

The Role of Research and Development in Industry and Commerce

Precious Sibiya

Abstract— “And when the queen of Sheba had seen all the wisdom of Solomon, the house that he had built, the food on his table, the seating of his servants, the service of his waiters and their apparel, his cupbearers, his entryway by which he went up to the house of the Lord, there was no more spirit in her.” (1 Kings 10:4-5) King Solomon was a great artist and creator. He wrote more than one thousand songs and three thousand proverbs. Works of the mind require meticulous research guided by a Godly passion. Let us faint not, but invest in researching.



1 INTRODUCTION

THE world technologies are fast transforming as we sleep by night. What is it that these emerging industrial nations are doing to up their market standards and quality of life? The secret is sound and effective research which leads to development. This paper seeks to provoke the minds of the readers regardless of which sector of the industry and commerce they belong, to think and act differently towards their undertaking. Every sector of the industry requires some spice of innovation which results from continuous research. What is it that the Japanese did to come up with brands like YAMAHA, TOYOTA, FIJISTISU, et cetera. It is possible to have strategies of Research and Development which are supported by sound Intellectual Property Protection Policies and Government funded.

Africa entered this millennium with renewed commitment to banish poverty, increase economic productivity, improve political and economic governance, achieve sustainable development and integrate itself into the global knowledge economy. This can only be achieved through if enough resources are allocated to Research and Development. The key to economic growth is research and development. When we lock up our doors and leave our offices or industries behind, do we completely shut out? Or do we allow our inner conscience to continue brainstorming about some aspect of work that could be improved? Do we make time to reflect on our professions and speculate on how best we can be better or perform above normal. Ladies and gentlemen, I want us all to pause our breaths for a while and try to imagine what our lives would be like without the works created by others – inventions – the chairs that we sitting on, the designer labels that we love to wear, the medication we took this morning. Does it ever cross our minds that were it not for some sleepless nights endured by famous inventors; we would still be under the cloud of uncivilisation.

2 WHAT IS RESEARCH AND DEVELOPMENT?

The process of research and development is recurring. From the writer's experience, R & D is the process of continuous study in a chosen field or area of work. Let me illustrate it by way of an example. Mr Sikai is a shoe

manufacturer at Siyaso Industry. The shoes that he designs and manufacturers have a ready market – primary school children. For Mr Sikai's business to keep ahead of the market, he has got to think continuously about how best he **can improve the design of his shoes** in order to maintain his client base. This is easy because when he sells shoes, after how long do his clients come back to purchase new pairs of shoes? As eluded to before, Mr Sikai has a **semi-permanent client** base. He can **converse with them** and **inquire on the problems** the children have with the shoes when worn to school. He can also ask them to suggest **other aspects** that they may wish to be factored into the design to make the **shoes more durable**. Once Mr. Sikai has established the problems and possible to the same, he may now begin playing around with his skills to come with a school shoe that does not wear out quickly in the rain, or a shoe that does not bend in line with shape of the feet. All the consultations that I have indicated to be taken by Mr. Sikai is what one would term research. When such research is conducted successfully, then we can say its development because we have moved from one phase to another.

-
- Author is currently pursuing a Masters Degree in Intellectual Property with WIPO/ARIPO and Africa University, Zimbabwe PH:+263712424333
Email:pureeshasibiya@hotmail.com

Though some may call it overtime work, but Mr Sikai would really come up with brilliant ideas when seated and relaxing at home over a glass of guava juice. One can dream big whilst in the middle of doing something unimportant. Way back in 1762 the Earl of Sandwich- John Montagu invented the sandwich whilst in the middle of a game of cards. He enjoyed his game so much that he could not go home and asked his butler to bring slices of meat which he placed between slices of bread. The principle of the sandwich became instantly fashionable and continues to be a popular snack around the world. (See Learn From the Past, Create the Future: Inventions and Patents page 57)

3 THE ROLE OF INDUSTRY AND COMMERCE.

3.1 INTRODUCTION

Nations' economic change and sustainable development are to a large measure accounted for by investments in science, technology and innovation. It is not the mere accumulation of physical capital and natural endowment that transform economies and stimulate human development but the ability of countries to produce, harness and wisely use scientific knowledge and related technological innovations. The economic history of the industrialized and Newly Industrializing Countries (NICs) vividly shows that economic improvement in these countries has been a result of the application of knowledge in productive activities. (Lall, S. (2000)) Indeed there is an explicit correlation between a country's scientific and technological capabilities and its economic performance and affluence.

