able to completely fulfil its roles and functions within the university.[297]

In offering a possible solutions to the existing state of loss of funding, it is first stated that there is a misconception that university IP is highly profitable and of great commercial value.[298]

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[291] Ncube *et al* op cit (n263) 298, 303.
[292] A Calata 'Greater strides towards open access' *UCT Newsroom and Publications Monday Monthly* 18 August 2014, available at *http://uct.ac.za/mondaypaper/?id=9837*, accessed on 3 October 2014.
[293] See Innovus, available at *http://www.innovus.co.za/pages/english/about-us.php*, accessed on 3 October 2014.
[294] A Nel 'Implementing the new Intellectual Property Rights from publicly funded research and development Act at Stellenbosch University' *Innovus*, available at *http://www.innovus.co.za/pages/posts/implementing-the-new-intellectual-property-rights-from-publicly-funded-research-and-development-act-at-stellenbosch-university-328.php*, accessed on 3 October 2014.
[295] Ibid.
[296] Ibid.
[297] Ibid.

In that regard, it is suggested that one solution would be to 'identify and ring-fence specific parameters and types of research agreements' that will empower a TTO make quick decisions; for instance, to allow certain IP clauses imposed by funders though they may technically be non-compliant with the IPR-PFRD Act.[299] Also research funders' context and intentions should be taken into consideration for instance when there is no commercial value to be gained from the research outcome.[300]

3.5.3 Report from NIPMO[301]

The IPR-PFRD Act requires recipients of public funding to bi-annually report to NIPMO on the IP status and commercialisation efforts taking place. During the conference, NIPMO reported receiving about 350 reports from all the 33 institutions that are recipients of public funds. The reports indicated that 70 per cent is pending protection; 21 per cent is disclosed and protected under IP; 6 percent has been licensed and 3 percent has been commercialised generating about ZAR 2.23 million. NIPMO has released ZAR 27 million as part of IP fund to assist institutions with IP protection and maintenance costs. It is reported that the IPR-PFRD Act has generated about 48 jobs within the universities' Offices of Technology Transfer (OTTs).[302] Further that it has given out about ZAR 27.7 million in OTT support.

NIPMO has similarly trained about 500 researchers and has had about three commercialisation workshops. In partnership with WIPO, a two week training course on IP management is run which has so far trained about 100 people. Further, NIPMO provides assessments tools for the institutions so that they can do their own novelty searches as well as create capacity within the institution. NIPMO has an OTT framework manual and similarly provides guidelines for the stakeholders to interpret and implement the IPR-PFRD Act.

Since the inception of the IPR-PFRD Act, NIPMO has worked hard to see that provisions of the IPR-PFRD Act are complied with as well as provide assistance in its implementation.

From, the figures, a lot more have been spent compared to what has actually been commercialised. When this reality was put to task to NIPMO's representative, optimism was

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[298] Ibid.
[299] Ibid.
[300] Ibid.
[301] Weyers op cit (n248).
[302] TTOs or OTTs as referred to by others, perform the function of technology transfer at Universities and research institutions.

expressed by stating that the IPR-PFRD Act was effective and that an OTT office was necessary to identify the research that is happening in universities.

3.5.4 NIPMO eases IPR-PFRD Act requirements

In mid 2014, NIPMO eased the control of the IPR-PFRD Act for certain clinical trials. It granted approval for IP transactions that included royalty-free non-exclusive licenses, offshore exclusive licenses, or local and offshore assignments for specific infectious diseases which include human immunodeficiency virus/ acquired immune deficiency syndrome (HIV/AIDs), Tuberculosis, malaria and neglected diseases. Such control was eased in instances where there is a philanthropic organisation or its intermediary that is funding such trials at below full cost. Serendipitous IP that results during the course of the trial will however be owned by the university in these below full cost projects, hence coming under the realm of the IPR-PFRD Act. RCIPS is required to report to NIPMO after every six months on such clinical trial agreements entered into.[303]

This is an important step by NIPMO and a demonstration that the rules are not cast in stone. It also assures its commitment to ensure that the spirit and the letter of the law are achieved for the benefit of the people of the Republic.

3.5.5 Impact of the IPR-PFRD Act on technology transfer processes at SA universities' TTOs

A study was done to examine publicly funded universities in SA and their technology transfer processes at the university TTO level. The study aimed to find out the impact of the IPR-PFRD Act on technology transfer at the TTOs.[304] A questionnaire survey and guided interviews on six TTOs were done. The survey requested TTOs to express the impact level of each of the 11 impact elements[305] of the four stages of IP development.[306] From the study, the impact elements

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[303] See RCIPS'NIPMO Eases IPR Act Control for Certain Clinical Trials, 13 June 2014, available at *http://www.rcips.uct.ac.za/news/nipmo-eases-ipr-act-controls-certain-clinical-trials*, accessed on 3 October 2014.

