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OCCUPATIONAL STRUCTURE

Biotechnology - Agro Based and ICT Industry

Menjana Pembangunan K-Pekerja

Menjana Pembangunan K-Pekerja

(Occupational Structure for Biotechnology – Agro Based and ICT Industry)

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LIST OF ANNEXURES

ANNEXURES

EXECUTIVE BRIEF

Biotechnology is said to be the technology of the 21st century that will drive economic and social development. Biotechnology provides powerful tools for the sustainable development of agriculture, fisheries, forestry, food industry as well as health care and industrial biotechnology. Realizing the importance of biotechnology in the near future, Malaysia has to capitalize her resources to be one of the global players in biotechnology.

Apart from being endowed with vast biological resources - potential providers of new genes and processes for biotechnology, Malaysia has in place a good policy on Biotechnology, infrastructure, substantial human capital as well as financial means to develop Biotechnology sector as the next engine of economic growth of the country.

The quality and skills of human resource is vital to the success of biotechnology industry. Recognizing the importance of skilled human resource, The Department of Skills Development, Ministry of Human Resource, Malaysia conducts an Occupational Analysis on the Agro-Biotechnology & ICT to evaluate the requirement of skilled manpower in this sector.

In conducting the Occupational Analysis on the Agro-Biotechnology & ICT, information on Malaysian biotechnology industry was gathered through literature search, interviews with the industry players from the public and private sectors. Visits to the biotechnology companies and related public departments were made. A workshop was held in an attempt to get better understanding on the organizational structure, job titles, hierarchy objectives and primary activities of the said organization.

The study from the Occupational Analysis on the Agro-Biotechnology & ICT revealed that biotechnology sector in Malaysia was categorically divided into four (4) major subsectors mainly agriculture, healthcare, industrial biotechnology and bioinformatics.

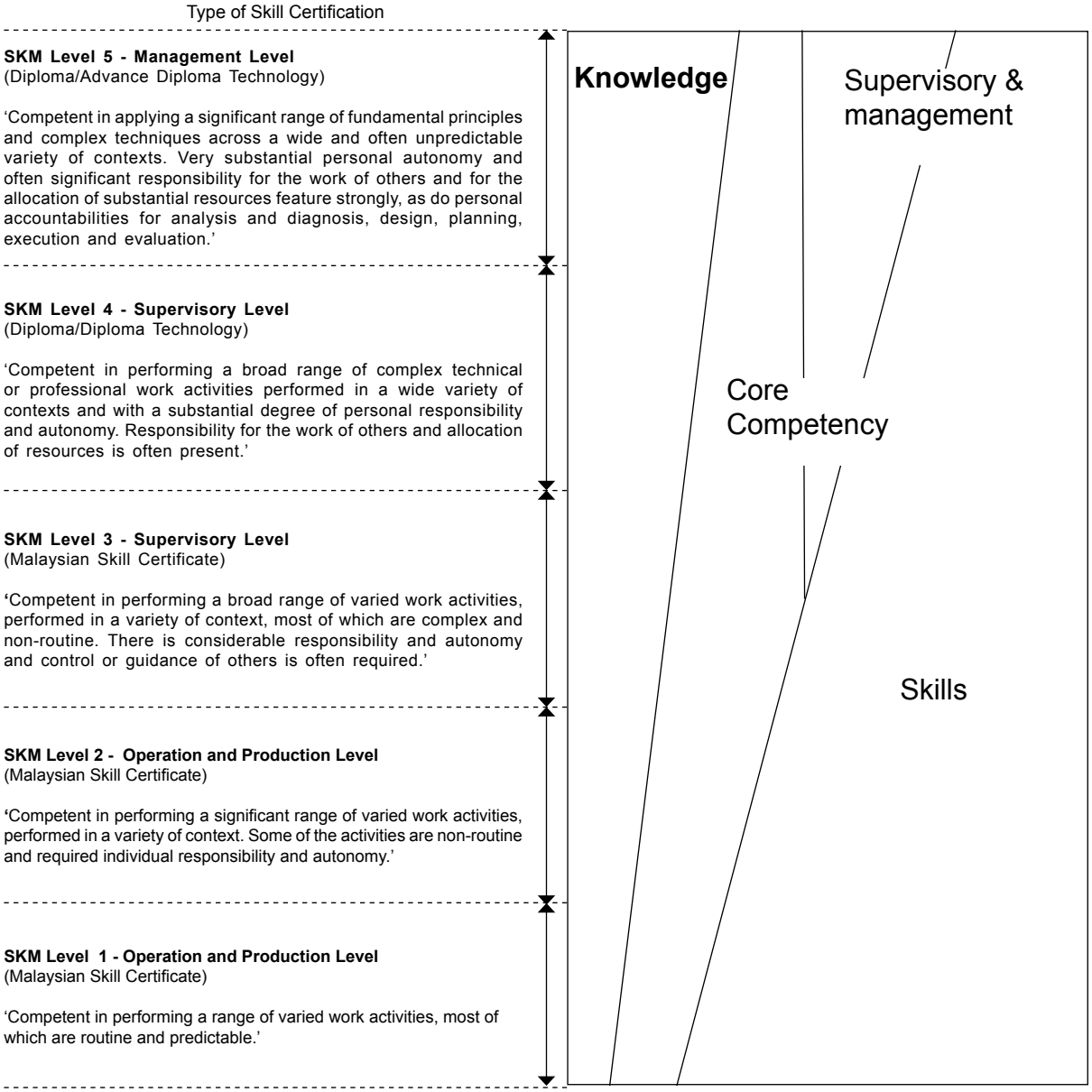
The agriculture biotechnology sector itself has four major areas that dominate the local biotechnology industry namely Plant Biotechnology, Animal Biotechnology, Aquaculture Biotechnology and Agro-based Food Biotechnology.

In term of Job Title and Hierarchy, the study shows that for each major area identified, there are three (3) major groups of occupation namely Research, Bioinformatics and Production. Each of the four (4) major group of occupation is stratified into five (5) levels of hierarchy except in the Bioinformatics which has 3 levels of hierarchy. A total of 58 job titles was identified. Out of this, 34 job titles were considered critical and 24 job titles were no critical. The critical job titles were found at the Level 1, 2 and 3 at research and production area of the four subsectors.

1. CONCEPT AND STRUCTURE OF MALAYSIAN SKILL CERTIFICATION SYSTEM

1. National Occupational Skill Standard (NOSS)

Definition: A NOSS is defined as a specification of the competencies expected of a skill worker who is gainfully employed in Malaysia for an occupational area and level.



2. BIOTECHNOLOGY IN MALAYSIA – BACKGROUND OF THE SECTOR

Introduction

Biotechnology is said to be the technology of the 21st century that will drive economic and social development. It has been shown to contribute significantly to advances in science and technology as well as to the health, pharmaceutical, agriculture and bio-related industries. Life styles in the current and futures decades will be increasingly shaped by advances in biotechnology, in the areas of health, environment, manufacturing and agriculture sectors.

Biotechnology provides powerful tools for the sustainable development of agriculture, fisheries, forestry, food industry as well as health care and industrial biotechnology. Biotechnology, when appropriately integrated with other technologies for the production of food, agricultural products and services, it can be of significant assistance in meeting the needs of an expanding and increasingly urbanized population in the next millennium.

Malaysian is endowed with vast biological resources. Its soil, forest and ocean are hosts to diverse arrays of microbes and plants that are potential providers of new genes and processes for biotechnology. Realizing the importance of biotechnology in the near future, Malaysia has to capitalize her resources to be one of the global players in biotechnology.

This paper attempts to highlight the definition, policies and plan, the current development status and focus area of biotechnology, human resource development as well as the scope of agro-biotechnology & ICT.

Definition of Biotechnology

There is a wide array of “biotechnologies” with different techniques and applications. The Convention on Biological Diversity (CBD) defines biotechnology as: *“any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use”*.

In the broader sense, the definition of biotechnology covers many of the tools and techniques that are common place in agriculture and food production. Interpreted in a narrow sense, which considers only the new DNA techniques,

molecular biology and reproductive technological applications, the definition covers a range of different technologies such as gene manipulation and gene transfer, DNA typing and cloning of plants and animals.

In the National Biotechnology Policy, biotechnology is described as an enabling tool for advances in agriculture, healthcare and industry providing for immense benefits to the nation, particularly in building skills, value-added employment and improving the quality of a wide range of products and services.

Biotechnology can be defined in at least two ways. It can mean any technique which uses living organisms to make or modify products, improve plant or animal productivity or to develop microorganisms for specific use. The definition encompasses new biological tools.

A second and narrower definition refers to new 'high-end' biotechnology, involving recombinant deoxyribonucleic acid (DNA), cell fusion and novel bio-process engineering techniques such as gene transfer and embryo manipulation.

CURRENT ANALYSIS OF THE SECTOR/SUBSECTOR

Biotechnology in Malaysia

Malaysia is blessed with a wealth of resources that lend themselves to the development of biotechnology. We are renowned for our rich biodiversity, excellent infrastructure, political stability, good regulatory policies and cost-competitive skilled labor and abundance of competitively priced raw materials in agriculture.

Malaysia aims to become a global hub for biomedical sciences and agricultural sectors. It is widely expected that Malaysia will become a global biotechnology hub for agriculture, pharmaceuticals, natural production, genomics, proteomics, bio-fermentation and environmental biotechnology by 2015. Strong government financial support, presence of multinationals, free trade agreements, world class infrastructure and good regulatory policies are the strengths of the upcoming Malaysian biotechnology sectors. Malaysian is one of the most attractive locations for global biotechnology investment.

The biotechnology industry has been identified as one of the key drivers of growth in transforming Malaysia into a knowledge-based economy, and the Government is fully committed to its development.

Policies and Development Plan to Promote Biotechnology

National Biotechnology Policy

Malaysia declared her intention to become a serious player in biotechnology at the launch of the National Biotechnology Policy (NBP) in April 2005. Launched by the Prime Minister of Malaysia, the new NBP is expected to give impetus to developing the biotechnology sector into a new economic engine to enhance prosperity and wellness of the nation by 2020.

Briefly, the highly comprehensive National Biotechnology Policy has been formulated to address vital aspects of biotechnology development in priority areas such as agriculture, healthcare industries and bioinformatics for further development. The main thrusts of the National Biotechnology Policy are as follows:

- Thrust One is to add value to the agriculture sector.
- Thrust Two is to capitalise on Malaysia's biodiversity to commercialise discoveries in natural products and bio-generics.
- Thrust Three is to leverage on the country's strong manufacturing sector.
- Thrust Four is to establish biotechnology centres of excellence around the country.
- Thrust Five is to build up a pool of skilled workers in biotechnology.
- Thrust Six is to give enough incentives and financial backing to encourage private sector and academia to get involved.
- Thrust Seven will be to improve the country's legal and regulatory framework. This will enable researchers to enjoy financial rewards from R&D biotechnology.
- Thrust Eight is the strategic positioning by establishing a global marketing strategy to build brand recognition for Malaysian Biotech and benchmark progress as well as establishing Malaysia as a center for contract research and manufacturing organizations.
- Thrust Nine is the government commitment to establish a dedicated agency to oversee the development of biotechnology industry.

NBP also addressed issues of intellectual property rights, bio-safety and financial infrastructure. To be completed over 15 years in three stages, the policy will initially see the establishment of advisory and implementation councils, biotechnology education and training of knowledge workers for research and manufacturing concerns, business development and industry creation.

The implementation of NBP encompasses three main phases. Phase 1 (2005-2010) deals on the issues of capacity building such as establishing advisory & implementation councils, developing legal and Intellectual Rights framework and educating and training of knowledge workers, building Malaysian brand and creating initial jobs and industries in agriculture health care, industrial biotech and bio-informatics.

The Malaysian Biotechnology Corporation (MBC) was created as a one-stop agency to spearhead the development of the sector, including coordination of regulatory policy among different agencies. There is no doubt that the creation of the Malaysian Biotechnology Corporation as a lead agency to guide biotechnology development in Malaysia has been a good catalyst for the growth of the nascent industry.

The Phase 2 (2011-2015) is the 'Science to Business' phase involves developing expertise in the discovery and the development of new drugs based *on natural resources*. During this phase, investment promotion and spin-off companies are intensified, strengthen branding, develop capability in technology licensing and creates knowledge intensive job. To achieve this objective, Malaysia has already set up a network of centers of excellence called Bionexus in research universities and research institutes in various parts of the country.

The Phase 3 is the global presence of the Malaysian biotechnology. During this phase, strengths and capabilities in technology development be consolidated, further expertise and strengths in product discovery and development, strengthens innovation and technology licensing and promotes global Malaysian companies.

It is anticipated that by 2020, NBP is able to achieve its objective to create wealth and social well being by creating 280,000 employments, 100 companies related to biotechnology and contributes 5% of GDP with compounded annual growth of 23.7%.

Biotechnology and the Ninth Malaysia Plan

The National Biotechnology Policy was re-emphasized in the Ninth Malaysian Plan (9MP) (2006-2010) launched on March 13, 2006. Under the Ninth Malaysia Plan, biotechnology will be promoted even further, not only as a vehicle of wealth and job creation, but also to be applied in various sectors of the economy.

It is well known that the biotechnology is not only the most heavily regulated industry in the world but it also has to meet the most stringent requirements for success and public acceptance. As such, there is a strong need for companies practicing biotechnology to emphasize on nurturing quality at every stage of the development in addition to enhancing its value using knowledge-intensive protocols developed from carefully conducted research and development activities.