3.2 ENVIRONMENTAL PROBLEMS – ROLE OF RESEARCH

The 21st century has come with numerous problems and complications such as environmental, health, energy and food. We are witnessing emerging technologies that continue to do us more harm than good. The accidents involving fast speed trains and coaches are disheartening due to the fatalities they cause. Surely more research needs to be done to reduce the number of injuries as a result of such accidents of such efficient technologies. The environment has suffered massive degradation. The WWF reports that Africa is currently one of the most vulnerable regions in the world to climate change. The reiterate that this vulnerability and the limitations of poor countries to adapt to climate change challenges were highlighted in Climate Change 2001, the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The report established how human activity (burning fossil fuels and changes in land-use) is modifying the global climate, with temperature rises projected for the next 100 years that could affect human welfare and

the environment. The historical climate record for Africa shows warming of approximately 0.7°C over most of the continent during the twentieth century; a decrease in rainfall over large portions of the Sahel (the semi-arid region south of the Sahara); and an increase in rainfall in east central Africa. Over the next century, this warming trends, and changes in precipitation patterns, are expected to continue and be accompanied by a rise in sea level and increased frequency of extreme weather events.

WWF's mission is to stop the degradation of the planet's natural environment

and to build a future in which humans can live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable resources is sustainable
- promoting the reduction of pollution and wasteful consumption

The climatic trends that we have recently witnessed in Australia, Brazil and South Africa herald the need to start researching more on how best we can foresee or manage such disasters with little loss of human and animal life. If Research is not doubled on the causes, effects and management of natural disasters, we may probably brace ourselves for more deaths due to this. What are our governments doing to ensure sanity in this field. More of our students should be encouraged to study Environmental sciences and develop interests in this. A recent headline in the Chronicle of 19 January 2010 says "MET office warns of Floods". For an ordinary Zimbabwean citizen the headline is just like any other headline. But for a researcher in Environmental Science surely this should send him straight to the computer laboratory to assess the probable damages, the likelihood of such floods ever visiting of land.

Climate change is the most precious component of our lives that needs not be ignored or taken lightly. The WWF Report on climate change also adds that it affects human life and animal life. WWF reports that Biodiversity is an important resource for African people. Uses are consumptive (food, fibre, fuel, shelter, medicine, wildlife trade) and no consumptive (ecosystem services and the economically important tourism industry). Given the heavy dependence on natural resources in Africa, many communities are vulnerable to the biodiversity loss that could result from climate change. The impact of climate change on humans will also be compounded by climate change-induced alterations of agriculture, water supply and disease. Hence the urgent need to increase resources for Research and Development Institutes in this field.

In order to solve inevitable problems such as environmental, it is urgent for countries around the world to make concerted efforts toward the further development of science and technology. Hence the need for sound policies on Research and Development to enable the scientific processes to be carried out effectively.

3.3 RESEARCH AND DEVELOPMENT AND ENHANCEMENT OF QUALITY OF LIFE

As a result of Research and Development, there are so many inventions. There are inventions that make our lives easier like television, umbrellas, mobile phones, automobiles/cars etc ; inventions that increase our knowledge of the world like the microscope, satellite stations, wireless technology etc ; inventions that entertain us like the television, the computer/games, the walkman/walkie-talkies it is commonly known, the ipad, power stations etc ; inventions that save lives like the fire extinguishers, the life saving jacket, the respirator for asthma patients, the blood pressure machine etc. The writer acknowledges the marketing strategy of most electronic firms, the likes of LG. Ever heard the catch "Life's Good". Indeed Research and Development enhances the standard and quality of life of the consumer. It is most probable that many households in Zimbabwe are budgeting for the ultra thin LCD television this brand new year. With enhanced products and processes; life becomes all the more easier and manageable and good. Research and Development which led to the invention of the mobile phones has definitely changed our way of doing things and status in life. One can call an ambulance or breakdown truck in the middle of nowhere, something that could have been impossible decades ago. We can now use our cell phones to transfer money, communicate out of office, which is a plus for commercial dealers because all business is transacted over the phone. Definitely one doesn't necessarily need an office to be doing business in this day and age.

3.4 RESEARCH AND DEVELOPMENT BOOSTS CONSUMER CONFIDENCE

Research and Development boosts the confidence of the consumer, the last end user of the product or process. If you have been following up my presentation, you will agree that Gillette has definitely been working almost every two to three years, they have a new product resembling excellence and resilient skills of their researchers who are by the way busy in the laboratory as we dialogue. The desire of Gillette is to come with shavers that are close to natural, that leave no trace of shaving at all. And they do this by carrying out continuous research on the

beard of the, the hairs to articulate how their clients can remain clean-shaven with no cuts, grazes, bumps or pimples. Religious users of Gillette products wantonly have confidence in the brand.