[304] See N Erasmus *The Impact of the Intellectual Property Rights Act for Publicly Funded Research and Development on Technology Transfer Offices at South African Universities* MBA (Pretoria) 2011.

[305] See Erasmus op cit (n304) 26. Impact elements were adopted by Erasmus from Staphorst' Master's thesis. They are choice of IPRs ownership, state walk-in rights on IP not declared, benefit-sharing policies, offshore IP registration process, requirements for non-exclusivity in IP transactions, preference in commercialisation rights to Small Medium Enterprises (SMEs) and Broad-Based Black Economic Empowerment (BBBEE) firms, IP detection process by TTO, NIPMO reporting process, NIPMO reaction time, IP disclosure process, structural and resource requirements to manage and commercialise IP.

of 'structural and resource requirements to commercialise and manage IP', 'disclosure process' and IP detection process by the technology transfer officers' were ranked as the top three impact elements in that order.[307] The study concluded that the IPR-PFRD Act enforcement and execution will demand a high degree of structural and resource requirements, particularly, and most importantly at the IP disclosure stage of IP development.[308]

The study calls for further research in this area with a view to determine the impact of this relatively new legislation.

3.6 Conclusion

This chapter has analysed the IPR-PFRD Act starting from its genesis down to its implementation and effects. The intention of those who proposed the law looks good on paper because it is clear that the underlying objective is to develop a sustainable economy for SA. The protection of IP that emanates from publicly funded R&D is thought to be a significant factor towards the attainment of that objective. The key question is thus whether placing emphasis on the protection of IP is a misconceived notion or a justified one.

On whether the IPR-PFRD Act has been transplanted or calibrated, a clear cut position is difficult to ascertain. This is because, firstly the IPR-PFRD Act's objectives are similar to those of the BDA and to that extent it reflects legal transplant. Secondly, there are numerous provisions that reflect calibration, for instance the provision that allow protection of R&D outcomes not protectable under SA law which is not in the BDA.

The BDA that was once described as the most inspired piece of legislation in the twenty first century is filled with uncertainties in the US and to date there is no consensus on its exact impact. What is however clear is, the BDA was just but one of the factors that played a role in the growth of industries in the US. The IPR-PFRD Act now in SA has similarly not escaped uncertainties. The loss of funding from external funders due to the complexities of complying with the IPR-PFRD Act is one negative impact experienced so far at UCT, Wits and Stellenbosch. That notwithstanding, its implementation is being approached in a cautious

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[306] Erasmus op cit (n304) 31. The four stages of IP development are IP creation, disclosure, protection and commercialisation.
[307] Erasmus op cit (n304) 50.
[308] Erasmus op cit (n304) 72.

manner. The Universities, industries and NIPMO are trying to implement the spirit as well as the letter of the IPR-PFRD Act.

The IPR-PFRD Act is still fairly new in SA and it is prudent that everything that happens as a result of its implementation is carefully monitored and recorded with a view to avoiding adverse effects.

CHAPTER FOUR

THE INTERPLAY BETWEEN KENYA'S SCIENCE TECHNOLOGY AND INNOVATION AGENDA AND THE EXSITING INTELLECTUAL PROPERTY PROTECTION MEASURES

4.1 Introduction

This chapter is aimed at critically analysing the interaction between the STI agenda in Kenya and the IP protection measures currently in place. It will attempt to draw a conclusion on whether there is need in the near or distant future to follow after the US and SA in enacting law regulating publicly funded R&D outcomes.

In 2008, Kenya charted a new course dubbed 'vision 2030', a development strategy aimed at steering its economy forward.[309] Key sectors and timelines were identified as essential to achieving that end. Importantly, STI is recognised as central in any modern economy in which knowledge plays a key role in the creation of wealth, socio-economic welfare and competitiveness in the global arena. In that regard, it features prominently in the vision 2030.

Kenya like many other African countries looks to SA in a bid to steer development and economic growth in the same success direction. SA is an economic power house when compared to the rest of sub-Saharan Africa and it is therefore reasonable for any African country including Kenya to emulate SA.[310] For example, Kenya's 2010 Constitution, the Bill of Rights in particular, is said to be fundamentally modeled on SA's Constitution with obvious modifications tailored to suit Kenya's populace.[311] It is thus reasonably foreseeable that if a Kenyan version of the BDA is to be considered, consultative discussions with SA policy makers or at the very least, research on SA's experience will greatly inform Kenya's ultimate position.