Towards this end, the strategic thrusts of biotechnology development in the Ninth Malaysia Plan have been formulated to include:

- transforming and enhancing value creation in the agricultural sector through biotechnology;
- capitalizing on the strengths of biodiversity to commercialize discoveries in health-related products and position Malaysia in the growing bio-generics market;
- nurturing growth opportunities in industrial bio-processing and bio-manufacturing;
- leveraging on the convergence of technologies to grow the nascent bioinformatics industry;
- promoting Bio-nexus as a unique brand to attract foreign and domestic investments in biotechnology;
- creating an enabling environment with supportive institutional, regulatory and financial framework to facilitate the build up of a strong and diversified biotechnology industry;
- enhancing human capital development to meet national needs; and
- establishing R&D centers of excellence and accelerating technology development, diffusion and commercialization.

Similar to the National Biotechnology Policy, the Ninth Malaysian Plan also identified four priority areas for concerted effort and investment, namely, agriculture biotechnology, healthcare biotechnology, industrial biotechnology and bioinformatics.

Third National Agricultural Policy

Under the Third National Agricultural Policy (NAP3), biotechnology products have been identified as one of the new sources of growth to emerge in agriculture sector. NAP 3 outlines important elements for agriculture transformation by utilization of high technologies including biotechnology.

The Third Industrial Malaysia Plan (IMP3)

Malaysia's industrial strength has developed significantly under its Industrial Master Plans with the help of foreign investments and technology transfers. In a number of industries such as semiconductors, there has been a conscious migration towards value added products and higher margin activities over time. The country hopes to exploit this biotechnology innovation to develop and produce industrial raw products such as biocatalysts such as enzymes for food and feed preparations, cleaning products, textile processing and other industrial processes.

In line with the governments commitment to develop biotechnology, competitive financial incentives, including enhancement of the existing packages are provided to encourage the private sector to venture into biotechnology (IMP3, Chapter 24; pg 675).

Focus Areas of Biotechnology in Malaysia

In general, the biotechnology industry in Malaysia consists of companies specializing in biotechnology, biopharmaceuticals, bioinformatics and agricultural biotechnology that focus on a range of products such as tissue culture, diagnostics kits, vaccine production and blood bank collection.

Companies involved agriculture are primarily plantation, (palm oil) herbal based and aquaculture companies. There are currently 20 companies involved in agriculture biotechnology activities.

The National Biotechnology Policy and the Ninth Malaysian Plan had clearly outlined four priorities or focus areas for concerted effort and investment in Biotechnology sector. These focus areas are namely, agriculture, healthcare, industrial biotechnology and bioinformatics. The Malaysian Biotechnology Corporation further details out areas or activities identified under each focus area such as in the Figure 1.

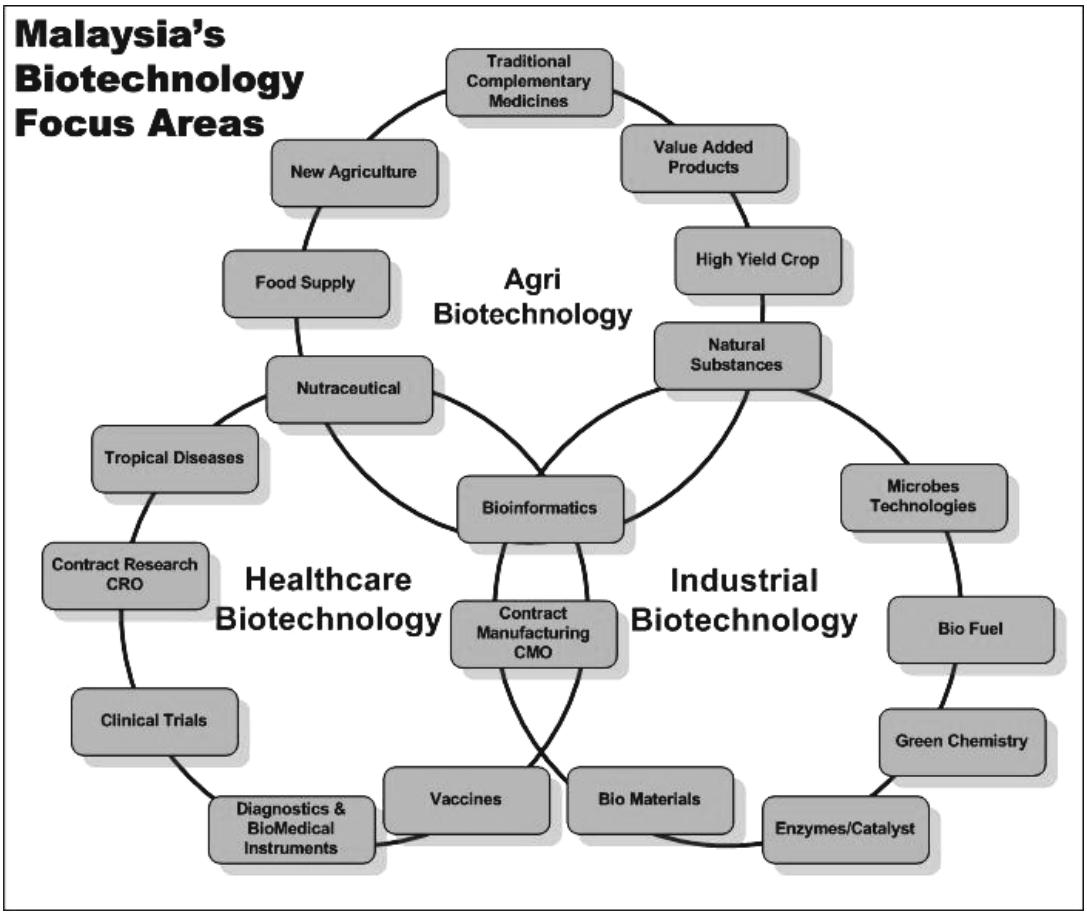


Figure 1: Malaysia's Biotechnology Focus Areas

Since this project on occupational analysis is limited to the scope of Agro-based Biotechnology & ICT, further elaboration will focus on the agriculture biotechnology. Bioinformatics activity is briefly discussed as this discipline is linked and interfaced between the research activities of the respective sector and production.

Agricultural Biotechnology

Malaysia is basically an agriculture-based country. It is not surprising that agricultural and food biotechnology have received greater emphasis. Agricultural biotechnology is envisaged as a potentially powerful tool to ensure food security for the country.

Agricultural biotechnology refers to the applications such as tissue culture, genetic engineering, functional genomics and proteomics that could be utilized to improve not only the productivity of plants and livestock but also to discover niche areas for increased agro-biotechnology products for use in healthcare and industrial biotechnologies.

Agricultural biotechnology has the potential to help increase production and productivity in agriculture, forestry and fisheries. It could lead to higher yields on marginal lands in countries that today cannot grow enough food to feed their people. There are already examples where biotechnology through genetic engineering is helping to reduce the transmission of human and animal diseases through new vaccines. Rice has been genetically engineered to contain pro-vitamin A (beta carotene) and iron, which could improve the health of many low-income communities.

Tissue culture has produced plants that are increasing crop yields by providing farmers with healthier planting material. Tissue culture of several industrial crops (oil palm, rubber, rattan, forest trees) together with food crops (rice, banana, sago, herbs and medicinal plants) and ornamentals (orchids, pitcher plants) have been successfully carried out for sometime.

Marker-assisted selection and DNA fingerprinting allow a faster and much more targeted development of improved genotypes for all living species. They also provide new research methods which can assist in the conservation and characterization of biodiversity. The new techniques will enable scientists to recognize and target quantitative trait loci and thus increase the efficiency of breeding for some traditionally intractable agronomic problems such as drought resistance and improved root systems.

The Agro-Based Biotechnology and ICT Sector

The Agro-based Biotechnology & ICT sector, basically, is an agricultural and its related activities that employ biotechnology in its course. The ICT plays supporting roles to ensure smooth running of a biotechnology operation. The Agro-based Biotechnology can be categorized to include plants, animals (livestocks & aquaculture) and food biotechnology.

Plant Biotechnology

Under the Plant Biotechnology, it could be referred to the applications such as tissue culture, genetic engineering and other crop improvement activities. Tissue culture of several industrial crops (oil palm, rubber, rattan & forest trees) together with food crops (rice, banana, sago, herbs & medicinal plants and ornamentals (orchids and pitcher plants) have been successfully carried out for some times. Several genetically modified crops and plants containing traits of value have been produced at the experimental stage.

Food Biotechnology

Food biotechnology is relatively new in Malaysia. Currently only food ingredients produced by traditional biotechnology like fermentation technology have brought to market products like soy sauce, yogurt, *nata, tempeh, tapai* and *budu*. Food biotechnology has also yielded high quality clarified fruit juices. Biotechnology processes in the production of monosodium glutamate, vinegar, yeast and syrups, are also being employed by the food industry in the private sector.

Animal Biotechnology

In animal biotechnology, several animal recombinant vaccines have been produced to assist the development of animal husbandry. Marker assisted breeding strategies are also being practiced to increase the efficiency of livestock breeding programs. To reduce the costs associated with importing food and feed, research is also underway to generate livestock feed through biotechnology that can substitute for the imported corn currently used for animal feed.

Bioinformatics

The rapid development in biotechnology science and computer technology science has created a demand on a new discipline called Bioinformatics. It combines the skills and knowledge on biology, genetic engineering, mathematics, statistics and computer programming and system to enable one to perform his job as a bioinformatician. At present, Universiti Malaya and Universiti Kebangsaan Malaysia are known to provide bioinformatics course at the degree and diploma level.

Bioinformatics provide tools and ways to record and archive this wide range of experimental data about the products and processes of molecular biology. In addition they provide ways of analyzing biological information, and modeling biological processes, outside of the traditional laboratory setting.

With the presence of Bioinformatics system such as MyREN, biological information can be stored and communicated so that it is accessible to the entire scientific community and readable by both machines and human beings. A significant part of this task is finding ways to link associated findings that come from different researchers, who are using different methods, and reporting different kinds of data.

Approach Employed by Malaysia to Develop Biotechnology Sector

To expedite the Malaysia biotechnology sector, the development of biotech will be spread out using the concept of bionexus network or centres of excellence from existing institutions around the country, known as BioNexus Malaysia.

This bioNexus will represent the best institutions that Malaysia has to offer in specific biotechnology subsectors. For a start, resources will be put into developing three centres of excellence:

- Agricultural technology - Mardi and Universiti Putra Malaysia.
- Genomics and molecular biology - Universiti Kebangsaan Malaysia.
- Pharmaceuticals and nutraceuticals, Biovalley in Dengkil.

The value proposition of the bioNexus network is that it will link and leverage on the facilities, infrastructures and capabilities of these existing universities and research institutes. With this approach, Malaysia hopes to witness the maturing of dedicated biotechnology companies and to establish industries that can spearhead economic growth in bio-business in general.

Privileges accorded to BioNexus status companies include assurances by the Government towards the creation of a conducive environment for biotechnology investment and business, as provided in the Biotechnology Bill of Guarantees; tax incentives and eligibility to apply for commercialization grants managed by BiotechCorp, an implementation agency that leads the development of the biotechnology industry in Malaysia.

CURRENT STATUS OF THE BIOTECHNOLOGY INDUSTRY SECTOR (e.g. no. of industry, industry relation with internal and foreign country, location, future potential of the industry until 2105 and others)

The biotechnology industry has been identified as one of the key drivers of growth in transforming Malaysia into a knowledge-based economy, and the Government is fully committed to its development. To spur the growth and development of the biotechnology industry, the introduction of the designation of BioNexus status to qualifying biotechnology companies, making them eligible for privileges offered by the Government.

As at 31 December 2006, BiotechCorp has awarded BioNexus status to seven companies, including three start-ups. It is currently reviewing applications by almost 100 companies for the BioNexus Status and nurturing other Malaysian biotechnology and life sciences companies to qualify for the status.

The biotechnology R&D activities in the country are categorized into seven sectors. These are namely molecular biology, plant biotechnology, animal biotechnology, medical biotechnology, environmental & industrial biotechnology, biopharmacy and food biotechnology. R&D activities in each sector are carried out via a Biotechnology Cooperative Center (BCC) which is supervised by BiotechCorp.

The majority of biotechnology R&D activities are being carried out in the public sector especially by the local universities and R&D institutions. Under the management of BIOTEK, a National Biotechnology Directorate (BIOTEK) was established in 1996 to promote and coordinate biotechnology R&D activities and private-public sector participation in the national biotechnology program.

In addition, Malaysia's agricultural biotechnology research doubled through a number of world class recognized research institutes to promote higher and better quality of rubber, oil palm and agricultural commodities. Malaysian biotechnology also has the enormous capability to develop products from its vast natural resources including tropical rainforest for use in human and animal healthcare, increased food production, environmental sustainability and monitoring.

Malaysia has not yet produced a biotechnology crop commercially. However, several genetically modified crops containing traits of value have been produced at the experimental stage.

At the Malaysian Agricultural Research and Development Institute (MARDI), rice has been successfully modified to resist the *tungro* virus and papaya manipulated to resist ring-spot virus infection and to have a prolonged shelf life. Other crop plants such as pineapples are manipulated to resist "black heart", bananas and papaya for delayed ripening and chili for virus resistance. Malaysia is also developing genetically engineered oil palm, with a focus on increasing value added products from the palms, such as high oleate and high stearate oil, nutraceuticals (vitamin A and E), bio-diesel and bio-plastics.

In the field of animal biotechnology, several animal recombinant vaccines have been produced to assist the development of animal husbandry. Marker assisted breeding strategies are also being practiced to increase the efficiency of livestock breeding programs.

The food biotechnology, in general, is relatively new in Malaysia. Food and food ingredients produced by traditional biotechnology like fermentation technology have been brought to market products like soy sauce, yogurt and 'tempeh'. Food biotechnology has also produced high quality, clarified fruit juices. Current research focuses on using enzymes to modify palm oil, sago starch and local fruit juices.