Brands like Maybelline, Black Opal and Revlon are common with women that really care for their beauty and hence boost their outward confidence. Continuous research has enabled these big names in the beauty industry to emerge with various products which enhance the look and feel of the facial skin, making women look younger and radiant.

3.5 RESEARCH AND DEVELOPMENT AND OUR HEALTH

The discovery of penicillin in 1928 triggered a systematic search for other terrestrial micro-organisms that could be used in new anti-biotics, leading to the discovery of such drugs as streptomycin, neomycin, chlorophenocol, and chlortetracycline. For a long interval research in the health field mainly concentrated on terrestrial plants and micro-organisms. This probably owed to the ease in obtaining specimen. According to the author of Salty Secrets: New Drugs from the Sea, recent pharmaceutical research is now focusing on the sea. Gravalos says that there are several phases in marine product research: specimen collection; establishing taxonomy; extracting possible active molecules; using screening techniques to evaluate therapeutic activity; and using organic synthesis to ensure supply. This research is progressive but much more effective if the government has solid and sound Intellectual property protection infrastructure. We as Zimbabweans and the whole world over, will benefit from the research as we are experiencing numerous health problems related to cancer, particularly the prostate cancer. I want to challenge our scientists and traditional medicines experts to continue to conduct thorough research on the cure for cancer which has taken its toll on our health map. Did our ancestral parents suffer from these diseases? If so what methods of healing did they resort to. We surely do have some of our grannies who are rich in indigenous knowledge. Their precious knowledge can be utilised to conduct research on traditional knowledge. Who knows where such research can take us?

Medical research has also given birth to Needle Aid, Many of us or our beloved relatives suffer from diabetes. Some are visually impaired or elderly. One Mr. Thomas Ink pen set out to help a beloved friend and elderly man ease the pain of insulin injections, but soon the Nova Scotia inventor's act of kindness was helping thousands across the country with similar afflictions. Needle Aid is a spring-loaded device that rests on the skin and helps to steady the needle and allows the user to inject at the correct angle and depth. The result was a reduced risk of

injecting at the wrong angle or injecting improperly. For the elderly or visually impaired this meant increased independence from their illness.

3.6 RESEARCH AND DEVELOPMENT IN VARIOUS CONTEXTS

Research and Development aids us as human beings to understand ourselves better and hence get the solutions particularly to our health problems, easily and guided. Today the results of Research and Development conducted by universities and other organisations are applied to industry in a number of ways. The Institute of Physical and Chemical Research of Japan is, as the name suggests a laboratory for the study of physics and chemistry. It was established in 1917, with a vision to promote Japanese scientific research. Dr. Kikunae Ikeda, a chemist who discovered monosodium glutamate, a flavour element that was later commercialised belonged to this famous Institute. Such opportunities enable our budding scientists to experiment and deliberate on certain discoveries which could make our lives better and improve our health and wellbeing. Currently, much study has been embarked by the world scientists to find the cure to HIV/AIDS. Another drug for malaria, coartemether, has been introduced to deal with the disease as it changes form due to natural circumstances. Research and Development and subsequent facilities which are well equipped and stocked enable us to get, sometimes quick, at times long solutions to problems that affect our day to day living.

Economic growth depends on the existence of reliable institutions within which human beings think, interact and carry on business. The key to economic growth is R & D. The purpose of R & D is to create knowledge and commercialize its outcomes in markets as new products or new production processes.

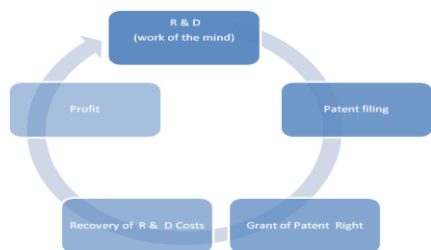
It is these new products that encourage and boost investor confidence, hence the fast growth of the economy. Investors are always attracted by new products or processes on the market. Product development is thus a potential source of competitive advantage for many companies. (Brown and Eisenhardt 1995). Hence product development is an essential process for success, survival and renewal of the firm. So without Research and Development, there can be no product upgrade, thus no economic effect will be felt.