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[309] See Republic of Kenya 'Kenya Vision 2030: The Popular version' (hereafter Vision 2030) (2007).
[310] Department of Trade and Industry: Republic of South Africa Trade Exports and Investments 'Why invest in South Africa', available at *http://www.dti.gov.za/trade_investment/why_invest_insa.jsp*, accessed on 12 December 2014.
[311] See H Varney *Breathing life into the New Constitution, A new Constitutional approach to law and policy in Kenya: Lessons from South Africa* (2011).

4.2 Vision 2030

Kenya's vision 2030 is the country's development blueprint that covers the period 2008 through 2030. It aims to transform the country into a newly industrialised middle income country that provides high quality life for all her citizenry. [312] The vision, set to be achieved by the year 2030 is founded on three pillars, economic, social and political. The three pillars are anchored on *inter alia* macroeconomic stability, enhanced equity and wealth creation, infrastructure, STI, human resource development and security.[313] Vision 2030 proposes intensified application of STI so as to raise productivity levels across the three pillars.

It also recognises the critical role played by R&D in accelerating economic development in the newly industrialised countries of the world. The government is expected to develop and implement several polices in support of this vision 2030. Among such policies is an STI policy. More resources are also expected to be devoted to scientific research, enhancing technical capabilities of the workforce and raising the quality of teaching. Modifications in the curricula are expected to ensure that creation, adoption, adaptation and usage of knowledge forms part of formal instruction in all schools, polytechnics and universities. A new incentive structure is to be developed to support use of STI in specialised research centres, universities, in the agricultural sector, business firms and indeed in all industries.[314]

4.3 STI Policy 2009

The then Ministry of Higher Education Science and Technology spearheaded an STI Policy[315] in 2009 which underscored the significance of mainstreaming STI in all sectors of Kenya's economy well in line with vision 2030. In order for STI to facilitate the realisation of Kenya's vision 2030, 12 indicative programmes were singled out to be implemented through various proposed projects.[316]

The second programme on 'Generation and Management of Intellectual Property Rights' is of relevance to an IP scholar and in particular for this research. This programme seeks to ensure that measures which provide an enabling environment for the management and

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[312] Vision 2030 op cit (n309 1.
[313] Vision 2030 op cit (n309) 6.
[314] Vision 2030 op cit (n309) 8-9.
[315] Republic of Kenya, Ministry of Higher Education Science and Technology (now Ministry of Education Science and Technology) 'Science, Technology and Innovation Policy and Strategy' (2009) (Hereafter STI Policy 2009).
[316] STI Policy 2009 op cit (n315) 51.

commercialisation of IP are in place alongside indicative projects judiciously aimed at enforcing the national IP regime.[317]

Indicative projects under this second programme are discussed below.

4.3.1 National Code of Practice for Managing and Commercialising Intellectual Property

The project will aim to develop a National Code of Practice to provide guidelines for the management and commercialisation of IP from research that is as a result of collaboration between industry and academic partners. The code will also cater for the exploitation of traditional knowledge.[318]

4.3.2 Knowledge Transformation and IPR Project

The project focuses on providing an environment that will enable the management and commercialisation of IP. It will aim at having a regime that will facilitate and encourage protection of new innovations and also attract public-private partnership agreements.[319]

This project's underlying objective is to support improvement of the system of protecting and utilising IPRs by establishing a government database of state financed R&D results. It will also support and stimulate activities involved with commercialisation and popularisation of research outcomes.[320]

It is the project's aim to periodically investigate and assess the ability of IPR regimes to foster local innovation and acquisition of appropriate foreign technologies. It will also investigate and assess whether the regime supports Small Medium Enterprises' (SMEs) use of technology upon which policy measures in support will be proposed. [321]

Expected outcomes of the project are the following;

- 'Provision of an increased opportunity for research organisation and researchers to benefit from their academic work due to improved IP utilisation and protection;
- Establishment of an information database on R&D results and consequently increased opportunity to utilise and commercialise the results; and

[317] STI Policy 2009 op cit (n315) 54.
[318] Ibid.
[319] Ibid.
[320] Ibid.
[321] Ibid.

- An increase in the number of property rights agreements of R&D results'.[322]

4.3.3 Assessment of the impact of IPR on National Innovation System project

This project will assess and investigate the ability of technology platforms to transfer patented inventions. It will also identify policy measures that are effective in strengthening innovation capabilities of SMEs. In addition it will aim at examining research exemptions for use of patented inventions and assess their effect on the conduct of scientific research.[323]

The programme and the indicative projects there under sound very promising for Kenya as far identifying, protecting, managing and commercialising of publicly funded research is concerned.