Malaysian private biotechnology sector consists of small to medium sized companies with a handful of larger plantation companies developing very strong research and development activities for their own crops. In 2003, it was reported that Malaysia has about 117 biotechnology-related company generated value added products of RM 1.4 billion creating 10,200 jobs. Out of 117 companies, 65.7% were involved in biotechnology related services, 23.9% in manufacturing and 7.7% in agriculture (Malaysia, 2005)

The private sector in the agriculture sector, has focused primarily on plant tissue culture. The annual production of orchids by tissue culture alone has been estimated to be worth RM 50 million, with an export earning of RM 33 million. Other agrobiotechnology products include food and health-related products. Malaysia is also looking into conducting clinical trials for other global companies and this outsourcing activity has great potential to attract foreign investment to the country by 2015.

SKILLED WORKER REQUIREMENT IN THE LOCAL INDUSTRY SECTOR (e.g.: statistics, location, domestic and international market demand, etc.)

Human Resource Development in Biotechnology Sector

The quality and skills of human resource is vital to the success of biotechnology. Under the 9MP, Malaysia is to produce 4000 biotechnology graduates with Bachelors, Master and PHD specializing in molecular biology, plants biotechnology, animal biotechnology, marine technology and bioinformatics. In-service trainings were also provided by the related departments and institutions.

Gap continued to persist between demand and supply skills as the creation of new employment opportunity I the sector still lagged behind. Malaysia still lacks expertise in biotechnology. In 2003, Malaysia had only 23,262 research personnel, and only 15,000 of them were researchers. Of this, fewer than 1000 had an academic background in biotechnology (Rozhan & Daud, 2007). Through 2003, local universities had produced more than 3000 graduates in this field of study, but no all are effectively employed as biotechnologists, since employment opportunities in the biotechnology field are still limited in both public and the private sectors.

Recognizing the existing gap, Department of Skills Development, Ministry of Human Resource, Malaysia initiates to increase the supply of trained workforce in biotechnology and related fields by conducting Occupational Analysis, developing NOSS followed up by training manual to hasten the training development in biotechnology.

Apart from Department of Skills Development, the Malaysian Technology Development Cooperation (MTDC), a Biotechnology Academy has been established. The academy provides training in advanced techniques in molecular biology and biotechnology. Biotechnology companies are invited to use the academy for training and technology transfer activities. The MTDC also provides incentives for startup as well as established biotechnology companies to set up operation in Malaysia especially at their Science Parks or Incubation Centre located at research universities.

INDUSTRIAL COMPETITION AT INTERNATIONAL LEVEL (e.g.: benchmarking, statistics, etc.)

To be a global player in the biotechnology sector, the government of Malaysia recognizes the importance of a conducive regulatory framework to ensure the success of its biotechnology endeavor. Efforts have been intensified to improve the Intellectual Property Rights Policy and management framework in order to foster innovation and safeguard investment in the biotechnology sector.

Along with this effort, the government has passed The Plant Variety Protection Acts, 2004 which intends to protect the plant breeder rights and promote domestic and international trade on superior planting materials in the country.

Apart from Intellectual Property Rights Policy, a Biosafety law is a necessary prerequisite to promote biotechnology development and use in a safe and responsible manner. Malaysia is taking its first steps toward the formulation of a Bio-Safety Law. The proposed bill protects the environment and human health while encouraging biotech development in the country.

This law attempts to regulate all activities involving genetically modified organisms (GMOs) and products made from them. In practice, this means that the bill will eventually cover virtually all biotech research and development and perhaps most food imports, production and processing in Malaysia. All biotech research activities must be notified and development & marketing of biotech products must obtain approval from national Biosafety Board to be set up.

Malaysia currently places no restrictions on the import of biotech food or feed, although it does have pending legislation that would regulate imports and labeling of genetically modified food.

It is anticipated that by 2020, NBP is able to achieve its objective to create wealth and social well being by creating 280,000 employment, 100 companies related to biotechnology and contributes 5% of GDP with compounded annual growth of 23.7%. The Ninth Malaysia Plan envisaged that by 2010, biotechnology and biotechnology related companies would have doubled to 400. Rozhan & Daud (2007) in his paper reported that, in the year 2003, a fewer than 100 companies were involved in producing biotechnology products, even fewer in agrobiotechnology.

Despite efforts on the many R&D activities that have been undertaken in Malaysia, the country has not experienced a significant growth in its biotechnology industry. In benchmarking Malaysia's achievement against global benchmarks such as the number of biotechnology companies founded or the number of biotechnology-related patents issued, Malaysia's achievement is yet to be applaudable. The number of biotechnology companies founded or the number of biotechnology-related patents issued that have been issued to Malaysian inventors all indicate that the considerable investment the country has made in biotechnology has not captured the opportunity to translate the nations biotechnological assets into the growth of the K-economy.

The greatest causes underlying this unfortunate state of affairs are the lack of a critical mass of co-located innovators, lack of state-of-the-art facilities and the lack of a strong entrepreneurial environment and mechanism for commercialization.

3. METHODOLOGY OF OCCUPATIONAL ANALYSIS IN AGROBIO TECHNOLOGY & ICT

In conducting the occupational analysis, several brainstorming sessions were held primarily to strategize the Plan of Action in accordance with guidelines as presented by JPK in term of scope of study, time frame and representation by panel of biotechnology experts from both public and private sector as stipulated in the letter of offer.

After several discussion and brainstorming sessions, a Plan of Action was formulated taking into consideration the activities and timeframe required. The details of the Plan of Action is as in the Annex 1.

As outlined by the guidelines, a literature search on the biotechnology was carried out to get some insight on the scope, policy, program, activities in the context of Malaysian scenerio. The scope covered under this search includes definitions, current analysis of the sector/subsector, current status of the Biotechnology industry sector, skilled workers requirement in the local industry and the industrial competition at international level.

The literature search findings was used as aguide to identify the scope of occupational study and analysis. The process of gathering the information, the Participatory Rapid Appraisal, (PRA) was employed. The tools used was a semi structured interview using prepared checklist as in Annex 2. The interview was done at selected site visit, representing plant, animal, aquaculture and food biotechnology sector. The list of site visit is as in Annex 3.

Besides site visit, more data and information were gathered from the key players of the related biotech sector at the International Biotechnology Conference and Exhibition & Showcase held in Johor Bahru, Johor on 17–20th of August, 2007. The list of experts interviewed are as in Annex 4.

Based on the activities done as above, substantial data and information were collected. The data and information were discussed and analysed in several in-house workshop attended by selected key person or experts from public and industry player. The presence of the key persons or experts were to help in the triangulation exercise of the PRA.

Finally, a workshop was held on 9th of September, 2007 to validate the initial findings. Experts from public and industry players were invited to participate in the panel discussion. List of experts is as in Annex 4. Subsequent to this workshop, a preliminary report was prepared and presented to JPK for comments and suggestions.

4. FINDINGS

Based on the occupational analysis carried out as outlined in the methodology, the findings of this study is as follows:

i. Scope of Biotechnology in Malaysia.

It was found that biotechnology sector in Malaysia was categorically divided into 3 major sectors namely agriculture, healthcare, industrial biotechnology and bioinformatics as priority areas.

In the agriculture biotechnology sector, it has four major areas that dominate the local biotechnology industry. These areas are the Plant Biotechnology, Animal Biotechnology, Aquaculture Biotechnology and Food Biotechnology.

ii. Job Title and Hierarchy

For each area identified, the job titles are categorised into 3 major groups of occupation namely Research, Bioinformatics and Production.

As an example, in the Plant Biotechnology sector, the major job categories are the Plant Biotechnology Research, Plant Biotechnology Bioinformatics and Plant Biotechnology Production. The same job classification applies to Animal Biotechnology, Aquaculture Biotechnology, Food Biotechnology and Bioinformatics.(Figure 2)

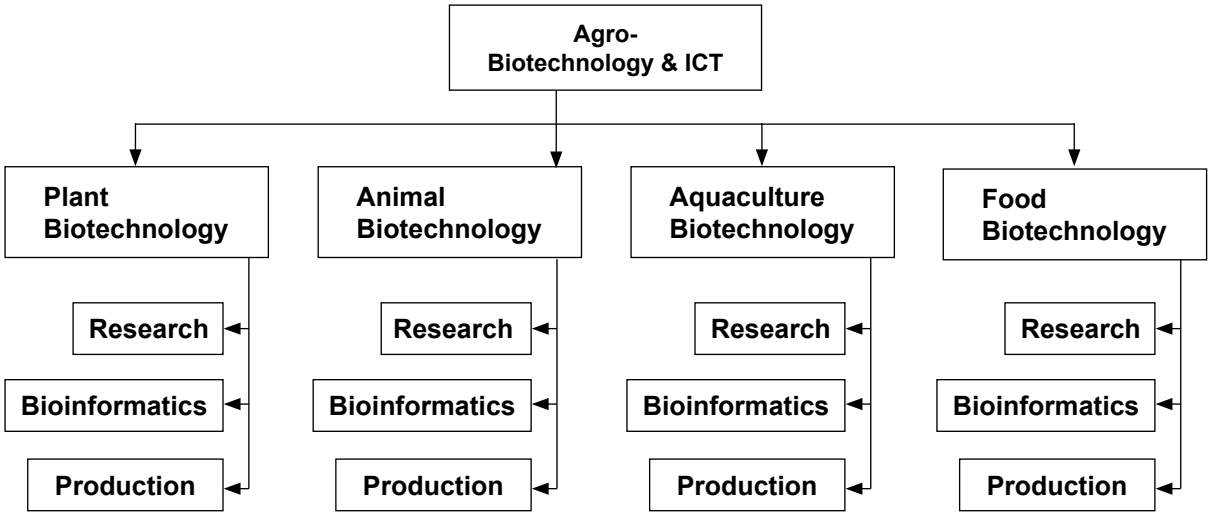


Figure 2: Organization structure of job the classification Agro-Biotechnology & ICT Sector

In term of hierarchy, each of the four (4) major areas is stratified into 5 levels except the Bioinformatics which has 3 levels of hierarchy. Graphically, the hierachy structure of job classification is as in Figure 3.

The details of the Job Title and Hierarchy is in Annex 6.

Plant Agro-Biotechnology

	Research	BioInformatics	Production
Level 5	Senior Plant Biotech Researcher	BioInformatic Manager	Plant Biotech Production Manager
Level 4	Plant Biotech Researcher	Assistant BioInformatic Manager	Plant Biotech Production Manager
Level 3	Assistant Plant Biotech Researcher	BioInformatic Programmer	Plant Biotech Production Supervisor
Level 2	Senior Plant Biotech Lab Technician	None	Senior Plant Biotech Production Technician
Level 1	Plant Biotech Lab Technician	None	Plant Biotech Production Technician

Figure 3: Organization structure of job hierachy for Plant Agro-Biotechnology.

iii. Occupational Definition

Under the Agrobiotechnology sector, 58 job titles are identified and defined. Each of the job title is given a job description as specified. The description for all 4 subsectors under the Agro-Biotechnology sector is as in Annex 7.

iv. Critical Job Title

	SUBSECTOR/LEVEL			LEVEL					**Jumlah (Total)**
			NL	L1	L2	L3	L4	L5	
1	Plant Biotechnology Research	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
2	Plant Biotechnology Bioinformatics	***Critical***		**0**	**0**	**0**	**0**	**0**	**0**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
3	Plant Biotechnology Production	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
4	Animal Biotechnology Research	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
5	Animal Biotechnology Bioinformatics	***Critical***		**0**	**0**	**0**	**0**	**0**	**0**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
6	Animal Biotechnology Production	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
7	Aquaculture Biotechnology Research	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
8	Aquaculture Biotechnology Bioinformatics	***Critical***		**0**	**0**	**0**	**0**	**0**	**0**
		Non-Critical		**0**	**0**	**1**	**1**	**1**	**3**

9	Aquaculture Biotechnology Production	***Critical***		**0**	**0**	**0**	**1**	**1**	**2**
		Non-Critical		**1**	**1**	**1**	**0**	**0**	**3**
10	Food Biotechnology Research	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
11	Food Biotechnology Bioinformatics	***Critical***		**0**	**0**	**1**	**1**	**1**	**3**
		Non-Critical		**0**	**0**	**0**	**0**	**0**	**0**
12	Food Biotechnology Production	***Critical***		**1**	**1**	**1**	**0**	**0**	**3**
		Non-Critical		**0**	**0**	**0**	**1**	**1**	**2**
			Critical						**34**
			Non-Critical						**24**
Jumlah *(Total)*				**8**	**8**	**10**	**12**	**12**	**58**

5. OTHER FINDINGS/RELATED INFORMATION

Based on the information gathered, Malaysian players in the Agro-biotechnology sector could be summarized as follows:

1. There are private companies and government departments actively involved in the biotechnology related activity, especially in plants, animals, aquaculture and food industry.

2. The private companies are ranged from small to big company. The big and medium companies are commonly involved in the research activities as well as the mass production of biotech related products. The small companies are normally involved in the mass production of biotech related products by getting the mother plants or materials from research institution, notably the university.

3. Also noted that some companies had special collaboration with foreign scientists as a means to get both expertise and latest technology in Agro-biotechnology. At the same time, this effort could reduce developmental cost substantially.

4. The organization of the big companies are well structured with job specifications well defined as compared to small companies.

5. It was observed that the local industry is short of training centre in agro-biotechnology, especially for workers at operational and supervisory level. Most industry player tends to train their workers based 'on job training' system.

6. The industry finds difficulty in getting skilled candidate to fill up certain position. As an example, a laboratory technician is recruited fresh from SPM school leaver. Very often, the industry has to conduct their own training both at entry level and on the job training which could take duration of 1 year. More specifically, a tissue culture laboratory technician may attend a one week course on tissue culture protocols but may require another year to equip them with the necessary skills and competency to perform his/her job skillfully.