Research and Development makes learning make sense. We have in our industries manpower that is involved in manufacturing of products. We also have those think tanks who advise on the quality of the product and methodology of processing it to its last form. Zimbabwe has produced some of the best brains in the world but lost

them due to brain drain. We can retain the upcoming researchers in our colleges by directly linking what they done or are doing in school, to industry. Most universities and R&D institutions in developing countries are now entering a stage where they will be expected to interact more with industry as well as governmental and nongovernmental organizations, in terms of consultancy, research contracts and commercialization of inventions, innovations and research findings. Collaboration between universities and industry or other bodies is not a new phenomenon. What perhaps will be new is the increased reliance of universities and R&D institutions on industry as a source of income. Industry and other public institutions will increasingly see such collaboration as a source of new technologies as well as expert support for their tasks of product, process and policy development. (WIPO Guidelines on developing an IP Policy for Universities and R&D Institutions)

International intellectual property law has an increasingly important significance for international trade and relations. From the music industry to the drug industry, intellectual property is a lucrative market, and both individuals and corporations have a lot to lose from the infringement of intellectual property rights. For example, music is a \$40 billion worldwide industry. According to the Recording Industry Association of American (RIAA), the music industry loses approximately \$4.2 billion each year to worldwide piracy. Governments need to look at the entertainment industry with a much sensitive approach, as this group of creators suffers the greatest infringement of their property without any compensation. The Anti-Piracy Association of Zimbabwe is reported to have recently destroyed some 60,000 pirated copies of music, confiscated from the infringers. But this in itself is an interim measure, and not deterrent. Government should adopt stringent legislation against piracy as currently only a fine of 200 us dollars is payable for copyright infringement. The very artists who entertain us die paupers while we buy pirated copies of their music. We are all killing the entertainment industry slowly. Artists need to be rewarded for the works of their own minds and imaginations that keep us going when the chores of the day are done and we require some rest.

The Concept of the Cycle of Intellectual Creation



The Cycle of Intellectual Creation Explained:

Those who work meticulously engage in research eventually come up with new products or processes. Some findings work, others do not. These findings are what we call intellectual property. During research resources are utilised or exhausted. Resources can be financial, human, time etc. They are invested during research, thus costs are incurred. The researcher then proceeds to apply for a patent which will serve to protect his/her intellectual creation. The Patent office grants the right after all the criteria has been satisfied. When the researcher is granted a patent right, then they can start recovering costs incurred during the research process. The costs will be covered and the remaining cash flow will be the profit which can then be utilised to conduct new Research and Development. This cycle indeed builds a society that is enthusiastic and anxious for innovative solutions.

Intellectual property refers to creations of the mind: inventions, literary, and artistic works and symbols that, names and images used in commerce. Take for instance, when graphic designer hands over a logo to a client, they are handing over what may well become that client's single biggest asset. Imagine some of the world's most recognised brands - the dollar value placed on those brands, and Coca-Cola at US\$36 billion (Financial World magazine, 1994) comes immediately to mind, adds substantially to the overall worth of the company which owns that brand.

Intellectual property is divided into two categories, that is Industrial Property - which includes patents for inventions, trademarks, industrial designs and geographical indications, and Copyright- which includes literary works such as novels, poems, and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonograms and those of broadcasters in their radio and television programs.

Intellectual property rights are like any other form of property-they allow the creator or owner of a patent ,trademark or copyright to benefit from his or her own

work or investment .Such rights are enshrined under Article 27 of the Universal Declaration of Human Rights, which sets forth the right to benefit from protection of moral and material interests resulting from authorship of any scientific ,literary or artistic production.

There is need to protect intellectual property for several reasons. To begin with, the progress and wellbeing of humanity rests on its capacity for new creations in the areas of technology and culture. Secondly, the legal protection of these new inventions encourages expenditure of additional resources, which leads to further innovation. Thirdly, the promotion and protection of intellectual property spurs economic growth, creates new job and industries, and enhances the quality and enjoyment of life. Intellectual property protection helps to balance the between the interests of the innovator and the public interest, to create an enabling environment in which creativity and innovation can exist for the benefit of all.

The link between Research and Development and Intellectual Property is indispensable. Without the reward which the patent system provides, researchers and inventors would have little incentive to continue producing better and more efficient products for consumers the whole world over.

Research and Development becomes more effective in an environment that protects Intellectual Property Rights adequately .The knowledge based economies of this age require creativity and innovation. For innovation and creativity to have an economic (and societal), its ownership must be clearly established and the IP system is designed to do that. This is a strategy that China has taken, and evidently its economy has steadily soared tremendously. With years of development, China has been gradually improving its system of laws and regulations on intellectual property and constantly strengthening the enforcement level. Meanwhile, the intellectual property quantity has increased rapidly and their performance has constantly improved.

Market entities have also made steady progress in improvement of their capacity to utilize intellectual property. China has expanded international exchanges in the field of intellectual property and increased its influence in international intellectual property affairs. The establishment and implementation of the intellectual property system have helped standardize China's market order, stimulated inventions and cultural creations, promoted China's opening up and importation of knowledge resources, and played an important role in China's economic and social development.