At the time this research was conducted, it was not very clear whether Kenya had a 'National Code of Practice for Managing and Commercialising IP' or at the very least a 'National IP policy'. The process of developing an IP policy for Kenya started in 2005 and it is believed that the process is ongoing.[324]

4.4 Science Technology and Innovation Act (STI Act)[325]

The STI Act was assented by the president on 14 January 2013. It's an Act of Parliament 'to facilitate the promotion, coordination and regulation of the progress of science, technology and innovation of the country. The STI Act also aims to assign priority to the development of science, technology and innovation as well as to entrench technology and innovation into the national production system.'[326]

A key provision in the STI Act and important in this research is the establishment of the National Research Fund (NRF).[327] The fund shall consist of 'a sum of money amounting to 2 per cent of the country's GDP, provided by the treasury every financial year.'[328]

Well in line with vision 2030, this provision has set out a fixed percentage of the country's GDP to be channelled to R&D. It is thus reasonable to expect that the government will

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[322] Ibid.
[323] Ibid.
[324] D Opijah 'Towards a National Intellectual Property Policy for Kenya' *Business Advisor*, 2 June 2013, available at *http://www.jdsupra.com/legalnews/towards-a-national-intellectual-property-13421/,* accessed on 1 December 2014.
[325] STI Act 28 of 2013, Laws of Kenya.
[326] STI Act 28 of 2013.
[327] Section 32(1) STI Act 28 of 2013.
[328] Section 32(1) (a) STI Act 28 of 2013.

want an account of the utilisation of the fund and whether it is manifesting in Kenya's economic growth.

Similarly, it can be anticipated that the legislators will turn to the existing IPR regime to determine whether it is in line with the country's vision 2030 and whether it is strong enough to incentivise the generation, protection and utilisation of IP generated by publicly-financed institutions, as well as researchers and inventors and in turn, foster the realisation of the country's development goals and objectives.

4.5 Kenya's knowledge-based economy

Kenya has also joined in the drive to pursue a knowledge-based economy. One way in which governments are pursuing this agenda is through commercialisation of the results of publicly funded research in universities and research institutions. IP law is central to this agenda when the outcomes of the research are to be monopolised through private rights and thereafter commercialised.

It is asserted that the ability to use IP as a tool to encourage and facilitate commercialisation is pegged on three fundamental policy concerns; IP protection, ownership and management capacity.[329] Graff carried out a survey of policies and practices across an array of developing countries among them Kenya. Based on his survey, he was of the view that higher capacities for institutional IP management appear to be more closely associated with levels of R&D expenditure, than with the existence or absence of national policies that allow or encourage institutional ownership. The implication is that IP management at the institutional level grows in tandem with strong R&D and the capacity for the local economy to commercialise the technology.[330]

Graff's opinion is synonymous with Sampat's who opines albeit in different words, that prior to the BDA, US' universities and institutions were already involved in R&D, IP creation and protection, technology transfer and commercialisation.[331] It is their shared opinion that developing countries first and foremost need strong R&D capacity in universities and research institutions and industries that are able to absorb the R&D outcomes.

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[329] Graff op cit (n188) 169.
[330] Ibid.
[331] Sampat op cit (n48) 783.

Systems of innovation in developed nations are the products of evolution over several generations. Those economies are today seeking to expand the private economic impact of R&D funded by the state through institutions built and strengthened over a long period of time as well as a strong pool of capable human capital that is the very source of their innovations.[332] These developed economies heavily invested in their institutions and human capital. The challenge that they face today is to ensure that they adapt a policy environment so as to improve the social rate of return on those investments. Graff opines that increasing the flow of innovation and technologies into the private sector is the way these economies are seeking to achieve their return rates.[333]

Developed countries are now concerned with increasing returns unlike developing countries that are yet to build capacity in their universities and research institutions.

It is paramount for countries to have a clear understanding of how national policies affect technology transfer from universities and public research institutions.[334] Garry likens systems of innovation in an economy to an ecosystem with IP forming just one part of it. Other parts include the research base, the legal IP regime and the institutional infrastructures which all co-evolve in a synergistic process with each part supporting while being supported by others.[335]

It is suggested that three fundamental policy questions have to be taken into consideration and answered in the economy's context. They are;

- 'To what extent are IP protections available?
- To whom can/should the ownership of those property rights be assigned?
- What capacity in the form of dedicated infrastructure, programs, or other resources will be provided to identify, protect and commercialise new technologies and to support industrial development and technology based entrepreneurship activities?'[336]

[332] Graff op cit (n188) 170.
[333] Ibid.
[334] Ibid.
[335] Ibid.
[336] Ibid.