7. Lack of awareness among the industry players regarding the National Occupational Skill Standard, NOSS in their organization set up may hinder the government's vision to inculcate the human capital development (K-Worker). This is reflected in the private company where the organization set up does not follow the job structure as stipulated by NOSS for the respective level (ie Level 1 to Level 5).

8. Biotechnology and Bioinformatics graduates find difficulty to get employment in the biotechnology industry. On the other hand, the industry was not able to identify and recognize the importance of the Biotechnology and Bioinformatics roles in their organizational structure due to lack of information and mismatch of skilled worker supply.

9. To date the public research institutions had achieved some measure of success in biotechnology such as herbal product processing technology, Advanced Bioreactor technology, pharmaceutical products, bio-organics fertilizer, to mention a few. However, this information has yet to filter down to industrial players to take for commercial venture.

10. Concurrent with global development, Biosafety and Intellectual Property Rights awareness among the agrobiotech players should be introduced and strengthened. The management of respective company should be more pro-active in ensuring new discoveries are patented and safe to consumers.

6. CONCLUSION AND RECOMMENDATION

Malaysia declared her intention to become a serious player in biotechnology by launching the National Biotechnology Policy (NBP) in 2005. Biotechnology industry is expected to generate MYR 270 billion of revenue, create 280,000 new jobs and establish 400 biotechnology-related companies by 2020.

Strengthened by the implementation of the 9th Malaysian Plan, the NBP has identified agriculture, healthcare, industrial biotechnology and bioinformatics as priority areas in biotechnology for further development.

Agrobiotechnology which include plants, animal, aquaculture and food, is an industry with great potential. Endowed with rich biodiversity, strong government support and a substantial human resource, this industry could generate revenue totalling MYR 1.4 billion worth of agro-biotechnology based product yearly.

Despite good policies, incentives and government support to develop local biotechnology sector, Malaysia has not experienced a significant growth in its biotechnology industry as compared with the neighbouring country. Lack of skilled worker is identified as one of the factor affecting the biotechnology industry. Thus, efforts and necessary action need be taken to rectify the situation. Efforts to conduct occupational analysis in biotechnology industry followed by developing national occupational skills standard and training manuals by the Department of Skills Development is timely.

Besides agriculture, healthcare biotechnology should be given due consideration. This priority area is recommended based on its potentials to leverage the country's extensive biodiversity and local knowledge in traditional or complementary medicine to develop new products for use in medicine and cosmetics. Pharmaceutical and nutraceutical industries are areas to be encouraged under the healthcare biotechnology.

Another priority area to be considered is the industrial biotechnology. This sector has a great potential to be developed based on the growing demand on products that are green and eco-evironmentally produced. Industries such

as semiconductors are going toward value added products and higher margin activities. Currently, research are going on to develop biocatalysts such as enzymes for food and feed preparations, cleaning products, textile processing and other industrial processes.

Production of biomaterials such as bioplastics, biofuel, specialty chemicals and ingredients for cosmetics and electronic chemicals will be a new trend in the future. Contract biomanufacturing and other industrial biotechnology application such as to clean up oil spills, degradation of waste and heavy metals in fragile ecosystems are in great demand in the near future.

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ANNEX 1

Checkist of Occupational Analysis on the Agro-Biotechnology & ICT

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1. Core Business syarikat
2. Job Title at the lowest level – number of person at the level
3. Job Title at the highest level – number of person at the level
4. How many levels of Jobs title/post available
5. Organizational chart o company
6. What kind of training given to the personnel or the respective level
7. What is the entry qualification or each level?
8. Nature and scope of ICT
9. Problems/constraints with workforce in the company
10. Future Plan/expansion on the manpower

ANNEX 2

Establishment Visited for Information Gathering

1. Jalor Lipur Sdn. Bhd.
   Kompleks Pertanian Serdang, Selangor

2. Unit Florikultur
   Jabatan Pertanian Serdang, Selangor.

3. Bahagian Teknologi Makanan
   Ibu Pejabat MARDI,
   Serdang, Selangor

4. Sempadan Gemilang Enterprise
   8539, Kampong Bharu, Simpang Kendong
   Alor Gajah, Melaka

5. Johor Plant Tech Sdn. Bhd.
   Jalan Aair Hitam
   Kluang, Johor

6. Ladang Pamol
   IOI Sdn. Bhd.
   Kluang, Johor

7. Bahagian Bioteknologi,
   Universiti Malaya

ANNEX 3

Experts Interviewed at the International Biotechnology Conference and Exhibition, Johor Bahru, 17–20 August 2007

1. Dr. Nolida Adam
   Ar-Raudah Biotech Farm Sdn. Bhd. Ulu Langat, Selangor

2. Mohd. Naziman bin Mohd Yunos
   Nutri Fertilizer, MardiTec

3. Dr. Khairuddin Abdul Rahim
   Agensi Nuklear Malaysia, Bangi, Selangor

4. Dr. Rusli Ibrahim
   Agensi Nuklear Malaysia, Bangi, Selangor

5. Dr. Nallammai Singaran
   TropBio Research Sdn. Bhd. Puchong, Selangor

6. Encik Khoo Chee Kiong
   Bank Pertanian Malaysia, Johor Bahru

7. Cik Faradilla Ghazali
   Ar-Raudah Biotech Farm Sdn. Bhd. Ulu Langat, Selangor

ANNEX 4

LIST OF EXPERTS PRESENT DURING THE WORKSHOP

EN. SAID AL JAFRI BIN OSMAN
MALAYSIAN BIOTECHNOLOGY CORPORATION SDN. BHD.

NAZRI BIN RAMLI
TECHNOLOGY PARK MALAYSIA

SYED RASHID BIN EDRUS
LES MOULES GROUP OF COMPANY

FARIDAH BINTI MOHD SOM
MARDI

HAJAH ZAM BINTI KARIM
UNIVERSITI MALAYA

ADAM BIN ALI
JABATAN PERTANIAN

DR. KHAIRUDDIN BIN ABDUL RAHIM
MALAYSIAN NUCLEAR AGENCY

AHMAD SHAWALUDDIN
TECHNOLOGY PARK MALAYSIA

AHMAD SAHALI BIN MARDI
MALAYSIAN NUCLEAR AGENCY

HAIRUL BIN HUSAIRI
TECHNOLOGY PARK MALAYSIA

ISMAIL BIN BYLE
JT SINARAN ENTERPRISE

MOHD HAFIZ BIN ABDUL RAHMAN
INSTITUT PENYELIDIKAN HAIWAN MALAYSIA

HJ. RAIHAN BIN HJ. SH AHMAD
JABATAN PERIKANAN MALAYSIA

MASAYU BINTI MASLAN
JOHOR PLANT TECH SDN. BHD.

ABDUL JAMIL KANDAR
JALUR LIPUR SDN. BHD.

AZMAN BIN OTHMAN
JABATAN PERHILITAN

DR. NALLAMMAI SINGARAM
TROPBIO RESEARCH SDN. BHD.

FACILITATOR
ENCIK WANG YUSUF WAN ISMAIL

WORKSHOP FACILITATOR
ISMAIL BIN MUHAMMED
SAMSUDIN MOHD. SALLEH

ANNEX 5

Job Titles and Hierachy – Occupational Analysis of Agro-Biotechnology & ICT

1) PLANT BIOTECHNOLOGY

	Research	BioInformatics	Production
L5	Senior Plant Biotech Researcher	BioInformatic Manager	Plant Biotech Production Manager
L4	Plant Biotech Researcher	Assistant BioInformatic Manager	Plant Biotech Production Manager
L3	Assistant Plant Biotech Researcher	BioInformatic Programmer	Plant Biotech Production Supervisor
L2	Senior Plant Biotech Lab Technician	None	Senior Plant Biotech Production Technician
L1	Plant Biotech Lab Technician	None	Plant Biotech Production Technician

2) ANIMAL BIOTECHNOLOGY

	Research	BioInformatics	Production
L5	Senior Veterinary Biotech Researcher	BioInformatic Manager	Veterinary Biotech Production Manager
L4	Veterinary Biotech Researcher	Assistant BioInformatic Manager	Assistant Veterinary Biotech Production Manager
L3	Assistant Veterinary Biotech Researcher	BioInformatic Programmer	Veterinary Biotech Production Supervisor
L2	Senior Veterinary Biotech Lab Technician	None	Senior Veterinary Biotech Production Technician
L1	Veterinary Biotech Lab Technician	None	Veterinary Biotech Production Technician

3) AQUACULTURE BIOTECHNOLOGY

	Research	BioInformatics	Production
L5	Senior Aquaculture Biotech Researcher	BioInformatic Manager	Aquaculture Biotech Production Manager
L4	Aquaculture Biotech Researcher	Assistant BioInformatic Manager	Assistant Aquaculture Biotech Production Manager
L3	Assistant Aquaculture Biotech Researcher	BioInformatic Programmer	Aquaculture Biotech Production Supervisor
L2	Senior Aquaculture Biotech Lab Technician	None	Senior Aquaculture Biotech Production Technician
L1	Aquaculture Biotech Lab Technician	None	Aquaculture Biotech Production Technician

4) FOOD BIOTECHNOLOGY

	Research	BioInformatics	Production
L5	Senior Food Biotech Researcher	BioInformatic Manager	Food Biotech Production Manager
L4	Food Biotech Researcher	Assistant BioInformatic Manager	Food Animal Biotech Production Manager
L3	Assistant Food Biotech Researcher	BioInformatic Programmer	Food Biotech Production Supervisor
L2	Senior Food Biotech Lab Technician	None	Senior Food Biotech Production Technician
L1	Food Biotech Lab Technician	None	Food Biotech Production Technician

ANNEX 6

JOB DESCRIPTION (OCCUPATIONAL DEFINITION) – IN THE AGRO-BIOTECHNOLOGY & ICT

JOB TITLES FOR THE ANIMAL BIOTECHNOLOGY *(RESEARCH)*

LEVEL 1

VETERINARY BIOTECH RESEARCH TECHNICIAN

LEVEL 2

SENIOR VETERINARY BIOTECH RESEARCH TECHNICIAN

LEVEL 3

ASSISTANT VETERINARY BIOTECH RESEARCHER

LEVEL 4

VETERINARY BIOTECH RESEARCHER

LEVEL 5

SENIOR VETERINARY BIOTECH RESEARCHER

JOB TITLES FOR THE ANIMAL BIOTECHNOLOGY *(BIOINFORMATICS)*

LEVEL 1

-

LEVEL 2

-

LEVEL 3

ASSISTANT VETERINARY BIOINFORMATICS MANAGER

LEVEL 4

VETERINARY BIOINFORMATICS MANAGER

LEVEL 5

SENIOR VETERINARY BIOINFORMATICS MANAGER

JOB TITLES FOR THE ANIMAL BIOTECHNOLOGY *(PRODUCTION)*

LEVEL 1

VETERINARY BIOTECH PRODUCTION TECHNICIAN

LEVEL 2

SENIOR VETERINARY BIOTECH PRODUCTION TECHNICIAN

LEVEL 3

VETERINARY BIOTECH PRODUCTION SUPERVISOR

LEVEL 4

VETERINARY BIOTECH PRODUCTION ASSISTANT MANAGER

LEVEL 5

VETERINARY BIOTECH PRODUCTION MANAGER

ANIMAL BIOTECHNOLOGY (RESEARCH)

Level 1

Occupational definition for

VETERINARY BIOTECH RESEARCH TECHNICIAN

A **VETERINARY BIOTECH PRODUCTION TECHNICIAN** IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS WITH GUIDANCE OF HIS/HER SUPERVISORS IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE ANIMAL LABORATORY.

In particular the person will:

1. Prepare basic reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipments.
4. Collecting sample, maintaining equipments and facilities on farm laboratory.
5. Record and update laboratory data/log book.
6. Undertake housekeeping such as cleaning and sample disposal.
7. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR VETERINARY BIOTECH RESEARCH TECHNICIAN

A SENIOR VETERINARY BIOTECH RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENTS AND EXPERIMENTAL PROCEDURES. HE/SHE ASSISTS, TRAINS AND GUIDES HIS/HER LABORATORY TECHNICIAN(S) IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE ANIMAL LABORATORY.

In particular the person will:

1. Prepare basic reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipments.
4. Record and update laboratory data/log book.
5. Determine sample, equipment and facilities to be used.
6. Guides the laboratory technician(s).
7. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 3

Occupational definition for

VETERINARY BIOTECH ASSISTANT RESEARCHER

A VETERINARY BIOTECH ASSISTANT RESEARCHER IS DESIGNATED TO HANDLE EXPERIMENTAL PROCEDURES AND VARIOUS EQUIPMENTS. HE/SHE ASSISTS HIS/HER SUPERIOR IN THE EXECUTION OF VARIOUS TASKS IN THE DATA GENERATION. HE/SHE SUPERVISES, TRAINS AND GUIDES THE LABORATORY TECHNICIAN(S) AND SENIOR VETERINARY BIOTECH RESEARCH ASSISTANT(S) UNDER HIS/HER SUPERVISION IN EXECUTING THEIR TASKS.