However, China's intellectual property regime still needs improvement. The quality and quantity of the self-relied

intellectual property still cannot meet the demands of economic and social development; the public awareness of the importance of intellectual property is comparatively weak; the capacity of market entities to utilize intellectual property is not very strong; infringement of intellectual property is still a relatively serious problem; there are still some cases of abuse of intellectual property; the intellectual property service and support system and training for all types of intellectual property personnel lag behind its development; and the role of intellectual property in promoting economic and social development needs to be strengthened.

3.7 RESEARCH AND DEVELOPMENT AND INDIGENOUS KNOWLEDGE

The United Nations (UN) on the Rights of Indigenous Peoples, adopted by the UN General Assembly in September 2007, refers in its Article 31(1) to the rights of indigenous peoples to 'maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions' Declaration.

Traditional Knowledge is an unpopular branch of Intellectual property which requires legal protection that is effective. Traditional medicines came as a result of ancient research by our ancestors' decades ago. However cunning foreign scientists have stolen this know-how and come up with famous and expensive drugs beyond the reach of many. It is said that in Brussels alone there have been 285 patents for medicinal plants well known in Indian medical systems, principally ayurveda, unani and siddha, the investigation revealed. Ayurveda is a traditional medical treatment. Unani is believed to have come to India from ancient Greece, whilst siddha is one of the oldest medical systems originating from the southern India. In this regard, Gupta is requesting that the Belgian government lift these patents, as they have already shown the authorities the medicinal uses of these systems were known in India.

The same article reports that the Indian government has thus effectively licensed 200,000 local treatments as 'public property', making the local remedies free for everyone to use, but not to be branded for sale. This initiative follows the startling discovery by scientists in Delhi of the extent of "bio-prospecting" of natural remedies by foreign companies. The UK's Guardian newspaper reports that an investigation of government records revealed that 5,000 patents had been issued, at a cost of at least US\$ 150 million for "medical plants and traditional systems." More than 2,000 of these belong to the Indian systems of medicine," claims Vinod Kumar Gupta, head of the Traditional Knowledge Digital Library. The discovery raised the question of why multinational companies are

spending millions of dollars to patent treatments that they claimed were ineffective, Gupta said.

It is said that Indian researchers have spent the last decade meticulously translating ancient Indian texts and compiling the information into a database that details the 200,000 treatments. The resulting Traditional Knowledge Digital Library will now be used by the European Patent Office to check against 'bio-prospectors' — parties interested in mining biological or genetic resources for scientific research or commercial development. Historically India, has fought lengthy and costly legal battles to have patents revoked. Officials say that, in a legal battle that lasted almost 10 years, the Indian government spent in excess of US\$ 5 million to have patents lifted from medicines created from turmeric and neem, an Indian tree. In this case, India succeeded "because [it] proved these were part of traditional Indian knowledge. There was no innovation and therefore no patent should be granted," Gupta said.

"Legislation, such as the Convention on Biological Diversity and the General Agreement on Tariffs and Trade, also seek to impose international norms on developing countries to promote trade in bio-technologies and human knowledge. The exact form of the national legislation to be adopted to secure these international obligations is the subject of heated debate between those representing the interests of transnational corporations, national governments and local communities. At the same time, some environmentalists have been promoting the commercialisation of forest products and indigenous pharmacopoeias, as ways of saving forests and making them vulnerable.

After centuries of disparagement, indigenous peoples suddenly find their traditional knowledge coveted by outsiders and they are demanding that mechanisms be established to effectively protect their rights. The problem is, how? Western legal regimes have a poor record of accommodating indigenous rights, and in the past many laws adopted to protect indigenous people's interests have done more."

5 THE ROLE OF GOVERNMENT IN RESEARCH AND DEVELOPMENT

5.1 INTRODUCTION

Nations' economic change and sustainable development are to a large measure accounted for by investments in science, technology and innovation. It is not the mere accumulation of physical capital and natural endowment that transform economies and stimulate human development but the ability of countries to produce, harness and wisely use scientific knowledge and related technological innovations. The economic history of the industrialized and Newly Industrializing Countries (NICs) vividly shows that economic improvement in these countries has

been a result of the application of knowledge in productive activities. Government has a very critical role to play in the development of its policies across the board. A sound Research and Development Policy is critical. It is however coupled with a strong Intellectual Protection Policy to build a confident pool of researchers and inventors. These aspects are discussed below in detail.

5.2 FORMULATION OF AN INTELLECTUAL PROPERTY POLICY

It is trite that laws and regulations concerning Intellectual Property Rights need to be improved. Special intellectual property laws, such as the Patent Law, Trademark Law and Copyright Law, and related regulations need to be promptly revised. Legislation concerning genetic resources, traditional knowledge, folklores and geographical indications should be formulated as needed. The uniformity and coordination of intellectual property legislation need to be strengthened to improve the practicability of laws and regulations. Intellectual property-related provisions contained in laws and regulations concerning unfair competition, foreign trade, science and technology and national defence need to be improved. All these measures require the drive or direction of government through a sound IP strategy.