4.6 Primary considerations that affect technology transfer

4.6.1 IP protection measures available in Kenya

The first policy question requires a country to consider whether it is possible to claim private property right over the intangible results of research. This is answered by a country's IP laws.[337]

Kenya is a state member to several international agreements that protect IP among them:

- The Paris Convention of 1883 which Kenya acceded to on 14 May 1965 and it entered into force on 14 June 1965.[338]
- In order to facilitate a common patent application for investors seeking to file patents in multiple countries, Kenya is a member of the PCT of 1970 which it acceded to on 8 March 1994, and it entered into force on 8 June 1994,[339] as well as the Harare Protocol which entered into force in Kenya on 24 October 1984.[340]
- The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organisation (WTO), which sets the minimum standards of protection for member states, entered into force in Kenya on 1 January 1995.[341]

In addition to the above, there are local protection measures available in Kenya. They are found in its national legislation: The Industrial Property Act, which protects Patents, industrial designs and utility models,[342] and Seeds and Plant Varieties Act which protects plant varieties.[343]

It is clear that R&D outcomes that satisfy the requirements of protection in Kenya are protectable within the frameworks of its legal system made up of both local and international legal instruments.[344]

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[337] Ibid.
[338] World Intellectual Property Organisation (hereafter WIPO) Contracting Parties- Paris Convention, available at *http://www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=2*, accessed on 10 December 2014.
[339] WIPO Contracting parties-PCT, available at *http://www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=6*, accessed 10 December 2014.
[340] Harare Protocol on Patents and Industrial Designs within the Framework of the African Regional Intellectual Property Organization (ARIPO) of 1982, available at *http://www.kipi.go.ke/images/docs/harare_agreement.pdf*, accessed on 10 December 2014.
[341] WIPO contracting parties-TRIPS Agreement, available at *http://www.wipo.int/wipolex/en/other_treaties/parties.jsp?treaty_id=231&group_id=22*, accessed on 10 December 2014.
[342] Industrial Property Act 3 of 2001.
[343] Seed and Plant Varieties Act 1 of 1972. Kenya is a member of the International Union for the Protection of New Varieties of Plants (UPOV). See UPOV 'Kenya acceded to UPOV' *UPOV Press Release No 37*, 13 April 1999, available at *http://www.upov.int/news/en/pressroom/37.html*, accessed on 10 December 2014.

It is assumed that these protection measures are effective to an extent that allows universities and public institutions protect publicly financed R&D outcomes.

4.6.2 Ownership of IP

The second policy question is concerned with ownership of IP from outcomes of R&D in publicly funded institutions. Ownership is vested in recipients of public funding in the US by virtue of the BDA and in SA through its IPR-PFRD Act. As already discussed in chapters two and three respectively, these laws set out obligations and conditions for how the institutions are to manage the IP.

Despite the lack of such specific legislative measures, it is indeed possible for countries to determine how universities and research institutions manage IP though other legal avenues which are discussed below.[345]

4.6.2.1 Patent laws regulations

IP laws often provide conditions for the disposition of patent rights between the individual inventor, the employing institution and a designated assignee of the rights which can either be the employing institution or a third party.[346]

In Kenya, section 32 of the Industrial Property Act provides for ownership of inventions made in execution of commission, or by an employee. In the absence of contractual obligations, inventions made in such circumstances shall belong to the commissioner of the work or to the employer provided that where the invention is of exceptional importance, the employee shall have a right to equitable remuneration taking into consideration his salary and the benefit the employer derives from that invention.[347] That section applies to governmental and other organisation.[348]

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[344] Article 2(6) Constitution of Kenya, 2010. Under that Article, any treaty or convention that Kenya ratifies forms part of the laws of Kenya.
[345] Graff op cit (n188) 171.
[346] Ibid.
[347] Section 32(1) Industrial Property Act 3 of 2001.
[348] Section 32(6) Industrial Property Act 3 of 2001.

4.6.2.2 Employment laws and regulations

Such laws may make provisions on the privileges, rights and responsibilities of employees including the disposition of rights to inventions made during the course of employment.[349] Kenya's Employment Act[350] is silent on employer/employee rights to inventions.