In particular the person will:

1. Prepare complex reagents and media for various experiments.
2. Ensure all equipments are in working condition.
3. Assign and guides Laboratory Technician(s) and Senior Veterinary Biotech Research Technician in performing their tasks.
4. Supervise Laboratory Technician(s) and Senior Veterinary Biotech Research Technician in performing their tasks.
5. Compile basic experimental data performed by technicians.
6. Prepare staffs performance appraisals.
7. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 4

Occupational definition for

VETERINARY BIOTECH RESEARCHER

A VETERINARY BIOTECH RESEARCHER IS DESIGNATED TO HANDLE SPECIALIZED LABORATORY EQUIPMENTS AND COMPLEX EXPERIMENTAL PROCEDURES. IDENTIFIES AND CLASSIFIES ANIMAL FOR EXPERIMENT. ASSISTS HIS/HER SUPERIOR TO PLAN, ORGANISE, CONDUCT, MONITOR AND ANALYSE THE OUTPUT OF PROJECTS AND RESOURCES. UNDERTAKES PERFORMANCE APPRAISAL.

In particular the person will:

1. Prepare and handle more hazardous reagents and media.
2. Handle more sensitive and expensive chemicals.
3. Plan, organize, conduct, monitor and analyze output of various experiments.
4. Analyze and document output of the various experiments.
5. Handle purchasing of basic and general equipment, chemicals and other consumables.
6. Prepare regular progress reports in accordance to the organization's Standard Operating Procedures (SOP).
7. Assist Senior Veterinary Biotech Researcher in managing all research matters including training, budget, recruitment and coordination to ensure optimal research operation.
8. Carry out staffs annual performance appraisal.
9. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 5

Occupational definition for

SENIOR VETERINARY BIOTECH RESEARCHER

A SENIOR VETERINARY BIOTECH RESEARCHER IS DESIGNATED TO LEAD, PLAN, MANAGE, COORDINATE PROJECTS AND RESOURCES. HE/SHE HANDLES HIGH-END EQUIPMENTS AND COMPLEX EXPERIMENTAL PROCEDURES. HE/SHE COORDINATES PROJECTS IMPLEMENTATION FOR INTERNAL AND EXTERNAL CLIENTS (RESEARCH). HE/SHE IS ALSO EXPECTED TO ASSISTS HUMAN RESOURCE DEPARTMENT IN RELATION TO LABORATORY STAFF RECRUITMENT, TRAINING AND STAFF DEVELOPMENT.

In particular the person will:

1. Plan, organize and manage all matters on overall research operation.
2. Plan, organize and manage all matters on budget and resources allocation.
3. Monitor and evaluate all research operation and budget and resources allocation.
4. Responsible for procurement of all necessary equipments, chemicals, consumables and other assets.
5. Responsible to all research activities, output and findings.
6. Ensure research activities comply with Biosafety Bills.
7. Register new biotech product for Intellectual Property rights.
8. Responsible in managing human resource including recruitment, training, performance appraisal and staff development to ensure optimal research operation.
9. Compile and review progress and reports to the management.

ANIMAL BIOTECHNOLOGY (BIOINFORMATIC)

Level 3

Occupational definition for

VETERINARY BIOINFORMATICS ASSISTANT MANAGER

A VETERINARY BIOINFORMATICS ASSISTANT MANAGER IS DESIGNATED TO PRIMARILY ASSIST ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FOR IDENTIFIED ANIMAL BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS VETERINARY BIOINFORMATIC OFFICER IN ANIMAL RESEARCH AND DEVELOPMENT AND TO MEET ORGANIZATIONAL CLIENT NEEDS. HE/SHE ALSO ASSISTS IN THE REPORT PREPARATION AND DOCUMENTATION.

In particular the person will:

1. Assist in designing bioinformatics software development.
2. Assist in the installation and testing of the software.
3. Maintain functionality of the hardware & peripherals and software.
4. Assist in the bioinformatics data analysis.
5. Assist in documentation of bioinformatics data.
6. Assist report preparation.
7. Keep and update records and procedures.
8. Maintain good working housekeeping.

Level 4

Occupational definition for

VETERINARY BIOINFORMATICS MANAGER

A VETERINARY BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY CARRY-OUT ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FOR ANIMAL BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS SENIOR ANIMAL BIOINFORMATICS OFFICER IN RESEARCH AND DEVELOPMENT, MEETING ORGANIZATIONAL CLIENT NEEDS, MONITOR AND ANALYSE THE OUTPUT OF PROJECTS AND RESOURCES. UNDERTAKES PERFORMANCE APPRAISAL, ASSISTS IN DOCUMENTATIONS AND UPKEEP TEAMWORK RELATIONSHIPS.

In particular the person will:

1. Carry out development on the new Bioinformatics software, databases and data analysis, and computer systems.
2. Assist Senior Veterinary BioInformatics Officer in manage existing Bioinformatics software development, databases and data analysis, and computer systems.
3. Carry out data collection and data analysis.
4. Make the necessary report and recommendations from the analyzed data.
5. Maintain and ensure the software conforms to requirements.
6. Assist Senior Veterinary Bioinformatics Officer in managing human resource including recruitment, training, performance appraisal and staff development.
7. Assist Senior Veterinary Bioinformatics Officer to manage project inventory.
8. Implement review and update Standard Operating Procedures.

Level 5

Occupational definition for

SENIOR VETERINARY BIOINFORMATICS OFFICER

A SENIOR VETERINARY BIOINFORMATICS OFFICER IS DESIGNATED TO PRIMARILY MANAGE, ORGANIZE AND ADMINISTER ACTIVITIES PERTAINING TO DEVELOPMENT PLAN, SYSTEMS ANALYSIS, DATABASES AND ANALYSIS, SOFTWARE AND HARDWARE DEVELOPMENT, USER SUPPORT, INSTALLATION AND MAINTENANCE OF OPERATING SYSTEMS, BUDGETING AND INVENTORY. HE/SHE ALSO DEVELOP STANDARD OPERATING PROCEDURES AND ADMINISTER HUMAN RELATION FUNCTIONS AND MAINTAIN NETWORKING WITH OTHER ENTITIES.

In particular the person will:

1. Manage existing bioinformatics software development, databases and data analysis, and computer systems.
2. Plan and propose additional/new bioinformatics software development, databases and data analysis, and computer systems.
3. Execute, coordinate and evaluate client's needs.
4. Carry out evaluation on the overall operation.
5. Manage human resource including recruitment, training, performance appraisal and staff development.
6. Supervise the implementation, review and update data and network security system.
7. Ensure systems conformance to standard and specifications.
8. Responsible for department procurement and inventory.
9. Maintain good network and relationship with other related entity.

ANIMAL BIOTECHNOLOGY (PRODUCTION)

Level 1

Occupational definition for

VETERINARY BIOTECH PRODUCTION TECHNICIAN

A VETERINARY BIOTECH PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM ROUTINE ACTIVITIES SUCH AS FEEDING, HEAD COUNTS AND WEIGHS STOCK, TRANSFERS STOCK, CLEANS, OPERATES AND MAINTAINS ANIMAL PROCESSING TOOLS AND EQUIPMENTS. OBSERVES AND REPORT ANY PROBLEM OR DISEASE ON ANIMAL AND APPLIES TREATMENTS WHEN INSTRUCTED. ASSISTS SENIOR BIOTECH PRODUCTION TECHNICIAN.

In particular the person will:

1. Feed, weigh, count transfer livestock.
2. Enter record of stock circulation in log book.
3. Observe and report problem or diseased animal.
4. Apply treatments as instructed.
5. Maintain cleanliness of tools and equipments.
6. Assist Veterinary Biotech Product Technician.
7. Comply with company Standard Operating Procedures (SOP).
8. Undertake housekeeping such as cleaning and sample disposal.

Level 2

Occupational definition for

SENIOR VETERINARY BIOTECH PRODUCTION TECHNICIAN

A SENIOR VETERINARY BIOTECH PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM, ASSIST ACTIVITIES SUCH AS OPERATING AND MAINTAINING OF THE ANIMAL PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. OBSERVES AND IDENTIFIES ANY PROBLEM RELATED TO PRODUCTION PROCESS AND RECTIFIES PROBLEM UNDER THE SUPERVISION OF BIOTECH PRODUCT SUPERVISOR. GUIDES VETERINARY BIOTECH PRODUCTION OPERATOR AND ASSISTS BIOTECH PRODUCT SUPERVISOR.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Execute plant production planning.
3. Supervise Veterinary Biotech Production Operator and provide assistant when necessary.
4. Enter record of action taken in log book.
5. Assist Biotech Product Supervisor.
6. Identify and rectify problems in the plant production process.
7. Comply with company Standard Operating Procedures (SOP).

Level 3

Occupational definition for

VETERINARY BIOTECH PRODUCTION SUPERVISOR

A VETERINARY BIOTECH PRODUCTION SUPERVISOR IS DESIGNATED TO PERFORM SUPERVISORY ACTIVITIES SUCH AS CHECKING RECORD ON THE ANIMAL PRODUCTION PROCESS. HE/SHE ALSO CARRIES OUT CERTAIN FUNCTIONS TO ENSURE SMOOTH ANIMAL PRODUCTION PROCESS UNDER THE SUPERVISION OF THE BIOTECH ASSISTANT MANAGER.

In particular the person will:

1. Coordinate production resources and other activity to ensure smooth animal production.
2. Routinely check and record process parameters on the animal production process.
3. Supervise routinely performed operating and maintaining process.
4. Execute and supervise production planning.
5. Supervise and analyze record of action taken in the log book.
6. Supervise Veterinary Biotech Technician and provide assistant when necessary.
7. Prepare report on animal production progress to the Assistant Production Manager.
8. Supervise the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

VETERINARY BIOTECH PRODUCTION ASSISTANT MANAGER

A VETERINARY BIOTECH PRODUCTION ASSISTANT MANAGER IS DESIGNATED TO PERFORM OVERALL PRODUCTION ACTIVITIES. HE/SHE ALSO ASSISTS IN MANAGING ALL PRODUCTION MATTERS INCLUDING TRAINING, BUDGET, RECRUITMENT AND COORDINATE TO ENSURE OPTIMAL PRODUCTION OPERATION.

In particular the person will:

1. Coordinate production resources and other activity to ensure smooth animal production.
2. Execute animal production as planned.
3. Ensure production target achieved.
4. Supervise Veterinary Biotech Senior Technician and provide assistant when necessary.
5. Prepare and report production progress to the Production Manager.
6. Assists in managing all production matters including training, budget, recruitment and coordination to ensure optimal operation of the plant production.
7. Assist troubleshooting exercises in the production process.
8. Ensure activities of checking and recording of process conditions or parameters in the plant.

Level 5

Occupational definition for

VETERINARY BIOTECH PRODUCTION MANAGER

A VETERINARY BIOTECH PRODUCTION MANAGER IS DESIGNATED TO BE RESPONSIBLE FOR THE OVERALL SMOOTH OPERATION IN ANIMAL PRODUCTION. HE/SHE ALSO MANAGES ALL PRODUCTION MATTERS INCLUDING BUDGET, RECRUITMENT, TRAINING AND COORDINATE OPERATION.

In particular the person will:

1. Plan, organize and manage all matters on budget and resources allocation.
2. Ensure all production and quality targets are met.
3. Ensure production costs are within budgetary targets.
4. Carry out improvement of plant design and operations.
5. Manage the entire production and operation system.
6. Monitor monthly, weekly and daily operation report.
7. Plan and execute the strategic planning for short-term and long-term sales and marketing of products.
8. Responsible in managing human resource including recruitment, training, performance appraisal and staff development.
9. Ensure all Standard Operating Procedures and safety standards are fully complied with.

JOB TITLES FOR THE AQUACULTURE BIOTECHNOLOGY *(RESEARCH)*

LEVEL 1

AQUACULTURE BIOTECH RESEARCH TECHNICIAN

LEVEL 2

SENIOR AQUACULTURE BIOTECH RESEARCH TECHNICIAN

LEVEL 3

AQUACULTURE BIOTECH ASSISTANT RESEARCHER

LEVEL 4

AQUACULTURE BIOTECH RESEARCHER

LEVEL 5

SENIOR AQUACULTURE BIOTECH RESEARCHER

JOB TITLES FOR THE AQUACULTURE BIOTECHNOLOGY *(BIOINFORMATICS)*

LEVEL 1

-

LEVEL 2

-

LEVEL 3

AQUACULTURE BIOINFORMATICS ASSISTANT MANAGER

LEVEL 4

AQUACULTURE BIOINFORMATICS MANAGER

LEVEL 5

SENIOR AQUACULTURE BIOINFORMATICS MANAGER

JOB TITLES FOR THE AQUACULTURE BIOTECHNOLOGY *(PRODUCTION)*

LEVEL 1

AQUACULTURE BIOTECH PRODUCTION TECHNICIAN

LEVEL 2

SENIOR AQUACULTURE BIOTECH PRODUCTION TECHNICIAN

LEVEL 3

AQUACULTURE BIOTECH PRODUCTION SUPERVISOR

LEVEL 4

AQUACULTURE BIOTECH PRODUCTION ASSISTANT MANAGER

LEVEL 5

AQUACULTURE BIOTECH PRODUCTION MANAGER

AQUACULTURE BIOTECHNOLOGY (RESEARCH)

Level 1

Occupational definition for

AQUACULTURE BIOTECH RESEARCH TECHNICIAN

A AQUACULTURE BIOTECH RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENTS AND EXPERIMENTAL PROCEDURES. HE/SHE ASSISTS WITH GUIDANCE OF HIS/HER SUPERVISORS IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE AQUACULTURE LABORATORY.

In particular, the person will:

1. Prepare basic reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipment.
4. Record and update laboratory data/log book.
5. Undertake housekeeping such as cleaning, sample disposal, sterilization.
6. Observe and report problem arise in the workplace.
7. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR AQUACULTURE BIOTECH RESEARCH TECHNICIAN

A SENIOR AQUACULTURE BIOTECH RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS, TRAINS AND GUIDES HIS/HER LABORATORY TECHNICIAN(S) IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE AQUACULTURE LABORATORY.