An IP Strategy is a set of measures formulated and implemented by a government to encourage and facilitate effective creation, development and management of intellectual property. It outlines how to develop infrastructures and capacities to support inventors of IP to protect, develop and exploit their inventions. An IP Strategy may also be defined as a comprehensive national document which outlines how all the policy developments and implementation take place in a coordinated manner within a national framework. Once government fulfils this role this will definitely boost the morale of research work and increase in the number of patents registered at the IP office. It is progressive to note that government of Zimbabwe has established an Inter-Ministerial Committee on Intellectual Property last year. This Committee is now embarking on the formulation of an Intellectual Property Policy to protect adequately the property rights of inventors and researchers. The IP strategy has to be incorporated into any overall development strategy and related to existing policies for economic, scientific and cultural development. This includes ensuring that existing partners are aware of strategy and, if appropriate, incorporated into the strategy. This work provides a head start for the strategy and should avoid work that would otherwise be necessary to assess and plan the capabilities, management, and role of the national IP Office in the delivery of rights, the making of IP policy, and the extent to which the national IP office provides advice and assis-

tance to business.

5.3 EMPOWER UNIVERSITY RESEARCH

Government should empower universities' research for commercialisation universities breed large pools of highly qualified personnel. Government must ensure or put in place adequate policies to empower such groups of professionals. Universities have two important roles :

a). Carrying out scientific research and development and analysis

b). They are the main and most efficient means of providing high level training and education in the sciences and new technologies.

Intellectual Property rights derived from university research provide the framework ,the incentives and benefits ,and the reliability and consistency necessary to attract the enthusiastic involvement of other sectors of society ,thus establishing the platform upon which global partnerships van be created ,enhanced and exploited for maximum results and advantage . Leveraging these Intellectual property rights has really produced some extremely encouraging results.

5.4 FORMULATION OF INTELLECTUAL PROPERTY CURRICULA

Intellectual property education should be introduced in our school curricula to harness innovation and instil a culture of creativity in our young generations. The education system is entrusted with producing adults who will assume the leadership of the nation and its business and look after its well being for the future generations. Creativity and innovation-related activities are increasingly part of the coursework in Intellectual property conscious nations.

It always happens that children have brilliant ideas and seemingly childish imaginations, but it is a fact that they too can be inventors. Alexander G. Bell once said "Always listen to children, they might have ideas we have never thought of." For instance ,in an interesting case of a patent registered by a child ,Jeanie Low always had to use a plastic step in order to reach the bathroom sink when she was very young. The tool often frustrated her as it would at times slip and send her falling or break when her father mistakenly stepped on it .This dilemma prompted Jeanie to create a sturdier with wooden stools ,screws ,hinges and magnets purchased from a hardware shop . The stool could actually fold away and unfold to allow Jeannie to work and still have room after folding it away when she finished using it .The local inventors association in her neighbourhood encouraged her to hire a lawyer and apply for a patent to protect her new tool .So it was in 1992 that Jeannie was granted US No. 5,094,515

patent for her 'Folding Step for Cabinet Doors' at the age of 11. This story supports the assertion that children can and are capable of inventing new things if given the necessary encouragement and support.

Government can stimulate creativity in young people by putting in place incentives and the opportunities to let their minds wonder. There are some international science and invention competitions held annually, for young people. At local level, we may begin by establishing Inventors Clubs in our primary, secondary and high schools. There must be set time for children to venture in creative works of their choice and properly trained teachers in the field of Intellectual property. The same inventors' clubs should engage in cooperation, school by school in each given province, district or ward. There may be need to launch an annual competition on the best invention and the best school should get an attractive price and if possible have the invention registered at the Intellectual Property Office in the school's name.

A good example of a country that took such initiative measures mentioned above is Singapore. The Intellectual Property Office of Singapore (IPOS) created 'Iperckidz' on intellectual property and outreach program for schools, designed to be both informative and fun. This program offers a 'Detective IP' CD ROM and website as well as in school shows. The Director General of IPOS captured the essence of the program at its launch by noting that creativity and innovation are inherent in children and they had the potential to be inventors, creators and owners of intellectual property in the future.

5.5 INCREASE THE NUMBER OF RESEARCH AND DEVELOPMENT INSTITUTES AND EMPOWER EXISTING ONES

As reiterated above, most research work has commonly been conducted in the Universities of many countries worldwide. This is because young and old scientists pool together in the laboratories to carry out their experiments and research. Government is however encouraged to empower the existing research institutes and establish new ones to ensure maximum research work for the growth of the nation's economy in all spheres.