4.6.2.3 Laws concerning funded or contracted research

Government funds or contracts often are accompanied by conditions and requirements for the recipients of those funds or for the parties to such contracts and this includes instances where it's for research.[351]

Government funding to public institutions in Kenya may be described as negligible. This position was reached by Bailey *et al* in a study carried out in Kenya and the University of Nairobi.[352] From their findings, government's contribution to research funds in the university is small. Public universities finance some research activities from funds that they generate through Module II (private-fee paying) academic program.[353] It was their finding that by far, the largest portion of research funding to the university is from external donors.[354]

Despite the degree of funding, Kenya's government nonetheless funds public universities and research institutions. The US and SA through the BDA and the IPR-PFRD Act respectively have laid down specific conditions concerning government funded and or contracted research. In Kenya, it is not very clear what specific conditions are attached other than the obligation placed upon recipients of public funds. Such recipients are normally called upon to make proper use of public funds for the benefit of the people.[355]

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[349] Graff op cit (n188) 171.
[350] Employment Act 11 of 2007.
[351] Graff op cit (n188) 171.
[352] See T Bailey *et al Universities and Economic Development in Africa Case study: Kenya and University of Nairobi* (2013).
[353] Bailey *et al* op cit (n352) 41.
[354] Ibid.
[355] See Article 201 Constitution of Kenya, 2010. Article 201(e) provides that public money is to be used in a prudent and responsible way.

4.6.2.4 Laws and regulations of the national R&D system

Many countries are taking specific steps to develop national innovation or R&D systems supported by an integrated set of policies covering the creation of new research institutions, increased research funding, management of human resources, and the provision of grants and subsidies.[356]These policies might include tax incentives for industry R&D and institutions, along with funds to support venture investments and entrepreneurship.[357] Part of this integrated set of policies, may contain rules for the provenance of IP created within the national system.[358]

Kenya has indeed taken specific steps to develop such an integrated set of policies, through the already highlighted STI policy of 2009 and the STI Act. The STI Act while increasing the amount of money spent on R&D[359] has no provision on ownership of IP generated from the research fund.[360] However, donations made to the research fund are to be zero-rated where the income is derived from Kenya.[361] That may be seen as an example of a tax incentive in support of research funding.

4.6.2.5 Question of ownership when there are no domestic policies

In the absence of laws specifically enabling or restricting ownership of IP, universities and public research institutions are free to establish their own policies and practices.[362] This is the position in many countries, including Kenya. Graff presents two sides of such a position: on one hand, the lack of a specific national policy on IP ownership often indicates a lack of coordination or transparency while on the other hand, such openness can allow research institutions greater IP management flexibility.[363]

Kenya's public universities and research institutions are neither prohibited nor mandated to take ownership of R&D publicly funded outcomes. They are left to adapt institutional policies and capacities to assert ownership as long as it is within the confines of basic legal requirements of national IP law.[364]

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[356] Graff op cit (n188) 171.
[357] Graff op cit (n188) 172.
[358] Ibid.
[359] See section 4.4 which highlights how the STI Act provides for the establishment of the NRF.
[360] Section 32(1) STI Act 28 of 2013.
[361] Section 32(3) STI Act 28 of 2013.
[362] Graff op cit (n188) 172.
[363] Ibid.
[364] Graff op cit (n188) 179.

In institutions that receive negligible funding for research from the state, one may argue that an openness that allows greater IP management flexibility is more suitable. But despite the small amount of funding, there is funding nonetheless, meaning that government is spending some resources to finance public universities and institutions and might exert some measure of control or the very least exercise some checks to ensure that ultimately the larger public benefits from research emanating from public institutions. Bearing in mind that under the STI Act, more resources for research purposes are to be set aside, government might want to see the fruits of this investment.

In August 2014, it was reported that Kenya required approximately $ one billion[365] to establish a national research system that will see it meet its social-economic and industrial needs,[366] alluding that Kenya was still looking into setting up the funds for R&D. To date, it is not evidently clear whether the Kenyan government has honoured the provisions of the STI Act.

Some public universities and research institutes in Kenya have adopted individual IP policies. For instance, the University of Nairobi, Kenyatta University, Moi University, Jomo Kenyatta University of Agriculture and Technology as well as the Kenya Medical Research Institute (KEMRI) have IP policies in place. KEMRI prides itself in its international recognition and participation in clinical research for example, in AIDS vaccine development and conducting clinical trials for the International AIDS Vaccine Initiative (IAVI).[367] The sources of funding for KEMRI have been broken down as follows; 50 per cent from the Kenyan government, 45 per cent from collaborating research partners and about 5 per cent from internally generated funds.[368] These universities are said to be in the process of establishing technology/science parks so as to promote commercialisation of their research outcomes. There are deliberate efforts to enhance linkages with industry.[369]