In particular the person will:

1. Prepare complex reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipment.
4. Record and update laboratory data/log book.
5. Undertake housekeeping such as cleaning, sample disposal, sterilization.
6. Guide the laboratory technician(s).
7. Assist Supervisor on procurement and inventory management.
8. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 3

Occupational definition for

ASSISTANT AQUACULTURE BIOTECH RESEARCHER

AN ASSISTANT AQUACULTURE BIOTECH RESEARCHER IS DESIGNATED TO HANDLE VARIOUS EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS HIS/HER SUPERIOR IN THE EXECUTION OF VARIOUS TASKS IN THE DATA GENERATION. HE/SHE SUPERVISES, TRAINS AND GUIDES THE LABORATORY TECHNICIAN(S) AND SENIOR BIOTECH RESEARCH ASSISTANT(S) UNDER HIS/HER SUPERVISION IN EXECUTING THEIR TASKS.

In particular the person will:

1. Prepare more complex reagents and media for various experiments.
2. Handle various complex equipments.
3. Coordinate research activities.
4. Supervise laboratory Technician(s) and Senior Biotech Research Technician in performing their tasks.
5. Analyze record in the log book and identify action to be taken.
6. Prepare report on animal production progress to the Assistant Aquaculture Biotech Researcher.
7. Check and record parameters on the research activities and processes.
8. Ensure the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

AQUACULTURE BIOTECH RESEARCHER

A AQUACULTURE BIOTECH RESEARCHER IS DESIGNATED TO HANDLE SPECIALIZED LABORATORY EQUIPMENTS AND COMPLEX EXPERIMENTAL PROCEDURES. IDENTIFIES AND CLASSIFIES AQUACULTURE SPECIMENS. ASSISTS HIS/HER SUPERIOR TO PLAN, ORGANISE, CONDUCT, MONITOR AND ANALYSE THE OUTPUT OF PROJECTS AND RESOURCES.

In particular the person will:

1. Prepare and handle more hazardous reagents and media.
2. Handle more sensitive and expensive chemicals.
3. Identifies and classifies plants.
4. Plan, organize, conduct, monitor and analyze output of various experiments.
5. Supervise all laboratory staffs under his/her superior.
6. Conduct environmental studies and prepare reports.
7. Handle purchasing of basic and general equipment, chemicals and other consumables.
8. Assists in managing all production matters including training, budget, recruitment and coordination to ensure optimal research operation.
9. Prepare regular progress reports in accordance to the organization's Standard Operating Procedures (SOP) including safety procedures.

Level 5

Occupational definition for

SENIOR AQUACULTURE BIOTECH RESEARCHER

A SENIOR AQUACULTURE BIOTECH RESEARCHER IS DESIGNATED TO LEAD, PLAN, MANAGE, COORDINATE RESEARCH PROJECTS, RESOURCES AND PROCEDURES FOR THE LABORATORY. HE/SHE HANDLES VERY COMPLEX EXPERIMENTAL PROCEDURES AND HANDLES HIGH-END EQUIPMENTS. HE/SHE COORDINATES PROJECTS IMPLEMENTATION FOR INTERNAL AND EXTERNAL CLIENTS (RESEARCH). HE/SHE IS ALSO EXPECTED TO ASSIST HUMAN RESOURCE DEPARTMENT IN RELATION TO LABORATORY STAFF RECRUITMENT.

In particular the person will:

1. Plan and organize all matters regarding the biotech research projects and resources.
2. Manage, monitor and evaluate all matters regarding the daily operations of the laboratory.
3. Analyze and compile complex data generated by the research.
4. Supervise the process of analyzing output of various research.
5. Be responsible for procurement of all necessary equipment, chemicals, consumables and other assets.
6. Ensure all research activities and its quality targets are met.
7. Responsible in managing human resource including recruitment, training, performance appraisal and staff development.
8. Compile and review progress reports in accordance to the organization's Standard Operating Procedures (SOP), including safety procedures.
9. Ensure all production and quality targets are met.

AQUACULTURE BIOTECHNOLOGY (BIOINFORMATICS)

Level 3

Occupational definition for

AQUACULTURE BIOINFORMATICS ASSISTANT MANAGER

AN AQUACULTURE BIOINFORMATICS ASSISTANT MANAGER IS DESIGNATED TO ASSIST ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM IDENTIFIED PLANT BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS AQUACULTURE BIOINFORMATIC OFFICER IN AQUACULTURE RESEARCH AND DEVELOPMENT AND MEETING ORGANIZATIONAL CLIENT NEEDS. HE/SHE ALSO ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIPS.

In particular the person will:

1. Assist in designing bioinformatics software development.
2. Assist in the installation and testing of the software.
3. Maintain functionality of the hardware & peripherals and software.
4. Assist in the bioinformatics data analysis.
5. Assist in documentation of bioinformatics data.
6. Assist report preparation.
7. Keep and update records and procedures.
8. Maintain good working housekeeping.

Level 4

Occupational definition for

AQUACULTURE BIOINFORMATICS MANAGER

A AQUACULTURE BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY CARRY-OUT ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM FISHERY BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS SENIOR AQUACULTURE BIOINFORMATICS OFFICER IN RESEARCH AND DEVELOPMENT, IN MEETING ORGANIZATIONAL CLIENT NEEDS, ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIP.

In particular the person will:

1. Design and carry out bioinformatics software development.
2. Carry out data collection and data analysis.
3. Make the necessary report and recommendations from the analyzed data.
4. Implement review and update Standard Operating Procedures.
5. Install, test and ensure the software conforms to requirements.
6. Assist Senior Plant bioinformatics Officer.
7. Keep and update records and procedures.
8. Assists in managing all production matters including training, budget, recruitment and coordination to ensure optimal operation.

Level 5

Occupational definition for

SENIOR AQUACULTURE BIOINFORMATICS MANAGER

A SENIOR AQUACULTURE BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY MANAGE, ORGANIZE AND ADMINISTER ACTIVITIES PERTAINING TO DEVELOPMENT PLAN, SYSTEMS ANALYSIS, DATABASES AND ANALYSIS, SOFTWARE AND HARDWARE DEVELOPMENT, USER SUPPORT, INSTALLATION AND MAINTENANCE OF OPERATING SYSTEMS, BUDGETING AND INVENTORY. HE/SHE ALSO ORGANIZES RESEARCH AND DEVELOPMENT ACTIVITIES, DEVELOP STANDARD OPERATING PROCEDURES AND ADMINISTER HUMAN RELATION FUNCTIONS AND LIAISON WITH OTHER ENTITIES.

In particular the person will:

1. Manage existing bioinformatics software development, databases and data analysis, and computer systems.
2. Plan and propose additional/new bioinformatics software development, databases and data analysis, and computer systems.
3. Execute, coordinate and evaluate client's needs.
4. Carry out evaluation on the overall operation.
5. Manage human resource including recruitment, training, performance appraisal and staff development.
6. Supervise the implementation, review and update data and network security system.
7. Ensure systems conformance to standard and specifications.
8. Responsible for department procurement and inventory.
9. Maintain good network and relationship with other related entity.

AQUACULTURE BIOTECHNOLOGY (PRODUCTION)

Level 1

Occupational definition for

AQUACULTURE BIOTECH PRODUCTION TECHNICIAN

A AQUACULTURE BIOTECH PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM ROUTINE ACTIVITIES FOR PRODUCTION SUCH AS OPERATING AND MAINTAINING THE PLANT PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. REPORT ANY PROBLEM RELATED TO PLANT PRODUCTION TO THE AQUACULTURE PRODUCT TECHNICIAN.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Enter record of action taken in log book.
3. Observe and report problem or diseased animal.
4. Apply treatments as instructed.
5. Enter record of stock circulation in log book.
6. Assist Senior Aquaculture Biotech Production Technician.
7. Maintain cleanliness of tools and equipments.
8. Undertake housekeeping such as cleaning and sample disposal.
9. Comply with company Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR AQUACULTURE BIOTECH PRODUCTION TECHNICIAN

A SENIOR AQUACULTURE PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM AND ASSIST ACTIVITIES SUCH AS OPERATING AND MAINTAINING THE AQUACULTURE PRODUCTION MACHINERIES, TOOLS AND EQUIPMENTS. OBSERVES AND IDENTIFIES PROBLEM RELATED TO PRODUCTION PROCESS AND RECTIFIES PROBLEM UNDER THE SUPERVISION OF BIOTECH PRODUCT SUPERVISOR. GUIDES AQUACULTURE BIOTECH PRODUCTION TECHNICIAN AND ASSISTS BIOTECH PRODUCT SUPERVISOR.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Enter record of action taken in log book.
3. Execute aquaculture production planning.
4. Supervise Aquaculture Biotech Production Operator and provide assistant when necessary.
5. Assist Biotech Product Supervisor.
6. Identify and rectify problems in the plant production process.
7. Comply with company Standard Operating Procedures (SOP).

Level 3

Occupational definition for

AQUACULTURE BIOTECH PRODUCTION SUPERVISOR

A AQUACULTURE BIOTECH PRODUCTION SUPERVISOR IS DESIGNATED TO PERFORM SUPERVISORY ACTIVITIES SUCH AS CHECKING RECORD ON THE PLANT PRODUCTION PROCESS. HE/SHE MAY CARRY OUT CERTAIN FUNCTIONS TO ENSURE THE SMOOTH AQUACULTURE PRODUCTION UNDER THE SUPERVISION OF THE AQUACULTURE BIOTECH ASSISTANT MANAGER.

In particular the person will:

1. Routinely check and record process parameters in the animal.
2. Supervise routinely performed operating and maintaining process.
3. Execute and supervise plant production planning.
4. Supervise and analyze record of action taken in log book.
5. Supervise Aquaculture Biotech Technician and provide assistant when necessary.
6. Prepare and report plant production progress to the Assistant Production Manager.
7. Supervise the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

AQUACULTURE BIOTECH PRODUCTION ASSISTANT MANAGER

A AQUACULTURE BIOTECH PRODUCTION ASSISTANT MANAGER IS DESIGNATED TO PERFORM OVERALL AQUACULTURE PRODUCTION ACTIVITIES. HE/SHE ALSO ASSISTS IN MANAGING ALL PRODUCTION MATTERS INCLUDING TRAINING, BUDGET, RECRUITMENT AND COORDINATE TO ENSURE OPTIMAL PRODUCTION OPERATION.

In particular, the person will:

1. Coordinate production resources and other activity to ensure smooth production.
2. Execute production as planned.
3. Ensure production target achieved.
4. Supervise Aquaculture Biotech Supervisor and provide assistant when necessary.
5. Prepare and report production progress to the Production Manager.
6. Assists in managing all production matters including training, budget, recruitment and coordination to ensure optimal operation of the plant production.
7. Assist in conducting troubleshooting exercises.
8. Supervise activities of checking and recording of process conditions or parameters in the animal.

Level 5

Occupational definition for

AQUACULTURE BIOTECH PRODUCTION MANAGER

A AQUACULTURE BIOTECH PRODUCTION MANAGER IS DESIGNATED TO PRIMARILY BE RESPONSIBLE FOR THE OVERALL SMOOTH OPERATION IN AQUACULTURE PRODUCTION. HE/SHE ALSO MANAGES ALL PRODUCTION MATTERS INCLUDING TRAINING, BUDGET, RECRUITMENT AND COORDINATE TO ENSURE OPTIMAL OPERATION.

In particular the person will:

1. Plan and organize all matters regarding the biotech research projects and resources.
2. Manage, monitor and evaluate all matters regarding the daily operations of the laboratory.
3. Carry out improvement of plant design and operations.
4. Monitor monthly, weekly and daily operation report.
5. Plan and execute the strategic planning for short-term and long-term sales and marketing of products.
6. Develop short-term and long-term plans and manage the budgets of the organization.
7. Responsible in managing human resource including recruitment, training, performance appraisal and staff development.
8. Ensure all Standard Operating Procedures and safety standards are fully complied with.

JOB TITLES FOR THE PLANT BIOTECHNOLOGY *(RESEARCH)*

LEVEL 1

PLANT BIOTECH RESEARCH TECHNICIAN

LEVEL 2

SENIOR PLANT BIOTECH RESEARCH TECHNICIAN

LEVEL 3

ASSISTANT PLANT BIOTECH RESEARCHER

LEVEL 4

PLANT BIOTECH RESEARCHER

LEVEL 5

SENIOR PLANT BIOTECH RESEARCHER

JOB TITLES FOR THE PLANT BIOTECHNOLOGY *(BIOINFORMATICS)*

LEVEL 1

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LEVEL 2

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LEVEL 3

PLANT BIOINFORMATICS ASSISTANT MANAGER

LEVEL 4

PLANT BIOINFORMATICS MANAGER

LEVEL 5

SENIOR PLANT BIOINFORMATICS MANAGER

JOB TITLES FOR THE PLANT BIOTECHNOLOGY *(PRODUCTION)*

LEVEL 1

PLANT BIOTECH PRODUCTION TECHNICIAN

LEVEL 2

SENIOR PLANT BIOTECH PRODUCTION TECHNICIAN

LEVEL 3

PLANT BIOTECH PRODUCTION SUPERVISOR

LEVEL 4

PLANT BIOTECH PRODUCTION ASSISTANT MANAGER

LEVEL 5

PLANT BIOTECH PRODUCTION MANAGER

PLANT BIOTECHNOLOGY (RESEARCH)

Level 1

Occupational definition for

PLANT BIOTECH RESEARCH TECHNICIAN

A LABORATORY TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS WITH GUIDANCE OF HIS/HER SUPERVISORS IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE PLANT LABORATORY.

In particular the person will:

1. Prepare basic reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipment.
4. Record and update laboratory data/log book.
5. Undertake housekeeping e.g.: cleaning, sample disposal, sterilization, keeps track of consumables and spare parts.
6. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR PLANT BIOTECH RESEARCH TECHNICIAN

A SENIOR PLANT BIOTECH RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS, TRAINS AND GUIDES HIS/HER LABORATORY TECHNICIAN(S) IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE PLANT LABORATORY.