Currently we have, inter alia, the Research Council of Zimbabwe, The Biotechnology Trust of Zimbabwe and Scientific and Industrial Research Development Centre commonly known as SIRDC. These research institutions are doing quite well in spite of the economic downturn experienced in 2008. The Biotechnology Trust managed to introduce successful bio fuel initiatives which have made life much easier especially for the women mostly because they cook and do all household and other chores.

It is reported that although global fuel production tripled between 2000 and 2007, rising from 4.8 billion gallons to some 16.0 billion in 2007, it still only accounts for less

than 3 percent of the global transportation fuel supply. It is progressive that our own researchers have also established the value of use of a cheap renewable fuel from the jatropha plant. Through the land reform programme which has benefited a bulk of Zimbabwean Nationals, new farmers have been encouraged to grow this favourable plant which we hope to utilise in replacing the current fuel which is causing air pollution and environmental degradation, particularly the ozone layer, thereby increasing global warming. However Government must ensure that jatropha to be grown at massive scales to secure the required fuel content. A large plant was indeed commissioned to start fuel production from jatropha, an applauded government strategy.

5.5.1 ADVANTAGES OF USING JATROPHA

- ✓ The higher energy content of this bio-fuel mix means less fuel is needed per flight and its lower specific gravity offers advantages over many standard jet fuels. It is an excellent "drop in" replacement for standard jet fuel, avoiding the need to make expensive modifications to the existing fleet.
- ✓ Unlike biofuel crops such as soya beans and corn, jatropha seeds need little water or fertilizer, they can be grown in harsh, non-fertile environments, making jatropha a drought resistant and pest resistant plant.
- ✓ Each seed produces 30 to 40 percent of its mass in oil and therefore has a higher yield per acre than many other plant oils. It is estimated that one hectare of jatropha (2.47 acres) produces approximately 600 gallons of oil.
- ✓ Plant based fuels like jatropha are said to be carbon neutral as any CO₂ emitted during production and use is offset by the plants' absorption during growth.

Government increase funding of all the research that is undertaken in these institutions to enable it to benefit for the betterment of the economy and the well being of the nation as a whole. The position on ownership of the work when it is eventually registered needs to be clarified. To this end, the US government enacted the Bayh-Dole Act in 1981. This enactment created a uniform patent policy among the many federal agencies that fund research, enabling small businesses and non-profit organisations, including universities, to retain legal title to inventions made under federally funded research programs.¹ This

was a great stride from the previous position. The most sensible move our government can take is to allow universities and research institutes to commercialize their research findings. There is therefore need now to establish Technology Licensing Offices to work and assist universities.

The government of Cameroon came up with an Investment Charter in 2002. This, among other things, set out to establish the following bodies to achieve its set objectives in the Charter:

- An Industrial Partnership Council;
- An Entrepreneurship Institute;
- A Trade and Industry Observatory;
- A Standardization and Quality Board; and
- An Intellectual Property Centre. This centre is aimed at resolving the

Shortcomings of the national office of Intellectual Property based at the Ministry in Charge of Mines, Industry and Technological Development.

6 WHAT INSPIRED THE JAPANESE?

The vitality of Japanese industry has been and will continue to be supported by its advanced capabilities in technological development. Now that Japan has ended its catch-up type growth, it is called on to create new technologies and industries to contribute to the betterment of the world, and intellectual property is indispensable to this end. The first patent law of Japan was enacted in 1885. Since then, patents have attracted attention in Japan as it imported technology from western economies. The very first invention in Japan was the 'Hotta - Style Anti - Corrosive Paint and Painting Method' which was filed in 1885, soon after the enactment of the Patent Law. This marked the beginning of new historical patents that emerged from the talented Japanese nation. Mr Sakichi Toyoda, founder of the Toyota group including the Toyota Loom Works devoted his life to research and invention and played an important role in the modernisation and industrialisation of Japan. He passed on his legacy to his son, who laid the basis for the present Toyota group. It is said that Sakichi would always be inspired when he visited western countries. He was said to be alarmed by the rate of automobiles on their streets. Hence he continued to conduct research and creativity to come up with what is still the world's most famous brand in the car industry - TOYOTA.

The growing intellectual curiosity of the Japanese also led the invention of personal computers made by SONY, previously named Tokyo Tsushin Kogyo. It changed its name to SONY as part of a global expansion strategy. Sony has rolled out many remarkable products including the world's first small transistor radio, the walkman. To-

day SONY still acquires patents based on continuous market demand and research to meet the demand gap.