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[365] Kenya Shillings (Kshs) 100 billion is approximately $ 1 billion upon conversion at an exchange rate of $1 equals Kshs 91.34.
[366] G Andae 'Kenya needs Shs 100 billion for research' *Business Daily*, 27 August 2014, available at *http://www.businessdailyafrica.com/Kenya-needs-Sh100-billion-for-research/-/539546/2432756/-/mswstjz/-/index.html*, accessed on 6 February 2015.
[367] K Simiyu *et al* 'Turning Science into health solutions: KEMRI'S challenges as Kenya's health product pathfinder' (2010) 10 *BMC International Health and Human Rights* 1 at 3.
[368] Ibid.
[369] JO Odek 'The Illusion of the TRIPS Agreement to promote creativity and innovation in developing countries: Case study on Kenya' in G Ghidini *et al* (ed) *TRIPS and Developing Countries: Towards a New IP world order* (2014) 286.

Although, Kenya still has a long road ahead, the initiatives outlined above are positive indications of its commitment towards innovation in some of Kenya's leading research entities.

4.6.3 IP management capacities

The third fundamental policy question concerns the provision for IP management and technology commercialisation. In order to own intellectual assets, public institutions need more than rights because it not enough to merely provide for the protection of private property while infrastructure and expertise remains inadequate. The development of infrastructure and expertise is necessary for institutions to manage intellectual assets and engage in productive commercial partnerships with private companies and other investors.[370]

Institutional developments take time to develop regardless of the economic capacity of a country. For instance, it took the US, a high income state, a decade or more for institutional development to spread through its universities.[371]These same US universities built and developed infrastructure and expertise on their own. However, in some countries policies have been pursued in the form of providing subsidies to universities to set up TTOs such as Denmark, while in other countries like Chile, national networks or central offices have been established to coordinate and assist universities in developing their TTO functions.[372] In SA, NIPMO was established and tasked with providing assistance to institutions in the establishment of TTOs.[373]

4.7 Kenya's reality check

It takes time for institutional policies to take shape and it takes time plus commitment to dedicate resources, establish offices and deploy staff. However, as universities concern themselves with the development or adaptation of formal policies, rules and regulations, they should be mindful of the fact that the informal norms and practices within the academic culture are equally essential.

Once policies and capacity are established at the institutional level, it can take up to ten years to develop and mature an effective IP management program self-sustained by the academic community.[374] The creation of offices or units for IP management, technology transfer, or

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[370] Graff op cit (n188) 172.
[371] Ibid.
[372] Ibid.
[373] Section 6(3) IPR-PFRD Act 51 of 2008.
[374] Graff op cit (n188) 172.

commercialisation, the volume of patents, licensing deals, or spinouts coming from the public sector is often a reflection of capacity development.[375]

The above are realities that Kenya needs to be mindful of in this area of IP protection.

4.8 Conclusion

This chapter has underscored the role of STI in Kenya's national development strategy. STI is said to facilitate the creation of knowledge and its application is vital to a knowledge-based economy. Such an economy is able to reflect *inter alia* growth, global competitiveness, creation of job opportunities, poverty eradication and improvement of the quality of life.

The vision is in place in Kenya, the policies are in place and some are presumably in the pipeline. As Graff rightly puts it, policies and the protection of private rights are not enough. Capacity development in terms of infrastructure and expertise is crucial for a developing country such as Kenya. Once Kenya is able to effectively leverage STI, its vision will be achievable.

[375] Ibid.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS FOR KENYA

5.1 Summary of the research questions

This chapter summarises the research questions in this dissertation which have been addressed in the previous chapters. It then concludes by setting out the recommendations for Kenya which answers the primary question for this dissertation, that is, whether Kenya ought to have a BDA model for itself?

The first and second research questions focussed on the US. As explored in chapter two, the BDA went through a long legislative journey judging from the numerous discussions, debates and policies that preceded its enactment. Several years later, the BDA is still the subject of discussion not just in the US but globally as well. Worth noting, is the fact that there is no consensus on the impact the BDA had in the US, especially because, there is evidence from both its supporters and critics making it challenging for an outsider to pick either side.

The third and fourth questions turned to SA, the first African country to emulate the BDA. Through the IPR-PFRD, SA has regulated the results of publicly-financed R&D. The IPR-PFRD Act came into operation in SA only in 2010 and there is not a lot on record compared to the US. However, despite the limited information, the IPR-PFRD Act has not escaped criticism especially because some negative impacts have been experienced at some leading universities such as UCT, Wits and Stellenbosch. All three universities have reported loss of funding from external funders due to complexities of complying with the provisions of the IPR-PFRD Act. Despite, the negative impact, there is also evidence of implementation of its provisions by NIPMO in a cautious manner in a bid to ensure that the spirit and letter of the IPR-PFRD Act are achieved for the benefit of the people of SA.