In particular the person will:

1. Prepare complex reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipment.
4. Record and update laboratory data/log book.
5. Undertake housekeeping e.g.: cleaning, sample disposal, sterilization, keeps track of consumables and spare parts.
6. Guides the laboratory technician(s).
7. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 3

Occupational definition for

ASSISTANT PLANT BIOTECH RESEARCHER

AN ASSISTANT PLANT BIOTECH RESEARCHER IS DESIGNATED TO HANDLE VARIOUS EQUIPMENTS AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS HIS/HER SUPERIOR IN THE EXECUTION OF VARIOUS TASKS IN THE DATA GENERATION. HE/SHE SUPERVISES, TRAINS AND GUIDES THE LABORATORY TECHNICIAN(S) AND SENIOR BIOTECH RESEARCH ASSISTANT(S) UNDER HIS/HER SUPERVISION IN EXECUTING THEIR TASKS.

In particular the person will:

1. Prepare more complex reagents and media for various experiments.
2. Handle various complex equipments.
3. Coordinate research activities.
4. Supervise laboratory Technician(s) and Senior Biotech Research Technician in performing their tasks.
5. Analyze record in the log book and identify action to be taken.
6. Prepare progress report on plant production progress to the Assistant Plant Biotech Researcher.
7. Check and record parameters on the research activities and processes.
8. Ensure the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

PLANT BIOTECH RESEARCHER

A PLANT BIOTECH RESEARCHER IS DESIGNATED TO HANDLE SPECIALIZED LAB EQUIPMENT AND COMPLEX EXPERIMENTAL PROCEDURES. IDENTIFIES AND CLASSIFIES PLANTS. ASSISTS HIS/HER SUPERIOR TO PLAN, ORGANISE, CONDUCT, MONITOR AND ANALYSE THE OUTPUT OF PROJECTS AND RESOURCES.

In particular the person will:

1. Prepare and handle more hazardous reagents and media.
2. Handle more sensitive and expensive chemicals.
3. Identify and classify plants.
4. Plan, organize, conduct, monitor and analyze output of various experiments.
5. Supervise all laboratory staffs under his/her superior.
6. Conduct environmental studies and prepare reports.
7. Assist in managing all production matters including budget, recruitment, training, and coordination to ensure optimal operation.
8. Prepare regular progress reports in accordance to the organization's Standard Operating Procedures (SOP) including safety procedures.

Level 5

Occupational definition for

SENIOR PLANT BIOTECH RESEARCHER

A SENIOR PLANT BIOTECH RESEARCHER IS DESIGNATED TO LEAD, PLAN, MANAGE, COORDINATE RESEARCH PROJECTS, RESOURCES AND PROCEDURES FOR THE LABORATORY. HE/SHE HANDLES VERY COMPLEX EXPERIMENTAL PROCEDURES AND HANDLES HIGH-END EQUIPMENTS. HE/SHE COORDINATES PROJECTS IMPLEMENTATION FOR INTERNAL AND EXTERNAL CLIENTS (RESEARCHES). HE/SHE IS ALSO EXPECTED TO ASSIST HUMAN RESOURCE DEPARTMENT IN RELATION TO LABORATORY STAFF RECRUITMENT.

In particular the person will:

1. Plan and organize all matters regarding the biotech research projects and resources.
2. Manage, monitor and evaluate all matters regarding the daily operations of the laboratory.
3. Carry out improvement of plant design and operations.
4. Monitor monthly, weekly and daily operation report.
5. Plan and execute the strategic planning for short-term and long-term sales and marketing of products.
6. Develop short-term and long-term plans and manage the budgets of the organization.
7. Responsible in managing human resource including recruitment, training, performance appraisal and staff development.
8. Ensure all Standard Operating Procedures and safety standards are fully complied.

PLANT BIOTECHNOLOGY (BIOINFORMATICS)

Level 3

Occupational definition for

ASSISTANT PLANT BIOINFORMATICS MANAGER

AN ASSISTANT PLANT BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY ASSIST ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM IDENTIFIED PLANT BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS PLANT BIOINFORMATIC OFFICER IN PLANT RESEARCH AND DEVELOPMENT AND MEETING ORGANIZATIONAL CLIENT NEEDS. HE/SHE ALSO ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIPS.

In particular the person will:

1. Assist in designing bioinformatics software development.
2. Assist in the installation and testing of the software.
3. Maintain functionality of the hardware & peripherals and software.
4. Assist in the bioinformatics data analysis.
5. Assist report preparation.
6. Assist in documentation of bioinformatics data.
7. Keep and update reports.
8. Maintain good teamwork and networks with other entities.
9. Maintain Standard Operating Procedures and safety standards are fully complied.

Level 4

Occupational definition for

PLANT BIOINFORMATICS MANAGER

A PLANT BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY CARRY-OUT ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM PLANT BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS SENIOR PLANT BIOINFORMATICS OFFICER IN RESEARCH AND DEVELOPMENT, IN MEETING ORGANIZATIONAL CLIENT NEEDS, ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIP.

In particular the person will:

1. Design and carry out bioinformatics software development.
2. Carry out data collection and data analysis.
3. Prepare report and make recommendations from the analyzed data.
4. Install, test and ensure the software conforms to requirements.
5. Assist Senior Plant bioinformatics Officer.
6. Keep and update records.
7. Assists in managing all matters including budget, recruitment, training, and coordination to ensure optimal operation.
8. Implement, review and update data and network security system.
9. Ensure all Standard Operating Procedures and safety standards are fully complied with.

Level 5

Occupational definition for

SENIOR PLANT BIOINFORMATICS MANAGER

A SENIOR PLANT BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY MANAGE, ORGANIZE AND ADMINISTER ACTIVITIES PERTAINING TO DEVELOPMENT PLAN, SYSTEMS ANALYSIS, DATABASES AND ANALYSIS, SOFTWARE AND HARDWARE DEVELOPMENT, USER SUPPORT, INSTALLATION AND MAINTENANCE OF OPERATING SYSTEMS, BUDGETING AND INVENTORY. HE/SHE ALSO ORGANIZES RESEARCH AND DEVELOPMENT ACTIVITIES, DEVELOP STANDARD OPERATING PROCEDURES AND ADMINISTER HUMAN RELATION FUNCTIONS AND LIAISON WITH OTHER ENTITIES.

In particular the person will:

1. Manage existing bioinformatics software development, databases and data analysis, and computer systems.
2. Plan and propose additional/new bioinformatics software development, databases and data analysis, and computer systems.
3. Execute, coordinate and evaluate client's needs.
4. Carry out evaluation on the overall operation.
5. Manage human resource including recruitment, training, performance appraisal and staff development.
6. Supervise the implementation, review and update data and network security system.
7. Ensure systems conformance to standard and specifications.
8. Responsible for department procurement and inventory.
9. Maintain good network and relationship with other related entity.

PLANT BIOTECHNOLOGY (PRODUCTION)

Level 1

Occupational definition for

PLANT BIOTECH PRODUCTION TECHNICIAN

A PLANT BIOTECH PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM ROUTINE ACTIVITIES FOR PRODUCTION SUCH AS OPERATING AND MAINTAINING THE PLANT PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. REPORT ANY PROBLEM RELATED TO PLANT PRODUCTION TO THE PLANT PRODUCT TECHNICIAN.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Record of stock in log book.
3. Observe and report problem or diseased plants.
4. Apply treatments as instructed.
5. Maintain cleanliness of tools and equipments.
6. Assist Plant Biotech Production Technician.
7. Undertake housekeeping such as cleaning and sample disposal.
8. Comply with company Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR PLANT BIOTECH PRODUCTION TECHNICIAN

A SENIOR PLANT BIOTECH PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM, ASSIST ACTIVITIES SUCH AS OPERATING AND MAINTAINING THE PLANT PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. OBSERVES AND IDENTIFIES ANY PROBLEM RELATED TO PRODUCTION PROCESS AND RECTIFY PROBLEM UNDER THE SUPERVISION OF BIOTECH PRODUCT SUPERVISOR. GUIDES PLANT BIOTECH PRODUCTION OPERATOR AND ASSISTS BIOTECH PRODUCT SUPERVISOR.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Enter record of action taken in log book.
3. Execute plant production planning.
4. Supervise Plant Biotech Production Operator and provide assistant when necessary.
5. Assist Biotech Product Supervisor.
6. Identify and rectify problems in the plant production process.
7. Comply with company Standard Operating Procedures (SOP).

Level 3

Occupational definition for

PLANT BIOTECH PRODUCTION SUPERVISOR

A PLANT BIOTECH PRODUCTION SUPERVISOR IS DESIGNATED TO PERFORM SUPERVISORY ACTIVITIES SUCH AS CHECKING RECORD ON THE PLANT PRODUCTION PROCESS. HE/SHE MAY CARRY OUT CERTAIN FUNCTIONS TO ENSURE THE SMOOTH PLANT PRODUCTION UNDER THE SUPERVISION OF THE BIOTECH ASSISTANT MANAGER.

In particular the person will:

1. Routinely check and record process parameters in the plant.
2. Supervise routinely performed operating and maintaining process.
3. Execute and supervise plant production planning.
4. Supervise and analyze record of action taken in log book.
5. Supervise Plant Biotech Technician and provide assistant when necessary.
6. Prepare and report plant production progress to the Assistant Production Manager.
7. Supervise the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

PLANT BIOTECH PRODUCTION ASSISTANT MANAGER

A PLANT BIOTECH PRODUCTION ASSISTANT MANAGER IS DESIGNATED TO PERFORM OVERALL PRODUCTION ACTIVITIES. HE/SHE ALSO ASSISTS IN MANAGING ALL PRODUCTION MATTERS INCLUDING TRAINING, BUDGET, RECRUITMENT AND COORDINATE TO ENSURE OPTIMAL PRODUCTION OPERATION.

In particular the person will:

1. Coordinate production resources and other activity to ensure smooth production.
2. Execute production as planned.
3. Ensure production target achieved.
4. Supervise Aquaculture Biotech Supervisor and provide assistant when necessary.
5. Prepare and report production progress to the Production Manager.
6. Assists in managing all production matters including budget, recruitment, training, and coordination to ensure optimal operation of the plant production.
7. Assist in conducting troubleshooting exercises.
8. Supervise activities of checking and recording of process conditions or parameters in the animal.

Level 5

Occupational definition for

PLANT BIOTECH PRODUCTION MANAGER

A PLANT BIOTECH PRODUCTION MANAGER IS DESIGNATED TO PRIMARILY BE RESPONSIBLE FOR THE OVERALL SMOOTH OPERATION IN PLANT PRODUCTION. HE/SHE ALSO MANAGES ALL PRODUCTION MATTERS INCLUDING BUDGET, TRAINING, RECRUITMENT AND COORDINATE TO ENSURE OPTIMAL OPERATION OF THE PLANT.

In particular the person will:

1. Plan and organize all matters regarding the biotech research projects and resources.
2. Manage, monitor and evaluate all matters regarding the daily operations of the laboratory.
3. Carry out improvement of plant design and operations.
4. Monitor monthly, weekly and daily operation report.
5. Plan and execute the strategic planning for short-term and long-term sales and marketing of products.
6. Develop short-term and long-term plans and manage the budgets of the organization.
7. Manage human resource including recruitment, training, performance appraisal and staff development.
8. Ensure all Standard Operating Procedures and safety standards are fully complied with.

JOB TITLES FOR THE AGRO-BASED FOOD BIOTECHNOLOGY *(RESEARCH)*

LEVEL 1

AGRO-BASED BIOTECH RESEARCH TECHNICIAN

LEVEL 2

SENIOR AGRO-BASED BIOTECH FOOD RESEARCH TECHNICIAN

LEVEL 3

ASSISTANT AGRO-BASED BIOTECH FOOD RESEARCHER

LEVEL 4

AGRO-BASED BIOTECH FOOD RESEARCHER

LEVEL 5

SENIOR AGRO-BASED BIOTECH FOOD RESEARCHER

JOB TITLES FOR THE AGRO-BASED FOOD BIOTECHNOLOGY *(BIOINFORMATICS)*

LEVEL 1

-

LEVEL 2

-

LEVEL 3

AGRO-BASED BIOTECH FOOD BIOINFORMATICS ASSISTANT MANAGER

LEVEL 4

AGRO-BASED BIOTECH FOOD BIOINFORMATICS MANAGER

LEVEL 5

SENIOR AGRO-BASED BIOTECH FOOD BIOINFORMATICS MANAGER

JOB TITLES FOR THE AGRO-BASED FOOD BIOTECHNOLOGY *(PRODUCTION)*

LEVEL 1

AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN

LEVEL 2

SENIOR AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN

LEVEL 3

AGRO-BASED BIOTECH FOOD PRODUCTION SUPERVISOR

LEVEL 4

AGRO-BASED BIOTECH FOOD PRODUCTION ASSISTANT MANAGER

LEVEL 5

AGRO-BASED BIOTECH FOOD PRODUCTION MANAGER

AGRO-BASED FOOD BIOTECHNOLOGY (RESEARCH)

Level 1

Occupational definition for

AGRO-BASED BIOTECH FOOD RESEARCH TECHNICIAN

AN AGRO-BASED BIOTECH FOOD RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE ASSISTS, WITH GUIDANCE OF HIS/HER SUPERVISORS, IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE FOOD LABORATORY.