Japan will not go unnoticed for inventing the world's first instant noodles. Mr Momofuku Ando of Nissin Food Products embarked on a quest to create a ramen noodle which could be eaten anywhere with just a bowl and chopsticks. One can be sure that market research was conducted, with results that prompted this innovative creation. To date we boast of 5 minute noodles when time is not within our reach and the body needs to be energised. Currently Japan, which never slumbers when it comes to inventions and other creative works is juggling with reforms to best adopt the emerging global trends in Intellectual Property.

The following are major issues of "S&T System Reform", which have been addressed in varying degrees and in various ways in all three Basic Plans launched so far:

- Securing the long-term supply of highly qualified scientists and engineers as well as research support staff.
- Strengthening the independence of young researchers.
- Enabling female and foreign researchers to make a research career in Japan.
- Increasing the mobility of scientists.
- Upgrading research facilities at national universities and government research institutes as well as developing the research infrastructure in terms of databases, bio-resources, etc.
- Creating a sufficient number of world-leading universities in Japan.
- Promoting each university to develop its own unique character in education and research according to its potential.
- Creating a more competitive R&D environment for universities and research institutes.
- Facilitating and strengthening exchange and cooperation between different sectors (industry, universities, government research institutes, etc.)
- Increasing the utilization by private industry of the outcome of publically funded R&D.
- Creation of R&D-type ventures based on technological seeds from public research.
- Promotion of R&D in the private sector.
- Developing appropriate policies and human and organizational capabilities for management of intellectual property at universities and research institutes.

Japan has also introduced the 'JAPAN BRAND' strategy in conjunction with the country's Intellectual Property Strategic Program, designed to promote its lifestyle and culture worldwide.

Japan continues to engage in research, which has led to the creation of small products without jeopardising their

performance. Nanotechnology is now recognized worldwide as one of the key issues in science and technology in the 21st century. For sustainable economic development and comfortable and safe life of the people, the Japanese government is committed to strong support for science and technology research. In March, 2001, the Second Science and Technology Basic Plan (2001-2005) was decided by the Council for Science and Technology Policy (CSTP), whose chairperson is the Prime Minister (Government of Japan, 2001). The Basic Plan assigns strategic priority in R&D to basic research and 4 prioritized areas in funding: life sciences, information and telecommunications, environmental sciences, and nanotechnology & materials science/technology. In nanotechnology & materials science, CSTP exemplified 5 fields: nano-devices & materials for next-generation communication systems Recording Industry Association of America, Press Room, Marketing Data, (information technology), materials for the environment & energy-saving (environment), nano-biology for new medical care technologies & biomaterials (biotechnology), underlying technologies such as fabrication and analysis/simulation technologies (generic technology), and novel materials with innovative functions (materials) (CSTP, 2001). Following this plan, the government funding for R&D on nanotechnology & materials science was increased from \$731 million (\$1 = ¥110) in FY 2001 to \$778 million in FY 2002 (CSTP, 2003) and reached \$855 million in FY 2004 (CSTP, 2004).

7 WAY FORWARD AND CONCLUSION

Government must prioritise effective policies that promote and protect research. A culture of creativity should be imbedded in our society. We need to look back into the past and see what inspired the ancient and biblical inventors and artists like Solomon.

If we never make mistakes, then we can never make anything. Today's famous Post It Notes were invented out of a failed experiment by one Dr. Spencer in 1968. He sought to create strong glue but instead created weak glue. One day he got so tired of his bookmarks falling off his hymnbook. He decided to use his weak glue to keep the bookmarks in place and it worked. It is said this was the start of a process that developed sticky notes we know as Post It notes.

REFERENCES

1. WIPO Magazine Geneva February 2009- No. 1W.-K. Chen, Linear Networks and Systems. Belmont, Calif.: Wadsworth, pp. 123-135, 1993. (Book style)
2. Dolores Garcia Gravalos has been cited as co-inventor on the US patent for Kahalalide F1,

acomound derived from a sea algae ,which was in phase 2 clinical trials for the detection of prostrate cancer K. Elissa, "An Overview of Decision Theory," unpublished. (Unpublished manuscript)

3. Lall, S. (2000) 'Technological Change and Industrialization in the Asian Newly Industrializing Economies: Achievements and Challenges.' In L. Kim and R. Nelson, eds., Technology, Learning, and Innovation, Experiences of Newly Industrializing Economies. New York: Cambridge University Press.
4. WWF " Impact on Climate Change" Paul V Desanker ,PhD,Center for African Development Solutions ,S.A. page 1
5. Strategic Promotion of Nano- Technology in R & D in Japan : Masahiro Masemura,National Institute for material sciences in Japan
6. The HolyBible King James Version
7. Vinnova Analysis VA 2009;13Priority Setting in Japanese Research and Policy page 52
8. <http://www.riaa.com/news/marketingdata/default.asp> (last visited Oct. 27, 2006)