The fifth and sixth questions explored Kenya which like many other African countries often emulates SA because of its perceived better practices. Kenya has a development blue print dubbed vision 2030 which identifies STI as central in any modern economy. Kenya's vision 2030 proposes intensified application of STI which led to the formulation of an STI policy in 2009. The generation and management of IPRs is included in the STI policy. Aside that, in 2013, Kenya enacted the STI Act which set out 2 per cent of the county's GDP for R&D. Thus, taking

all this facts into consideration, it is anticipated that a BDA model for Kenya might soon be considered.

5.2 Concluding remarks and recommendation

The global market today involves trade in diverse products and services. Such diversity has been fuelled by the creativity and inventiveness of mankind. This is because the products embody *inter alia* high technology, creativity and distinctive marks.[376] In a nut shell, there is a rush among countries to grow a knowledge-based economy. Such an economy has been recognised, albeit arguably as the most favourable way of competing in a global economy.

In a knowledge-based economy, IP has been accorded a significant and strategic role. The role of IP, particularly its protection, management and commercialisation in publicly funded institutions has been emphasised by the governments of developed countries and presently by developing countries. Universities and research institutions have been identified as key players in supporting the growth and development of a knowledge-based economy.

Systems of innovation in an economy were likened to an ecosystem whereby IP is said to be one of the tools. Undeniably IP is one of the necessary tools needed to access and use knowledge, meet the innovation and technological needs of a country as well as drive and stimulate development and economic growth. Thus protection of IP especially in publicly-financed institutions has to be looked at in the context of the other tools. For a country like Kenya, it has to be looked at in the context of *inter alia,* the existing legal IP regime, research capacity and the norms of universities and research institutions, human capital, the amount of funding channelled to these public institutions and the industries that are to absorb the R&D outcomes.

This research has attempted to explore the US' BDA and SA's IPR-PFRD as they apply to their respective countries. The disparate literature that exists regarding the impact of those laws makes it difficult to take a standpoint on their desirability or otherwise.

Looking at the legislative journey of the BDA in the US, despite the current standoff, illustrates how the US had come to a point where some circles, especially Congress at that time, had expressed the need for legislation that regulates publicly financed research. The BDA was

[376] Odek op cit (n369) 239.

primarily intended to help the country in maximising returns of the heavy investments that the government was making in the institutions. It has been pointed out that universities in the US were already involved in patenting and commercialisation activities but not to the extent desired by Congress.

At that time, there was no clear position on the ownership of IP at federally funded institutions and this was purported to limit them in licensing their outcomes. That period was characterised by two policy options, 'title in the contractor' or 'title in the government' and either could be adopted by the government. This lack of consistency by the government in determining who held clear titles to the research innovations was confusing to say the least, and discouraged the private sector in commercialisation. The BDA thus clarified the issue of ownership and this is one of the impacts of the BDA that is acknowledged by the conflicting schools of thought in their views on the effects of the BDA.

SA on the other hand has had limited experience with its IPR-PRFD Act due to the short period of time it has been in force. The background of the IPR-PFRD Act is the policy documents, and innovation plan from the DST. The documents published years back highlighted the need for SA to develop a knowledge-based economy through innovation, and the need to protect the IPRs emanating from its publicly-financed institutions. The IPR-PFRD Act has received its fair share of criticisms. Some of those views have been speculative and others have been based on what has been experienced so far by recipients of public funding involved in significant research in SA. Some of the criticisms are *inter alia* its inconsistencies with other laws, financial burdens placed upon the TTOs, bureaucracies introduced, loss of funding from industry funders and the huge financial burdens in implementing it.

In seeking to emulate these two countries, Kenya is reminded of Berkowitz *et al* position that for a law to be effective, its demand must exist so that such law will be applicable. Kenya needs to look at the demands that exist in the country as far as regulation of publicly financed R&D is concerned. The demands will come from universities and public institutions that are obviously the beneficiaries of public funding. In formulating laws to govern them, legislators have to bear in mind that various players have to work in concert that is, the state and the recipients of the funds. In addition, all actors involved in the process have to constantly keep in mind that the ultimate beneficiary is the people of Kenya.

It is for Kenya to learn the invaluable lessons from the experience of the US and SA, to avoid the consequences of unfavourable legal and policy environments, as well to avoid repeated cycles of blunders that continue to plague developing countries that fail to take charge of their own development destiny especially when it comes to the protection of IPRs.

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