In particular the person will:

1. Prepare basic reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipments.
4. Carry out routine task as instructed by Senior Laboratory Technician.
5. Record and update laboratory data/log book.
6. Observe and report contaminated samples to Senior Laboratory Technician.
7. Undertake housekeeping such as cleaning, sample disposal, sterilization.
8. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR AGRO-BASED BIOTECH FOOD RESEARCH TECHNICIAN

A SENIOR AGRO-BASED BIOTECH FOOD RESEARCH TECHNICIAN IS DESIGNATED TO HANDLE ROUTINELY SPECIFIC GENERIC EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS, TRAINS AND GUIDES HIS/HER LABORATORY TECHNICIAN(S) IN THE EXECUTION OF SPECIFIC TASKS IN THE GENERATION OF DATA FOR SPECIFIC PROJECT (TASKS) IMPLEMENTED IN THE FOOD LABORATORY.

In particular the person will:

1. Prepare complex reagents and media for experiments.
2. Prepare experimental samples.
3. Prepare and use generic equipment.
4. Record and update laboratory data/log book
5. Carry out specific task as instructed by Assistant Food Biotech Researcher.
6. Undertake housekeeping such cleaning, sample disposal and sterilization.
7. Guides the laboratory technician(s).
8. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 3

Occupational definition for

ASSISTANT AGRO-BASED BIOTECH FOOD RESEARCHER

AN ASSISTANT AGRO-BASED BIOTECH FOOD RESEARCHER IS DESIGNATED TO HANDLE VARIOUS EQUIPMENT AND EXPERIMENTAL PROCEDURES. HE/SHE THEREFORE ASSISTS HIS/HER SUPERIOR IN THE EXECUTION OF VARIOUS TASKS IN THE DATA GENERATION. HE/SHE SUPERVISES, TRAINS AND GUIDES THE LABORATORY TECHNICIAN(S) AND SENIOR BIOTECH RESEARCH ASSISTANT(S) UNDER HIS/HER SUPERVISION IN EXECUTING THEIR TASKS.

In particular the person will:

1. Prepare more complex reagents and media for various experiments.
2. Handle various complex equipments.
3. Compile experimental data from all experiments.
4. Record and update laboratory data/log book.
5. Carry out specific task as instructed by Food Biotech Researcher.
6. Guides the laboratory technician(s).
7. Supervise laboratory Technician(s) and Senior Biotech Research Technician in performing their tasks.
8. Ensure all activities conform to safety procedures in accordance to the organization's Standard Operating Procedures (SOP).

Level 4

Occupational definition for

AGRO-BASED BIOTECH FOOD RESEARCHER

AN AGRO-BASED BIOTECH FOOD RESEARCHER IS DESIGNATED TO HANDLE SPECIALIZED LAB EQUIPMENT AND COMPLEX EXPERIMENTAL PROCEDURES. IDENTIFIES AND CLASSIFIES FOODS. ASSISTS HIS/HER SUPERIOR TO PLAN, ORGANISE, CONDUCT, MONITOR AND ANALYSE THE OUTPUT OF PROJECTS AND RESOURCES.

In particular the person will:

1. Prepare and handle more hazardous reagents and media.
2. Handle more sensitive and expensive equipments.
3. Identify and classify foods microbes.
4. Plan, organize, conduct, monitor and analyze output of various experiments.
5. Supervise all laboratory staffs under his/her superior.
6. Conduct environmental studies and prepare reports.
7. Handle purchasing of basic and general equipment, chemicals and other consumables.
8. Assist in managing human resource including recruitment, training, performance appraisal and staff development.
9. Prepare regular progress reports in accordance to the organization's Standard Operating Procedures (SOP) including safety procedures.

Level 5

Occupational definition for

SENIOR AGRO-BASED BIOTECH FOOD RESEARCHER

A SENIOR AGRO-BASED BIOTECH FOOD RESEARCHER IS DESIGNATED TO LEAD, PLAN, MANAGE, COORDINATE RESEARCH PROJECTS, RESOURCES AND PROCEDURES FOR THE LABORATORY. HE/SHE HANDLES VERY COMPLEX EXPERIMENTAL PROCEDURES AND HANDLES HIGH-END EQUIPMENTS. HE/SHE COORDINATES PROJECTS IMPLEMENTATION FOR INTERNAL AND EXTERNAL CLIENTS (RESEARCHES). HE/SHE IS ALSO EXPECTED TO ASSIST HUMAN RESOURCE DEPARTMENT IN RELATION TO LABORATORY STAFF RECRUITMENT.

In particular the person will:

1. Plan and organize all matters regarding the biotech research projects and resources.
2. Manage and monitor all matters regarding the daily operations of the laboratory.
3. Analyze and compile complex data generated by the research.
4. Supervise the process of analyzing output of various research.
5. Be responsible for procurement of all necessary equipment, chemicals, consumables and other assets.
6. Supervise all laboratory staff.
7. Manage human resource including recruitment, training, performance appraisal and staff development.
8. Compile and review progress reports in accordance to the organization's Standard Operating Procedures (SOP), including safety procedures.

AGRO-BASED BIOTECHNOLOGY FOOD (BIOINFORMATICS)

Level 3

Occupational definition for

ASSISTANT AGRO-BASED BIOTECH FOOD BIOINFORMATICS ASSISTANT MANAGER

AN AGRO-BASED BIOTECH FOOD BIOINFORMATIC ASSISTANT MANAGER IS DESIGNATED TO PRIMARILY ASSIST ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM IDENTIFIED FOOD BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS FOOD BIOINFORMATIC OFFICER IN FOOD RESEARCH AND DEVELOPMENT AND MEETING ORGANIZATIONAL CLIENT NEEDS. HE/SHE ALSO ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIPS.

In particular the person will:

1. Assist in designing bioinformatics software development.
2. Assist in the installation and testing of the software.
3. Assist in the bioinformatics software development and/or bioinformatics data analysis.
4. Maintain functionality of the hardware & peripherals and software.
5. Keep and update records and procedures.
6. Assist report preparation.
7. Maintain good working relationships.
8. Maintain good teamwork and networks with other entities.
9. Maintain Standard Operating Procedures and safety standards are fully complied.

Level 4

Occupational definition for

AGRO-BASED BIOTECH FOOD BIOINFORMATIC MANAGER

AN AGRO-BASED BIOTECH FOOD BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY CARRY OUT ACTIVITIES PERTAINING TO DESIGN AND DEVELOPMENT OF BIOINFORMATICS SOFTWARE FROM FOOD BIOTECHNOLOGY SECTOR(S). HE/SHE ASSISTS SENIOR FOOD BIOINFORMATICS OFFICER IN RESEARCH AND DEVELOPMENT, IN MEETING ORGANIZATIONAL CLIENT NEEDS, ASSISTS IN DOCUMENTATION AND UPKEEP TEAMWORK RELATIONSHIP.

In particular the person will:

1. Design and carry out bioinformatics software development.
2. Carry out data collection and data analysis.
3. Make the necessary report and recommendations from the analyzed data.
4. Implement, review and update Standard Operating Procedures.
5. Install, test and ensure the software conforms to requirements.
6. Implement, review and update data and network security system.
7. Assist Senior Food bioinformatics Officer.
8. Keep and update records.
9. Maintain Standard Operating Procedures and safety standards are fully complied.

Level 5

Occupational definition for

SENIOR AGRO-BASED BIOTECH FOOD BIOINFORMATICS MANAGER

A SENIOR AGRO-BASED BIOTECH FOOD BIOINFORMATICS MANAGER IS DESIGNATED TO PRIMARILY MANAGE, ORGANIZE AND ADMINISTER ACTIVITIES PERTAINING TO DEVELOPMENT PLAN, SYSTEMS ANALYSIS, DATABASES AND ANALYSIS, SOFTWARE AND HARDWARE DEVELOPMENT, USER SUPPORT, INSTALLATION AND MAINTENANCE OF OPERATING SYSTEMS, BUDGETING AND INVENTORY. HE/SHE ALSO ORGANIZES RESEARCH AND DEVELOPMENT ACTIVITIES, DEVELOP STANDARD OPERATING PROCEDURES AND ADMINISTER HUMAN RELATION FUNCTIONS AND LIAISON WITH OTHER ENTITIES.

In particular the person will:

1. Manage existing bioinformatics software development, databases and data analysis, and computer systems.
2. Plan and propose additional/new bioinformatics software development, databases and data analysis, and computer systems.
3. Be responsible for documentation.
4. Execute, coordinate and evaluate client's needs.
5. Maintain good network and relationship with other related entity.
6. Be responsible for systems conformance to standard and specifications.
7. Be responsible for department procurement and inventory.
8. Carry out evaluation on the overall operation.
9. Manage human resource including recruitment, training, performance appraisal and staff development.
10. Supervise the implementation, review and update data and network security system.

AGRO-BASED FOOD BIOTECHNOLOGY (PRODUCTION)

Level 1

Occupational definition for

AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN

AN AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM ROUTINE ACTIVITIES FOR PRODUCTION SUCH AS OPERATING AND MAINTAINING THE FOOD PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. REPORT ANY PROBLEM RELATED TO FOOD PRODUCTION TO THE FOOD PRODUCT TECHNICIAN.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Record action taken in log book.
3. Observe and identify contamination on product and confers to Senior Food Biotech Product Technician.
4. Apply treatments as instructed.
5. Record all inventories in stock book.
6. Maintain cleanliness of tools and equipments.
7. Assist Senior Food Biotech Production Technician.
8. Undertake housekeeping such as cleaning and sample disposal.
9. Comply with company Standard Operating Procedures (SOP).

Level 2

Occupational definition for

SENIOR AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN

A SENIOR AGRO-BASED BIOTECH FOOD PRODUCTION TECHNICIAN IS DESIGNATED TO PERFORM ASSIST ACTIVITIES SUCH AS OPERATING AND MAINTAINING THE FOOD PRODUCTION MACHINERY, TOOLS AND EQUIPMENTS. OBSERVES AND IDENTIFIES ANY PROBLEM RELATED TO PRODUCTION PROCCESS AND RECTIFY PROBLEM UNDER THE SUPERVISION OF BIOTECH PRODUCT SUPERVISOR. GUIDES FOOD BIOTECH PRODUCTION TECHNICIAN AND ASSISTS BIOTECH PRODUCT SUPERVISOR.

In particular the person will:

1. Routinely perform operating and maintaining process.
2. Enter record of action taken in log book.
3. Execute food production planning.
4. Supervise Food Biotech Production Technician and provide assistant when necessary.
5. Carry out specific task as instructed by the Biotech Product Supervisor.
6. Assist Food Biotech Product Supervisor.
7. Identify and rectify problems in the plant production process.
8. Comply with company Standard Operating Procedures (SOP).

Level 3

Occupational definition for

AGRO-BASED BIOTECH FOOD PRODUCT SUPERVISOR

AN AGRO-BASED BIOTECH FOOD PRODUCTION SUPERVISOR IS DESIGNATED TO PERFORM SUPERVISORY ACTIVITIES SUCH AS CHECKING RECORD ON THE FOOD PRODUCTION PROCESS. HE/SHE MAY CARRY OUT CERTAIN FUNCTIONS TO ENSURE THE SMOOTH FOOD PRODUCTION UNDER THE SUPERVISION OF THE FOOD BIOTECH ASSISTANT MANAGER.

In particular the person will:

1. Routinely check and record process parameters in the plant.
2. Supervise routinely performed operating and maintaining process.
3. Execute and supervise plant production planning.
4. Supervise and analyze record of action taken in log book.
5. Supervise Food Biotech Technician and provide assistance when necessary.
6. Guide Technician and Senior Food Biotech Technician.
7. Prepare and report food production progress to the Assistant Production Manager.
8. Supervise the company Standard Operating Procedures (SOP) are followed.

Level 4

Occupational definition for

AGRO-BASED BIOTECH FOOD PRODUCTION ASSISTANT MANAGER

AN AGRO-BASED BIOTECH FOOD PRODUCTION ASSISTANT MANAGER IS DESIGNATED TO PERFORM OVERALL PRODUCTION ACTIVITIES. HE/ SHE ALSO ASSISTS IN MANAGING ALL PRODUCTION MATTERS INCLUDING BUDGET, TRAINING, RECRUITMENT AND COORDINATION TO ENSURE OPTIMAL PRODUCTION OPERATION.

In particular the person will:

1. Coordinate production resources and other activity to ensure smooth production.
2. Execute production as planned.
3. Ensure production target achieved.
4. Supervise Food Biotech Supervisor and provide assistant when necessary.
5. Report production progress to the Production Manager.
6. Assists in managing all production matters including budget, training, recruitment and coordination to ensure optimal operation of the food production.
7. Assists in conducting troubleshooting exercises.
8. Supervise activities of checking and recording of process conditions.

Level 5

Occupational definition for

AGRO-BASED BIOTECH FOOD PRODUCTION MANAGER

AN AGRO-BASED BIOTECH FOOD PRODUCTION MANAGER IS DESIGNATED TO PRIMARILY BE RESPONSIBLE FOR THE OVERALL SMOOTH OPERATION IN FOOD PRODUCTION. HE/SHE ALSO MANAGES ALL PRODUCTION MATTERS INCLUDING BUDGET, TRAINING, RECRUITMENT AND COORDINATION TO ENSURE OPTIMAL OPERATION OF THE PRODUCTION.

In particular the person will:

1. Plan and organize all matters regarding the food biotech research projects and resources.
2. Ensure all production and quality targets are met.
3. Ensure production costs are within budgetary targets.
4. Continuously look into the improvement of food design and operations.
5. Manage the entire factory operation line.
6. Monitor monthly, weekly and daily operation report.
7. Plan and execute the strategic planning for short-term and long-term sales and marketing of products.
8. Manage, monitor and evaluate all matters regarding the daily operations.
9. Manage human resource including recruitment, training, performance appraisal and staff development.
10. Ensure all Standard Operating Procedures and safety standards are fully complied with.